5 Assessment framework

Key points

- The relative merits of the policy options for recovering water for the environment should be assessed against a common assessment framework incorporating the criteria of effectiveness and efficiency.
- Effectiveness reflects how well a policy mechanism achieves its objectives and is assessed using the following policy design criteria: clearly formulated objectives; targeting of the objectives; and budgetary cost effectiveness. The institutional and social impediments to implementation will also influence effectiveness.
- Efficiency involves maximising the wellbeing of the community through improving the way resources are allocated and used. It can be presented in a cost–benefit framework, where the costs and benefits are broadly defined to include environmental and social impacts. Efficiency also has a dynamic dimension.
- Efficiency may be improved by reducing the transaction and opportunity costs of the acquisitions, while maintaining or increasing effectiveness.
- Water recovery policy is likely to create winners and losers at both the sectoral and regional levels. However, the distributional effects are complex, difficult to disentangle from external factors, and often ambiguous.
- The impact of the water buyback on water markets will be largely determined by the volume of water shifted from consumptive to environmental use. However, other factors also play a role, including: the transparency in the setting of policy objectives and the Government's purchasing activity; the choice of a purchase mechanism that minimises transaction costs; and the pace of the buyback.

This chapter outlines the range of policy options for recovering water that will be considered in subsequent chapters and presents a common assessment framework that will be applied in assessing their merits.

5.1 Breaking down water recovery into policy design questions

A policy to recover water for the environment could be conceptualised as a set of policy design questions that would apply broadly to all forms of water recovery. The issues that need to be resolved are:

- **The volume, frequency and location of the water needed to meet environmental demands** — this involves identifying and prioritising environmental demands and incorporating these into the valuation of the water to be acquired (chapter 4).
- **Choice of product** — this involves deciding what property or contractual right should be acquired to deliver the environmental objectives. The range of options includes:
  - acquiring an existing water product, such as water entitlements and seasonal allocations, or developing and acquiring new water products, such as options contracts or contractual variations to water licence conditions
  - acquiring environmental outcomes directly, through contracts for environmental services (chapter 7).
- **Design of the acquisition mechanism** — this involves determining the method and geographic locations of the water recovery. Possible acquisition methods include:
  - administrative approaches to acquiring water
  - targeting a particular method for water recovery, such as investment in irrigation infrastructure
  - market-based approaches using mechanisms, such as existing market exchanges or various forms of tenders (chapters 6 and 8).
- **Determining the sequencing and pace of the acquisition** (chapters 6 and 8).
- **Determining appropriate governance arrangements for the various components of the policy** (chapter 9).

In order to assess the relative merit of the various policy options, a common assessment framework is required. In developing the framework, the Commission has predominantly used the criteria of effectiveness and efficiency, but has also considered the social and spatial distribution of the likely impacts.

5.2 Effectiveness

Effectiveness refers to how well a policy mechanism achieves its intended outcome, and can be assessed using the following criteria:

- clearly formulated objectives
- accurate targeting of the objectives
- budgetary cost effectiveness
- institutional or social impediments to implementation of the policy option that might impede effectiveness.

Clearly formulated objectives

In order for a policy to be effective and efficient it needs to be underpinned by clear, measurable objectives (the perceived objectives of the Australian Government's programs for recovering water were discussed in chapter one). The objectives should be formulated in a way that does not unduly restrict the range of options to address them, but be sufficiently specific to allow direct targeting and subsequent assessment of the policy.

Another important requirement is that the objectives are internally consistent. When it is impossible to achieve the objectives simultaneously, the necessity of tradeoffs between those objectives should be acknowledged and some guidance needs to be given on how to approach those tradeoffs. For example, if a policy has dual objectives of maximising environmental benefits and facilitating structural adjustment, it can be unclear how conflicts between these objectives should be resolved, and where the balance between the environmental and social outcomes should lie.

