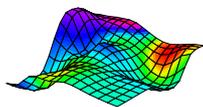


Discussion paper to
The Murray Darling Basin Commission

A market approach to the *Living Murray* initiative: a discussion paper

Final Report
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The views expressed in this paper of course remain the responsibility of the author and should not be seen to necessarily reflect the views of those who have assisted to date or the Murray Darling Basin Commission who has sought the paper.

Feedback on this discussion paper is welcome, as a precursor to more detailed instrument design.

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EXECUTIVE SUMMARY

At its April 2002 meeting, the Murray-Darling Basin Ministerial Council agreed on a number of initiatives designed to improve the health of the River Murray. This included initiating investigation and consultation into options for recovering water for environmental flows in the River Murray (the *Living Murray* initiative).

In seeking to provide guidance on the potential magnitude of flows sought, Council identified three 'reference' volumes of water for consideration. A large program of investigations was then initiated to identify associated river health gains, means to source the necessary water and attendant costs. With the benefit of this information, Council flagged that a *final* decision on an environmental flow regime for the River Murray may be agreed by October 2003.

A key challenge for the *Living Murray* initiative has been to find policy instruments that will minimize the opportunity costs associated with meeting the community's heightened demand for environmental outcomes. The potential for administrative approaches to yield targeted volumes of water cost effectively is now being questioned.

The opportunity costs associated with sourcing water are likely to vary significantly across the southern connected Murray-Darling Basin, due to variations in production systems, water supply infrastructure condition, land condition and hydrology (with implications for return flows and in-stream water quality such as salinity). In addition, the access rights and reliability associated with water entitlements that may be transferred from the private to public sector, and the tradeability of environmental allocations, will also affect ultimate costs and benefits.

These circumstances do not lend themselves to a deterministic approach or the use of administrative instruments with which to efficiently source targeted water.

A desirable path would be to accelerate property right reform processes that will deliver the markets and institutions necessary to achieve an efficient reallocation of water to the environment. This would require resolution of the water property rights impasse, the development of comprehensive markets for water entitlement trading, the development of parallel markets for water quality impacts and cost-reflective water pricing regimes that accounted for the jointness of water supply.

However reform processes have been slow, while environmental gains are sought now. It is argued in this paper that changes in resource use ahead of such reforms should be pursued via a more incremental approach focused on environmental outcomes, not flow volumes per se. In this way, changes in resource use that can most efficiently deliver targeted environmental improvements can be identified, including alternatives to water sourcing where appropriate (such as structural and operational opportunities). Such an approach could facilitate early gains but within an adaptive management framework.

That is, a learning approach that provides choice, flexibility and price discovery will be more effective than a deterministic plan based on poor information. In this regard, a market

approach should be seen as broader than merely a water purchasing instrument. It is about using the power of markets to reveal information

Market approaches seek to bring together information from buyers and sellers to reveal efficient exchanges and hence maximise the social benefits of change. In addition, by rewarding willing sellers, resulting changes in the mix of activities supported by the River Murray are likely to be seen as fair and equitable relative to administrative policy interventions.

Market approaches could be applied at a range of scales, from irrigation authorities, to irrigators along specified supply channels, to individual irrigators. Specific market instruments that could be used by governments to source water include:

- Bilateral negotiation
- Government standing in the water market
- Competitive tender
- Auction-based tendering
- Compulsory tender

These options embody varying complexity, transaction costs and administrative and legislative requirements. These factors need to be compared with their relative efficiency in bringing the widest possible range of sellers to the market, their ability to price discriminate within that market and ability to incorporate broader non-market factors – such as implications for salinity and infrastructure viability. Ultimately, a balance between instrument efficiency and workability will be required. Indeed selected instruments are likely to evolve over time as information revealed and lessons learnt in early applications allow more refined approaches to be used. Appropriate next steps in investigating instrument selection and design are recommended in this paper.

The approach argued in this paper is predicated on breaking the nexus between the *Living Murray* and COAG reform agendas, and on jurisdictions committing funds for priority 'first-step' outcomes. Cost sharing issues need not be imposed on water sourcing instruments, but rather should be the subject of separate jurisdictional consideration and pursued through their own processes according to their own cost-sharing principles.

Similarly, while property right and water market reforms are desirable for longer term, enduring reforms, they are not essential to support a first step. In the face of an administrative instrument to source water under the *Living Murray*, water market reforms would serve to reduce opportunity costs. However, if a market approach is used to source water, this is not the case, and linking progress to property right reforms will cause unnecessary delays. Moreover, governments may face higher budget costs in sourcing water after market reforms.

The greatest insights as to the likely benefits and costs of increasing environmental flows in the River Murray will come from a cautious first-step. Governments should seek to start simply, employ a market approach to reveal information and design instruments to learn.

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1 INTRODUCTION

A range of possible approaches for sourcing water for environmental flows in the River Murray are being investigated under the *Living Murray* initiative. The potential for traditional approaches (such as via water use efficiency savings) to yield targeted volumes of water at acceptable cost is being questioned, and has heightened interest in the potential use of market instruments.

Market instruments offer significant advantages over administrative or planning approaches where significant variation in compliance costs is anticipated yet the source of low cost opportunities is largely unknown.

Sources of water that could be recovered for environmental flows include through:

- water savings from the redevelopment of regional water supply systems, or
- water use efficiencies associated with management or technology changes by water users, or
- reduced consumptive use of water by irrigated agriculture, urban or industrial users.

The opportunities and costs associated with these sources is likely to vary significantly across the vast southern connected Murray-Darling Basin, due to variations in production systems, water supply infrastructure condition, land condition and hydrology (with implications for return flows and in-stream water quality such as salinity). In addition, the access rights and reliability associated with any water entitlements that may be transferred from the private to public sector, and the tradeability of any environmental allocations, will also affect ultimate costs and benefits of the initiative.

Market approaches seek to bring together information from buyers and sellers to reveal efficient exchanges and hence maximise the social benefits of change. The advantages of market approaches relative to other mechanisms for water sourcing include:

- Greater choice and flexibility would be provided to irrigators and environmental managers;
- Greater opportunities provided for participation by environmental interests (eg. by philanthropists);
- Water recoveries can be achieved at lower overall cost and probably faster; and
- Incentives are provided for innovation and efficiency improvements.

Market approaches however require significant effort in the design phase, and may be unworkable where property rights are incomplete or where there are few market participants.

The aim of this discussion paper is to consider the potential role of a market approach for the *Living Murray* initiative and to scope the types of market instruments applicable and issues that would need to be resolved to make them workable.

2 POLICY CONTEXT

The suitability of any policy instrument will depend upon the context in which it is used. In this section, the goal of the *Living Murray* initiative and likely policy setting within which a market instrument would need to be applied is examined. It is argued that the circumstances of the *Living Murray* initiative provide a strong case for the adoption of a broad market *approach* to policy. Such an approach would focus on environmental outcomes, not ML of water. Premised on the assumption that recovering water from consumptive users will be the best means to realise environmental gains, the potential role of a specific market *instrument* for this purpose is considered in later sections.

