Discussion Paper

Inquiry into Water Resource Management and Planning Charges

6 August 2009

Economic Regulation Authority
WESTERN AUSTRALIA

Economic Regulation Authority
Perth, Western Australia
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Disclaimer

Foreword

The Economic Regulation Authority has been asked by the Treasurer to undertake an inquiry and provide recommendations on the issue of water resource management and planning charges. The final report is due to the Treasurer by 2 January 2009.

The purpose of this discussion paper is to share with interested parties the Authority's preliminary views on the principles that should guide the setting of water resource management charges. Interested parties are invited to consider the principles identified in this paper and prepare a submission to the inquiry.

The process thus far has involved the Authority releasing an issues paper on 30 April 2009, which was followed by the receipt of 30 submissions (all of which are available on the Authority web site). The Authority is providing three weeks for interested parties to provide a submission on this discussion paper. During this submission period, a round table will be held with interested parties (on 10 August 2009) to discuss issues of relevance to the inquiry.

Submissions on any matters, including those raised in this discussion paper, should be submitted by 31 August 2009 to:

publicsubmissions@era.wa.gov.au

Or addressed to:

Inquiry into Water Resource Management and Planning Charges
Economic Regulation Authority
PO Box 8469
Perth Business Centre
PERTH WA 6849

Section 1.3 of this discussion paper provides further information regarding the process for making a submission.

Interested parties and stakeholders will have a further opportunity to make submissions following the release of the Authority's draft report, which is expected in October.

I encourage interested parties to consider the matters raised in this discussion paper and prepare a submission to the inquiry.

LYNDON ROWE
CHAIRMAN

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1 Introduction

The Treasurer of Western Australia gave written notice to the Economic Regulation Authority (**Authority**), on 2 April 2009, to undertake an inquiry into water resource management and planning charges in Western Australia.

The inquiry has been referred to the Authority under Section 32 of the *Economic Regulation Authority Act 2003* (**Act**), which provides for the Treasurer to refer to the Authority inquiries on matters related to regulated industries (i.e. water, gas, electricity and the rail industry).

1.1 Terms of Reference

The Terms of Reference for the inquiry are provided in **Appendix A**.

In accordance with the Terms of Reference, the Authority is to provide the Government with a range of options and recommendations for:

- the recovery of the water resource planning and management expenses incurred by the Department of Water; and
- the most appropriate regulatory arrangements for the setting of service standards for the water resource manager, the setting of the charges and the subsequent recovery of those charges from water users.

In considering the options, the Authority is to consider and develop findings on:

- the tasks or activities undertaken in the efficient management of the State's water resources by the Department of Water, that would appropriately be recovered from water users;
- the most appropriate level of cost recovery from water users; and
- the most appropriate allocation of costs between licence holders and other water users.

The options recommended to the Government are to include:

- the implementation impacts for various types of users, including a sensitivity analysis on capacity to pay assumptions; and
- opportunities for implementation under both the existing legislative responsibilities of the Department of Water as well as those specified by the National Water Initiative.

The Authority is also required to have regard to:

- the Government's social, economic and environmental policy objectives;
- the Government's obligations as a signatory to the National Water Initiative Intergovernmental Agreement; and
- any relevant pricing principles arising from the 1994 Council of Australian Governments water reform agreement and the National Water Initiative.

In undertaking the inquiry, the Authority recognises section 26 of the Act, which requires the Authority to have regard to:

- the need to promote regulatory outcomes that are in the public interest;
- the long-term interests of consumers in relation to the price, quality and reliability of goods and services provided in relevant markets;
- the need to encourage investment in relevant markets;
- the legitimate business interests of investors and service providers in relevant markets;
- the need to promote competitive and fair market conduct;
- the need to prevent abuse of monopoly or market power; and
- the need to promote transparent decision making processes that involve public consultation.

1.2 Review Process

The recommendations of this inquiry will be informed by the following public consultation process:

- An issues paper was published on 30 April 2009 and 30 submissions were subsequently received.
- This discussion paper invites interested parties to provide feedback to the Authority on the principles the Authority should use in developing the draft recommendations.
- A round table will be held on 10 August 2009 to discuss the inquiry.
- Following consideration of submissions on this discussion paper and matters raised at the round table, the Authority intends to publish a draft report in October 2009. Public submissions on the draft report will then be invited.
- The final report for the inquiry is to be delivered to the Treasurer by 2 January 2010 and the Treasurer will, in accordance with the Act, have 28 days to table the report in Parliament.

The Authority will also be consulting with its Consumer Consultative Committee during the course of the inquiry.

In accordance with section 45 of the Act, the Authority will act through the Chairman and members in conducting this inquiry.

1.3 How to Make a Submission

Submissions on any matter raised in this discussion paper or in response to any matters in the Terms of Reference should be in both written and electronic form (where possible) and addressed to:

Inquiry into Water Resource Management Charges
Economic Regulation Authority
PO Box 8469
Perth Business Centre
PERTH WA 6849

Email: publicsubmissions@era.wa.gov.au

Fax: (08) 9213 1999

Submissions must be received by 31 August 2009.

Submissions made to the Authority will be treated as in the public domain and placed on the Authority's web site unless confidentiality is claimed. The submission or parts of the submission in relation to which confidentiality is claimed should be clearly marked. Any claim of confidentiality will be dealt with in the same way as is provided for in section 55 of the *Economic Regulation Authority Act 2003*.

The receipt and publication of a submission shall not be taken as indicating that the Authority has knowledge either actual or constructive of the contents of a particular submission and, in particular, where the submission in whole or part contains information of a confidential nature and no duty of confidence will arise for the Authority in these circumstances.

