



Australian Government

Land & Water Australia

New Markets: Buying and Selling Environmental Goods and Services

A Summary of Recent Research by Land & Water Australia on Market-based Instruments

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This fact sheet outlines six projects on Market-based Instruments commissioned by Land & Water Australia, and explains why it is an important area for ongoing research and investment.

It supplements an earlier fact sheet titled 'Facts about stewardship, ecosystem services and market-based instruments' that is available on the www.lwa.gov.au/sirp website.

What is a Market-based Instrument?

Market-based Instruments (MBIs) are frameworks for buying and selling environmental goods and services.

For a producer, MBIs provide structures and processes for selling aspects of their land stewardship; like selling cattle at the regional stockyard.

The sorts of things a producer might 'sell' include clean runoff water, endangered grasslands, remnant woodlands or even carbon captured through growing new farm forests. Rather than going to the stockyard, the 'instruments' used to sell these goods and services are auctions, offsets, cap-and-trade and credit systems and the like.

In natural resource management (NRM), MBIs work by providing a framework for a market exchange between buyers of environmental services (such as government agencies, regional NRM bodies or licensed polluters), and willing sellers of these services (such as farmers).



Under an MBI framework:

- 'buyers' of environmental services are provided with a marketplace in which to choose the best value outcomes
- land managers (and others) are given a business incentive to become suppliers, or 'sellers' of innovative environmental services.

Market-based instruments (MBI), such as environmental taxes, tradable permit systems or targeted subsidies, apply the economic principles of supply and demand to the management of natural resources such as water, biodiversity, habitat, water quality and forests.

MBIs can be used to:

- alter market prices
- set caps on the use of resources
- improve the way a market works

- create a market where one previously did not exist.

MBIs have been successfully used to:

- improve existing incentive processes
- target intervention by engaging specific land managers
- engaging land managers in specific management activities to improve the management of natural resources
- gain greater results for less funding.

Examples of MBIs include:

- conservation tenders or auctions
- environmental offsets
- cap-and-trade mechanisms

MBIs are already being used by regional NRM groups and government agencies to meet regional planning targets.

MBIs can be used to complement and leverage other incentives for encouraging better management, such as conservation agreements, taxation incentives, grants, subsidies and stewardship payments.

Not long ago, society had taken the supply of environmental goods and services for granted. Traditional markets have inadvertently encouraged their depletion, and left good land-stewards shouldering the costs.

In an ideal world, the opposite would be true; financial rewards would flow to the best land-managers and markets would strongly deter practices that damage our natural resources.

This is exactly what MBIs are designed to do – to correct market failures by sending signals that encourage better practices.

Why Invest in Knowledge to Underpin Market-based Instruments?

To date, governments have been the major buyers of environmental goods and services – purchasing

on behalf of society as the ultimate beneficiaries. In early 2008, the Australian Government, for example, purchased 35 billion litres of water in the southern Murray-Darling Basin at a cost of \$50 million as part of a broader buyback plan to revive the river's health.

Governments are, however, increasingly looking for ways of shifting these costs to industries and consumers so that they can factor in the full costs of their production activities into their decision-making.

MBIs set up to trade carbon are a good example – Energy Australia purchased over \$1 million in carbon certificates in 2004 under the NSW Greenhouse Gas Abatement Scheme. The Australian Government's proposed emissions trading scheme, identified in its 'Carbon Pollution Reduction Scheme Green Paper', is expected to drive nation-wide investment in carbon storage and capture along the full production supply chain.

'Biobanking' schemes, such as the NSW Government's Biodiversity Banking and Offsets Scheme, are an MBI designed to enhance and protect biodiversity values using the income generated from the sale of credits.

For example, a non-government organisation might purchase private land of high ecological importance, and then sell the biodiversity credits to industry to fund its ongoing management. The credits might be sold to a developer who needs to offset the impacts of a proposed property subdivision in order to gain development approval. The costs incurred by the developer in buying the credits are then likely to be passed on to the eventual property purchasers.

MBIs are expected to result in market prices for goods and services that more accurately reflect the full cost of production and, at the same time, realise better and cheaper environmental outcomes.

