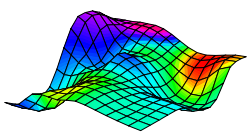
Report to the

NSW CMA Chairs' Council

Use of market based instruments by Catchment Management Authorities in NSW to achieve landscape scale change

Background Paper

17th October 2007



BDA Group

Economics and Environment

CSIRO

Acknowledgements

The NSW CMA Chairs' Council engaged BDA Group, in collaboration with CSIRO, to advise the Council on the current and potential use of market based instruments for Catchment Management Authorities in NSW to achieve landscape scale change consistent with their Catchment Action Plans.

Despite every effort to verify data and clarify issues raised, any remaining errors or omissions are the responsibility of the authors. Accordingly this report does not necessarily reflect the views of the NSW CMA Chairs' Council.

Contact Details

Drew Collins
Managing Director
BDA Group
PO Box 4022
Manuka ACT 2603
Ph: 02 – 6282 1443
Email: drewcollins@netspeed.com.au

Stuart Whitten
Economist/Institutional Analyst
CSIRO Sustainable Ecosystems
GPO Box 284
Canberra ACT 2601
Ph: 02 – 6242 1683
stuart.whitten@csiro.au

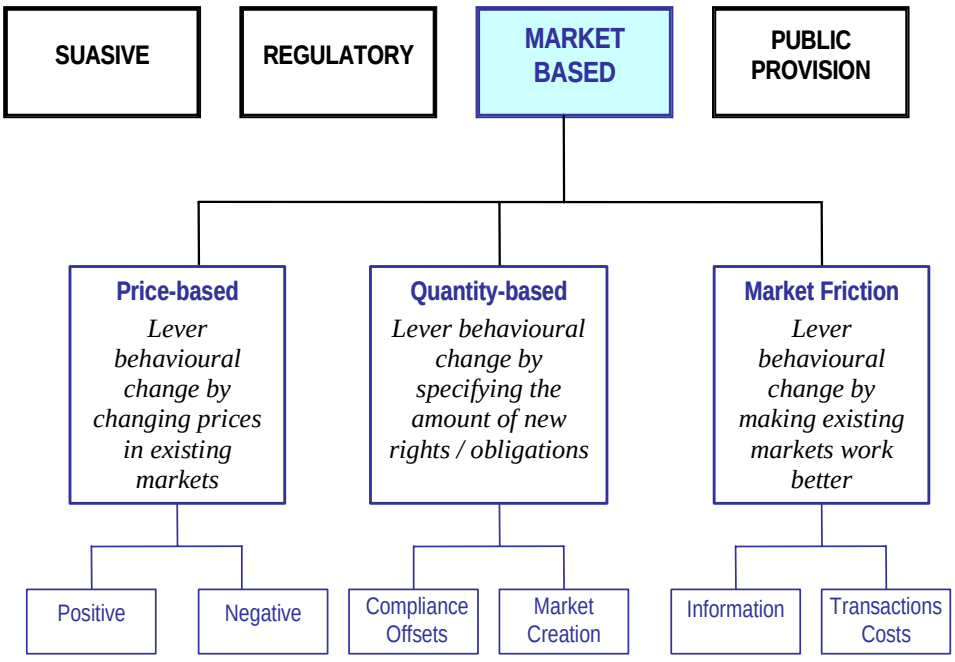
EXECUTIVE SUMMARY

The NSW CMA Chairs' Council (CCC) engaged BDA Group and CSIRO Sustainable Ecosystems to assist the Council develop an *Action Plan* that the CCC can use to promote the more widespread use of market-based instruments (MBIs) by Catchment Management Authorities (CMAs) in NSW for natural resource management (NRM).

This report has been prepared as a background document for participants who will be invited to attend a CCC convened workshop to discuss opportunities and impediments to the more widespread use of MBIs. In this report, a preliminary overview of experiences with MBIs for NRM is canvassed, and a framework for the selection of MBIs across differing biophysical, economic and stakeholder contexts is presented.

Market based instruments (MBIs) are instruments that influence behaviour through changing price signals rather than through explicit directives. MBIs can be categorised as either price based, quantity based or market friction instruments. Price based instruments set about to influence the price signals in existing markets while quantity based instruments see the establishment of new rights or the alteration of existing rights. Market friction instruments aim to improve the operation of existing markets but reducing the costs of operating in those markets. MBIs work well when there a range of individuals who can make changes and variation in the cost and / or effectiveness of those changes. Figure E1 illustrates the type of MBIs available for NRM.

Figure E1: Range of MBIs for NRM



Of all MBIs, the focus in NRM to date has been on positive price instruments such as subsidies and grants. CMAs have typically employed non-competitive or administrative based schemes that have tended to target management actions without necessarily measuring resource outcomes.

More recently, there has been interest in the use of market-like instruments, such as tenders or auctions to deliver natural resource outcomes rather than fixed grant payments. While these are only at an embryonic stage, some schemes have been implemented in NSW and others are actively being developed. However tenders and auctions have focused almost exclusively on achieving biodiversity conservation objectives, driven by the implementation of new native vegetation legislation and the direct role that the CMAs play in the implementation of the legislation.

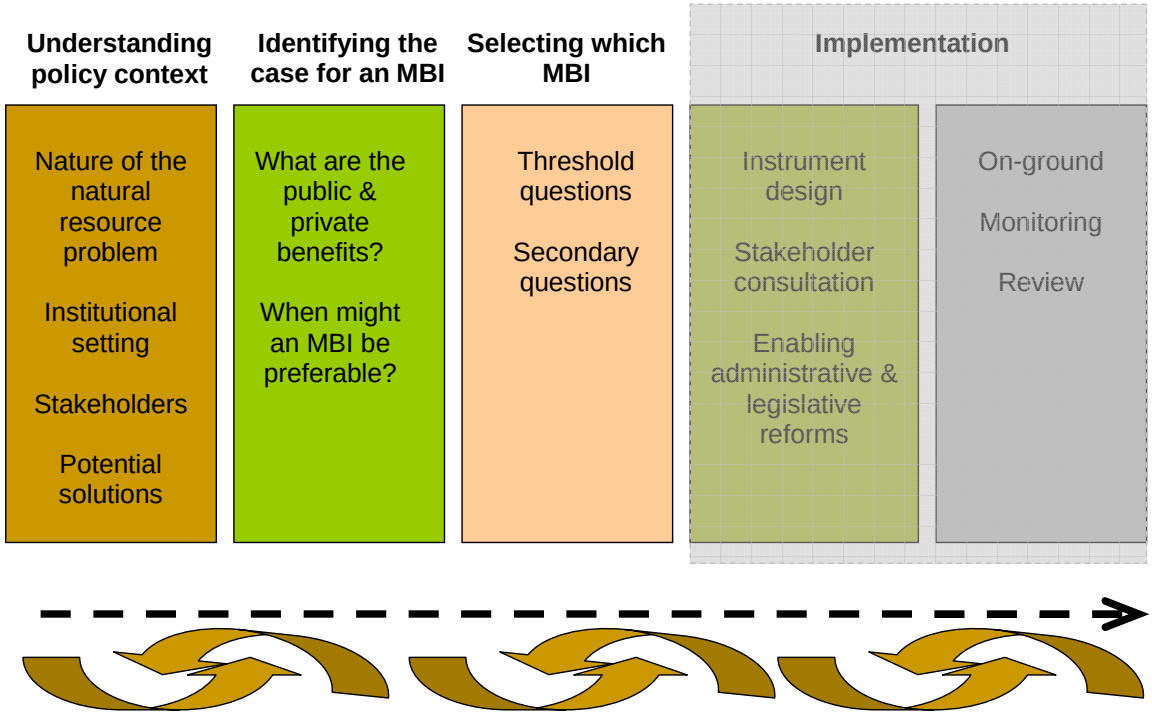
Negative price based instruments such as performance bonds, taxes, fees or charges have received little attention. Similarly, the development of markets for environmental resources, such as salinity, nutrients and greenhouse gases, are still in their infancy in Australia. The few markets created to date focus primarily on urban and industrial activities, although some have sought to extend 'compliance offsets' to rural-based activities. Examples here are in relation to greenhouse gases and water pollutants. Specific compliance offset arrangements have been introduced to manage native vegetation and biodiversity on rural lands, under both the Native Vegetation Act 2003 and Threatened Species Legislation Amendment Act 2004.

Under the *NSW Native Vegetation Act 2003*, landholders seeking to clear native vegetation must seek approval from their relevant CMA who then must assess likely impacts. Clearing of remnant vegetation will only be approved if overall management actions improve or maintain environmental outcomes. Under certain circumstances, clearing may be allowed on the condition that suitable offsets for the lost ecosystem services are provided. The rules that underpin offset trading (will) seek to ensure compatibility of sites and protect social, economic and environmental outcomes.

Relatively few 'market friction' instruments have been employed. The most notable instrument is labelling. For example, mandatory labelling requirements exist for farm chemicals, and voluntary 'green' labelling schemes are also common (such as in relation to organic produce and greenhouse gas emissions).

To date, while a small number of CMAs have introduced market-like instruments such as tenders to manage biodiversity conservation goals, there is still very little practical experience with MBIs at the catchment level. In this project, a framework has been developed to help practitioners determine if and when an MBI might be the appropriate instrument to use. There are four principle steps in the introduction of an MBI, as shown in Figure E2.

Figure E2: Steps in selecting an MBI



The first three steps, which are focused on the selection of the appropriate policy tool, are considered in this paper.

Understanding the policy context involves identifying the underlying biophysical nature of the natural resource problem, potential solutions, stakeholders and the institutional setting. We also ask the question as to why the market is failing to deliver the natural resource outcome that is desired. Understanding why this is occurring is a key to ensuring the appropriate type of policy intervention.