Further information regarding this inquiry can be obtained from:

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Manager Projects
Economic Regulation Authority
Ph (08) 9213 1900

Media enquiries should be directed to:

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2 Discussion of Economic Concepts Relevant to this Inquiry

The Authority is an economic regulator and, as such, generally applies the principles of economics to matters that it is inquiring into. Economics provides a broad framework for assessing how best to allocate resources, in a way that maximises the welfare of a society. As such, it takes into account all costs and benefits of resource allocation, including environmental and social impacts, and not just impacts on those parties directly involved.

This section explains some key economic principles, in general terms, before then applying them to the key question in this inquiry: how should water resource management and planning costs be recovered, in order to maximise the well-being of Western Australians?

2.1 Efficiency

The principles of economics largely relate to economic efficiency. When economists refer to a market as efficient, they are generally referring to a market in which decision makers, whether they are consumers or producers, have the incentive to make decisions that enhance the overall well-being of the community. At any particular point in time, community well-being is maximised when the goods and services that are produced are the ones that are wanted by society, produced at least cost, and allocated to those who value them most highly.

In efficient markets, resources are allocated to their most productive use in society.[1] This can be achieved when the prices that customers pay for a good or service reflect the cost to society of providing the additional amount of that good or service (i.e. the "user pays" principle).

One of the important characteristics of decisions that are efficiency-enhancing is that they are forward-looking. This means that decisions of the past are not relevant to the issue at hand. For example, if you have made a loss in the past (such as buying a non-profitable business) then any decision going forward should not be based on your past investment, but on what improves your well-being in the future (perhaps cutting your losses and selling the business).

Economic efficiency also requires that goods and services are provided at least cost.[2] For example, new production technologies can lower the costs of producing a good without compromising its quality. Likewise, different management techniques can reduce the costs of providing services, while maintaining service standards.

Another aspect of economic efficiency is that investments are optimal over the long term, in their timing and location.[3] Over time, community well-being is enhanced whenever investments in new goods and services reflect the ever-changing preferences of consumers. An example of dynamic efficiency is in the timing of large-scale capital investments in a way that minimises costs over the long-term.

[1] This is known as "allocative efficiency".

[2] This is referred to as "technical efficiency" or "productive efficiency".

[3] This aspect of efficiency is known as "dynamic efficiency".

2.2 Market Failures

There are some areas of economic activity where markets either do not work or perform poorly for one reason or another. For example, markets may not work where an activity is in the nature of a public good, such as national defence, which is therefore provided by government and funded through taxation. Market failure may also arise where there are environmental impacts, economies of scale or barriers to trade.

In situations of market failure, there may be ways of improving on the outcomes of the market (such as through regulation). However, care needs to be taken to ensure that any intervention in the market actually improve overall levels of well-being; i.e. that the benefits of economic regulation exceed the costs, including the costs of any unintended consequences.

Public Goods

One source of market failure is where a good or service exhibits characteristics in the nature of "public goods". Public goods are very different to the "private goods" familiar to consumers (i.e. the ones for which ownership is generally undisputed).

- In the case of private goods, you can exclude other people who have not paid for the good from using it, and your use of the good denies others from using it.
- Public goods, on the other hand, are goods that cannot readily be owned by any one person. This means that it is difficult to exclude people from using the good. However, any one person's use of a public good will generally not detract from anyone else's use of it.

One of the most often cited examples of a public good is national defence, which is a good "consumed" by all Australians from which no-one can be excluded and one person's consumption of it does not reduce another's.

Public goods can also have benefits that are limited to a local population. For example, the parks and ovals provided by local governments have local public good characteristics because they are generally of benefit to the local community.

Common Property Goods

Some goods have a mixture of private and public good characteristics. In the case of common property goods (such as a water resource, fish stocks and other natural resources), ownership is often disputed, so you may not be able to exclude others from drawing on the resource (particularly in the case of aquifers). However, one person's use of the resource can directly impact on the well-being of others.[4]

The characteristics of common property goods (non-excludability of those who do not pay for the good, but rivalry in the use of the good) can lead to them being over-exploited. In these cases, a detailed regulatory response may be needed to ensure an optimal economic and equitable outcome. This response may include licensing, monitoring and carefully considered planning.

[4] There is a fourth type of good, characterised by a high ability to exclude non-payers, but non-rivalry in consumption. These goods are known as near-public goods. Examples include highways, pipelines, wire networks and education, where use can be restricted to those who pay, but one person's use does not diminish another person's use (except when there is congestion).

Externalities

In some instances the consumption of a good has an impact on a third party. This case raises the concept of an "externality". An externality exists whenever the decision of one party impacts on the well-being of a third party. Externalities can be either beneficial or detrimental.

- For example, technology associated with a new invention (such as the internet) can benefit the wider community, and not just the inventor who incurred the research costs which led to the invention.
- An example of a negative externality is traffic congestion where one person's decision to use a road can impact on the time it takes another person to complete a journey.

Sometimes externalities can be "internalised", by requiring the decision maker to take into account the impacts on third parties when they make their decision.

- For example, when making the decision on whether to invest in research and development, an inventor has the option of applying for a patent for any resulting inventions, which provides a temporary private benefit to the inventor and allows research and development costs to be recouped.
  - Alternatively, governments may provide funding for research and development, taking into account the public benefits of such projects.
- In the case of congestion, it may be appropriate to introduce a congestion charge as has occurred in London. In this case, drivers who travel to the city during peak times are charged a congestion tax.

The point of internalising an externality is to make sure that efficient decisions are made. Unless positive externalities are taken into account prices may be set too high, with the result that fewer goods and services are produced and sold than is optimal. Conversely, ignoring negative externalities can lead to over-production or over-consumption.