The Prime Minister's Science, Engineering and Innovation Council stated 'that it is far cheaper to maintain our natural systems than it is to allow them inadvertently to be damaged and, subsequently, to inherit a costly repair bill.' (2002)

Much of this thinking is new and innovative, and needs to be underpinned by sound knowledge to guide policy development and implementation. To gain widespread credibility and application, the

buyers, sellers and regulators interacting within any MBI framework will need to be confident that it works, as will the broader Australian community. This is where Land & Water Australia has an important role to play as a research and development corporation established to invest in knowledge to support the sustainable management and use of Australia's natural resources.

Project Outcomes

Land & Water Australia has invested in the following six projects related to Market-based Instruments.

1. Building Regional Australia's Capacity to Initiate Markets for Ecosystem Services

This report aims to put MBI theory into practice and provide guidance on their design and where they are likely to perform best.

Regional NRM bodies are the principal target audience.

The project is supported by Land & Water Australia through the Joint Venture Agroforestry Program, and was led by Dr Stuart Whitten of CSIRO's Ecosystem Services team.

It is argued that the benefits of MBIs come from harnessing the 'gains from trade'. Gains from trade are derived from differences, or heterogeneities, among landholder preferences, resources or production opportunities. Because of these differences, trades leave both parties better off.

MBIs are likely to outperform other instruments where the ability of potential participants to provide the desired outcome varies greatly; there is flexibility in the range of responses that will deliver the desired outcome; regulatory approaches are difficult; and there is greater scope for innovation in improving NRM management.

Identifying where the gains from trade are present and how they may be harnessed is reliant on good information about the biophysical issue targeted, and the community and policy context in which the MBI is to be considered.

There are three categories of MBIs: price-based; quantity-based; and market friction instruments. Choosing between them is based on whether there is an existing market for the environmental good or service.

In the absence of existing markets, the decision facing most regional NRM bodies is between price- and quantity-based MBIs.

Quantity-based instruments are preferred when:

- there is a set quantity target,
 - there are low costs of additional ecosystem service provision,
 - damage thresholds are present,
 - environmental outcomes are perceived as a duty rather than worthy of reward, or
 - there are long time lags in producing the desired outcome.
- Price-based instruments are preferred when:
- there is a fixed budget available,
 - additional actions are costly,
 - payment is considered acceptable, and
 - outcomes can be achieved within the payment period.

Despite these principles, instrument choice remains a pragmatic trade-off that will involve consideration of the relative transaction costs among other factors.

It is also important to note that MBIs may be designed to address single or multiple issues.

Market failures prevent the gains from trade being realised. The most common forms of market failure are incomplete property rights, information failure or asymmetry, market structure issues and constraints to market participation.

MBIs need to be designed to avoid or minimise market failures. The researchers discuss aspects of design and implementation to address market failures.

2. Encouraging Participation in Market-based Instruments and Incentive Programs

Low levels of landholder participation can impair the ability of MBIs and incentive programs to achieve their desired outcomes, as well as reduce their efficiency.

This project, led by Professor Mark Morrison from Charles Sturt University, looked at the characteristics of MBIs and incentive programs that encourage participation, who participates, and how participation can be increased through better communication.

The researchers conducted eight focus groups in four regions in NSW and Queensland, interviewed 25 experts and surveyed some 6,000 landholders across five NRM regions.

Behavioural factors, especially social connectedness, business orientation and information seeking, were identified as some of the best predictors of participation. Some situational variables were also found to influence participation, including farm size, hours worked on-farm and duration on the property.

The work suggests that participation in MBIs and incentives can be influenced by the choice of program administrator, flexibility in outcomes and practices, paperwork requirements, access to technical support, clarity about eligibility and processes, contracting arrangements and the program type.

Landholders demonstrated much greater interest in applying for a fixed grant or a variable cost-share program compared to a tender. Contract duration, monitoring requirements and payment schedules were important determinants of participation.

In terms of who participates, age was found to have a negative influence, whereas education was positively correlated. Attitudes were found to play a key role in participation, especially trust in the delivery organisation. Attitudes like environmental responsibility, innovativeness and profit-focus were found to be good predictors of behavioural intentions, but not participation.