2.1 The policy dichotomy

At its April 2002 meeting, the Murray-Darling Basin Ministerial Council agreed on a number of initiatives designed to improve the health of the River Murray¹. This included;

- Progressing existing initiatives, such as in relation to fish passage, salt interception works and improved wetland health;
- Initiating a \$150m program of structural and operational works to make best use of the water currently available to the River Murray environment (the 'Implementation Works Program'); and
- Initiating investigation and consultation into options for recovering water for environmental flows in the Murray (The *Living Murray* initiative).

All seek to '*improve the health of the River Murray*', yet the efficiency of each in contributing to this objective is unknown and hence there is no basis to conclude whether or not the mix is optimal. This input-focused, silo approach to natural resource policy is not uncommon. Of most relevance here however is the dichotomy of approaches embodied in the Implementation Works Program compared to *Living Murray*.

In the case of the Implementation Works Program, Council has adopted a 'beneficiary-pays' philosophy. The benefits from a healthier River Murray arguably will accrue broadly to the Australian population, and so member governments have agreed to share the costs of the program drawing on consolidated revenues.

The Implementation Works Program also embodies a market approach. That is, while a broad suite of candidate works were reviewed in preparing a business case for the Program, the selection of works to proceed with is essentially a tender approach. The member States have been invited to submit proposals, which are then being assessed on a benefit-cost basis to ensure environmental gains, for the given budget are maximized.

¹ Corowa Communique, 12 April 2002

Finally, the Implementation Works Program is recognised to be a first step to facilitate early action. Changes or additions to the Program are likely to be canvassed over its seven-year implementation program (and beyond), as better information on river health needs and the merits of various river regulation strategies become available. This incremental approach can also respond to the effects of broader water sector reforms that may act to amplify or lessen benefits from targeted works. For example, a significant change in the seasonality or spatial use of irrigation water arising from water market reforms could significantly alter the merits of various works. However rather than being constrained by broader reform agendas, the Implementation Works Program is being progressed to facilitate early gains within an adaptive management framework

Sourcing water for the environment in the *Living Murray* has been initiated under a very different policy setting. Beneficiary pays has not been clearly embraced, with the question of 'Who should pay' being put before the community.² In principle, it is difficult to understand why purchasing engineering works or water for the same ends should be treated differently. Of course the difference has arisen due to the concerns of State Governments that either purchasing entitlements or compensating irrigators for water compulsorily acquired for environmental purposes may set a precedent for other aspects of water policy and broader natural resource reforms (such as land clearing). Cost-sharing has become a divisive issue and a major impediment to progressing the *Living Murray*.

The *Living Murray* has also adopted a very deterministic approach. A large program of investigations has been initiated to identify the potential river health gains, how they can be achieved and what they will cost. This was initially progressed with a view to Council making 'a final decision on an environmental flow regime for the River Murray in October 2003'³. This is out of step with the more incremental and learning approach adopted for the Implementation Works Program, and seemingly in ignorance of the failure of such an approach with forestry reforms in Australia.

Notwithstanding the impressive information base collected by the MDBC and partner governments through research programs, gross informational shortcomings will continue into the foreseeable future due to the scale of the Murray-Darling basin, and diversity within it. This has in part been recognised by Council, who in their more recent communiqué, now envisage the possibility of a 'first-step' decision in November 2003.

Also contrary to the Implementation Works Program, the *Living Murray* is being made contingent on the broader water reform programs of States and via COAG. The potential for changes in access rights and trading to impact the effectiveness of water recoveries and environmental flows is perhaps more transparent than for the Implementation Works Program.

² This is a key question posed in the Council's Living Murray Discussion Paper of July 2002

³ Corowa Communique, 12 April 2002

This has prompted many to press for concurrent reform. In particular, irrigators who probably see water recoveries for environmental purposes as inevitable, have sought to use the *Living Murray* as a bargaining chip to progress access rights and trading reforms which in themselves have far greater implications for the irrigation sector. However these issues are both complex and contentious, with government again concerned over property right precedents. As a result, reform may not come quickly with obvious implications for the *Living Murray* if coupled to the COAG agenda.

It is argued in this paper that the *Living Murray* should be pursued in a similar policy context as is embodied in the Implementation Works Program, and as detailed in Section 3, in a similar way as was adopted for water quality under the Salinity and Drainage Strategy.

2.2 Potential water sources and policy instruments

As part of the investigations being undertaken under the Living Murray initiative, a range of possible options to source water are being investigated. Often, options put forward confuse sources of water and policy instruments that can facilitate the transfer of water from identified sources to environmental uses.

There are broadly two sources of water and two principal types of policy instruments. Sources include saving water that is currently 'lost' in off-farm water storage and delivery systems, and the other through reducing on-farm water use (either through increasing water use efficiencies or reducing irrigated production). Policy instruments can be either administrative or market based.

Some of the water source / instrument options that have been put forward are briefly canvassed below, without attribution, to indicate the breadth of views that exist;

Government funding of water use efficiency savings

Recovering sufficient volumes of water through efficiency savings may hold some attraction as the costs are not transparent to those incurring them (ie: taxpayers). However by design, some sourcing possibilities are excluded (such as changes in the mix or intensity of production), and so overall costs are likely to be greater than necessary. In addition, unless competitive allocation mechanisms are used to identify the most cost-effective investments, administrative selection is also likely to introduce inefficiencies.

The review undertaken by ACIL Tasman⁴ indicates that only limited opportunities exist to recover water through efficiency savings off-farm, at a cost less than the marginal value of water in irrigation. In addition, the 'Snowy process' will presumably capture many of the low cost opportunities that do exist.

⁴ ACIL Tasman (2002), Scope for water use efficiency savings as a source of water to meet increased environmental flows – independent review

Water use efficiency saving opportunities undoubtedly abound on-farm from a technical perspective. However no case has been made as to why efficient profit-maximising irrigators would not have found and exploited profitable opportunities to reduce water use and expand production or sell surplus water. Government hopes of doing a better job are at best misplaced. A useful critique of the water savings fallacy is provided by Gyles⁵.

A more fundamental problem identified by ACIL Tasman, is that many 'savings' are not real. Water associated with some savings is currently being used by irrigators or the environment, either directly or via return flows.

Government modifying the reliability of entitlements

The modifying reliabilities option, proposes a volumetric tax on irrigators seeking to convert entitlements from low to high security. Assuming irrigators' desire to convert entitlements is driven by sound economics and risk management preferences, any tax on this worthwhile endeavour will impose economic efficiency costs. This will be compounded to the extent that it is the more efficient irrigators that are likely to seek to convert their entitlements. Moreover, the opportunistic nature of the option is likely to yield only limited volumes - at unknown times and sources.

Broad based compulsory acquisition of entitlements

This option entails a cut to the Murray-Darling Cap, either with or without payment of compensation. This is probably the simplest and quickest administrative means to source water, and could be tailored to deliver desired volumes. However many also recognise that the approach would be relatively blunt, as it would not target the lowest cost water and the immaturity of current water markets would not facilitate an efficient redistribution of entitlements in the short to medium term.