Lack of Competition

In some markets, there is a lack of effective competition to ensure that the goods and services in these markets are produced at least cost. Lack of competition may arise where there are economies of scale or scope, so that some goods or services are most cost-effectively provided by one firm or only a few firms. For example, electricity, gas and rail networks all have monopoly characteristics, so that regulation may be required to ensure that services are provided efficiently.

2.3 Cost Allocation

There is another set of concepts that is usefully explained when considering the issue of how to allocate costs. In an efficient market, costs are generally allocated to those who cause the costs to be incurred.

Overheads

A particular issue for producers operating in a competitive market is the issue of how best to recover the costs of overheads. Overheads are those costs that are necessary for the operation of the business but cannot be directly related to particular goods or services produced. Examples include rent and utility costs.

A service provider that has market power and that seeks to maximise economic benefits will seek to recover its overheads from those consumers who are least responsive to price, while recovering fewer or no overheads from price-sensitive consumers. The effect of this will be to maximise production and minimise the overall price.

Efficient pricing requires that the prices of goods or services are no less than the incremental cost, and no greater than the stand-alone cost, of providing those goods and services.

Lumpy Investments

An issue arises where new capacity is built periodically in large increments (so called "lumpy" investments). This issue often arises in network industries such as gas, electricity and water. A new customer can prompt the need for a substantial investment in new capacity that would benefit not only them, but also other existing and future users. If the new customer were required to pay for all of the new capacity, it would not be built if the benefit to the new customer is less than the cost of the new capacity. However, it is efficient to build the new investment where the total benefits to the new customer and other existing and future customers exceeds the cost. In that situation, there is a case for sharing the cost of the new capacity between existing, new and (estimated) future users.

There is a special case where it is efficient for the cost of new capacity not to be shared with existing users. This arises where existing users derive no benefit from the new capacity and where existing charges adequately recover the costs of existing installed capacity. However, more often than not existing users will benefit from the installation of new capacity through increased service reliability and to meet the demands of organic growth (e.g. growth in demand by existing users).

Equity

Economic efficiency incorporates equity, since for a given distribution of wealth and income, social welfare is maximised when goods and services are allocated to those who value them most. However, there are different ways to define equity, which can be used to guide pricing.

- One concept is "horizontal equity", which means that customers in similar circumstances should be treated similarly. For example, the government provides a subsidy to ensure that all households in Western Australia have access to water for basic needs at an affordable price.
- Another concept is that of "vertical equity", which means that customers in different circumstances should be treated differently. For example, household customers in the north of the State, where water usage is higher due to the drier climate, are provided with a greater amount of water for their basic needs at an affordable price.

2.4 Summary

To summarise, the following set of principles are likely to be relevant to this inquiry:

- Monopolies need to be regulated so as not to recover more than their efficiently incurred costs, including a return on investment.
- Efficient decisions are forward-looking and do not take into account the results of decisions made in the past.

- If someone causes costs to be incurred that they alone benefit from, then they should pay for those costs.
- If someone causes costs to be incurred that benefit them and future users, then the costs may be shared between that person and the future users.
- If someone causes costs to be incurred that benefit them and all other users, then the costs may be shared between all users (existing, new and future).
- If someone causes costs to be incurred that benefit themselves and benefit others who cannot be readily identified then it may be efficient to provide a subsidy to encourage the efficient level of costs to be incurred.
  - Conversely, if someone causes costs to be incurred that benefit themselves and harms others who cannot be readily identified then it may be efficient to apply a tax to encourage the efficient level of costs to be incurred.
- If costs are efficiently incurred but cannot be readily recovered from a person using the good or service, then the activity is likely to be a public good activity which, if the good or service is to be provided, may need to be funded through taxation.
- If a good is in the nature of a common property good, then a detailed program of regulation including licensing, monitoring and careful planning may be needed.
- People in like circumstances should be treated alike (horizontal equity).
- People in different circumstances should be treated differently (vertical equity).

3 Application of Economic Concepts to Water Resource Management and Planning

The demands on water resources in a given area may be for a wide range of uses, including drinking water supplies, environmental preservation, farming, industry, tourism or protecting the amenity values of the environment and communities. While water is a renewable resource, over-consumption of water resources can reduce the flows of water available for the environment and for consumptive use, so mechanisms may be required to constrain the use of a water resource.

The "market" in question is the provision of water rights to the users of water resources, including the government acting on behalf of the community, which values environmental preservation. The focus of this inquiry is on the costs incurred by the Department of Water (**Department**) in its activities to efficiently plan and manage the State's water resources, and how best to recover those costs.

There is a wider issue, not the subject of this inquiry, of how best to ensure that there are signals in place to those who use water that reflect the full opportunity cost of the water at any particular time. There are different ways to address this issue (e.g. through water pricing, or ideally through the use of tradeable rights to water), and they are part of a wider debate.

It is useful to identify the types of market failure that can arise in the market for water resources, in order to determine the types of approaches that could be applied to promote efficiency in this market.

3.1 Where is the Market Failure?

Externalities

Of all of the economic concepts described above, the one that is most relevant to water resource management and planning is the concept of the common property good, which is characterised by strong externalities and property rights issues. The fact that all water courses, wetlands and underground water sources are vested in the Crown, unless they are allocated in accordance with a statutory function, indicates that an unfettered market is likely to result in outcomes that do not maximise overall well-being. In the issues paper (30 April 2009), the Authority noted that the absence of government intervention in the market for water resources could result in the following negative externalities:

- there would be no legislative check on the amount of water that could be taken, with the consequence that existing water users' security of supply and environmental flows could be compromised;
- similarly, unchecked water use could lead to major land impacts such as land subsidence;
- unchecked land-use and development activity could compromise the quality of the water resource, which would have a consequence for both environmental flows and other users;
- unchecked development activity could take place in unsuitable areas, with any development investment being negated due to flood activity or drainage issues;

- lack of available water due to inefficient and unchecked use could significantly increase the cost to the community of new drinking water sources;
- open access to a water resource would impact on investment because there would be uncertainty about the ongoing availability of the resource; and
- there would be little incentive to invest in water resource assessments because others would be able to free ride on that investment without having to pay.