Targeting of the objectives

Matching policy instruments to policy objectives

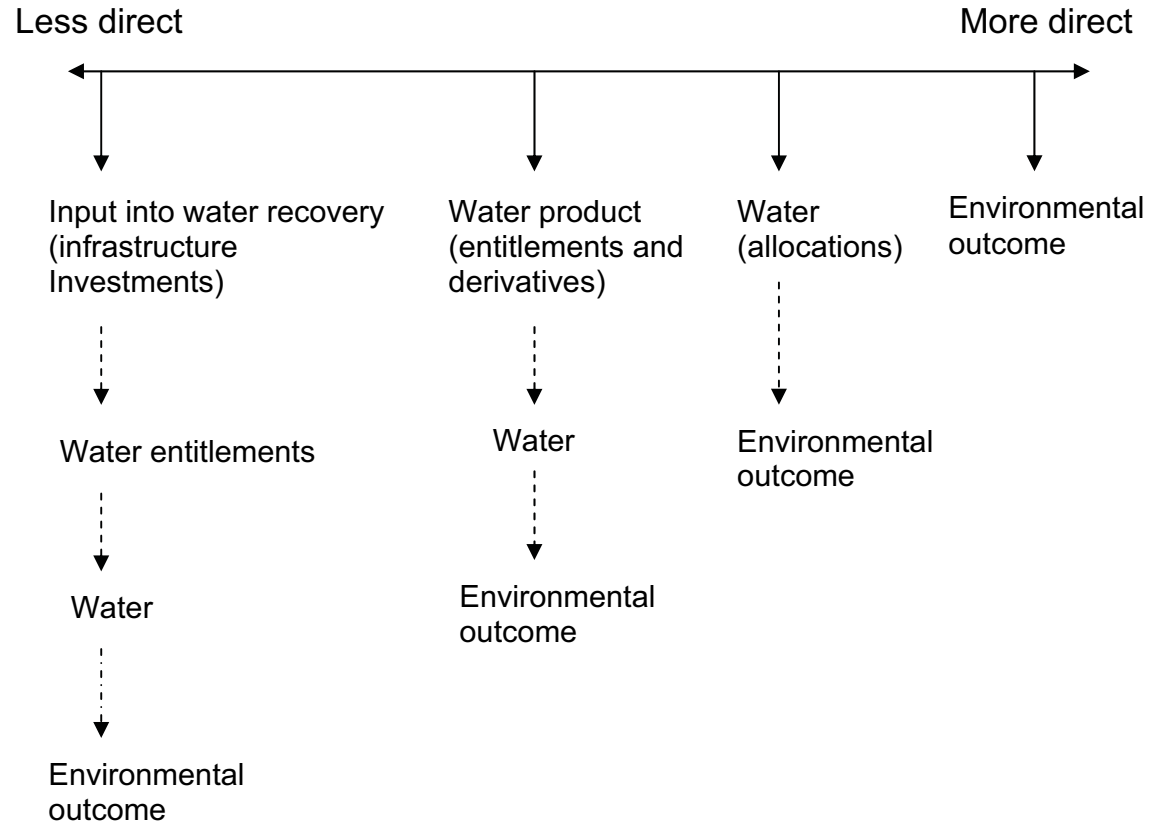
When a policy has multiple unrelated objectives an issue arises of whether these should be addressed through a single policy instrument, or whether multiple instruments are needed. In some cases a policy instrument may contribute to the achievement of several objectives. However, that policy instrument is unlikely to be the most effective and efficient way of addressing each of those objectives. Typically, a more direct approach of matching individual policy instruments to specific objectives is more effective and efficient. Where a policy instrument is used

to pursue several unrelated objectives, its effectiveness and efficiency in achieving each of those objectives should be assessed against more direct policy instruments.

Direct targeting of outcomes

Water could be recovered for the environment through a range of means, some of which are more directly linked to the environmental outcomes than others (figure 5.1).

Figure 5.1 **Alignment of the policy output with the environmental objectives**



Focusing the policy on inputs that are only indirectly linked to the policy objectives could reduce effectiveness because of uncertainty about the causal linkages between the policy and the objectives, and the contribution of other factors to the outcome. For example, the achievement of an environmental outcome through the acquisition of water could be undermined by other factors such as land management practices. This is not to say that the closest alignment of the policy output with the outcome would necessarily be preferred in all circumstances. There may be implementation difficulties or costs associated with such an approach that could make it impractical.

Spatial and temporal targeting

To achieve an environmental outcome, the acquisition of the water (or similar) product should target the location and timing of the environmental demand. Spatial targeting depends on the location of water acquisitions (keeping in mind the hydrological connectivity and the potential for the same water to deliver environmental benefits in two or more locations).

Temporal targeting depends largely on the choice of product and the mechanism of acquisition. For example, some water products might be best matched to environmental demands that are constant over time, while others could be better aligned with periodic and highly variable environmental demands. The time taken to finalise the acquisition, both due to the choice of product and the mechanism of acquisition, also influences the effectiveness of temporal targeting. For example, some water products, such as infrastructure improvements, take longer to deliver water than others, such as seasonal allocations. Similarly, various acquisition methods differ in their timeliness.