Government sponsored redevelopment of irrigation areas

Those promoting this option argue that a regional planning approach should be applied to identifying both off-farm and on-farm opportunities for water use efficiency 'savings'. Specifically, the option is premised on government funding to promote voluntary changes in regional water use integrated with broader natural resource and water supply infrastructure plans. It highlights that current resource and infrastructure management is the product of extensive regional planning processes with stakeholder support and tied government assistance. Operational specifics of such an option are not clear, but references to 'comparative assessment investment criteria', 'land retirement strategy' and 'phasing out inefficient irrigation practices' conjures up a deterministic, administrative policy approach similar to those which have contributed significantly to current problems.

⁵ Gyles, O (2002), Valuing benefits of increased irrigation water use efficiency, Department of Primary Industries, Victoria.

Volumetric tax on water trading

A volumetric tax (with financial compensation) imposed on water trading, would share similar economic efficiency failings as the volumetric tax on irrigators seeking to convert entitlements from low to high security. Moreover, limited water is likely to be recovered.

A voluntary surrender of entitlements

Under this option, government would run a *voluntary* tender for entitlements for transfer to an environmental water account and subject to paying less than market value. This option is also unlikely to yield the necessary volumes as its philanthropic basis - seeking irrigators to subsidise water purchases for the social good - means uptake is likely to be limited.

Government standing in the water market

This more market based approach would see government competing alongside other water purchases in existing water markets. The option has received little encouragement within government, due to concerns that it 'may result in a market shock and drive a price increase'. While this observation is likely to be true, it will be equally true of any approach that would result in greater water scarcity – a point discussed further in this discussion paper.

The development of a robust market-based instrument for water sourcing has received little attention until recently. The option of government standing in the water market and alternative market-based approaches are explored in this paper.

2.3 The confounding issues

Promoting the health of the Murray, particularly through mechanisms designed to recover water from consumptive users for environmental flows, is confounded by a number of issues. In the context of the *Living Murray*, these include:

- Uncertainty over environmental improvements being sought
- Interconnectedness of natural resource management and water supply infrastructure
- Information on potential benefits and costs is dispersed and incomplete
- Incomplete property rights and an immature water market
- Lack of a clear policy position on which to consult
- Uncertainty over how environmental water will be accounted and managed

There is evidence that the health of the River Murray is in decline and that reduced and altered flow patterns are a significant contributor. Similarly, it is generally agreed that increased flows will deliver environmental improvements, however the scope and nature of improvements possible under different flow regimes remains the subject of on-going research. As indicated

above, the contribution of alternative means to improve the health of the River Murray have been left to other programs with no attempt to seek value across all possible means.

The value that the community places on various environmental improvements has also not been explicitly estimated, but is the subject of a proposed choice modelling study.

Changes in on-farm water use will affect the extent of groundwater and salinity problems as well as the cost of distributing water. Recourse to water markets by irrigators to make up for any entitlement losses, will similarly affect resource, infrastructure and environmental outcomes. As a result, interventions to transfer rights from consumptive users to environmental uses will have impacts beyond the farm-gate.

Given the scale of water sourcing that is being investigated (up to 17 per cent of current irrigation water use), integration of environmental flow policy with broader resource management is of paramount significance. Water sourcing instruments that ignore these fundamental factors may facilitate increased flows but may exacerbate environmental and financial problems.

While governments have assembled an impressive information base, significant information asymmetry continues. That is, while government may hold information on the importance of sourcing water from particular areas and implications for broader resource management, irrigators hold information on their unique direct costs, opportunity costs and private benefits of changing farm management practices and reducing water use. Information on infrastructure maintenance and supply costs generally sits with the water supply authorities. The regional case studies proposed by the MDBC is aimed at bridging this asymmetry of information.

The COAG 1994 water reform agreement heralded a staged program of water sector reforms covering access rights, pricing, trading, salinity, return flows, environmental allocations, and the like. Each State is pursuing reforms from differing historical, political and community perspectives, each has embodied reforms in new legislation and all are cautious of the implications of the *Living Murray* to their reform agendas.

Rights to the use of rural water are not fully specified and vary between the states. This has led to a range of difficulties in managing both the volume and quality of flows, and in the establishment of markets for irrigation water. Water trading in the southern connected Murray-Darling Basin is particularly constrained by a plethora of differing water access rights and supply agreements.

Arising from the incomplete specification of water rights and different stages of policy reform among the States, there is disagreement on the benchmark from which new allocations for environmental flows should be counted, and ongoing reforms may undermine any benchmark. In addition, as rights to flows are vested with the States, the management arrangements for environmental water are unclear. Putting aside the issue of State rights, how environmental water is used may have significant implications for irrigation allocations.

Council has initiated a major community consultation exercise as part of the *Living Murray*. However the exercise has been frustrating to many, as no clear policy has been put forward on which to elicit feedback. The issue of compensation with any compulsorily acquired water or land is particularly contentious.

2.4 Need for an incremental and learning policy approach

The *Living Murray* is being progressed in an environment of uncertainty, complexity and with fundamental informational deficiencies. As noted by Hussey⁶,

'One way to framing policy and gaining acceptance in the face of such challenges and complexity is to get all the information and research outputs conceivably necessary, assemble in one place with the underpinned conclusions and policy proposals, and consult extensively until a politically acceptable collection of people agree with what is being proposed. Such a big-bang approach to policy is difficult to deliver even when circumstances are conducive. The task can become Herculean when facing the challenges and complexities enumerated for the Living Murray initiative.'

For this reason, and mindful of the experiences in other sectors such as native forestry, Hussey and others are calling for a more incremental and learning approach for the *Living Murray*. This would entail clarifying policy goals, establishing a process that will effectively deliver the information needed and initiating early action to 'hold the line' in the interim.

Importantly, the objective of the *Living Murray* should be to improve environmental services not to claw-back water from consumptive users per se. Establishing environmental water rights will not always equate with an improvement in river health. There is a general assumption that the property right structure relevant to irrigation is also efficient for meeting environmental objectives. This is may only be true for base flow in the river. It is clear that river health could be achieved with other water products such as sales water, temporary or leased water, or through operational or landscape changes⁷. Much is to be learnt about matching demands for environmental improvements with the supply of goods or services that can meet these demands most efficiently.

In the interim, policy makers need to promote early action based on the best scientific advice. Presumably this is that increased flows provide the best way to secure early environmental gains. Attention then needs to focus on the best way of achieving the identified flow changes; be it amendments to the rules governing current consumptive entitlements or increased flows at key, yet opportunistic, times. Flexibility to provide this water at minimum cost to other users will be critical.

⁶ Hussey (2003), The Living Murray initiative: Progressing National Interest Outcomes, a note to the MDBC, 30 April

⁷ Gary Stoneham, pers com (2003)

To this end, a *process* to pursue early river health outcomes that provides choice, flexibility and price discovery will be more effective than a deterministic plan based on poor information. In this regard, a market approach should be seen as broader than merely a water purchasing instrument. It is about using the power of markets to reveal information.

For the purposes of this discussion paper, the following sections are premised on the assumption that recovering water from consumptive users is necessary to facilitate early action. However this premise requires continual challenge, particularly as our knowledge of environmental benefits sought and alternative means to meet them grows. This would be promoted through competition between the suite of programs being pursued across and within jurisdictions and the *Living Murray* itself.