Internalising Externalities

There is a range of ways in which the externalities associated with water use can be addressed. If all of the costs associated with water use could be internalised into the cost of using water, then users would make the optimal decision (the one that maximises social welfare, including environmental impacts) about how much water to use. Further, allowing those who hold rights to water to trade those rights would ensure that the scarcity value of water is reflected in its price, and would allow water resources to go to those who value them most highly. Fully cost-reflective pricing would also encourage water users to use water more efficiently.

The main method used by the Department of Water to "internalise an externality" is the allocation of water licences, which allow licensees to take up to a specified annual volume of surface water or groundwater, subject to the terms and conditions of the licence.[5] Licences can be used to:

- address and allocate property rights;
- prevent, minimise or ameliorate externalities;
- prevent the full or partial allocation of water to a party when significant externalities exist;
- create rules that govern or guide development.

Licensing, therefore, is one tool that can assist towards achieving the efficient use of water resources. However, it does not address the issue of the scarcity value of water (unless the rights to water can be traded).

The current legislation acknowledges that in some instances there is likely to be a net benefit to society from licensing the market for water resources (i.e. the benefits of licensing outweigh the costs). The legislation provides for areas to be "proclaimed" if it is deemed likely that the benefits of licensing are greater than the costs. If an area is not proclaimed, then the use of water resources in that area is not licensed (however, there may still be regulations governing development). The process of proclamation can be prompted by the Department of Water, for example, for unproclaimed areas where new development requires secure water supplies. In other cases (such as in the case of the recently proclaimed Whicher area), potential new water users may seek proclamation, in order to ensure security of water supply for their enterprises and hence resolve property rights issues.

Where an area is proclaimed, government intervention would, from an efficiency perspective, be aimed at influencing decision making to the extent that any externalities associated with a particular decision are taken into account when that decision is made. For example, the government intervention would try to ensure that water would only be

[5] There are other approaches that can be used to address externalities, such as through taxing the use of the resource. However, such methods are not typically applied as a way of encouraging a water user to take less water in the presence of an externality.

taken from a river to the point at which the environmental values that society assigns to the river would not be compromised.

A licence provides the licensee with the right to collect and use water, in accordance with licence conditions, for the period of the licence. Licence holders need the security provided by such licences, as they often need to make significant capital investments in their businesses, which depend on a water supply. The licence conditions do include a level of reliability of supply, so that a full allocation may not be available in some years when water supplies are low. Thus, there is some degree of risk borne by the licence holder, which they need to factor in to their investment decisions.[6]

Once a licence expires, the licensee effectively loses the right to water, unless the licence is renewed. Currently, licence periods are generally for 10 to 15 years, although it is anticipated that once the new water legislation is in place, water rights may be issued in perpetuity. In setting the licence conditions, the Department is effectively internalising the externalities associated with water usage under the licence. This would be the case both for a fixed period licence or a licence in perpetuity.

The costs incurred by the Department to undertake activities that attempt to internalise externalities can be allocated to "users". However, the users of goods or services depend on the nature of those goods or services: some of the activities carried out by the Department have private good characteristics, others have public good characteristics, and some have a mixture of both. The principles governing decisions on who should pay for particular goods or services are summarised under section 2.4 above. Thus, private goods or services should ideally be paid for by the private user of those goods or services, whereas public goods or services should ideally be paid for by the public through taxation, and costs that are incurred on behalf of both private and public users should be shared between them.

Private Goods

Where the Department provides services that have private good characteristics, it would be efficient for those who receive those services to pay for them. Services by the Department that have private good characteristics include the direct costs of administration, assessment and monitoring associated with issuing and maintaining a licence.

It should be noted that the Water Corporation, as the main provider of public drinking water supplies across the State, is a major licence holder in many areas. The Water Corporation's current licences for surface water and groundwater account for around one fifth of the State's total licensed allocations. This means that any licence costs borne by the Corporation (or other licensed water suppliers) are ultimately recovered from water customers.

When the water resource in an area approaches full allocation, a potential new water user (or an existing water user seeking to renew their licence) can prompt the need for a large-scale study of water resources, including monitoring, hydrological modelling, environmental impact studies, climate and demand forecasting. This is analogous to, but not exactly the same as, the "lumpy investment" decision problem referred to earlier.

- There is a case for sharing the costs of such activities, which are prompted by new licence seekers, between the licence applicants and other users, depending on the circumstances as summarised in section 2.4 above.

[6] However, the Department generally aims to provide allocations with a high level of security (e.g. above 90 per cent reliability, which means that the licensee could expect their full allocation 9 years out of 10).

  - To the extent that the costs of work undertaken by the Department benefit all licence holders, such costs should be shared amongst all of them (new, existing, and future), since all licence holders contribute to the utilisation of water resources, and the need to measure and monitor what water is available.
  - To the extent that the costs of work undertaken by the Department do not explicitly benefit all licence holders, then the recovery of the Department's costs might be limited to new and future users without recovery from existing users (at least until licence renewal).
  - Alternatively, it could be considered that there is an implied provision in all licences for the monitoring and management of water resources required to maintain an adequate water supply to the licence holder, including wider assessments associated with future allocations. This recognises that water resources are vested in the State and that management costs are incurred for the benefit of all users (existing, new and future) and should therefore be recovered from them all.

- There may also be public benefits to such information, so there may also be a case for a proportion of the costs to be borne by the public.