In ***identifying the case for an MBI*** we use a framework for choosing between intervention types based on the public and private benefits likely to accrue with the NRM outcome. Using this framework the choice between using regulation, suasive and market based instruments can be identified. It can also be used to indicate cases where no government intervention should be considered. In this section we also outline a number of other characteristics that need to be present in order to make an MBI the preferred instrument.

In determining when to ***select an MBI*** we present a number of threshold and secondary questions that should be asked to refine MBI selection. Threshold questions include those relating to whether a market already exists and whether there are impediments to the operation of the market, or

where no market exists, the ease with which property rights can be generated and allocated or market attributes be harnessed to signal incentives for NRM. Secondary questions are then posed in relation to a number of factors that will influence the workability, effectiveness or acceptability of different instruments.

The last section of the paper highlights both the experiences by CMAs with MBIs and opportunities and impediments to more widespread use of MBIs. Some of the key impediments canvassed include institutional and legislative issues, availability of funds and the annual nature of funding cycles, data availability and available CMA staff expertise. Opportunities for developing and delivering NRM outcomes using markets are explored in relation to the potential for:

- new commodities (carbon, water quantity and environmental flows, habitat and biodiversity);
- new business models (brokering, revolving funds, counter-cyclical trading, trust funds);
- new investment pathways (catchment levies, utility and development levies, private sector funding); and
- a role as service providers, that in turn can enhance NRM outcomes;

Lastly, it should be noted that the MBI selection framework, overview of MBI experiences and canvassing of impediments and opportunities are aimed at providing a discussion starter for the CCC workshop, rather than being put forward as the definitive policy model or exhaustive list of issues.

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1 INTRODUCTION

The NSW CMA Chairs' Council (CCC) engaged BDA Group and CSIRO Sustainable Ecosystems to advise the Council on the current and potential use of market based instruments (MBIs) for Catchment Management Authorities (CMAs) in NSW to achieve landscape scale change, consistent with their Catchment Action Plans and the NSW Government's 13 state-wide targets for natural resources management. These targets are directly linked to the delivery of the NSW State Plan, particularly the E4 Priority: better outcomes for native vegetation, biodiversity, land and coastal waterways.

Marked based instruments are policy tools that encourage behaviour through market signals rather than through explicit directives. There is growing interest in MBIs as they can often deliver equivalent outcomes at lower cost by allowing landholders the flexibility to decide on whether to change their actions or incur higher costs. Conversely, regulatory approaches can promote inefficiency, inhibit innovation and impose unnecessary costs. This is because regulation usually imposes uniform requirements on all landholders, yet the cost of say protecting remnant vegetation will vary, as may the benefits from various ecological communities and locations.

CMAs face the difficult role of facilitating landholder stewardship of the natural resource base and the management of desired environmental amenities. This study has been initiated to assist NSW CMAs in their selection and use of MBIs. The objectives of this study are fourfold:

1. To provide background on the range and implementation experience of MBIs both in NSW and more broadly;
2. To provide a framework to aid in decisions of when and if to use an MBI, and in selecting an appropriate type of MBI;
3. To identify the institutional environment & CMA organizational capacity to support MBIs; and,
4. To recommend an *Action Plan* that the CCC can use to promote more widespread use of MBIs by CMAs and to garner the necessary support from the various levels of government.

It is not intended that this report be used as a 'recipe book' that CMA practitioners can employ to identify MBIs for NRM in NSW. Rather, this report has been prepared to provide a preliminary investigation against objectives 1 and 2, for use as a background document for participants who will be invited to attend a workshop to discuss the current CMA operating context, potential impediments to more widespread use of MBIs and to test our proposed framework for MBI selection and design.

A final report documenting our findings and recommendations against all project objectives will be prepared following the workshop and submitted to the CCC.

2 ENVIRONMENTAL POLICY INSTRUMENTS

Interest in market based policy instruments (MBIs) to promote the provision of environmental services has risen significantly over recent years. The enthusiasm for MBIs has been driven by the success of domestic competition reforms in water, electricity and gas; by the success of the high profile 'acid rain scheme' in the US and moves to greenhouse gas emission trading schemes worldwide; and the success of the *BushTender* pilot in Victoria which has spawned a raft of similar tender-based schemes seeking to purchase on-farm management changes. Difficulty in targeting and accounting for improvements within traditional policy approaches have also been driving forces in MBI thinking.

As discussed throughout this report, the compliance flexibility offered by MBIs offers the possibility of lower environmental management costs and the potential to remove governments from day to day micro-management of the resource base, as the market takes over detailed allocative functions. There is also the potential with some instruments to engage third-party funding sources, although this message has perhaps been oversold and the need for underpinning legislative drivers poorly understood.

In this section the menu of MBIs is presented in a classification framework applicable to natural resource management applications. However MBIs will not always be the appropriate policy instrument. While there are many factors relevant to the choice of policy instrument (and this is the focus of latter sections), the suitability of a MBI or other policy instrument will be determined by the underlying reason why markets to date have failed to deliver optimal outcomes. Accordingly, the types of market failures that can be at play are firstly canvassed in section 2.1 ahead of an overview of the broader suite of policy instruments available to governments. Further detail about the types of market failure and the classification framework is provided in Attachment 1.

2.1 Market failure and policy instruments

In the context of land management, environmental outcomes have a range of characteristics which prohibit their value being transmitted through market signals. Environmental outcomes that fall into this category include biodiversity and ecosystem conservation, watershed protection, groundwater recharge and land salinisation, greenhouse gas sequestration and soil conservation.

As the benefits of the supply of these environmental outcomes are not captured in market transactions, they will be undersupplied relative to society's preferences. Conversely, agricultural outputs will be oversupplied. The presence of such 'market failures' presents a case for government policy interventions to promote more sustainable resource management.

There are two types of market failures common to natural resources - public goods and externalities. Externalities occur when those producing or consuming a good do not incur all the

costs or benefits associated with that production or consumption. While externalities can be positive or negative, it is the negative ones that are generally the focus of government intervention. Many NRM goods fit into this category, including irrigation and dryland salinity, nutrient pollutants and greenhouse gas emissions.

Public goods are goods which are non-rival and non-excludable. Because of these characteristics, those producing these goods cannot capture the benefits created, and so they will be undersupplied. In other cases, governments may intervene where market impediments are leading to transactions costs[1] or market power[2] which prevents efficient levels of production.

There are four main types of instruments that can be utilised by governments to address market failures. These are suasive, regulatory, market based instruments and public provision of services and infrastructure. The focus in the following section is on market based instruments, but all four types are first briefly explained below and in further detail in Appendix 1.

Suasive instruments use information in order to influence individual's behaviour. Types of suasive instruments include education campaigns, guidelines and codes of practice. These instruments are useful when a lack of information is causing individuals not to adopt a change which has a net private benefit.

Regulatory instruments introduce requirements such as mandatory standards, licensing or mandatory management plans or a statutory duty of care, and penalties for those who do not comply with them.

Public provision is often used when the solution to a land management problem displays characteristics of a 'public good', such that it would not be possible for private sector suppliers to accrue the broader benefits of its provision. Examples include salt interception schemes to manage in-stream salinity and public reserves to promote biodiversity conservation.

Market based instruments (MBIs) seek to influence resource management practices through changing price signals rather than through explicit directives. MBIs can be categorised as either price based, quantity based or market friction instruments. Price based instruments set about to influence the price signals in existing markets while quantity based instruments see the establishment of new rights or the alteration of existing rights.

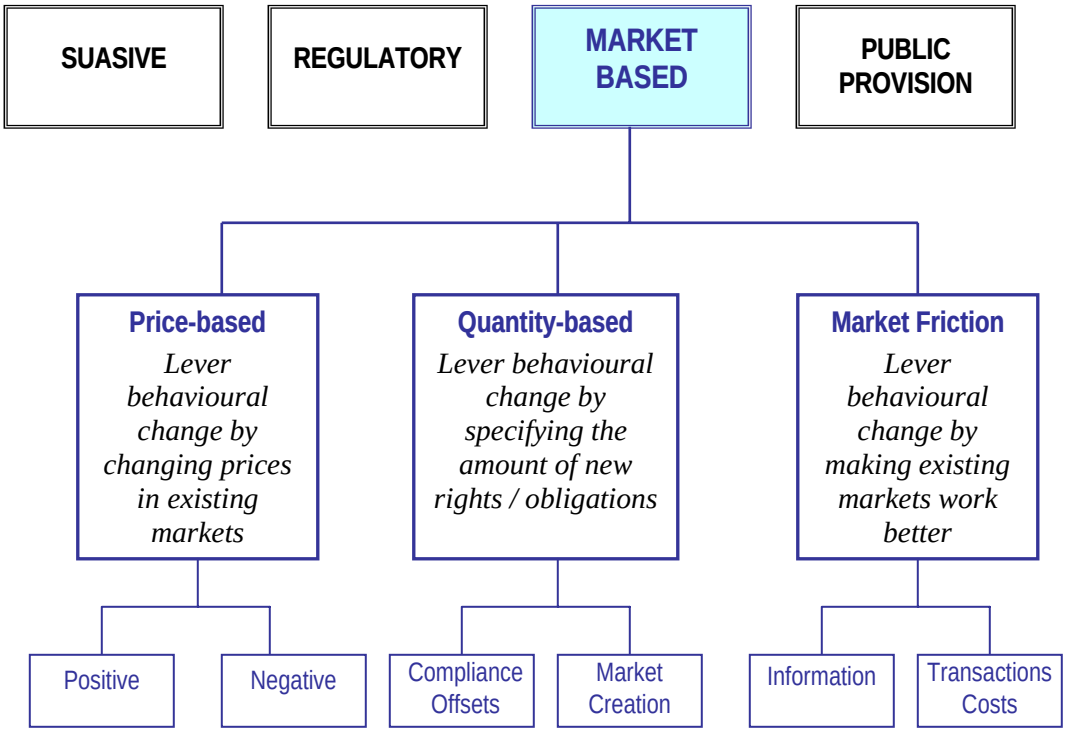
Market friction instruments aim to improve the operation of existing markets but reducing the costs of operating in those markets. Market based instruments work well when there a range of

[1] Transactions costs are defined as any costs associated with transactions in a market. They include the search costs of seeking buyers, costs associated with obtaining information, the costs of undertaking the exchange and any costs associated with compliance.