3 DESIGNING A MARKET APPROACH FOR THE LIVING MURRAY

The waters of the River Murray support a wide range of activities, ranging from the maintenance of ecological systems, tourism and recreation, urban and industrial uses and to support a myriad of agricultural production systems. Increased demands from any of these sectors for greater access to the waters of the River Murray will serve to amplify the scarcity of the available resource and hence its value. Other changes such as climate change may also make water scarcer. Whether such demands are met through social, administrative or market means, opportunity costs will be imposed on other users and the marginal value of water – or price – will increase.

A fundamental objective for governments participating in the Living Murray is to find policy instruments that will minimize the opportunity costs associated with meeting the community's heightened demand for improved environmental outcomes for the River Murray. It is argued in this discussion paper that market instruments can serve to minimize the economic costs of securing water for the environment. In addition, by rewarding willing sellers, resulting changes in the mix of activities supported by the River Murray are likely to be seen as fair and equitable relative to administrative policy interventions.

3.1 Conceptual framework

3.1.1 *Missing and incomplete markets*

The River Murray provides a range of environmental amenity values in addition to benefits associated with the diversion and consumption of its waters. These environmental amenities include the abundance and range of native fish (eg. the Murray cod), waterbirds, riverine forests and internationally significant wetlands. As these amenities are largely freely available to be enjoyed by the general public, there would be no return to be made by the private sector investing in the maintenance of these amenities. As markets for these environmental amenities are largely missing, there tends to be under-provision of them relative to socially desirable levels. In turn this prompts calls for investment by government or philanthropic parties for the national good.

This problem is compounded by a range of negative 'externality' impacts on the health of the River Murray arising from other activities. These activities include the diversion of water for use by irrigated agriculture, groundwater and salinity impacts from dryland farming practices and the reduction in flows or increase in pollutants arising from urban and industrial water use. As noted by Stoneham et al⁸, through no fault of their own, those making land and water use decisions simply do not consider all the costs or benefits associated with any course of action. This arises because the markets in which they operate are incomplete. For example, water

⁸ Stoneham, Chaudhri, Stiema and Doering (2001), Auction design for land-use change in the Murray Darling Basin, DNRE, Melbourne

markets exist, but current water 'rights' are poorly defined in terms of volume and virtually silent on quality.

As a consequence, values that can be observed on water markets do not reflect the full social benefits and costs, including environmental impacts, from resource use. Therefore governments cannot simply buy water from current users at prevailing prices to deliver a predetermined increase in the provision of environmental amenities from the River Murray. In fact government cannot even guarantee that the transfer of water from current uses to environmental uses will deliver a net social benefit.

The most desirable path would be to accelerate property right reform processes that will deliver the markets and institutions necessary to achieve an efficient reallocation of water to the environment. This would require resolution of the water property rights impasse, the development of comprehensive markets for water entitlement trading, the development of parallel markets for water quality impacts and cost-reflective water pricing regimes that accounted for the jointness of water supply.

Once these reforms were complete, transfer of water from consumptive users to environmental uses by purchasing entitlements could be achieved through the market structures in place and the costs of the changes would be minimised. The impacts on salinity, infrastructure viability, etc would be captured in transactions and efficient outcomes assured.

However reform processes have been slow, while environmental gains are sought now.

In the absence of expediting these reforms, the challenge is to facilitate a change in water use to a more socially desirable pattern, at minimum cost and consistent with longer term reform goals. This may include:

- Public provision via increased environmental allocations (*project water*), and
- Changes to water access rights (*rules water*), but
- Changes to incentive structures faced by the private sector so that private actions generate greater environmental services

All would affect the availability and reliability of water for consumptive users. As canvassed in Section 2, a range of instruments ranging from regulatory, administrative and market-based are available. An important determinant of which instrument will serve government best will be their effectiveness in overcoming the asymmetry in the information available to government and water users.

3.1.2 Overcoming the problem of asymmetric information

In the context of securing additional water for environmental purposes, government will be seeking to maximise the environmental outcomes that can be achieved via sourced water within its limited budget, while private irrigators and water supply authorities will be seeking to maximise their returns from changing management practices and selling water. The terms of

voluntary exchanges will depend on the information held by each party. Notably, government and irrigators will have different information – there is asymmetric information.

Government will have information on the importance (value) of increasing the provision of environmental amenities, as well as in relation to other impacts such as salinity, weir pool levels, etc. Irrigators and water supply authorities will have information on their own unique direct costs, opportunity costs and private benefits if they were to change management practices through for example, investing in water supply system or on-farm changes to save water or in reducing water use.

The significance of the information asymmetry should not be underestimated. A recent study⁹ completed under the *Living Murray* concluded that;

- There is insufficient information available to government to be conclusive on the potential for on-farm efficiency savings
- There are significant externalities associated with investments in water use efficiency, and
- The information asymmetry between irrigation enterprises, water authorities and policy makers presents a strong argument for a market driven approach.

The current approach under the *Living Murray* is very deterministic. Government is trying to assemble the necessary information to indicate which sources of water, where and how they should be recovered. The fact that this is proving difficult underscores the information asymmetry. Economists are starting to understand that the transaction costs associated with information revelation (both hidden and missing information) are significant. Utilisation of market-based approaches to manage complex systems such as the Murray rest on their ability to resolve these missing and hidden information problems – that is, a market approach would act to overcome this problem by having the relevant parties bring information to the market and in so doing to reveal the cost-effective opportunities that will maximise environmental outcomes.

3.1.3 Cost-sharing arrangements separated from water sourcing instruments

Regardless of what type of policy instrument is used, the transfer of water from existing users to the environment will not be costless. Investment in water saving infrastructure or technology comes at a direct cost, while lower levels of irrigation water use poses an opportunity cost. A core issue for government is how these costs should be shared.

The primary consideration in relation to environmental reforms is the balance between beneficiary-pays versus a polluter-pays cost sharing framework. Cost-sharing generally does not affect the overall social benefits of a given reform, but it may be crucial to community

⁹ ACIL Tasman (2001), Scope for water use efficiency savings as a source of water to meet increased environmental flows – independent review

acceptance and policy success. Indeed consideration of jurisdictional issues in Section 2 suggests that this could be a terminal issue for the *Living Murray* if not properly addressed.

It is not the role of this paper to argue any particular cost-sharing model. However it is possible to separate cost-sharing instruments from the mechanism used to deliver the environmental gains. That is, cost-sharing can be incorporated in jurisdictional revenue raising instruments while environmental gains can be pursued through a separate application of revenues.

This would assist in breaking through the cost-sharing impasse as well as help straighten-out the information processes needed to determine river health outcomes sought and efficient means to provide them. By separating the purchaser of river health services from the provider, this would encourage the development of a language to rank alternative environmental services and encourage consideration of a broader set of abatement actions other than just the purchase of water entitlements. From the supply-side, it would create competitive conditions for the supply of water that will improve river health at lowest cost.

The proposal here is that jurisdictions should provide agreed funding to the *Living Murray* as a basis for securing environmental outcomes. Jurisdictions could then seek to recover their costs within their own jurisdiction according to their own cost-sharing principles. To the extent that a contribution from beneficiaries of enhanced River Murray environmental health was deemed appropriate and benefits were thought to widely accrue across the population, then arguably this would be funded from consolidated revenue or a broad-based levy. SA in its recent budget announced such a levy would be used for this purpose.