Effect of uncertainty — the need for adaptive management

Various aspects of environmental water recovery are characterised by considerable uncertainty. There is uncertainty about:

- the environmental science, including the location and extent of environmental problems to be addressed and the causal links between the time and form of environmental watering and environmental outcomes
- deliverability of water to areas of environmental need, due to hydrological and institutional constraints
- how the community values particular environmental outcomes
- future climatic conditions that could influence the volume and economic value of the water allocated to consumptive and environmental uses.

In view of this, much of the water recovery policy will need to respond to new knowledge as it arises. It is, therefore, important that the water recovery policy remains flexible by:

- allowing for an iterative approach to reducing uncertainty through experimentation
- minimising the consequences of mistakes that result from imperfect knowledge, by facilitating timely and low-cost adjustment in response to new information.

The pace of water recovery could influence the capacity of the policy to engage in and benefit from experimentation. The choice of water products influences the cost and timeliness of adjusting to new knowledge.

Budgetary cost effectiveness

Budget constraints mean that budgetary cost effectiveness is an important consideration in selecting between the available options. Budgetary cost effectiveness is improved by reducing the financial cost to a government of acquiring a unit of environmental benefit (thus releasing budget funds to acquire additional benefits).

Institutional impediments to implementation

The effectiveness of particular water acquisition options depends on whether there are any institutional or social constraints to their implementation. Potential institutional impediments include the various administrative and legal constraints on trade imposed by the irrigation infrastructure operators and jurisdictions, and the implications of the way the water property rights are defined.

In most instances the preferred approach is to address directly any institutional constraints on trade (chapter 10). However, where this can not be done in a timely manner, a second-best approach of addressing these constraints is through the design of the water recovery policy. For example, the geographic targeting, pace of the acquisitions, and the choice of product (where the constraints apply to particular products, such as water entitlements) may be affected.

The institutional settings governing property rights have a direct bearing on the choice of product and could also influence the mechanism of acquisition. For example, acquisition of volume-based water products may be an ineffective, or at least insufficient, strategy in the Northern Basin, where many entitlements are flow based. And different acquisition mechanisms may be needed to acquire water in regulated and unregulated systems.

A separate institutional consideration is the governance structures applying to the water acquisition policy itself. Effective governance requires that:

- the responsibility for components of the policy task is allocated to agencies best equipped to deliver them, taking into account the relevant skills, expertise and administrative costs, as well as potential conflicts of interest
- adequate arrangements are in place to ensure accountability.

The choice of governance model may have substantial implications for the way the water recovery policy is implemented (chapter 9).

Social impediments to implementation

Water recovery policy may also generate some adverse regional or sectoral impacts (discussed below), which could lead to social resistance to the policy. In the case of water purchases from willing sellers, this may manifest itself in few willing sellers or in sellers demanding a price premium. In the case of administrative acquisitions, social resistance might give rise to litigation (for example, due to disputes over compensation). The potential capacity of the water acquisition policy to address distributional issues — which may be a source of possible social resistance — is discussed in chapter 8. Nevertheless, some of this resistance could also be reduced by improving other aspects of the policy. For example, greater community acceptance might be achieved by clear formulation and communication of the objectives of water acquisitions, particularly if some of those objectives are consistent with community preferences, and other supporting instruments are used more directly to address social issues.

5.3 Efficiency

An efficient policy is one that maximises the wellbeing of the community through improving the way resources are allocated and used. One way to assess efficiency is through a cost–benefit analysis. The costs and benefits should be broadly defined to incorporate all benefits and costs including environmental and social impacts. Maximising the net benefit involves acquiring water for environmental use up to the point at which the benefit of acquiring an additional unit of water is equal to the cost of shifting that water from its current use. In practice, this task is difficult, due to information problems, in particular poor scientific knowledge and the difficulty of revealing the community's willingness to pay for environmental benefits. Because of this, in some cases, analysis may need to be limited to assessing the relative efficiency of policy alternatives.

Benefits

Chapter 4 describes the various types of environmental benefits that could result from water acquisitions and identifies the difficulties in valuing the environmental benefits to determine the efficient balance between environmental and consumptive uses of water.

It is important that any water acquisition policy recognises that the environmental benefits to the community of acquiring water depend on a multitude of factors (some of which have been identified in chapter 4) and that these are incorporated to the greatest practical extent in the decision to acquire the water.