[2] Market power is defined as situations where the small number of players in the market results in any one player being able to exert an influence over the outcomes of exchange in the market. For example, a monopoly supplier is able to exert market power by increasing prices.

individuals who can make changes and variation in the cost and / or effectiveness of those changes. Figure 2.1 outlines the broad types of MBIs available for NRM.

Figure 2.1: Range of market based instruments



2.2 Market based instruments (MBIs)

Beyond the broad classification of market instruments as either price, quantity (property right) or market friction, several taxonomies of instruments have been developed. A relevant classification of market instruments is provided below.

2.2.1 Price based instruments

Price based instruments offer landholders an incentive to rehabilitate, protect or actively improve NRM outcomes beyond what is required under prevailing regulatory settings.

Negative incentives

Instruments in this group include charges, taxes and financial enforcement incentives. Charges and taxes have often been used for revenue purposes, sometimes with revenues hypothecated to fund environmental programs.

However true 'Pigovian' taxes seek to internalise the externality costs of an activity. That is, the charge or tax provides an incentive to introduce new technologies, products or processes to minimise impacts and hence avoid the charge or tax. Their effectiveness will therefore depend upon the responsiveness or 'price elasticity of supply' of the regulated emission, activity or product. As the cost of realising environmental gains falls on those creating the externalities, charges and taxes are often termed 'polluter pays'.

Charges and taxes can be useful where environmental outcomes can be easily related to a measurable proxy. As an example, taxes have been applied to fertiliser inputs as a proxy for pollution. However, the quantity used may be less relevant than related management practices, and so input taxes may be an inefficient instrument.

Financial enforcement incentives impose penalties for non-compliance with environmental regulations. They are only a market instrument if the incentives are linked to the progressive environmental damage as performance exceeds non-compliance. Examples include performance bonds and non-compliance fees (penalties levied where performance exceeds regulated targets). The use of these fees recognises that activities may face significant uncertainty over potential environmental impacts and significant economic costs could arise if operations had to close at short notice due to non-compliance.

Positive incentives

Instruments in this group include subsidies, tax concessions and direct grants. Rather than imposing a liability (as in the case of negative instruments), these instruments operate by providing a financial incentive to encourage desirable activities. In this respect they are often termed 'beneficiary pays' incentives. Subsidies are often used when it is difficult to identify, monitor or enforce tax approaches (say where impacts are from diffuse sources), where tax imposts may lead to spill over costs (such as illegal practices) or for equity reasons. Subsidies target a small number of self-nominating landholders, industries or community groups depending on the context of the scheme.

2.2.2 Quantity based instruments

These instruments operate by creating tradeable rights or by altering existing rights to environmental resources (or to the degradation of such resources). A broad range of trading instruments has been crafted, which for current purposes we have classified as either compliance offsets or market creation.

Compliance offsets

Offset schemes allow regulated sources to comply with statutory requirements controlling on-site impacts through sponsoring off-site compensatory action. Offset schemes have typically been used

in conjunction with development consent processes applicable to new operations, and to constrain growth in pollution loads or loss of important ecological communities. An example where a rural landholder may seek a compliance offset is in relation to compliance with the Native Vegetation Act (discussed in section 4) while rural landholders may be the supplier of offsets to entities regulated in relation to nutrient or greenhouse gas emissions.

While we have separated compliance offsets from market creation, their use does involve the establishment of a new market. However compliance offsets are not always tradeable to third parties, which may limit available offset opportunities and increase complinace costs. For these reasons, more formal offset markets have also been created where offsets can be traded with third parties, including market intermediaries such as brokers, NGOs and government. The creation of offset markets can significantly improve the operation of offset schemes by providing price discovery, market depth (to minimise compliance costs) and reducing transaction costs.

Market creation

Where no statutory requirements currently exist for the management or supply of an environmental good, a market must be created. This requires the obligations of liable parties to be established in a regulatory framework, a regulator/administrator, rules for the creation and use of tradeable rights (permits or credits), a system for exchange of rights, a compliance and enforcement framework, scheme boundaries, funding arrangements and so on.

With available scientific understanding, and monitoring and enforcement technologies, it is usually not feasible to establish tradeable rights directly for environmental damages. As a surrogate, rights to a closely related activity can be used to achieve the desired environmental outcome. A successful tradeable rights instrument therefore requires a direct relationship between the activity expressed in the rights and the environmental outcome being sought.

The range of trading instruments extends from simple 'bubble' schemes through to more complex trading instruments involving point and diffuse, regulated and unregulated sources of pollution.

Bubble schemes involve setting an overall pollution limit over a small number of regulated sources, allowing them to negotiate relative abatement efforts (and any financial inducements) subject to agreed scheme parameters (eg; targets, trading rules, monitoring, etc). Agreed outcomes are usually enforced through contract and licensing conditions. However, where the number of participants increases, administration costs will also increase, while the ability (and cost) of participants to identify mutually advantageous exchanges will become harder. In these circumstances, more formal trading arrangements offered in permit trading schemes are likely to be superior.

Permit trading schemes involve placing a cap on the overall load of pollutants / resource extraction / land clearance, allocating tradeable permits and only allowing discharges / extractions /clearance

in line with permits held by the regulated parties. Permit trading schemes can also incorporate offset provisions, so that unregulated parties can undertake compensatory actions and sell the 'credits' to regulated entities.

Trading schemes have often been employed where a significant *reduction* in pollution loads is required. Offset schemes have typically been used in conjunction with development consent processes applicable to new operations, and to constrain *growth* in pollution loads or to prevent any further loss of environmental amenities.

2.2.3 Market friction instruments

These instruments are focussed on improving the operation of existing markets through the provision of information or lessening of transaction costs.

Information provision

Perhaps the most familiar type of mechanism in this category is labelling and certification – such as the use of a 'green' marketing label on produce. Through labelling, consumers find out more about the way in which a commodity is produced, and producers learn more about what consumers are willing to pay. Both can then make more informed decisions. So for example, where consumers value produce that has been grown in a way that will promote more sustainable resource management, price premiums may be secured which then provides an incentive for the broader adoption of the relevant farm practices.

Labelling is usually supported with some form of certification or accreditation system, which provides a mechanism to ensure that landholders providing the produce comply with the relevant environmental requirements. They are suitable where there is consumer awareness of the impacts of different products / produce on the environment and strong consumer preferences for 'environmentally friendly' produce and products, but no prior information available to differentiate between producers on the basis of environmental performance.

Lessening of transaction costs

The aim of the policy intervention in this case is to reduce the transactions costs associated with existing markets. In some cases, as markets expand and the number of transactions increase, governments can reduce the costs associated with the market transactions. For example, the introduction of web based exchanges for water trading has significantly reduced the time taken for trades to occur. In other areas, the introduction of new land management practices may be hindered by the increased risks that the landholders face in trying a new, untested approach. However, these approaches may offer public benefits. Governments may have a role in promoting the establishment of risk management tools, such as insurance to cover the downside risks of

conservation based land management or facilitating the creation of new products on the market to manage this risk, such as the use of derivatives.

2.3 Related policy issues in fostering improved NRM

2.3.1 Leveraging third party investment

There has been recent interest in the potential to leverage third part investment in NRM. Various pilots and schemes are currently being trialled in Australia to bring third party funds to NRM. In 2001, an Allen Consulting Group report[3] outlined the potential additional third party funds that they believed could be attracted to NRM. They believed that there were a number of potential land management changes that had rates of return close to commercial rates of return, which with the benefit of modest government funding could be made commercial.

A NAP National MBI program Round 1 study by Greening Australia and CSIRO was funded to investigate this approach further[4]. The pilot focused on the potential contribution of leverage based approaches, defined as policy approaches that involve joint investment of public and private funds. These issues were explored through the creation of a *Land Innovation Fund* with a mandate to identify, develop, and invest in near-commercial projects providing a mix of public environmental benefits and financial returns. The fund had access to $1 million in public capital, to be matched by at least $1.5 million in private investment.

The pilot investigated and secured investment in projects that were different to traditional grant based projects or competitive tenders. The study team concluded that the experience of the pilot suggests that leverage approaches provide a valuable addition to the set of natural resource management policy tools available to governments – particularly where the most effective land use changes are not well known to governments, where significant innovations in resource management or enterprise structures are required, and where actions provide both public and private benefits.

A project 'Policy Committee'[5] provided cautious support for the outcomes of the study, indicating that 'investment leverage appears sufficiently likely to add a valuable option to the existing suite of policy tools to justify more extensive trialling of the approach'.

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[3] Allen Consulting Group, 2001, Repairing the country: leveraging private investment, prepared for the Business Leaders Roundtable.

[4] Hatfield-Dodds, Steve, Carl Binning and Bruno Yvanovich, 2006, Farming Finance: Final Evaluation Volume 1 – Policy Findings, Market Based Instrument Pilot ID46, Greening Australia / CSIRO, Canberra

[5] Roger Beale, Senior Associate The Allen Consulting Group and Neil Byron, Commissioner, Productivity Commission

2.3.2 Stewardship schemes

The second area of interest is in the use of stewardship schemes. They generally involve landholders entering agreements to implement certain measures to minimise resource degradation in return for payment. Like subsidies and fixed grants, they target 'self-nominating' landholders. These schemes can be implemented with varying cost sharing arrangements between government and landholders. There is significant interest in Australia in these schemes and the Commonwealth government has recently committed funding to a new environmental stewardship scheme.