Where a 'polluter-pays' contribution from water resource users was deemed appropriate, States could seek contributions via externality charges in water pricing regimes applicable to agricultural, urban and industrial water users in the Southern connected Murray. Indeed the incorporation of externality charges into water pricing regimes is a central component of the water pricing reforms agreed under the COAG reform agenda. Apart from recovering the costs that may be associated with the *Living Murray*, externality pricing would provide an enduring incentive so that environmental impacts are internalised into private water use decisions.

3.1.4 *Maximising social gains from purchases*

If governments agree to provide a budget for securing improvements in the environmental health of the River Murray, the next challenge is then to maximise the gains for the given budget or conversely, for any agreed improvement in environmental outcomes, to minimise the budget required.

It has already been argued that a market approach will reveal information on cost-effective options, and in so doing reduce the costs of change. That is, the introduction of government as a buyer of water will prompt suppliers to consider returns to water in current uses relative to selling / leasing / investing in water savings. Driven by self interest, cost-effective suppliers will self nominate and reveal an explicit market 'price' for these services. Therefore as well as a

first step in promoting river health, the action will also facilitate 'price discovery' and help government set longer term investment goals.

There is also the opportunity for governments to be price discriminating rather than paying the market clearing price. Government can act to drive prices for environmental water down to the minimum that irrigators or other water providers are willing to accept. Such an approach would be efficient and maximise the environmental benefits that can be delivered for the budget available. The rationale for a government body to seek to minimise payments for the supply of environmental services is succinctly put by the Productivity Commission¹⁰;

'Government funds are not limitless, yet demands on governments to meet the needs of the community are many. Where governments seek to meet as many objectives as possible using limited resources, it is in the community's interests for government to pay the minimum amount necessary to achieve conservation (or other) goals'.

The budget savings achievable through say a price-discriminating tender approach have been estimated for the recent *BushTender* trial¹¹. It was estimated that a traditional fixed-price payment would have required a budget of seven times that used with the competitive auction approach to secure the same outcomes. This benefit arises largely because the competitive tender, properly designed, encourages applicants to reveal their true opportunity costs in order to be successful in the bidding process. Such pricing approaches are common to many markets, such as airfares and housing.

Figure 1 shows how a well designed market approach can drive down costs to government compared to an administrative approach.

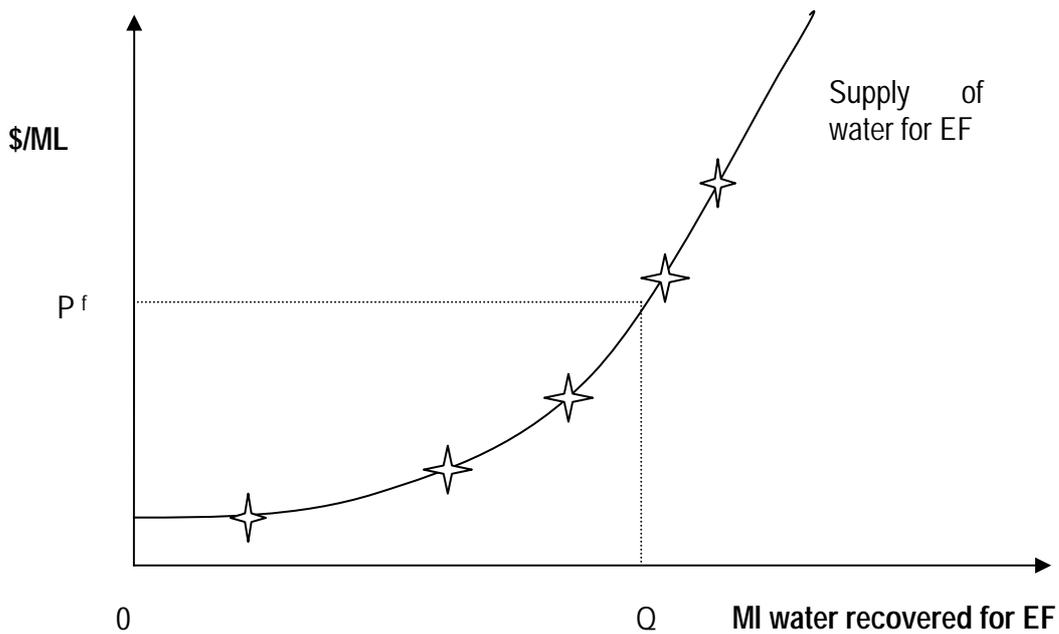
Under an administrative approach and where limits to water trade exist, the projects chosen may recover water at costs indicated by the stars on the water supply function. In total, the recovered water may equal say Q ML.

Alternatively, a fixed price market approach designed to recover Q ML would only target those projects that can provide water for less than or equal to P_f , and would pay P_f for each ML recovered. That is, those projects that would yield the water shown on the supply function between 0 and Q. The cost would equal $P_f \times Q$, which would be a budget cost less than that required to secure water under the administrative approach.

¹⁰ Productivity Commission (2001), *Cost Sharing for Biodiversity Conservation: A Conceptual Framework*. Staff Research Paper, AusInfo, Canberra

¹¹ Stoneham, Chaudhri, Ha and Strappazon (2002), Auctions for conservation contracts: an empirical examination of Victoria's *BushTender* trial, paper presented to the Environmental Economics Network Conference, ANU 2-3 May 2003, Canberra.

Figure 1: Budget cost under alternative purchasing approaches



Alternatively, if a price discriminating market approach is used, then the same projects (and opportunity costs) as under the fixed price approach would be identified, but only the minimum required to recover the water would be paid for each project – that is, the budget would only equal the area under the supply function up to Q . This could be significantly less than under the fixed price approach.

Water market reforms to eliminate trade constraints will act to make opportunity costs under an administrative versus market approach converge. However despite such market reform, the budget cost of a poorly targeted administrative approach may still significantly exceed that under a competitive market approach.

3.2 The policy package required

The desirable characteristics of a policy package that would facilitate a market approach to the Living Murray can be postulated drawing on the preceding sections. Briefly they are:

- Focus the *Living Murray* on environmental outcomes, not on volumes of water per se
- Be adaptive. In this regard a learning *process* to pursue river health outcomes will be more effective than a deterministic plan based on poor information (on both the benefits associated with different environmental outcomes and the costs of achieving them). Start simply and design to learn
- Establish a benchmark from which gains are sought
 - Establish an accounting and compliance framework
 - Establish a requirement for States to 'make good' if other actions (such as groundwater extraction, farm dam development or major landuse changes) impacted upon the benchmark.
- Break the nexus between the Living Murray and COAG reform agenda
 - Be compatible, if not catalytic, with reform directions; not captive to them
 - Adopt an incremental reform approach
 - Be mindful of the sequencing of reforms
- Facilitate early gains by committing agreed funding for priority outcomes
 - Action tailored to specific environmental outcomes
 - Cost-recovery a separate jurisdictional issue
- Employ a market instrument to source water and 'reveal' cost-effective action (taking into account broader resource and infrastructure impacts)
- Establish administrative and legislative arrangements for the use of sourced water
 - Allow a portfolio of water 'products' to be sourced and scope to trade with consumptive users to maximise the environmental budget and minimise opportunity costs.