Environmental benefits can also be increased through addressing the policy design criteria for achieving effectiveness, formulated above. Much of the discussion in subsequent chapters will focus on this avenue for increasing environmental benefits.

Another way of improving the efficiency of the policy is through reducing its cost to the community, for a given quantity of benefit.

Costs

The costs to the community of water acquisitions can be broadly categorised into transaction and opportunity costs.

Transaction costs

Transaction costs are the costs incurred by the relevant parties in initiating, negotiating and finalising transactions. The nature of the costs depends on whether the water is acquired through a market-based instrument, or administratively, and whether the water is acquired directly, or through investment in infrastructure.

In the case of water purchases, transaction costs include the administrative costs incurred by the Australian Government in setting up and running the purchase scheme, the administrative costs of the relevant state government agencies and utilities in processing conveyance applications, and the negotiation and conveyance costs to the current holders of water rights. The costs are primarily influenced by:

- the type of product acquired — costs could vary depending on:
  - whether the product is permanent (requiring a single transaction) or temporary (requiring multiple ongoing transactions)
  - whether the product is currently traded in the market (allowing the utilisation of existing institutions and knowledge) or new (creating the need to educate the participants)
  - how complex the product is and how prone it is to information asymmetries (these could give rise to wasteful rent-seeking during negotiation).
- the purchase mechanism and the governance arrangements underpinning the acquisition.

In the case of administrative acquisition of water rights, transaction costs include:

- the cost to the Government and affected water right holders of negotiating compensation, where applicable (including the potential litigation costs)
- the cost to the Government of administering the acquisition.

In the case of less direct water acquisitions undertaken outside of the water market, such as through infrastructure investments, the transaction costs include:

- the administrative costs to the Government of assessing proposals and monitoring and enforcing compliance with successful proposals
- the administrative costs of the relevant state planning and environmental agencies in assessing applications
- the cost to the relevant parties of preparing proposals, and (if the proposal is successful), the costs of obtaining planning approvals and of demonstrating compliance with the terms of the proposal.

Opportunity costs

Opportunity costs are the value of the best alternative use of resources that are foregone in pursuing a policy. In the context of water purchases for the environment, the opportunity cost would be the value of that water in its most valued alternative use. In efficient markets, this would be reflected in its market price. In the case of indirect water acquisitions, such as through infrastructure upgrades, the opportunity cost would be the financial cost of the investment.

Several factors will influence the opportunity costs of water acquisitions including:

- the volume of the water acquired
- type of product acquired — costs would vary depending on:
  - whether the product acquired is a water product, an input into the recovery of water (such as infrastructure investment) or a composite of the water and other contractual or property rights (such as in joint acquisitions of water entitlements and land or in direct acquisitions of environmental outcomes)
  - whether the product is temporary or permanent in nature and whether it is flexible in adjusting to new knowledge about the costs and benefits of the water
  - whether the parties to the transaction value any other characteristics of the water product that are not related to the volume of water. For example, high reliability water entitlements are often valued by irrigators as a price risk management tool against fluctuations in water prices

- the mechanism of acquisition — assuming the environmental and other benefits are not affected by the choice, the water should be acquired from those that place the lowest value on their water. The ability to identify such water users is largely dependent on the design of the acquisition mechanism
- pace of water acquisition — a slower pace of acquisition may improve adjustment opportunities for the sellers (particularly if they have fixed assets) and hence, reduce the cost to them of parting with their water rights
- the presence of third-party effects — shifting the water from consumptive to environmental use may result in external costs or benefits that are not reflected in the market price of the water. These may include environmental effects such as salinity impacts.

While the acquisition of water by the Government may impose greater than optimal opportunity costs on the community at the outset, over time some of these costs may be mitigated through subsequent trade in the water market. For example, if the Government purchases water from sellers who value water more highly than others in the market, those sellers would be likely to engage in secondary trade to buy back water from those that place a lower value on it. This would ensure that the water again moves to its highest value use, subject to the transaction costs of trading. Similarly, if a greater than optimal volume of water is acquired, the Government may subsequently sell some surplus water back on the market. Nevertheless, such secondary trade would likely be subject to delays and various transaction costs, particularly in catchments that have a thin water market. It is, therefore, desirable for the Government to seek to minimise the opportunity cost of the water acquisitions at the outset.

Achieving dynamic efficiency

Dynamic efficiency refers to achieving an efficient allocation of resources over time. There are two contexts in which dynamic efficiency is relevant to water recovery policy:

- the degree to which the Government influences community expectations of future policy — the sovereign risk component
- the degree to which the policy facilitates or hinders the future ability of the community to adapt to changed economic and climatic conditions.