2.3.3 The use of 'market-like' mechanisms – auctions and tenders

Where the public provision of an environmental amenity requires the transfer of rights from private to public ownership, 'market like' instruments such as auction and tender mechanisms are increasingly being used to promote improved budget cost-effectiveness.

Similarly, subsidies are increasingly being allocated through the use of auction and tender mechanisms, so as to maximise NRM outcomes for given budgets. While the inherent MBI is a subsidy, significant efficiency gains can be achieved through use of the competitive allocation mechanisms employed in auctions and tenders. Given the reliance to date on subsidy instruments and pressures on public budgets, these market-like instruments are being enthusiastically embraced, and are discussed further in section 3.3.2 and experiences with them in Section 4.

2.3.4 Abolishing or reforming perverse subsidies

Policy instruments can have broader impacts than those directly sought, sometimes to the detriment of society. In the context of agriculture and the environment, the Industry Commission (1998) observed

> *'In the past governments have inadvertently contributed to many of the adverse environmental impacts associated with agriculture. Government sponsored and encouraged much of the irrigation and land clearing for agricultural development, directly or indirectly – albeit with the best of intentions. In some cases, the environmental consequences were not known. In others, evidence of the possible consequences was ignored or discounted.'*

The States have primary legislative responsibility for the management of natural resources and industry support. Areas of historic concern, with regard to perverse subsidies, lie with the provision of extension, R&D and marketing support, underpricing of natural resources, regulatory requirements on where and how resources may be used (e.g. water, forests, development approvals), conditions on lease titles (impacting stocking rates), and administrative structures for natural resource management policy and planning. However, the role of government in relation to these sectors has changed markedly in recent years, as observed by the SSC (2000):

'Where governments once strove to support and protect rural communities from the adjustment shocks of global trends, governments in the eighties and nineties reduced subsidy and tariff support and assessed regulations that provided a competitive advantage to those industries. Governments have also commenced a drive to address the cost of the provision of infrastructure such as water services through user-pays systems - all with the aim of ensuring an open, internationally competitive economy cognisant of the costs of resource use and environmental impact'.

2.3.5 Mixing of instruments

The policy instruments have been described individually above, however they are commonly used in 'packages'. Choosing policy instruments to make up an appropriate package depends on many factors that may include:

- Cross-pollutant / impact effects;
- Timing and sequencing issues;
- Geographical variation and ability to target local objectives;
- Whether instruments are complementary or substitutes;
- The extent to which affected parties are free to seek out low cost compliance methods;
- Degree to which the mechanisms are compatible and collectively are effective in achieving the environmental outcome;
- Acceptability to landholders and likelihood of any significant social impacts;
- Overall ease of implementation, modification and enforcement;
- Budgetary cost to government;
- Degree to which instruments can be integrated within existing institutions and legislation and whether they are dependent on prior reforms to perverse instruments;
- Accountability in the sense that outcomes attributable to individual instruments and the mix overall can be effectively monitored

3 EXPERIENCES WITH MARKET BASED INSTRUMENTS

This section provides an overview of the use and current state of play of market based instruments, categorised according to the classification framework outlined in Section 2. Finally some of the key methodological developments in the design of market based instruments are explained.

Information on each of the market based instruments that has been reviewed for this study can be found in Attachment 2.

3.1 The use of market based instruments in Australia

The use of market based instruments for natural resource management is not new in Australia. In the last century, subsidies, tax concessions and bounties have been used to promote "land development". These policies resulted in the clearing of native vegetation, culling of pest species (including native fauna), the development of agricultural land and water and the increased use of fertilisers and chemicals. At the time, the environmental implications of these policies aimed at promoting agricultural development were not recognised or were ignored.

Over time, as the relative scarcity of resources and environmental amenities has increased, State and Commonwealth governments have turned their attention to improved stewardship of natural resources. Over the past decade, both levels of governments have used subsidies, grants and tax concessions to encourage land conservation practices. Recent grant schemes include Landcare and Bushcare, National Heritage Trust grants, Salt Action and Murray Darling Basin Commission (MDBC) grants, as well as programs administered by NSW National Parks and Wildlife Service (NPWS), Greening Australia and others.

Taxation concessions have been introduced for Landcare and water conservation, while other income tax concessions include S30-55 for donations to conservation organisations and for bequests of land to be exempted from capital gains tax, including for landholders who enter into perpetual conservation covenants.

Subsidies have typically been directed at offsetting (some) input costs associated with providing environmental services rather than paying for delivered outcomes. For example, Bushcare grants may assist with fencing costs for preserving an area of native vegetation, but the exact environmental services being 'purchased' (biodiversity, soil conservation, etc) are rarely estimated. Given the poor definition of services being purchased, the success of these schemes is difficult to establish.

The establishment of the BushTender program in Victoria and the Environmental Services Scheme pilot in NSW signalled a shift by government to consider more explicitly the environmental outcomes that the landholder actions might deliver. Public and private programs directed at establishing environmental covenants on property titles – such as those established through the

Trust for Nature – have also offered more output-based subsidies, but there operation to date have been relatively limited.

While these programs are credited with increasing awareness and promoting local conservation objectives, they have been criticised as not being able to deliver the landscape scale change required. Further, there is concern over:

- the potential level of public funding that may be required;
- addressing the diffuse and cumulative impact of issues commonly associated with natural resource use;
- connecting change at the farm level to best deliver a landscape scale change; and
- the lack of a long regulatory history in relation to natural resources, impeding regulatory approaches.

In response, governments have turned their interest to market based instruments and more fundamental property right reforms. To date, most progress in this regard has been in relation to 'consumptive' resources such as water, forestry and fisheries rather than environmental resources of a more non-use nature, such as water quality, biodiversity and climate change. From the 1980's, access rights to water, forestry and fisheries have been progressively introduced, with constraints placed on overall resource access and use, and markets established to trade these rights.

The early focus on these resources reflects the desire of resource users for promoting productive and allocative efficiency of resource use. In the case of environmental resources, where policy objectives are more to limit impacts upon them for largely off-farm beneficiaries establishing property rights and community endorsed management goals has been more difficult.

Over the past five years, there has been a strong push for the use of MBIs from both Commonwealth and State Governments, as evidenced by the National Action Plan for Salinity and Water Quality's National Market Based Instruments Pilot Program. There are an increasing number of investigations into MBIs, including laboratory and in-field pilots. However, the take-up of MBIs remains low.

3.2 The current state of play with market based instruments in NSW

Positive price based

The focus in NRM has been on positive instruments, particularly subsidies and grants. There is a long history of CMAs and other bodies using instruments that influence the prices faced for NRM provision by landholders. The most common instrument used by CMAs to date have been largely non competitive or administrative based schemes such as direct grants for on ground works (for example, a fixed $/km of fencing) or subsidisation of the cost of works in cost sharing

arrangements. Older style schemes have tended to target actions without necessarily measuring outcomes (they do not use the NRM outcome as a unit of exchange and purchase), allocate funding on a community based rather than on a competitively determined value for money; and were often seen as a cost sharing exercise rather than one of benefit maximisation.

More recently, there has been an interest in the use of market-like instruments such as tenders or auctions to deliver natural resource outcomes rather than fixed payments. While these are only at an embryonic stage, some schemes have been implemented in NSW. Most are a derivative of the BushTender Scheme which was implemented in Victoria (see Attachment 2 for more details).

Both BushTender and more recent auctions have demonstrated the cost-effectiveness of competitive allocation approaches. For example, the BushTender pilot was estimated to reduce expenditure to around 15% of a comparable non-competitive grants program (Stoneham et al. 2002b). In 2006 the Wimmera Catchment Management Authority in conjunction with CSIRO conducted two auction rounds for on-farm management of salinity. CSIRO concluded that the auction had been 60% more cost effective than the alternative of fixed grants (RIRDC 2007).

There have been a number of Statewide schemes implemented in NSW that exhibit at least some characteristics of auctions. The (then) Department of Land and Water Conservation (DLWC) implemented both the Environmental Services Scheme and the TARGET approach in 2001. The Environmental Services Scheme was designed to demonstrate the way in which management agreements could be put in place with landholders to deliver environmental services. Twenty two contracts were signed for ten year agreements to deliver a range of management actions.

At the catchment level, a number of Catchment Management Authorities have been active in implementing auction systems, mainly targeted at biodiversity conservation. The Hunter Central Rivers CMA has implemented three auction rounds (and are close to implementing their fourth), the Northern Rivers CMA has implemented two rounds under their Bush Recovery Program and the Southern Rivers CMA has implemented the Bush Incentives Scheme. All these tenders operate in a similar manner, with bids assessed according to the site value and context, the environmental value of the actions and the relative cost effectiveness in achieving the desired outcome. Priorities for funding are established under the Catchment Action Plans.

In 2001, the Liverpool Plains Land Management Committee introduced auctions for the delivery of management actions targeted at a range of environmental objectives. Three auctions in total have been run, with $1.8million spent. Management actions that generate multiple environmental benefits receive greatest environmental scores.

Anecdotal evidence from the CMAs indicates these schemes have been well received by landholders with the level of interest high. CMAs also believe these schemes to be more cost effective than alternative fixed grant approaches. However, there does not appear to be much

empirical assessment of how effective the schemes have been, both in terms of delivering environmental outcomes as a result of the management actions that have been contracted, nor the cost effectiveness.

Tenders or auctions have focused almost exclusively on achieving biodiversity conservation objectives. In New South Wales, this has been driven by the implementation of new native vegetation legislation and the direct role that the CMAs play in the implementation of the legislation. Very few tenders have been used to manage other natural resource management issues.