3.3 The Salinity and Drainage Strategy illustrates the approach

In the 1980s the MDBC faced a similar policy challenge with respect to salinity. Salinity in the River Murray was increasing and leading to a range of impacts, including environmental. Finding a solution to the 'quality' problem was confounded by problems similar to those now facing the 'quantity' problem. That is, significant gaps in scientific understanding, the need for inter-jurisdictional collaboration, uncertainty over the costs of correctional measures, and the

knowledge that the effectiveness of measures may be undermined over time with concurrent water reforms.

The policy adopted facilitated early action, a learning approach and the use of a market instrument to minimise costs. Importantly, the policy established an enduring framework that has enabled a more expansive response to evolve as information, community support and broader resources policy has advanced. Key elements of the strategy were:

Benchmark - Baseline conditions were established and each State committed to ensuring compliance with the baseline. Initially the baseline excluded impacts arising from developments prior to the agreement, but under the recent Basin Salinity Management Strategy this has been extended to include all contributing sources.

Early action - The Strategy included new operating rules for flushing lakes, improved drainage disposal and land management, and importantly a program of salt interception schemes to reduce salinity levels by 80EC as measured at Morgan..

Cost-sharing - The program of works was jointly funded by the Commonwealth, Victoria, New South Wales and South Australia. As part of the Strategy, Victoria and New South Wales were each allocated 15 EC units (or credits) to offset salinity impacts of future developments

Accounting framework - A salinity register was established by the MDBC to track credits and debits and broader compliance against the Strategy. Any significant works must be assessed for their impact on EC at Morgan and allocated credits or debits accordingly. The cumulative impact of 'insignificant' works is also accounted.

Market instrument to reduce costs - By allowing States the opportunity to create and trade credits, overall costs can be reduced. No EC credit trades have taken place between the States, however Victoria has significantly devolved liability for credits to industry and water supply authorities (a system of salt disposal entitlements has been developed which allows entitlement trading).

An incremental approach to securing environmental gains - Under the Strategy, States were not required to surrender rights relating to land or water management, nor were the development of comprehensive water property rights and water markets (that account for the salinity impacts of water trade) required. Rather States were able to pursue their own water and land resource management reforms under conditions of accountability for salinity impacts.

4 MARKET MECHANISMS FOR WATER SOURCING

For government to minimise the social cost of sourcing water for environmental purposes, and to provide for price discovery, a competitive buying approach should be utilised. Relevant issues are canvassed in this Section.

4.1 What budget will be required?

It has been argued in this report that an incremental approach should be adopted, as fundamental information on environmental outcomes achievable, the value the community places on them and the cost of realising them is unknown.

Accordingly, estimation of a budget to secure a first step improvement can only be approximate. Far greater insights on the costs of recovering water for environmental purposes will be gained from applying these funds than from the preceding modelling and opinions from the myriad of vested interests. Subsequent environmental gains are likely to be sought and budgets required, and decisions on these will be better informed by the information revealed through the initial purchases.

A countervailing consideration for government will be the budgetary implications of an incremental approach against a background of water market reform. These reforms are being pursued because they will allow water to move to higher valued uses, delivering greater overall social benefits. In turn, the marginal value of water can be expected to be higher once reforms have been completed. Therefore the budget cost to government, based on the prevailing marginal opportunity cost of water, can be expected to be higher *following* market reform. In effect, water market reform will create economic 'rents' that will be (freely) captured by market participants, but some of these rents will need to be bought back in securing water for environmental flows. Delays in progressing transfers of water from existing users to environmental accounts are likely to impose budget costs on governments.

4.2 What type of water should be targeted?

How much water, from what source and held under what arrangements will depend upon the environmental outcomes being sought and institutional arrangements prevailing, particularly in relation to the trading of environmental water recovered.

Water trading offers an efficient means to allocate water over time between environmental and consumptive users, maximising overall environmental and productive benefits. The marginal value of water for river health may be lower, for example, in times of water scarcity and higher when flood events can be 'topped up'. Therefore rather than seeking a fixed environmental allocation to be released each year, the environmental manager may wish to secure more water in some years and less in others. For a given budget, greater environmental outcomes will be realised if water recoveries reflect these environmental needs, particularly if the marginal value of water to irrigators moves differently to its value for environmental purposes.

If environmental allocations are tradeable, permanent entitlements could be leased onto the temporary water market when not needed, securing funds to increase total holdings and environmental outcomes.

However if constraints on the trading of environmental water are to be imposed, flexibility to recover permanent or temporary entitlements could serve the same purpose. For example, a base level of permanent entitlements (of appropriate security) could be held, and temporary water entitlements purchased as needed. This could be locked into long-term agreements with irrigators based on announced allocations as a means of providing certainty to the environmental manager that water would be available and to lessen transaction costs.

The current arrangements for managing the environmental flows allocated for maintaining the Barmah-Millewa forests are instructive. That is, while a nominal yearly allocation was initially agreed, under the current management arrangements half the environmental water is only transferred from consumptive users to the forest when a certain water availability threshold is met.

4.3 What types of purchasing instrument will be most appropriate?

A range of options exist. Complexity does not equal superiority. The suitability of different instruments will depend on the scope of issues to be accommodated, our ability to 'commodify' them and the transaction costs involved. In addition, while all instruments seek to identify and capture low opportunity cost water, their effectiveness in engaging the widest group of potential sellers will vary. Some instruments will also allow a price discriminating approach to lower budget costs and some will require significant upfront investment in instrument and market design. Inevitably tradeoffs between theoretical efficiency, workability and cost will need to be made.

Distortionary instruments such as taxes on water trades or on entitlement changes (low to high security) have not been considered. The merits of the alternative instruments in the context of the *Living Murray* are discussed below.

4.3.1 Bilateral negotiation

Bilateral negotiation would involve direct negotiation between the government and sellers, with significant opportunity to 'tailor' purchase terms. Negotiated outcomes allow the unique circumstances of individual sellers to be considered and factored into price or non-price aspects of sale agreements. However the negotiations are only informed by the price information that the participants bring to the negotiations, rather than the collective valuations of all potential sellers. Consequently tender or auction approaches are more useful when the goods do not have a fixed or determined market value. Auctions in particular can be used to maximise 'price discovery' and can also be less costly and time consuming than a series of individual negotiations.

4.3.2 *Government stands in water market*

Under this approach, Government or its representative would participate in existing water entitlement markets, under the same conditions as private sector participants. Government could look to purchase temporary, permanent or a mix of water entitlements, and target purchases to securing water from those sources that offered the greatest benefits. The major disadvantage would be that sellers bring only limited information to the market and government would need to compete within the rules of the market. Where multiple environmental outcomes may arise from water purchases, there may be less opportunity than under negotiated purchases to evaluate benefits given competitive pressure from other buyers. Tender and auction approaches overcome this by expanding the information that sellers may need to bring to the process, and provide time for government to analyse bids.

Another concern with government standing in water markets is the issue of market depth and power. As noted earlier, some have argued that such action may result in a market shock and drive a price increase. While the greater water scarcity introduced by *any* market or non-market mechanism to recover water will lead to price increases, concern may be premised on an expectation of a potentially large volume (1500ML) of high security water being secured under permanent arrangements.