The four variables that had the largest and most consistent influence on participation were trust, social connectedness, business orientation and

information seeking. These factors, together with socio-demographic and situational variables, were used to identify five distinct landholder groupings (three mainstream and two hobby farmers). The groups also differed in their participation in and awareness of MBI and incentive programs.

In terms of the most effective communication with landholders, the research found that participation was more likely where landholders directly hear about a program. Networks, field days, seminars and experimental economics workshops were also found to be persuasive information channels.

Newsletters, advertising and the internet, given their limited reach, were seen to play a complementary role. The internet was identified as a channel that could be more fully exploited and, together with industry newsletters, print media and radio, may be the most effective ways of targeting some of the more difficult to reach landholder groupings.



3. Achieving Coordinated Landscape-scale Outcomes with Auction Mechanisms

A team of economists and scientists, led by Andrew Reeson from CSIRO Sustainable Ecosystems, examined the effectiveness of competitive tenders, a type of MBI, for allocating payments for environmental goods and services.

The project aimed to improve the design and implementation of competitive tenders to achieve cost-effective conservation outcomes at the landscape-scale. It focused on using competitive tenders to establish conservation corridors and similar landscape-scale change that requires coordinated actions by landholders.

Case studies in northern Queensland and New South Wales tested the techniques discussed.

The work found that running tenders over a number of rounds facilitated habitat corridor formation. Landholders were given opportunities to modify their bids between rounds, based on information provided to them about the location of other bids across the landscape. Landholders didn't know the number of rounds in advance, and weren't able to increase their price if they found they were located within a potential corridor. In this way, the competitive nature of the tender was maintained.

The research emphasises the complexity of assessing bids. The value of any single bid is dependent upon the other bids in the total package. It is therefore necessary to calculate the value of each possible combination of bids for the landscape as a whole. In doing so, habitat condition and management must be accounted for, together with connectivity and complementarity where appropriate.

This project also makes recommendations on the design and implementation of competitive tenders to ensure optimal participation by landholders, and on the use of simulated tender exercises in workshops with potential participants as a valuable engagement tool.

4. Agricultural Land Retirement as an Environmental Policy

A team of researchers, led by Dr Ben White at the University of Western Australia, have been analysing contract design in the context of agricultural land retirement policy, including in the United States and European Union. Agricultural land retirement is defined as a short-term or long-term diversion of land from agriculture to non-agricultural use, including native revegetation, forestry and fallow.

A cost-efficient land retirement policy is described as having three components. It should target land retirement according to environmental objectives; estimate compliance costs for the target population of farms; and use a policy mechanism (flexible contracts or auctions) to account for variations in compliance costs.

The unobserved shadow price of land plays a key role in a land retirement scheme. It is what the landholder compares the rate of compensation per hectare against. The shadow price of land is strictly the shadow rent of the marginal (or additional) hectare of land to the landholder. In the short-term, this price can be above or below the market rental for leased land or market land price when converted to a rental value.

This project proposes three methods of estimating the shadow price of land, including a comprehensive method of determining this price to farmers. The analysis shows that much simpler methods may also provide accurate estimates.

It demonstrated that targeted land retirement in the Western Australian wheatbelt, as a case study, has the potential to achieve multiple environmental benefits. A scheme similar to the American Conservation Reserve Program (CRP), coupled with appropriate management measures, is suggested as providing long-term solutions to catchment management, water shortage and land degradation. As the CRP system is high cost, land retirement would need to be targeted to protect priority public assets. The research identifies ways of reducing these costs.

The work indicates that land retirement policies are likely to be most effective in regions of low land values in combination with high value public assets. The researchers propose that the implications of a compulsory or voluntary land retirement scheme could be explored through a relatively small trial in a high value catchment.



5. Breaking through the Equity Barrier in Environmental Policy

Researchers Steven Schilizzi and Jonelle Black from the University of Western Australia argue that policies which focus on increased economic efficiency may be at the expense of equitable or fair outcomes for current and future landholders.

It is therefore important to examine the equity implications of efficiency-maximising policies like MBIs. For example, a policy may be efficient, but politically unacceptable if it is seen as socially unfair.