However, a recently announced auction in Victoria, called Stream Flow Tender (VDSE 2007), will see the government purchasing management actions that will contribute to improved stream flows. It will allow licence holders to decide themselves their most cost-effective way to make water available for environmental flows, through either changing their licence access conditions, reducing the volume they are allocated or surrendering their licence. Bids will be assessed according to the best value for money for environmental benefit. While participation in the scheme is voluntary, if targeted volumes are not achieved, mandatory changes are proposed.

Similarly, the NSW Government, via its Riverbank program, has entered water markets to purchase water access rights for environmental purposes. To date, purchases have been made on an opportunistic basis with both individual sellers and via brokers, however the use of tender mechanisms is being investigated.

The MDBC is also in the process of completing a pilot water purchase program under the Living Murray initiative. Some 20 GL has been identified via an expression-of-interest process where bids were assessed on a weekly basis based on cost-competitiveness. While not a formal tender system along the BushTender model, it did nonetheless take advantage of competition among sellers to minimise total budget costs.

Negative price based

To date in the NRM sector, policy interventions to promote environmental objectives have largely been through government funded positive price incentives, rather than through negative price based instruments such as performance bonds, taxes, fees or charges.

There are however some examples, such as environmental levies used by some NSW councils, levies collected by the Australian Government to fund Rural Research and Development Corporations, and one-off levies such as the levy payable on sugar to fund the Sugar Industry Reform Program (SIRP) which provides support to the industry to ensure its long-term viability and sustainability. Interstate, Victoria uses salinity charges to manage new developments they may impact salinity discharges to the River Murray, as part of its commitment under the Murray-Darling Basin tradeable salinity credits scheme (discussed below).

Box 2.1: Auctions in more detail - the Bush Incentives Auction

The scheme funds the management of selected sites that support native vegetation communities, particularly those that are officially listed as threatened, have been largely cleared or exist only as small remnant patches in the landscape.

The scheme uses a tender process to identify bids that offer the best value for money in protecting vegetation. Following a site visit, the landholder identifies the services they can provide in a management plan prepared with CMA staff. The landholder then submits a bid, indicating the amount of money required to provide the services outlined in the plan. The bids are assessed by the CMA in terms of conservation value divided by the funds sought. The conservation value is made up of the conservation significance of the site, how well its connected to other native vegetation in the landscape, condition of the site, size of the site and the landholder management actions.

Initially landholders could sign a five or ten year agreement with the CMA. After a review of initial rounds the CMA has recently changed the agreement length to a 10 or 15 year agreement or one that can be signed for perpetuity. Payments are made for the first four years of the contract with a large proportion of payment occurring up front (60%) and the remaining payments spread across the remaining three years. Although not explicit, longer contracts are preferred by the CMA.

The CMA has determined a threshold environmental value below which the CMA has determined there is no biodiversity benefit from funding works.

There have been four rounds so far. Some including both table land and coastal landholders and some only including one or the other (dependant on staff in required locations)

Sources: Discussions with Southern Rivers CMA staff August 2007 and DECC 2006 http://www.southern.cma.nsw.gov.au/pdf/SRBI-QA.PDF, accessed 12 July 2007.

Market creation – quantity based MBI

The development of markets for environmental resources, such as salinity, nutrients and greenhouse gases, are still in their infancy in Australia.

Two salinity trading schemes are in operation in Australia. These are the Tradeable Salinity Credits under the Murray Darling Basin's Salinity and Drainage Strategy and the Hunter River Salinity Trading Scheme in NSW. Under the Murray-Darling Basin tradeable salinity credits scheme, State government funded salt interception schemes received credit under the Strategy. Any new irrigation, drainage or industrial developments that create a net increase in salinity need to be allocated equivalent credits. Credits held by State governments can be traded and new credits are issued for measures that reduce salinity. The MDBC maintains a credit register and monitors state compliance against the Salinity Strategy.

The Hunter River Salinity Trading Scheme regulates discharges of saline water from coalmines and power stations in the Hunter River catchment above Singleton. The objective of the scheme is to manage saline water discharges so as to minimise impacts on irrigation, other water users and

on the aquatic ecosystem. The scheme manages salinity by restricting discharges to a share of that which can be safely diluted within a high flow event. Credits are allowed to be traded. Credit trading gives each licence holder the flexibility to increase or decrease their allowable discharge from time to time while limiting the combined amount of salt discharged across the valley. An online trading system allows licence holders to trade quickly and simply. The trades can be for a single day or longer periods and the terms of the trade are negotiated by the parties involved.

A study of the potential for a cap and trade approach to manage net recharge in the Coleambally Irrigation Area determined that while it was feasible to design a system of property rights and a cap for irrigation – induced salinity in this instance the gains were not sufficient to precede with this policy instrument (CSIRO and BDA Group 2005). The main reason why the gains where unlikely to outweigh the costs were relatively small production benefits combined with significant costs to set up and maintain a system of property rights.

To manage greenhouse gas emissions the Australian and State governments have been investigating the potential of a cap and trade system. This would involve the establishment of a new right to emit carbon dioxide, a cap on the total carbon dioxide which could be emitted and the ability to trade these rights. While consideration of these schemes is still on-going, NSW along with other State governments have established statutory frameworks which recognise rights associated with carbon sequestered by trees and forests.

In the interim, a greenhouse gas abatement scheme has been established for electricity retailers in NSW - the NSW Greenhouse Gas Abatement Scheme[6]. While liabilities do not extend outside of these parties, landholders are able to generate carbon sequestration credits provided they meet certain criteria. Initially only freehold landholders were able to take up this option but since February 2007 leasehold landholders can also generate these sequestration credits. Actions to create these credits may also create biodiversity and salinity benefits, and hence reduce the costs of achieving other environmental outcomes.

Experience with the development of a trading scheme for nutrients has been gained with a scheme trialled in South Creek, a tributary of the Hawkesbury River in NSW. In 1996, the NSW EPA introduced the South Creek Bubble Licence Scheme, which mandated significant reductions in nutrient discharges from a group of three sewage treatment plants, and allowed them to trade 'abatement effort' between themselves[7]. The inclusion of diffuse source offsets was recently trialled through an extension of the scheme - the South Creek Pilot Offset Scheme. Under this expanded scheme, the sewage treatment plants as well as a major urban land developer, could meet their

[6] For further information see: http://www.greenhousegas.nsw.gov.au/documents/Intro-GGAS.pdf, accessed 13 July 2007.

[7] While the three sewage treatment plants have the same owner (Sydney Water), their different operating structures has resulting in beneficial trades occurring between them in order to meet the bubble licence conditions.

nutrient reduction liabilities through purchasing nutrient offsets from nearby landholders. Eight offset projects were initiated under the scheme, including installing dams at market gardens to capture and store water and an irrigation recycling scheme to minimise runoff, building wetlands, installing fences on grazing properties to prevent cattle eroding creek banks (BDA 2005).

Compliance offsets – Quantity based MBI

The most common quantity based instrument for NRM that has been implemented in NSW has been compliance offset schemes to manage native vegetation and biodiversity (including fisheries habitat)[8].

At the State wide level, BioBanking is currently being implemented as an offset tool to manage the impacts of urban development on biodiversity conservation. BioBanking will allow 'biodiversity credits' to be generated by landowners who commit to enhance and protect biodiversity values on their land. These credits will be protected by conservation agreements with landholders. These credits can then be sold. Developers can buy these credits and use them to offset the impacts on biodiversity values that are likely to occur as a result of development. Work is still being done by Department of Environment and Climate Change (DECC) to develop the assessment methodology which will determine how many credits can be generated by a site and how many credits a developer will need to purchase for a development on a site.

The second State wide scheme is the development of native vegetation offsets under the *NSW Native Vegetation Act 2003.* Under the Act, landholders seeking to clear native vegetation must seek approval from their relevant Catchment Management Authority (CMA) who then must utilise a computer modelling program – the Property Vegetation Plan Developer (PVPD) – to assess likely impacts. Clearing of remnant vegetation will only be approved if overall management actions improve or maintain environmental outcomes.

Clearing will not be permitted when the PVPD delivers a 'red' light, while a 'green' light indicates that clearing can proceed subject to an approved Property Vegetation Management Plan. Offsets are allowable where landholders have received an 'amber light' under the PVPD. The 'amber' provision allows clearing on the condition suitable offsets for the lost ecosystem services are provided. Where there is no potential for 'on-farm' or 'local' offsets, assistance via an 'Offset Pools' provision may be available. Assistance is conditional on satisfying the relevant CMA that the landholder will suffer relative hardship and real financial loss due to not being able to clear.

[8] The NSW government introduced offsets for aquatic habitats. See Attachment 1 for more information.

Box 2.2: Offset schemes in more detail - BioBanking

Currently, biodiversity offsets are developed on a case by case basis in NSW. A number of offsets have been negotiated during the development consent process. The DECC is currently piloting a biodiversity offsets and banking scheme called BioBanking to formalise the offsetting process and create greater certainty and transparency with assessment procedures. The objective of the scheme is to stop the decline in biodiversity as a result of development by requiring biodiversity values to be maintained or improved and allow consolidated areas of biodiversity to be protected.

BioBanking will allow 'biodiversity credits' to be generated by landowners who commit to enhance and protect biodiversity values on their land. These credits will be protected by conservation agreements with landholders and can then be sold. Developers can buy these credits and use them to offset the impacts on biodiversity values that are likely to occur as a result of development.

The Scheme will support biodiversity certification requirements under planning legislation and be consistent with property vegetation planning processes under the *Native Vegetation Act*.