In the case of the former, it is important that community investment decisions are informed by the best possible knowledge of current and future Government policy. This underscores the importance of clearly defined and transparent policy objectives. It is also important that the Government considers the implications of its

policy on long-term community perceptions of sovereign risk. For instance, an uncompensated compulsory acquisition of a privately-held asset may come at low administrative cost and may even be efficient in the short run. However, this policy is likely to adversely affect the private incentives for future investment in similar assets.

In the case of the second point, Government policy should not work against or introduce any impediments to future structural adjustment. The status quo should not be automatically pursued as an end objective, because the existing economic structure is unlikely to be the most efficient one under future (unknowable) conditions.

Coordination of policy mechanisms to improve effectiveness and efficiency

Coordination of the various policies that recover water for the environment in a way that maximises their synergies is important to achieve effectiveness and efficiency. There are two potential approaches to coordination. Under the first approach, the existing mix of the policy mechanisms is assumed to be fixed, and coordination for the most part involves managing the geographic location and pace of implementation of those mechanisms. The weakness of this approach is in the assumption that the instruments in the current mix are compatible and that the current set of policy instruments is optimal.

Under an alternative approach, which is preferred by the Commission, coordination of the implementation of the different instruments is preceded by an assessment of all of the policy instruments against a common assessment framework. This approach is itself likely to improve the compatibility of the different policy instruments. It would allow the identification of the most effective and efficient policy instruments, potential fields of application of particular instruments, and the efficiency and effectiveness tradeoffs between the instruments.

5.4 Distribution of impacts

A policy to recover water could impose costs on particular groups in the community even when it leads to an overall net community benefit. If one of the objectives of government policy is the achievement of an equitable distribution of costs and benefits in the community, the distribution of the impacts of the policy becomes an important consideration. This section outlines the distribution of impacts on the various affected groups including irrigators, regional communities and the broader community.

Impacts on irrigators

The impacts of water recovery on irrigators differ depending on whether the water is recovered through a buyback, through administrative means, or via investment in irrigation infrastructure.

The impacts on irrigators from a buyback

The buyback of entitlements could impact individual irrigators in three ways. First, a policy to purchase water for the environment from current holders of water entitlements introduces an additional demand on water and hence, would increase the price of water (whether in the form of water entitlements or seasonal allocations). The impacts on particular irrigators of this price increase are complex and ambiguous. Whether an individual irrigator benefits or incurs a cost depends on their initial permanent water holding and on whether the water acquisition changes their activity in the water market from being a net purchaser to a net seller of water.

Thus, the buyback could impose a cost on irrigators that held few entitlements and relied largely on purchasing seasonal allocations. However, for irrigators that relied largely on their entitlements prior to the buyback, the buyback presents a clear opportunity to benefit from the higher price of their asset. This opportunity would be particularly important for the many irrigators currently facing cash flow problems and/or the pressures of high debt levels.

The second impact arises from irrigators exiting their irrigation area and potentially increasing the cost of servicing fixed infrastructure for irrigators that remain in the system. (In an extreme scenario, the remaining irrigators may not be able to meet the increased cost and so would exit the system, leaving irrigation infrastructure assets stranded.) However, these costs would be mitigated by the termination fees levied by infrastructure operators (chapter 10) and the ability to decommission some infrastructure following a reduction in delivery needs.

Finally, some of the environmental benefits arising from water recovery policy, such as improved productivity due to better water quality, would be local in nature. These would accrue largely to the irrigators, rather than the broader community.

The impacts on irrigators from administrative acquisition of water

The impacts on irrigators whose water is administratively acquired will depend on whether those irrigators are compensated and to what extent. Where there is no compensation, a cost will be incurred by irrigators whose water holdings have been

reduced, while for compensated acquisitions, the impact would depend on the size of the compensation relative to the value of the water to the irrigator.

The acquisition would reduce the volume of water available for consumptive use and increase the price of water entitlements and seasonal allocations in subsequent private trade. As in the case of the buyback, the impacts from this price increase on particular irrigators would depend on their remaining water holding and on whether the increase in the price is sufficient to influence them to sell their water in the water market.

Further, similarly to the buyback, there may be increased infrastructure costs faced by remaining irrigators, and there may also be localised environmental benefits captured by irrigators, from improved water or soil quality.