The 18-month study looks at the concept of the 'probability of acceptance' in the context of water allocation policies in Western Australia. Its purpose was to inform policy design by generating information on the type of equity concepts stakeholders have in mind when reacting to different water allocation policies.

A two-pronged approach was taken. Firstly, surveys were used to explore the equity concepts of urban and rural populations in relation to reticulated water and bore water management policies. Secondly, controlled experiments tested some of the important factors revealed by the surveys.

- The survey results show remarkable consistency in concepts of equity across all sectors of the population in relation to water allocation. A clear and mostly stable structure of preferences between different concepts of equity emerged across all sectors of the population.
- While there are variations, these are of intensity or degree rather than kind. Income and age seem to influence concepts of equity the most, and education shows no influence at all. The stable structure of revealed preferences supports the research hypothesis that influences are not random but structured. The controlled experiments were planned to test the structural stability; something surveys cannot do.

The experimental study further confirmed the research hypothesis that equity concepts are context-dependent and therefore, in principle, predictable. However, some are more context-dependent than others, as well as more sensitive to particular factors. Of three context factors studied, uncertainty about one's position in society affects

equity concepts the most, followed by considerations of equity-efficiency tradeoffs and, lastly, the role of monetary incentives (the profit motive). Confirmation of these results is needed through further experimentation.

It was further found that MBIs are less likely to be opposed on grounds of inequity if their efficiency benefits are clear and credible. In general, support for an equity concept is less context-dependent than opposition to it. From a policy perspective, the research suggests that it is more costly to tackle the reasons underpinning support than opposition. The role of wealth on equity concepts was found to depend strongly on the particular equity concept involved. More work is needed to understand the effects of real money, benefits or resources on equity concepts.



6. Creating Markets for Environmental Goods and Services: A Mechanism Design Approach

Gary Stoneham's report focuses on the environmental impacts of land use change resulting from 'missing markets'. Until recently, these markets were thought to be missing because the environment is largely a public rather than private good.

In terms of demand, we don't have information on how much individuals or the community want or are prepared to pay for environmental goods and services. When it comes to supply, we don't know which landholders produce the lowest cost environmental goods and services, nor do we have information about the actions taken by landholders in providing them.

Furthermore, units of environmental goods and services aren't discreet. For example, trees along a waterway provide habitat, store carbon and filter water runoff – and are spread unevenly across the landscape.

Mr Stoneham's work explains that these issues should be considered when designing different policy mechanisms, such as tradeable permits, offset markets and auctions to allocate conservation contracts, and that their relative importance will vary. In the case of an auction, a trial suggests that auctioning conservation contracts to reveal landholder 'type', rather than just randomly drawing landholders, resulted in a 30% saving in purchase costs.

Higher costs and diminished economic efficiency are said to result from environmental programs that use centralised approaches, like planning and legislation. This is because all landholders, whether high- or low-cost providers, are required to comply. These approaches are advocated as having a limited but well-defined role in any policy mix. Similar efficiency and cost-effectiveness problems apply to other policy mechanisms, such as fixed-price grants and simple incentive schemes.

The work also suggests that the development of a set of environmental accounts within the National accounts framework used for the rest of the economy is possible if market-based approaches are employed.

This would provide society with a comprehensive picture of the status of the environment, the impact of public funds allocated to the environment, and information about supply prices. Such information would assist policy-makers and the public in making better choices and, ultimately, dramatically improve environmental management.



Summary

The projects in this fact sheet demonstrate that much progress has been made in designing and implementing MBIs.

The researchers concerned have tested and refined their ideas in different regional contexts and, in doing so, have actively engaged with a wide variety of stakeholder interests.

While just a selection of a much broader suite of research activities occurring across the country, this body of work makes a significant contribution to supporting an effective and appropriate role for MBIs in realising NRM and environmental outcomes in Australia.

Land & Water Australia's future research investments will build on these strong foundations.

The complete reports and individual fact sheets from the projects outlined in this publication can be downloaded or ordered from the Land & Water Australia website at www.lwa.gov.au/sirp. Alternatively you can email: enquiries@lwa.gov.au or Phone: (02) 6263 6000

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