Under the *Threatened Species Legislation Amendment Act 2004*, the Environment Minister may certify environmental planning instruments. Where development will lead to biodiversity loss, gains will be needed in other appropriate areas to offset the loss. The BioBanking scheme will provide an 'alternative path' through the threatened species regulation by allowing offsets where biodiversity certification has been conferred on the planning instrument – this means that 'persons who would currently require threatened species licences, assessments, concurrences, or who are required to apply the threatened species test of significance, can participate in the BioBanking scheme *instead* of going through the existing complex processes (DECC 2005, p. 3; DECC 2006). Key aspects of the proposed scheme are summarised below:

- Development will firstly be required to avoid or minimise impacts through appropriate on-site actions.
- There may be thresholds where development cannot proceed because offsets cannot maintain biodiversity – as determined through spatial analysis.
- Where development can proceed, BioBanking may be used to meet the 'improve or maintain' requirement for biodiversity certification.
- Biodiversity offsets must ensure like-for-like replacement, with the biodiversity assessment tool considering structure, function and composition, scale, conservation status of ecological communities and ensure long term viability and functionality of biodiversity.
- Developers would use the 'rules-based' assessment tool to identify if the use of offsets is appropriate; and the number of biodiversity credits needed.
- Individuals can set up and manage biodiversity bank sites under a conservation agreement and generate credits. These lands will be secured and managed in perpetuity to protect and enhance their biodiversity values. The credits could be sold and used to offset the impact of developments elsewhere. Funds generated by the sale would be used for the future management of the site.
- DEC, as the scheme manager, would verify credits requirements, authorise BioBanks and issue credits, audit Banks, recover administration costs from participants, manage a credit register, etc.

- The most critical aspect of the scheme, and indeed most biodiversity management schemes, will be the identification of biodiversity values and robustness of actions to maintain or replace them. For the BioBanking scheme, it is proposed that the biodiversity assessment tool be based on the tools that have been developed for the property vegetation planning process under the *Native Vegetation Act* – that is, the PVP Developer. It will, of course, need to be extended to address biodiversity impacts not related to clearing (e.g. drainage of a wetland).

In recognition of the risks that management actions may not achieve ecological outcomes, offsets greater than 1:1 will be sought to provide a safety margin. A three month pilot is due to comment with implementation scheduled for after the pilots completion.

Source: http://www.environment.nsw.gov.au/threatspec/biobankscheme.htm, accessed 13 July 2007.

The rules that underpin offset trading, ensure compatibility of sites and protect social and economic outcomes are yet to be developed. However, the Government has indicated that offsets may include agreeing not to clear regrowth, reducing stocking rates from areas of remnant vegetation, planting, re-seeding or improving habitat by weed control. In addition, offsets must:

- meet specific criteria for each environmental outcome;
- meet specific criteria to reach the 'improve or maintain' outcome;
- persist for at least the duration of the negative impact (which may be in perpetuity); and
- be in addition to actions or works carried out using public funds or to fulfil regulatory obligations (NSW Government 2005).

Frameworks for offsets have also been introduced by some NSW local councils. For example, the Liverpool City Council introduced a Habitat Offsets Policy framework to use offsets to address impacts on biodiversity from development proposals (DECC 2006) and the Camden Council introduced the Natural Assets Policy which is based on no net loss for land that has been identified as ecologically significant and introduces offset provisions where a developer cannot meet this obligation on-site.

Market Friction – information provision

Relatively few MBIs have been specifically targeted towards improving the way that markets work in order to achieve environmental objectives. Where they have been investigated, the key instrument here is labelling. Mandatory labelling requirements exist for farm chemicals, and more broadly, most State governments have introduced labelling schemes for energy efficiency. Voluntary 'green' labelling schemes are also common (such as in relation to organic produce and greenhouse gas emissions), although the extent to which they are supported with certification requirements and the veracity of those requirements varies.

Market friction – reducing transaction costs

Again, there have been few policies that have been directed at reducing the transactions costs of markets. Nevertheless, an important component of the development of any new market has been establishing trading systems that minimise transactions costs. For example, as the depth and breath of water trading increased, more streamlined administrative procedures were developed to reduce the time taken to approve trades.

The development of risk management tools has also been a focus of economic research. Crop insurance has been of ongoing interest but generally found unworkable, while recent studies have investigated potential instruments to support the introduction of conservation management practices when risk was seen as a barrier to change.

3.3 Key methodological developments

3.3.1 Development of metrics

Rights and responsibilities necessary for MBIs will only be credible where there is a clear and demonstrable link between the rights specified and environmental outcomes sought. The allocation of rights, trading of rights, and the monitoring and enforcement of performance, are all dependent on sound metrics. That is, physical measures of the environmental outcome, or a suitable proxy for the outcome.

For example, an emissions permit may have a 'performance basis' defined in terms of the annual quantity of allowable emissions. Alternatively, the basis may be specified in terms of a pollution process such as the expected recharge of a groundwater aquifer, which has a functional relationship to the level of dryland salinity in a catchment. In some cases an 'input basis', such as the permissible use of a polluting input, may be used when there is a clear quantifiable link between the quantities of input used and consequent pollution levels.

Generally an instrument will be more efficient if applied closest to the point of environmental damage and vice-versa. However this needs to be balanced with the technical capability and costs involved in establishing workable metrics. Some MBIs have been introduced that are applied to inputs or processes when a more efficient outcome metric could have been used.

The metric represents a complex bundle of trade-offs and is not simply a question of estimating a measure of biophysical change (which in itself is extremely complex) but often must also take into account other drivers of values. For example, the location of change may be important. The core of metric design is the conversion of spatially distributed and differing degrees of outcome change into a single, cardinal, comparable unit. This single unit facilitates comparison of environmental service production at different locations.

The design of an appropriate metric remains a critical issue in MBI development. A variety of metric design frameworks have recently been developed or proposed (eg under the NAP National MBI program) to aid MBI practitioners.

3.3.2 Developments with tender instruments

As the experience with tender mechanisms grows in Australia, improvements in the area of targeting auctions to outputs and to achieving multiple benefits are occurring.

Subsidies and grants have almost exclusively been directed at offsetting (some) input costs associated with promoting or protecting biodiversity, rather than paying for delivered outcomes. For example, *Bushcare* grants may assist with fencing costs for preserving an area of native vegetation, but the exact environmental services being 'purchased' (biodiversity, soil conservation, etc) are rarely estimated and directly rewarded. The establishment of the *BushTender* trials in Victoria signalled a shift by government to purchasing environmental *outputs*. However the difficulties involved in identifying environmental outputs arising from changes in farm inputs and land uses should not be underestimated.

Accordingly, outcome-based MBIs remain a novel policy instrument in Australia. A current research project in the NSW Murray catchment, *Auctions with outcome bonuses – An Application to Ground Nesting Birds in the Murray Catchment,* is investigating the effectiveness of achieving the targeted environmental outcome of habitat conservation of different input and output based performance measures and incentives in an auction framework.

Most of the auctions conducted so far in Australia target one environmental outcome, generally native vegetation or biodiversity. A more recent development has been the investigation of auctions that deliver multiple environmental outcomes with the one auction. This concept was first examined in Victoria, with the EcoTender scheme. EcoTender follows similar technical lines as BushTender, but is based on delivering salinity, water quality, water quantity and biodiversity outcomes in the one tender. The main keys to success from the trial in Victoria were the multidisciplinary approach to design and implementation, the specialist skills that were developed and the consideration of the relationship between actions on the ground and overall outcomes in the contract design (Eigenraam, Strappazzon, Lansdall, Ha, Beverly and Todd 2006).

A multi-outcome auction approach has the advance of also being able to introduce third parties who may be interested in purchasing some of the environmental outcomes. For example, in the Victorian trial case, about 80% of the carbon sequestered was able to be sold to a third party. While a multi outcome auction has the potential to be more cost effective at achieving many environmental benefits than an individual auction for each outcome, policy makers need to exercise caution when considering the application of a multiple outcome auction. Policy makers should ensure that landholders can actually deliver the multiple outcomes before additional effort is

invested in creating this instrument. It is also only worthwhile if there is variation in the ratio at which different products are produced. If a biodiversity unit always creates 1 unit of carbon, it does not make sense to measure these separately in a multiple outcome auction.

Another issue that is being explored in more recent trials of competitive tenders is the possibility for landholders to put in joint bids that cover activities on more than one spatially connected property. The hypothesis is that this may generate greater environmental benefits at the landscape scale than bids that are fragmented across the landscape. For example, a recent CSIRO project investigated how to establish vegetation corridors in the Desert Uplands of Queensland using auctions or other voluntary arrangements. Agreements between 10-12 landholders are required to create a corridor. These mechanisms offer new pathways to achieving landscape management goals through voluntary mechanisms in ways that were previously thought implausible or highly unlikely.

3.3.3 Offset schemes capturing diffuse sources

A recent development with compliance offsets is the inclusion of diffuse source offsets. Within Australia so far, offset schemes have generally included only point sources due to the lack of biophysical understanding about both the extent of diffuse source pollution and the relationship between a diffuse source action and the environmental outcome. However, as scientific understanding improves, and as estimates of the cost effectiveness of diffuse source actions has been obtained, governments are now considering including diffuse source polluters in these schemes.

4 THE NSW POLICY AND LEGISLATIVE CONTEXT

4.1 CMAs as a part of the NSW governance structure

In November 2006 the NSW State Government launched its State Plan. The purpose of the State Plan is to set clear priorities for Government action with challenging targets for improvement to guide decision making and resource allocation[9]. The Thirteen Catchment Management Authorities (CMAs) established across NSW in 2003 (Box 4.1 and Figure 4.1) are a part of the State Plan implementation.

The establishment of the CMAs is specifically to facilitate strategic investment and accountability in natural resource management (NRM) and to ensure that regional communities have input into natural resource management in their catchments[10]. The CMAs formally began in 2003.