However under an incremental approach, initial quantities of water may be significantly less and it is not clear which water entitlements would be most affected. If purchases are directed at low security water in times of relative abundance, price effects may not be large.

With government 'posting' a buy price, or for smaller volumes opportunistically buying water placed on the market, the scope for price discrimination will be limited. Government participation on water markets could also be constrained by volumetric limits or exit taxes at the regional or State levels. These trade restrictions would need to be resolved and competition issues considered for a number of potential instruments.

4.3.3 *Competitive tender*

A competitive tender represents a discrete buying process where government retains significant flexibility in bid selection and negotiation on final terms. Government or its representative would formally elicit offers and assess voluntary bids based on predetermined criteria, which could include multiple outcomes such as implications for salinity, infrastructure and any offsetting savings in other government assistance. A potentially broad suite of sellers could be included and price discriminating practices could be employed.

Similar issues to those for standing in water markets would need to be considered - buying temporary or permanent water, overcoming regional trade restrictions, and identifying which environmental outcomes to seek to maximise. Additional issues include defining who can participate in the tender process (ie; who are the sellers), what reserve prices will be used, procedural issues and bid assessment.

Sellers could in principle be at either the irrigator and/or supply system level. Due to the interconnectedness of groundwater use and surface water infrastructure supply costs with regional water demand, seeking sellers at the supply system level may enable these factors to be better integrated into bids. In addition, bids at the supply authority level could be formulated with State governments to account for potential savings from other assistance programs, reducing overall costs. On the other hand, individual irrigators will hold information on their unique opportunity costs of reducing water use, and this information needs to also be captured in bids (of importance here is who holds the legal rights to sell entitlements – can authorities sell part of their bulk entitlements? Could supply level issues be captured in exit taxes or subsidies if sales at irrigator level?).

Reserve prices can be set to ensure prices paid do not exceed anticipated benefits. The establishment of a reserve price will be difficult when a multitude of environmental factors are being considered. This is in part overcome by the adoption of a cost minimisation objective and a fixed budget. This in turn relies on the implicit assumption that within this budget environmental gains are believed to exceed costs. To the extent that government has undertaken economic assessments of benefits and costs, including a comparative assessment of other ways of improving river health (such as via engineering works, land management changes, etc), this appears reasonable. Depending on the bid assessment tool used, reserve prices may be applied to different sources of water.

A tender process would require government to have sufficient information on environmental benefits associated with bids to allow their ranking in terms of cost-effectiveness. Some of this information can be sought from tenderers, while other data sets will need to be brought together by government from its own sources or other parties (such as local government). A simple tendering process would allow scope for government to seek follow-up information.

4.3.4 Auction-based tendering system

An auction based tendering system would handle a large number of potential sellers more effectively, but a more structured bid assessment process requiring rules on how prices will be struck and bids assessed would be needed. In addition to the issues pertinent to any tendering system, an auction-based system would also need to consider whether bids would be open or sealed, the number of bidding rounds, and employ a quantitative bid assessment tool. This later requirement may pose significant challenges if a multitude of environmental factors are to be included in the assessment.

In essence, the auction format requires well-defined and standardised commodities. As already discussed, scientific understanding of water sourcing, flows and environmental outcomes is far from complete and development of bid evaluation criteria and weights may be difficult. To make the auction process workable, environmental outcomes would need to be defined by no more than a few easily measurable values - so that the auction selection process can be managed by a set of rules or principles. This presents an inherent conflict. To make an auction

workable and keep costs down, these values would need to be characterised in a few variables, which may not ensure selection of water with the highest river health values.

Examples of auction approaches that incorporate multiple environmental factors include the US Conservation Reserve Program and the *BushTender*¹² program conducted in Victoria in 2001/02. Extension of the *BushTender* auction approach to include salinity and return flows is being investigated under NAP funding of a number of field based pilots into the application of market-based instrument for natural resource management.

In addition, further illustration is firstly provided in a MDBC commissioned report by Stoneham and Chaudhri (2000)¹³, and secondly in relation to achieving water use efficiency savings by Heaney and Beare (2002)¹⁴.

4.3.5 *Compulsory tender system*

Whereas participation in the preceding instruments would be voluntary, under a compulsory tender approach all nominated 'sellers' would be required to participate. For example, a proportion of irrigators' or supply authorities bulk entitlements could be withdrawn, either on an annual basis or to coincide with scheduled entitlement reviews. The implicit volume of water under surrendered entitlements would need to be significantly more than was required, with the selection of which entitlements to retain for the environment being established in one of two ways;

Firstly, all sellers could be required to submit a price at which they would accept surrender of their entitlement. Government could then identify which entitlements to retain, and to make payment at either a fixed or discriminatory prices. Entitlements not required would then be returned. While sellers could submit 'protest' prices, almost guaranteeing they retained their entitlement, the instrument would still bring a far greater number of sellers into the process than any of the voluntary instruments – potentially serving to lower overall costs.

A second approach would be for government to retain required environmental flow volumes and to sell back surplus entitlements to the market. Revenue raised would then be distributed equally to those surrendering entitlements in the first place. This approach is similar to that employed under the US Acid Rain Scheme to reduce incrementally industrial air pollutants and to ensure market liquidity for new entrants. While the approach could be applied in the instance of the Living Murray, it imposes a specific cost-sharing outcome rather than the separation of water sourcing and cost-sharing as argued earlier in this paper.

¹² See Stoneham, Chaudri and Strappazon (2002), Auctions for conservation contracts: An empirical examination of Victoria's BushTender trial, paper presented to the Australian Agricultural and Resource Economics Society, February, Canberra

¹³ Stoneham and Chaudhri (2000), *Auction design for landuse change in the Murray Darling Basin*

¹⁴ Heaney and Beare (2002), Competitive tendering for public investment in improving water use efficiency, paper presented to the Conference of Economists, Adelaide

In either case, significant legislative changes would be required to facilitate a compulsory tender process.

4.4 What should be the scope of the instrument

The most critical issue in developing an instrument will be on setting boundaries for the scope of the instrument. Ideally, a market instrument should be developed such that all impacts are either accounted for in bids made by sellers or captured in the buyers bid assessment framework. This requires an understanding of the range of impacts, how they are affected by water transfers, developing appropriate metrics given 'dose-response' relationships and our ability to measure and enforce outcomes. Again, tradeoffs will be required between instrument scope and potential benefits, to limit transaction costs and ensure instruments are workable.

The *BushTender* approach required ecologists to develop a metric to establish relative benefits for different environmental outcomes arising from different actions. The cost of various intervention actions was then revealed from landholders and alternative actions were then ranked on a value for money basis.

A similar approach could be used for the *Living Murray*. However this will be challenging given the complexity of hydrological and environmental relationships, non-standard benefits and complementarity or competing nature of benefits from changes in regional water use.

The ability of the *Living Murray* and water sellers to access and articulate this information will be a critical parameter affecting the choice of buying approach. Some of the factors that would need to be considered and integrated into purchasing instruments are outlined below.