In allocating the costs of providing private goods and services amongst licence holders, a key principle is that the costs of licences should reflect their costs to society (including potential externalities to the environment and other users). In some cases, incorporating the costs of water resource management services provided to licence holders into the costs of licences could discourage new applications for water or cause existing licence holders to relinquish their licences. This reduces the pressure on water resources, and would limit water allocations to those who place the highest value on water. The ability to trade water allocations would help to ensure that water is allocated to its highest value use.

Public Goods

The Department undertakes many activities that have public good characteristics. These include:

- the production of scientific information on the hydrological state of water resources;
- activities with a focus on preserving or rehabilitating ecosystems; and
- the development of regional water plans, which provide information for regional and State-wide management of water resources and development planning.

It does not enhance economic efficiency to recover the cost of public goods from users.

Some activities may have a mixture of private and public good characteristics (e.g. work that is carried out to collect information on the water available for particular licensed allocations, but which also supports strategic planning). In such cases, there may be a case for sharing the costs between licence holders and the general public.

Lack of Competition

In order to provide secure water entitlements, it is necessary to establish how much water is available over the long term (the sustainable yield). This requires the gathering of information on the flows and use of water in an area (e.g. monitoring, modelling,

forecasting). Such services could be carried out by private firms, such as hydrological, environmental and engineering consultants. However, the collection and collation of information on the water resources of Western Australia also has strong natural monopoly characteristics; that is, it is most cost-effectively carried out by a single organisation, in order to avoid duplication of effort, and to make public the information that is gathered.

Thus, to the extent that the Department of Water is a natural monopoly provider of water resource management and planning services, there is likely to be a role for regulation to ensure that those services are provided cost-effectively.

It is also useful to distinguish between which particular services are most efficiently provided by the Department, and which could be provided more efficiently by other parties.

- The costs of some services carried out by the Department can be reduced by outsourcing to private providers through competitive tenders. (The Department regularly engages private consultancy firms through competitive tenders.)
- Further, users of the Department's services should have the option of obtaining competitive services from providers other than the Department.

3.2 Summary

To summarise, applying economic principles would suggest the following approach to the allocation of costs associated with water resource management and planning.

- Water resources are a common property good, and regulation, including licensing, monitoring and planning may be needed to ensure their optimal use.
- Licensing should be required only if the benefits to society exceed the costs.
- If the costs incurred to address an externality have private good characteristics, the costs should be borne by the licensee (and the option of obtaining those services from providers other than the Department should be available).
- If the costs are incurred to provide a public good, the costs should be borne by the general community.
- The costs associated with providing goods that are a mixture of public and private goods should be shared between licence holders and the public.
- As a monopoly provider of most of its services, the Department of Water should only be able to recover efficiently incurred costs (from either consolidated revenue or users).

4 Case Studies

The principles identified in the preceding sections can be tested by applying them to case studies. Two case studies have been selected for this paper: the case of surface water allocation in the Warren-Donnelly River systems, and the case of groundwater allocations in the Gnangara groundwater system.

4.1 Surface Water Allocation in the Warren-Donnelly River Systems

Background

The Warren River and Donnelly River catchments are in the Warren subregion of south west Western Australia, a high rainfall area. Irrigated agriculture is the highest user of surface water resources. The industry is largely self supply, based on small farm dams which are intercept runoff and river flows. Dam water is used for a wide range of agricultural production, including wine, fruit, vegetables, pasture, aquaculture, and truffles. In the lower parts of the catchment the rivers flow mainly through State Forest reserves, and out to sea.

The Warren River was proclaimed in 1959 and the Donnelly River in 1968 under the *Rights in Water and Irrigation Act 1914* (**RiWI Act**). Proclamation was prompted by increasing demand for water from agricultural developments in the area, and in response to disputes between users relating to the impacts of proposed dams on flows to other water users, resulting in the Department of Water being requested to arbitrate. Since proclamation, there has been an acceleration of on-stream dams in the cleared areas of the Warren and Donnelly systems.

Impacts of Water Use

The Warren-Donnelly riverine ecosystem has evolved on the basis of low summer stream flows, when there is little rainfall, and high winter stream flows when rainfall is high. Placing a dam, or multiple dams, on a water course can reduce summer and winter stream flows below the flow rates that would occur naturally. This can lead to reduced security of supply for other water users downstream and potential environmental damage from the river being in a drier state that it would otherwise be.

As consumptive use in the area increases, other disputes related to the use of water and water rights are likely to arise. One issue in the area is the water used by tree plantations, which do not require water licences under the current legislation. To the extent that such plantations make use of surface water resources (rather than groundwater resources, which are not proclaimed), it could be argued that they should require a water allocation.

Licensing Farm Dams

Whether or not a licence to take surface water is required by a dam owner depends on firstly whether the area is proclaimed (as the Department cannot issue licences for water use in unproclaimed areas) and secondly the type of dam that the water user develops.

Under the current *Rights in Water and Irrigation Act 1914*, licences are required for:

- dams built on water courses ; and
- off-stream dams to which water is pumped from a stream (as water is being abstracted from the stream).

Licences are not required for:

- off-stream dams capturing overland flows. This includes the capture of spring water flowing across a property, although this right can potentially be restricted if the spring is prescribed under local by-laws (there are currently no prescribed springs in the Warren-Donnelly area);
- dams for land owners who abut a water course and, under riparian rights, take water without a licence for the purpose of domestic use, stock watering and domestic garden.

In addition to a licence to take water, dam owners also require a permit to construct dams.

Dam licences are allocated on the basis of the capacity of the dam (which is generally between 50-100 ML, although some dams exceed 1,000 ML). Consumption from the dams is not metered, so the volume of water consumed from the dams is estimated by the dam owner, and then provided to the Department.