Table 4.1 The Thirteen NSW Catchment Management Authorities (CMAs)

Western	Gwydir / Border Rivers
Lower Murray Darling	Northern Rivers
Murray	Hunter / Central Rivers
Murrumbidgee	Hawkesbury / Nepean
Lachlan	Sydney Metropolitan
Central West	Southern Rivers
Namoi	

The CMAs are statutory bodies established under (part 4 of) the *Catchment Management Authorities Act* 2003 (CMA Act). CMAs operate with boards whose members are appointed by and are accountable to the Minister.

CMAs are the primary means for the delivery of Federal and State funding to help landholders improve the natural resources of the state. The NSW CMAs are responsible for the spending of the Federal and State government jointly funded National Action Plan (NAP) and Natural Heritage Trust (NHT) $436 million for on-ground works around NSW over the period 2003/4 to 2006/07 (NRC 2006).

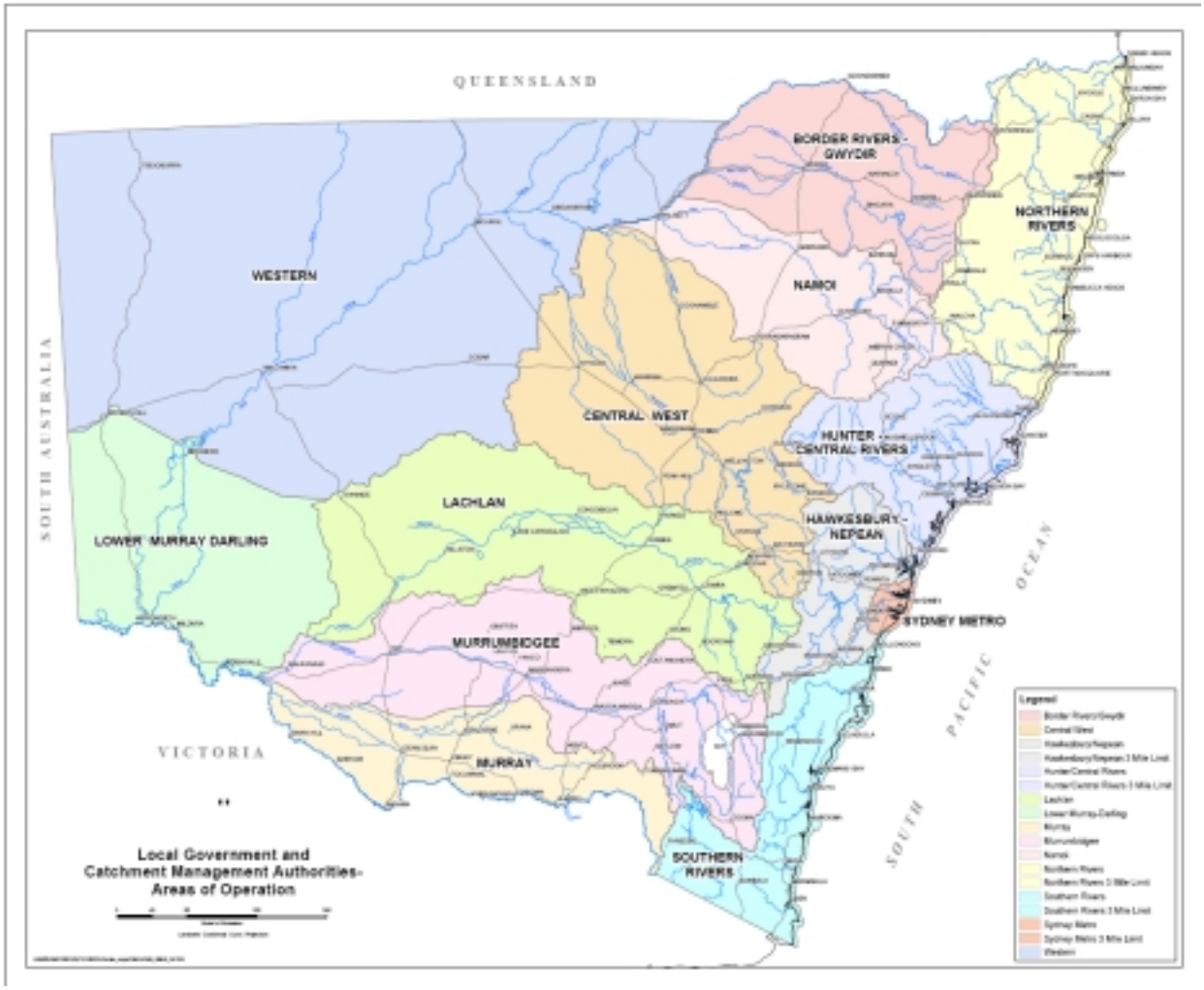
[9] NSW State Government www.nsw.gov.au/StatePlan - accessed 20th August 2007

[10] CMAs NSW www.cma.nsw.gov.au 2007 – accessed 3rd July 2007

In addition to Government funding, CMAs also gain investment from community, local government and sometimes even business (often for specific projects) (HCRCMA 2007). Schedule 4 of the *Catchment Management Act 2003* gives authorities the ability to levy catchment contributions if they have a shortfall in the funding available for catchment activities in the annual implementation program and if specifically authorised by regulations (NRC 2006, CMA Act 2003, Schedule 4). There is some ministerial jurisdiction over levying in that at the beginning of a charging year a CMA must disclose its income sources and proposed expenditure for that year (NSW CMA Act 2003).

The Hunter Central Rivers CMA is the only CMA that currently raises funds through a levy (and then only raises a levy from landholders in the Hunter Valley section of the catchment). The levying mandate is a legacy left over from when the HCRCMA was a trust.

Figure 4-1: Location of CMAs in NSW



Source: NSW CMAs 2005 (www.cma.nsw.gov.au)

4.2 Catchment Action Plans (CAPs)

To deliver NRM improvements and to do this in a way that is integrated across different layers of government and strategic across NSW (NRC 2006), CMAs are required to develop ten year catchment action plans (CAPs). Developing the CAPs requires the identification of regional NRM priorities and the integration of these with state and national priorities and targets (NRC 2006).

The NRC standards by which the CAPS are required to be developed against and the state wide targets to be achieved by the CAPS are provided in Figure 4.2 and Box 4.2. Despite the fact that CAPs are developed according to law (specifically with reference to part 4 of the *CMA Act 2003*) and the CAPs and implementation plans are approved by the Minister, the CAPs are not legally binding in their implementation (HCRCMA, NRC 2006).

The lack of legal enforceability around CAPs results in the majority of CMA effort directed to an advisory role and in developing voluntary incentive type instruments. The one exception to this is the CMAs role in native vegetation management, this is discussed further in the next section.

Box 4.1: NSW NRC standards for CMAs

To assist CMAs in investing in NRM that is cost effective and protects and improves high value natural resource assets, the NRC have developed a guideline for standards for CMAs. The standard is the establishment of a quality process to deliver best practice natural resource management (NRC 2005a). The standard is a number of interdependent components which when applied successfully and together will support natural resource managers identify specific investment priorities and in developing methods for addressing these in the context of state wide targets. The standard is in place to assist CMAs:

- Use the best available information to result in structured and transparent decisions;
- Manage the NRM issue at the optimal spatial temporal and institutional scale;
- Collaborate with other parties to maximise gains, share or minimise costs;
- To meaningfully engage with the community;
- To effectively manage risk and maximise efficiency and effectiveness;
- Quantify and demonstrate progress towards goals.

Table 4-2: NSW NRC State-wide targets for natural resource management

Biodiversity	
Macro Environmental	1. By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition 2. By 2015 there is an increase in the number of sustainable populations of a range of native fauna species.
Specific Priorities	3. By 2015 there is an increase in the recovery of threatened species, populations and ecological communities. 4. By 2015 there is a reduction in the impact of invasive species
Water	
Macro Environmental	5. By 2015 there is an improvement in the condition of riverine ecosystems 6. By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses 7. By 2015 there is no decline in the condition of marine waters and ecosystems
Specific Priorities	8. By 2015 there is an improvement in the condition of important wetlands and the extent of those wetlands is maintained. 9. By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems
Land	
Macro Environmental	10. By 2015 there is an improvement in soil condition
Specific Priorities	11. By 2015 there is an improvement in the extent of land that is managed within its capability
Community	
Macro Environmental	12. Natural resource decisions contribute to improving or maintaining economic sustainability and social wellbeing
Specific Priorities	13. There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management.

Source: NSW Natural Resource Commission, www.nrc.nsw.gov.au, accessed 10th July 2007.

4.3 CMAs and their influence over NRM issues

The development of the CAPs requires CMAs to recognise and gather information on NRM priorities and targets for their catchment. Across the CMAs these NRM priorities typically include water, vegetation/biodiversity, soil quality (erosion and salinity) and pests and weeds. Regardless of the desire to make changes in priority NRM areas, the level of influence that CMAs have in these areas will vary.

CMA influence can be categorised as either advisory, facilitative or direct/regulatory (or a mix of these) with the level of influence varying with NRM issue. Table 4.1 indicates the key CMA roles according to this classification.

Advisory

An advisory role is one where CMAs have influence in either an advisory, planning or an expert opinion role but do not have any legislative or enforcement powers in relation to actions associated with the NRM outcome. For example, the *Water Management Act 2000* requires that a member of the CMA sit on the water management committee but this is an advisory position on an advisory committee (*Water Management Act 2000*: Section 13 and 389A). Another potential advisory role of the CMA that could be granted by the Minister is in the monitoring of water quality and environmental health objectives as specified by the water management plans.

Facilitative

Due to the lack of enforceability of CAPs the role of the CMA could be considered to be largely facilitative. That is, the extent that CMAs can bring about land use change (in line with their CAPs and State Plans) is through facilitating voluntary behavioural change. This role has been seen to a large extent with the role out of grants and incentive schemes by CMAs to entice change.