The impacts on irrigators from investments in infrastructure

The distribution of the impacts on irrigators from water recovery through investments in infrastructure could differ from that of direct water acquisitions (whether administrative or market based). To the extent that the investments are subsidised and participation is voluntary for the irrigators (or irrigation infrastructure operators), those that participate would be expected to derive a benefit. The size of this benefit would depend on whether the Government subsidy includes a premium over what the irrigator would have been willing to accept to undertake the investment.

Impacts on regional communities

Irrigators are a part of regional communities, so the positive and negative impacts (as well as all the uncertainties associated with them) on irrigators are a part of the regional level impacts.

In addition to the direct impacts on irrigators, there could be indirect impacts on regional businesses that service irrigated agriculture and that are likely to experience a reduction in demand for their services if there is a contraction in irrigated agriculture due to reduced supply or higher cost of irrigation water. These negative impacts may lead to flow-on effects, where other businesses providing inputs into the production of the initially-affected business are also adversely affected.

There may also be benefits accruing to regional communities from irrigators investing some or all of the proceeds from the sale of their water back into the region, either in the form of increased consumption or as business investment. In

addition, some of the environmental benefits of the acquisitions, such as an increase in the recreational value of environmental assets, may be experienced at the regional level. If the flow-on effects of the negative impacts are included in assessments of regional impacts, the flow-on effects of these benefits would also need to be included (appendix D).

Overall, much of the impact of water acquisition on regional communities is indirect and ambiguous and depends on:

- the net impact on irrigated agriculture in the region
- the share of irrigated agriculture in aggregate regional production
- the extent to which irrigated agriculture relies on regional production for its inputs
- how the proceeds from selling water and/or compensation are used
- the distribution of the environmental benefits of the acquisition.

Impacts on the broader community

Water recovery policy will result in both costs and benefits for the broader community. Taxpayers will cover the budgetary cost of the water acquisitions, (including the cost of raising the tax revenue). The benefits to the broader community will be in the form of the environmental benefits generated by the acquisitions.

To summarise, assessing the distribution of the impacts from environmental water recovery is complex. There could be both positive and negative impacts at the irrigator and regional levels and much would depend on factors outside of the control of the water recovery policy.

5.5 Impact on the water market

The terms of reference for this study require the Commission to consider the impact of the buyback on water markets. Of importance is whether and how the design of the buyback can be modified to mitigate any adverse impacts. The relevance of the various aspects of the design of the buyback is outlined below.

Choice of water product

The water markets have given rise to a range of water products, and new products may be developed as a consequence of the buyback. However, the underlying asset behind all of those products is the right to take and use water. In this context, the prices of all products that give rights to the same water will be interconnected, and will move together, depending on changes to the supply of, and the demand for, water. Consequently, it is the volume of the water acquired for environmental use at any given time, relative to the water available, that would have the biggest influence on prices in water markets, not whether the water was acquired through a particular product.

For example, the purchase of a water entitlement yielding a series of seasonal allocations into the future, would have a similar effect on the prices of all water products to a yearly acquisition of the same volume of water in the seasonal allocation market. This is because in the two cases, the same volume of water would be shifted from consumptive to environmental use.

Choice of purchase mechanism

The key factor influencing water prices is the volume of water shifted from consumptive to environmental use, and the choice of purchase mechanism in the buyback is unlikely to directly affect the prices in the water markets. However, the design of the buyback mechanism can still have an indirect effect by influencing the transaction costs faced by market participants. If the buyback introduces substantial uncertainty about the current market price of water (for example, through utilising a mechanism that keeps prices secret and delays the execution of trades) this could increase transaction costs for all buyers and sellers in the water markets. Conversely, a buyback that utilised existing market platforms could 'deepen' the markets (improving the information about the current price of water) and foster the development of private intermediaries and exchanges. This could reduce the transaction costs of all market participants (chapter 8).

Pace of the buyback

One feature of the buyback that could influence the impact on water markets is the pace of the purchasing. A faster pace could hamper the ability of the irrigators to adjust their production practices to using less water, particularly if those irrigators have fixed assets that would need to be abandoned as a consequence. In turn, this may result in irrigators demanding a higher price for the water they sell (chapter 8).

The need for transparency

Finally, as in other markets, the expectations of participants in the water market play a significant role in the functioning of the market, and it is important that the buyback accurately informs those expectations. This would necessitate the greatest possible transparency from the Australian Government in formulating and communicating to the market the environmental watering demands, and the extent to which particular purchases of water address those demands.