In order to manage water use, the Department places licence conditions covering the operation of outlet valves, bypass valves, reporting of estimated consumption (such as through return forms), and other water management obligations.[7]

Department of Water's Activities in the Warren-Donnelly Area

The Department of Water's Manjimup office provides services and support across a range of programs operating in the district. There are also staff based in the Department's Perth head office and Bunbury regional office who work on planning and management work to support the Warren-Donnelly program. Activities specific to the Warren-Donnelly area include:

- licensing and water use management, which includes managing and issuing licences, compliance and auditing, monitoring of stock and domestic abstractions, commercial and water utility licences, and investigation to determine impacts of water use on other water users;
- planning and policy development, which includes scientific investigation and assessment (hydrological and environmental), for developing water allocation plans and licence operating strategies;

[7] Farm dams have outlet valves, which allow water to flow out of the dam and into the water course. Some on-stream dams bypass valves, which allow water to flow around the dam, without disruption to the water course, although most dams in the area do not as this is a new requirement. Licence conditions may be specified regarding when valves should be opened, in order to maintain flows to the environment at particular times of the year.

Dam licences can also require the water user to be metered, such as in the case of in-stream dams taking water for non-riparian purposes.

Some dams have a water entitlement that is separated into a consumptive use (e.g. horticulture) and non-consumptive use (e.g. storage). The licensee is required to submit an annual water use return showing what crops they have grown and the area of each crop. Ideally this provides data from which the Department can calculate the amount of water used on a district basis.

- water resources assessment and measurement, which includes ongoing assessment of rainfall and stream flow measurement, gauging, flood warnings, water quality measurements, algal bloom investigations;
- land-use planning and development advice, as a component of a broader departmental program;
- salinity management and recovery in the Warren River catchment;
- administering the *Country Areas Water Supply Act*; and
- stakeholder management and community consultation, through the Warren Donnelly Water Advisory Committee, allocation planning and licensing consultation, site visits and ongoing industry group consultation.

In response to increasing water demand, the Department has over the last two years increased its efforts in planning and assessment in the Warren Donnelly area. In August 2008, the Department set interim allocation limits for water use in all sub- catchments of the Warren-Donnelly system, based on a regional overview of the sustainable diversion limits. These limits will form part of the Warren-Donnelly surface water allocation plan, due to be published as a consultation draft in October 2009. In developing the water allocation plan, the Department has carried out a number of studies since 2006, including:

- ecological water requirement studies across the south west;
- land use mapping; and
- farm dam mapping in upper Lefroy.

Application of the Principles to Cost Recovery

The principles outlined in sections 2 and 3 can be applied to the case study of the Donnelly River to derive an approach to water licensing and cost allocation.

Approach to Internalising Externalities

The first issue is whether there are particular activities in the area that use surface water and cause, or have the potential to cause, externalities significant enough such that there is a net benefit to proclaiming the area, allowing for those activities to be licensed.

The main externalities that could arise from the use of water resources in the Warren-Donnelly catchment area are, in broad terms:

- a reduction in flows to the environment, resulting in damage to the environment; and
- a reduction in the water available for consumptive use by landowners in Manjimup.

Some activities may not cause significant externalities, in which case they should not require licensing. For example, dams where water is held for aesthetic purposes and not consumed, or water used for stock watering or domestic purposes, may have minimal impacts on the environment or other users, and if so, should not require licensing.

Where there are significant externalities associated with some activities, these can be internalised through licensing. For example, to the extent that tree plantations make use of surface water resources (rather than groundwater resources, which are not proclaimed), it could be argued that they should require a surface water allocation. Positive externalities, where these arise, should also be taken into account. For example, increased forestation can improve water quality by lowering salinity levels in rivers.

Private Goods Provided by the Department

The services provided by the Department of Water that are likely to have private good characteristics include those related to administering and assessing new licence applications, licence renewals or licence amendments, and monitoring compliance with licence conditions. The costs of these services should be borne by the licence seeker. It should be noted that in many cases the licence seeker, rather than the Department, will carry out activities associated with licence assessment or monitoring, thus directly incurring these costs themselves.

If costs are incurred by the Department to ameliorate environmental impacts resulting from water use by a licence holder, then these should be allocated to the licensee if the licensee has breached the conditions in their licence. However, if the licensee has acted within the terms of their licence, then the costs should be recovered from public funds. The principle here is that the property rights assigned to the licensee, as expressed in their licence terms and conditions, should internalise all the forward-looking costs of any externalities associated with their licence.

The Department may also offer a dispute resolution service in the case of specific disputes between water users. The costs of dispute resolution should be allocated to the parties involved.

For some licence applications, assessing the amount of water that can be sustainably allocated can be more complex, particularly if the application is for a large amount of water, or if water resources are approaching full allocation. This can trigger the need for more large-scale assessments of the available water resources and the impacts of increased water use (i.e. a "lumpy" research project). Where these studies are likely to benefit other future licence seekers, they should at least be shared between the new licensee (including those seeking licence renewals and amendments) and estimated future users. However, there may also be a case for sharing the costs amongst all licensees (current, new and future), on the grounds that all licence holders contribute to the need for such assessments, and that the work benefits all users by ensuring water resources in the area are not over-allocated and are of a high quality.

Public Goods Provided by the Department

Other activities carried out by the Department in the region may have public good characteristics. Examples include:

- studies conducted as part of broader strategic water planning (such as the development of the South West groundwater areas allocation plan, or the South West regional water plan);[8]
- scientific studies aimed at increasing the general understanding of water resources in Western Australia, and applicable to the management of water resources State-wide;
- any work carried out to support the development of government policy or water legislation.

[8] Department of Water (2009), *South West Regional Water Plan*; Department of Water (2008), *South West Groundwater Areas Allocation Plan – Draft for Public Comment*, and government response (May 2009).