4.4.1 Volume

Sound water sourcing instruments (whether administrative or market based) need to identify the volume related characteristics of water recovered. This will be guided by the river health benefits sought, and at a minimum must specify the volumetric unit (probably ML) its temporal and spatial characteristics. Given continued uncertainty as to where in the Murray stem flows are needed, units could be expressed in terms of Hume ML equivalents. This could account for the effects of delivery losses and return flow impacts associated with recovered water.

However if it is clear that environmental flows are to be used for spatially separated benefits, volumetric losses in getting water to where it is needed may require a suite of flow products. For example, some environmental outcomes sought under the *Living Murray* may be best served by seeking to recover 'Hume equivalent' water, while other outcomes may be best served by, for example, 'Morgan equivalent' water. In this latter case, supply efficiencies from sourcing water from various tributary systems may be pertinent.

The timing of available water is also likely to be important. The extensive storages on the Murray system provide significant flexibility as to when water can be released for environmental purposes. However water recovered will reflect differing inter-year availability

depending on the nature of access rights attached to it, and whether it is purchased on a temporary or permanent basis. Like all investors, the environmental manager must look to develop a portfolio of assets (water) with appropriate risk / reward characteristics. To this end, the differences in reliability of various entitlements and the availability of temporary or permanent transfers may offer additional flexibility. In any case, purchases will need to explicitly account for the availability of alternative recoveries.

4.4.2 *Salinity*

Changes in the diversion and regional use of water will lead to changes in River Murray salinity and associated downstream impacts. Under the Salinity and Drainage Scheme, a salinity credit or debit will be realised. This may arise due to either reduced salt export to the Murray with reduced irrigation, and / or due to the dilution effects of the increased flows.

The market instrument should seek to maximise these benefits by explicitly incorporating salinity benefits in bid assessments. EC credits under the Salinity and Drainage Strategy provide a metric, and all bids could be assessed for implicit EC credits / debits.

Issues for consideration include:

- EC credits are partial in that salinity impacts upstream of Morgan are not included
- The 'rights' to any credits created
- Second-round salinity impacts that may arise as increased water scarcity leads to increased water use efficiency and decreased return flows.

4.4.3 *Infrastructure*

Due to 'jointness of supply' of irrigation water within areas, decisions by an irrigator as to the volume of water used can impact the cost and availability of water to other irrigators. For example;

- Capital costs associated with water supply along a channel will depend upon the volume transported. As the volume falls, costs to the remaining irrigators increase. This may lead to second-round water sales if supply charges are reflective of costs, and may impact the viability of infrastructure (stranded assets).
- Channel capacities in some instances limit supply, and so reduced irrigation demand can benefit other irrigators by increasing their effective supply reliability.

These issues would be dealt with most easily if water were purchased at the Supply Authority level, as individual irrigators are unlikely to hold the necessary information and have no private incentive to modify bids for these factors. Conversely, individual irrigators hold the rights being traded, and so it may not be possible to handle this at the authority level.

Options to account for these impacts within a market instrument include;

- Specifying 'exit' taxes by channel / district – these are being applied to water trading in some areas, but may not be appropriate for the volumes considered under the *Living Murray*.
- Seek only joint bids, employ more sophisticated bidding approaches (some experience elsewhere), offer premiums for joint bids or require bids to be endorsed at the authority level (leaving it up to individuals to negotiate with authorities)
- Use of compulsory acquisition powers to prevent 'hold-outs' on channels which would prevent sensible infrastructure rationalisation.

Issues for consideration include:

- Legal - need to assess charging powers of authorities (who may hold bulk supply licences). Can they impose cost reflective charges on hold-outs? Can authorities sell water – what are their supply obligations?
- Equity – if authorities run by nominated members, will they act to ensure equity to all?

It is also understood that many authorities apply 'retention factors' that limit the amount of water that can be traded out of a district to counteract the up-thrust of saline water as a result of ground water pressures. This 'jointness in consumption' or strategic interdependence is similar to the infrastructure issue above, in that authorities are likely to hold the information on potential impacts, and individual irrigators have no incentive to incorporate these costs into their bids if they did have the necessary information. Issues for consideration include:

- How common are retention factors, what is their legal base, how robust are the designated factors, how are they enforced?
- What are the associated costs where retention factors are breached?
- What are the economic penalties associated with 'stranded land' – that is, land with these artificial water use requirements?

4.5 Other instrument design issues

A range of other issues are noted below that will require consideration when choosing a market instrument.

- Instrument administration and transaction costs
- Purchasing water linked to allocation rules (such as access to off-allocation water) rather than entitlements per se
- Impact of purchasing rights held by 'sleepers and dozers' on volumetric security
- Second round price effects leading to water use efficiency savings and reductions in return flows
- Taxation implications (CGT) of transactions
- Legal, institutional and administrative arrangements for water sourcing

5 NEXT STEPS

The purpose of this paper has been to argue the case for the adoption of an incremental, learning policy approach that makes use of a market instrument to secure low cost early gains.

Subsequent work should focus in more detail on the merits of alternative instruments and key design parameters.

Indicative tasks for further research include;

1. Further develop and critique the range of market-based instruments that can be used.
2. Identify the nature and significance of impacts that could be incorporated in the scope of environmental water sourcing for the River Murray, including in relation to;
 - a. natural resource issues such as salinity, waterlogging, water quality, flood and riparian management
 - b. natural resource management strategies being pursued by irrigation regions
 - c. water supply infrastructure refurbishment costs
 - d. government assistance being provided to irrigation areas
3. Undertake a comparative analysis of market instruments for recovering water for use as environmental flows in the River Murray. Specific attention should be given to key design issues, including;
 - a. suitable metrics for framing and evaluating bids
 - b. eligible sellers – individual irrigators and / or supply authorities
 - c. ensuring competitive bidding processes
 - d. price discovery
 - e. minimising costs to governments
 - f. minimising transaction costs
4. Identifying the characteristics of institutional arrangements necessary to support the most promising market type instruments in the short term and in the longer term when water and other resource markets are more fully developed.

APPENDIX A: EXTRACT FROM THE TOOWOOMBA COMMUNIQUÉ

MURRAY-DARLING BASIN MINISTERIAL COUNCIL

Friday, May 9, 2003

'The vision for The Living Murray, agreed in April 2002, is "a healthy River Murray System, sustaining communities and preserving unique values."

'... the Council directed the Commission to bring to its November 2003 meeting a proposal for a first step decision that will deliver measurable and integrated ecological, social and economic outcomes. This will be based on the scientific and socio-economic evidence to be presented before the meeting and the estimated costs and benefits of the options considered.

'Council recognised there are many ideas on how water might be recovered for environmental flow, that the choice will depend on the targets agreed and that the improvement of the health of the River Murray will depend on a range of factors other than flow volumes.

'Council has agreed that the development of water recovery mechanisms, against the three reference points should proceed to the next step. The Commission will conduct case studies, will estimate ecological, social and economic impacts, will collaborate and consult on these, and will have regard to the degree of choice and flexibility available, if adopted.

'Council noted that expanded and effective permanent interstate and intrastate trading markets in water access entitlements is fundamental to The Living Murray initiative, and will consider the prospects for commencement of an expanded market across the southern Basin by the 2004/05 irrigation season at its November 2003 meeting.'