Lack of Competition

As a monopoly provider of water resource management and planning services, the Department of Water should be subject to independent scrutiny to ensure that its costs are efficient.

4.2 Groundwater Allocation on the Gnangara Groundwater System

Background

The Gnangara groundwater system covers an area of around 2,200 km^2 of the Swan coastal plain. The Gnangara groundwater areas are bound by the Swan River to the south, Gingin Brook to the north and extend inland to the Darling Fault. The Gnangara groundwater system comprises three main aquifers – a shallow unconfined Superficial aquifer (known as the Gnangara Mound), and two deeper confined aquifers, the Leederville and Yarragadee aquifers.

The Gnangara system is made up of eight proclaimed groundwater areas.[9] The area has been progressively proclaimed for groundwater licensing from 1975 to1996.

As at August 2009 there was around 264 GL/yr of licensed water allocations from the Gnangara groundwater system.[10]

- The system supplies around half of the drinking water for Perth making public water supply the highest use of water in the Gnangara system. Around 40 per cent of water abstracted from the system is for public drinking water supplies.
- The second highest use of water is horticulture and agriculture, followed by unlicensed domestic garden bores and parks and gardens.
- The remaining licensed allocations cover a wide range of activities, including industry and commercial, system losses, fire fighting, roadworks and cave supplementation.

The main unlicensed use of water from the Gnangara system is for domestic garden bores, which do not require a licence. There are around 155,000 garden bores in Perth, around half of which are on the Gnangara system, which are estimated to draw about 58 GL per year from the system.

Declining Groundwater Levels

Over recent decades groundwater storage and water levels on the system have fallen significantly. Since 1990, storage levels in the Gnangara Mound have declined by around 600 GL. This decline is the result of a number of factors including a reduction in rainfall, increased water abstraction and changes in land use. Currently, the population in the area is around 60,000, and is expected to increase to 390,000 by 2031.

There are numerous groundwater-dependent ecosystems across the region, including permanent and seasonal wetlands, groundwater-dependent terrestrial vegetation, mound springs and caves. The decline in groundwater levels is impacting on groundwater-

[9] These include Yanchep, Gnangara, Wanneroo, Gwelup, Mirrabooka and Swan groundwater areas, and parts of Gingin and Perth groundwater areas.

[10] 2009 Gnangara groundwater allocation plan.

dependent ecosystems. T he health of wetlands is declining and some are shifting from a wetland ecology to a terrestrial ecology. The Yanchep caves contain unique aquatic invertebrate fauna which are at the risk of extinction and have been supplemented by groundwater pumped from other parts of the system.

A further issue is the 22,000 hectares of pine plantations within the Gnangara system. The pines intercept groundwater from the system but no water licence is required for pine plantations, under the current legislation, as they are not irrigated. Modelling predicts that removal of the pines (up to 17,500 ha) could increase recharge to the aquifers by 35 GL per year .

Allocation Planning in the Gnangara Groundwater Areas

The Gnangara groundwater allocation plan is a long-term, complex project with ongoing planning and updates required. The current phase of planning took around 2.5 years and involved three full time equivalent staff (from allocation planning, environmental water assessment, policy and hydrogeology). The cost of the project is around $800,000. This cost does not include the costs of long term drilling, monitoring, modelling and planning associated with Environmental Protection Agency section 46 reviews.

Due to the increased demand, reduced supply and declining groundwater levels, the Department has classified the Gnangara groundwater system a Category 4 area, where the water resources are fully or over-allocated.

Over the past few years the department has directed significant resources towards allocation planning in the Gnangara groundwater areas. The Department's work is in response to the significant decline in rainfall observed over the last 30 years. The plan aims to balance abstraction of groundwater with the need to retain water in the ground to meet ecological, social and cultural needs and provide for future public and private use. The draft plan was released in February 2008 and the final plan is due for release later this year.

In developing the groundwater allocation plan, the Department has undertaken a number of major projects including: assessing the groundwater dependent ecosystem; hydro-geological investigation and assessments; social value studies and use assessments.

Following this assessment work, the Department:

- reviewed allocation limits for all groundwater resources, capping or reducing allocation limits for most resources. This means there are limited opportunities for new licence entitlements;
- obtained a commitment across government to reduce the abstraction of groundwater for public water supply and to the development of contingency supplies; and
- developed a set of assessment and planning actions for the Department to complete, to support our broader goal of maximising water availability within a sustainable limit. These include:
  - groundwater investigations and modelling (in the context of a drying climate);
  - environmental investigations (in the context of a drying climate);
  - policy development under water reform, including for the Integrated Water Supply Scheme;
  - research into unlicensed use.

Gnangara Sustainability Strategy

The Department of Water is also the lead agency in the development of the Gnangara Sustainability Strategy (draft released in July 2009 for public comment). This $7.5 million project is funded by Government (except for some projects by the Water Corporation), and includes all government agencies responsible for the management of land and water within the Gnangara groundwater system. The project was established to consider land and water management options for the system to ensure the sustainable use of water and to protect the environment into the future.

The Gnangara allocation plan represents one of the first steps in implementing the Gnangara sustainability strategy. The costs incurred by the Department of Water as part of the Gnangara Sustainability Strategy have not been included in the costs of the

Application of the Principles to Cost Recovery

Approach to Internalising Externalities

The demands on groundwater resources in the Gnangara area result in a range of externalities, including the deterioration of groundwater dependent ecosystems, and impacts on the quality and quantity of water available for use.

Some of these externalities can be internalised through the use of licences. Licensing can limit the amount that may be abstracted, in order to achieve a total volume of abstractions that better matches the rate of groundwater recharge. Licence conditions can also be used to achieve specific management objectives, including water use efficiency, demand management, and the avoidance or amelioration of any local impacts of abstraction.

All activities that generate significant externalities should be subject to licensing. In the past, some activities that impact heavily on water resources in the area have not required licences (such as pine plantations). However, in future, it would be consistent with the principles to require such activities to be licensed on the basis of their demand on water resources.

Some externalities are independent of the actions of licence holders. Modelling as part of the Gnangara sustainability strategy shows that even if there were no further groundwater abstractions from the system, water levels in some ecosystems within the area would continue to decline, because of lower expected rainfall in the future.

Private Goods Provided by the Department

The services provided by the Department of Water in the administration, assessment, monitoring and enforcement of licences to abstract water from the Gnangara system are private goods, and the costs should be recovered from the licence holders.

Licences can be viewed as temporary property rights, subject to the conditions within the licence. The “rules” attached to a licence should be set in a way to best capture the expected costs and externalities over the period of the licence. When a licence is renewed, new rules can be set, reflecting the forward-looking costs at that point.

- For example, it would be inappropriate to require licence holders to pay for the costs of meter installation if metering was not required or anticipated at the time the licence was awarded, and was only introduced as a requirement later. However, new licence applicants could be required to install meters, at their own cost.

- If a licence is awarded for a particular volume of abstraction at a given level of security, that volume and security level should apply for the period of the licence.

As water allocation issues in the Gnangara area become more critical, the costs associated with future water allocations can be expected to increase. There is a need to more closely monitor the levels and conditions of groundwater resources, and further evaluate the impacts of abstraction in different parts of the system, to ensure that licence terms and conditions reflect forward-looking costs and externalities. New licence applications, or licence renewals and modifications, can prompt the need for large-scale assessments of water resources and impacts. A proportion of these costs would be appropriately allocated to licence holders, with the remainder recovered through taxation, to the extent that there are public benefits. A key question is whether such costs should be recovered from licence applicants (thus signalling to new and future licence seekers the incremental cost of their applications) or across all existing, new and future licence holders (on the grounds that all water users prompt the need for such assessments).

Public Goods Provided by the Department

The complexity of water resource issues in the Gnangara system means that much of the work carried out by the Department has public good characteristics, overlapping with large-scale and long-term land use and development planning, regional strategic planning and policy development. Research work of a general nature (i.e. not in response to particular licence applications) could also be viewed as a public good. Such activities are most appropriately funded through general taxation. Examples include:

- work carried out as part of the Gnangara sustainability strategy;
- large-scale modelling of water resources, such as the Perth Regional Aquifer Modelling System (PRAMS).

Lack of Competition

As in the previous case study, it would be appropriate for the activities carried out by the Department of Water, as a monopoly provider of water resource management and planning services, to be subject to independent scrutiny to ensure cost efficiency.

5 Summary and Conclusions

The purpose of this paper has been to:

- identify and explain the key principles which the Authority is considering applying in assessing how best to recover water resource management and planning costs;
- illustrate through the use of case studies how those principles could be applied in practice; and
- to invite public comments on the proposed principles and their application.

The main issue in the management and planning of water resources in the State is that there are externalities which arise from the use of water resources, on the environment, and on other users. These externalities can be internalised to some extent through regulation (including licensing).

However, the allocation of water resources to users involves costs in establishing the amount of water that can be allocated. These costs may be associated with private goods or services (such as individual licence assessment and compliance monitoring), public goods (for example, strategic land use planning), or some activities that are a mixture of private and public goods.

A key principle is that the costs of any services (or share of services) provided to licence holders should be recovered from licence holders.

Another principle is that the Department of Water, as a natural monopoly provider of many of the State's water resource management and planning activities, should be subject to independent scrutiny to ensure that its costs are efficient.

The Authority welcomes any comments on the principles and issues presented in this discussion paper. The feedback will be used by the Authority in the development of the draft report and draft recommendations, which will be open to further public consultation.

Appendix A. Terms of Reference

INQUIRY INTO WATER RESOURCE MANAGEMENT AND PLANNING CHARGES

TERMS OF REFERENCE

I, TROY BUSWELL, Treasurer, pursuant to section 32(1) of the Economic Regulation Authority Act 2003, request that the Economic Regulation Authority (ERA) undertake an inquiry and provide the Government with a range of options and recommendations for:

- the recovery of the planning and management expenses incurred by the Department of Water for the sustainable management of the State's water resources; and
- the most appropriate regulatory arrangements for the setting of service standards for the resource manager, the setting of the charges and the subsequent recovery of those charges from water users.

The options are to include:

- the implementation impacts for various types of users, including a sensitivity analysis on capacity to pay assumptions; and
- opportunities for implementation under both the existing legislative responsibilities of the Department of Water as well as those specified by the National Water Initiative.

In doing so, the Authority is requested to consider and develop findings on:

- the tasks or activities undertaken in the efficient management of the State's water resources, by the Department of Water, that would appropriately be recovered from water users;
- the most appropriate level (or percentage) of cost recovery from water users; and
- the most appropriate allocation of costs between licence holders and other water users (licensed entitlement or actual use).

In developing its recommendations, the Authority will have regard to:

- the Government's social, economic and environmental policy objectives;
- the Government's obligations as a signatory to the National Water Initiative Intergovernmental Agreement; and
- any relevant pricing principles arising from the 1994 Council of Australian Governments water reform agreement and the National Water Initiative.

The Authority will release an issues paper as soon as possible after receiving the reference. The paper is to facilitate public consultation on the basis of invitations for written submissions from industry, government and all other stakeholder groups, including the general community.

A draft report is to be available for further public consultation on the basis of invitations for written submissions.

The ERA will complete a final report no later than nine months after receiving the Terms of Reference.

TROY BUSWELL MLA
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SCIENCE AND INNOVATION; HOUSING AND WORKS