Some of the potential roles of the CMA in water management can also be seen as facilitative. For example, section 389A of the *Water Management Act 2000* notes that the Minister may grant the CMA the ability to manage adaptive environmental water under access licences. The CMA would be able to manage environmental water licences by acting as a participant in the water market but only has an advisory role in the allocation of the initial environmental licences and over the rules of trade.

Table 4:3 Core NSW CMA tasks

Category	Key tasks	Level of influence
Planning and Investment	Develop and implement CAPs, investment strategies and annual implementation plans	**Facilitative -** developed according to law but not legally binding/enforceable
	Make decisions on the investment of NAP and NHT funding	**Facilitative -** because most CMAs are delivering NAP and NHT funds. The implementation of these funds is primarily through grants and incentives for on ground works which the CMA can influence in terms of participation etc but which compliance can not be enforced.
	Finance catchment activities	
	Deliver incentives through property vegetation plans (PVPs) and other mechanisms	
	Advice local and state government on impact of planning on NRM.	**Advisory –** can advice but local government does not have to comply with regional planning
Native vegetation	Administer and manage PVPs Administer and manage native vegetation consents under the *Native Vegetation Act 2003* Monitor landholders who meet contractual obligations of PVP	**Regulatory/direct –** CMAs are the referral operation of NSW native vegetation regulation.
Water	Manage water licences and water conservation trusts Assist communities with water management decisions	**Unclear, mainly advisory –** CMAs have a statutory but not regulatory role. CMAs provide advice on water management and sharing plans, may be allocated a licence to manage environmental flows but can't create and allocate licences
On ground works	Facilitate and manage catchment based NRM works – river rehabilitation, native vegetation management, salinity management, soil conservation. Assist private landholders conduct works to improve catchment natural resources health.	**Facilitative –** incentive schemes are voluntary. **Regulatory/direct –** CMAs can set the rules and requirements for incentive participants (within boundaries)
Community engagement	Assist landholders try new land management practices that will improve catchment health. Provide technical advice on vegetation management Consult aboriginal communities Provide information and support	**Facilitative/advisory**

Source: Adapted from NSW CMAs 2005, www.cma.nsw.gov.au (accessed 3rd July 2007)

Regulatory / direct

In this case CMAs have either legislative powers or a funding base to instigate and enforce instruments. For NSW CMAs this is only the case for native vegetation where CMAs have legislative powers under the *Native Vegetation Act 2003*. The CMA operationalise native vegetation management legislation through the administration and management of the property vegetation plans (PVPs)[11], native vegetation approvals under the *Native Vegetation Act 2003* and through the provision of expert advice and support on vegetation management issues. The development of PVPs (using the standardised PVP developer toolkit) is commonly used by CMAs as a first step for landholders to access incentive funding. Funding of $120m was provided to the CMAs under the *Native Vegetation Act 2003* for on-farm incentives. The Minister has the authority for approval of Property Management Plans, but this is usually delegated to the CMAs.

The CMA Act indicates that in the future it is possible that CMAs may have enhanced regulatory functions in threatened species and the capacity to be appointed as the consent authority for developments under the *Environmental Planning and Assessment Act 1979* (CMA Act 2003 Part 3).

4.4 Who else is operating in NRM in NSW and implications for CMAs?

While CMAs have been established to provide a state government integrating framework for NRM delivery in NSW, there are a number of other layers of government and governance that affect NRM in NSW. These other layers include local government and industry cooperatives (for example irrigation districts and corporations). Federal and State government NRM investment is already conducted through the CMAs (see process documents on the NAP, NHT and joint funding arrangements held by Commonwealth Department of Environment and Water Resources).

Local government

Local government is a significant investor in NRM in NSW. It is recognised by the NRC that at present the relationship between local government and the regional NRM delivery model of CMAs is not well defined (NRC 2006). At present, the level of integration of local governments with the NRM models relies on the resolve of the CMAs. It is recognised by the NRC that this approach is at risk of high transaction costs due to the number of local governments within a CMA catchment (NRC 2006).

A number of CMAs consulted as part of this project highlighted the good relationships that they held with local government. This was particularly the case with CMAs containing coastal land. In

[11] Voluntary but legally binding vegetation agreements between the landholder and the CMA. Once a PVP has been agreed upon, this remains legally binding on the title of the land and binds future land holders if the property is sold (NSW Government Native vegetation information sheet www.nativevegetation.nsw.gov.au. Accessed 20th August 2007)

these cases, CMAs recognised the extent of priority vegetation in local government ownership and partnered with local governments to manage this land to CMA target requirements. The planning and approval role of local government is also recognised as presenting future opportunities for MBIs by CMAs. This is discussed further in the report.

Industry organisations / peak body authorities / district organisations

In addition to CMAs, throughout NSW there are a number of industry cooperatives and peak bodies with priorities in researching and supporting productivity in the regions. The majority of these groups have formed around irrigation areas with a key purpose to improve water use efficiency of irrigators and to make environmental improvements in local river systems (eg: Macquarie Food and Fibre).

In irrigation areas, irrigation authorities such as Coleambally Irrigation Cooperation Limited (CICL) operate to manage irrigation operation and uptake of land and water management plans (LWMPs), which are developed according to the *Water Management Act 2000*. Under the LWMPs, CICL use incentives to bring about NRM actions such as biodiversity investment, reductions in water use and changed land use. These incentives are capped at a certain percentage of a maximum amount (eg: 80% of a maximum of $500/ha for protection and enhancement of native vegetation). The LWMPs predate CMAs and CAPs but have been included in CAPs (although still implemented by the irrigation authorities).

Non Government Organisations

There are a range of NGOs who directly promote NRM outcomes through their programs. Among them are Greening Australia, Australian Bush Heritage, NSW Nature Conservation Trust, and so on. Programs run by these organisations are similarly funded from a range of public and private sources, and may comprise fee for service activities or the use of market-like mechanisms to allocate funding for on-ground works or for conservation agreements.

Popular among these organisations has been the use of revolving funds and the use of covenants on land titles to ensure gains are secure.

5 FRAMEWORK FOR MBI DEVELOPMENT

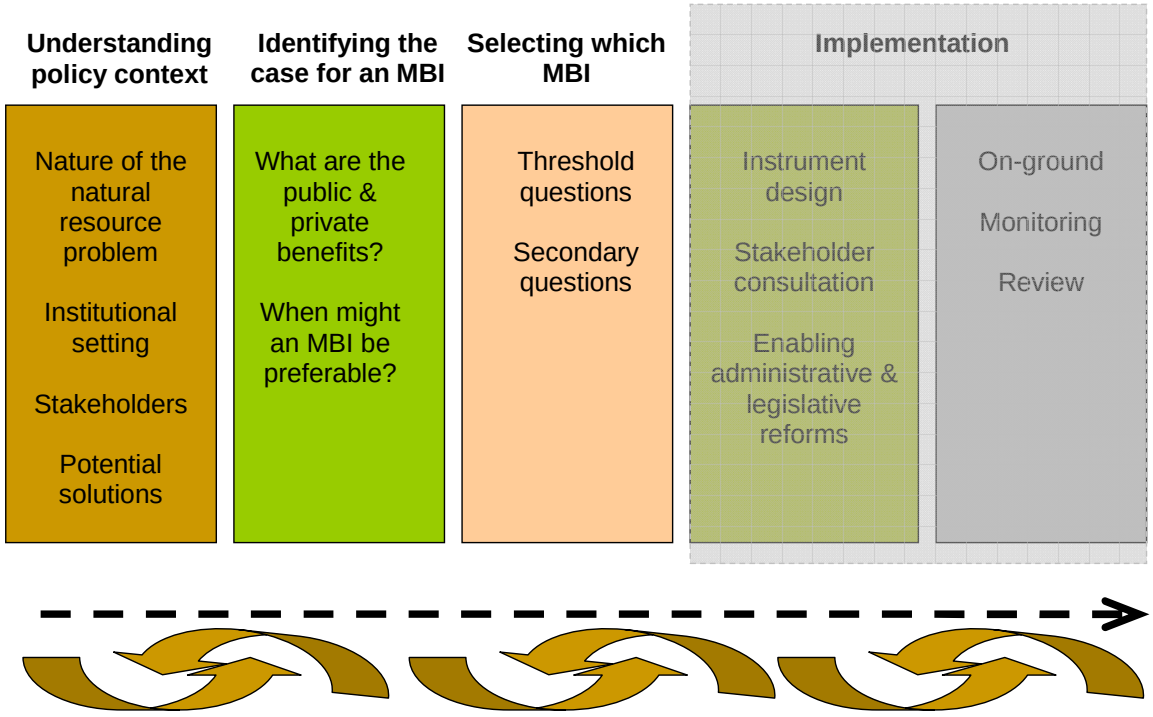
A number of steps are involved in identifying, developing and implementing MBIs. Figure 5.1 outlines the major steps in the process of identifying the case for using an MBI, selecting which type of MBI to use, designing the instrument and implementing and reviewing its application.

It is important to note that the process of selecting a policy tool is not likely to be linear; rather questions would need to be revisited at various times through the process. It is anticipated that the first pass through the steps would be used to identify the gaps in knowledge which would be used to prioritise further effort.

There may not be data available to answer every question but this is not necessarily a constraint to implementing a market based instrument. In some instances it will be important to invest in further data collection. In other instances, it may be judged that the missing primary data is not crucial to implementation, but can be obtained through other means, such as expert judgement or adoption of experiences from other catchments.

This report is concerned with the first three steps in confirming the merits of applying an MBI and selecting which MBI may be best suited. Each instrument has detailed design and implementation issues which are beyond the scope of the report.

Figure 5-1: MBI framework



In section 6 we discuss the importance of understanding the policy context. This involves identifying the nature of the natural resource problem, potential solutions, stakeholders and the institutional setting.

In section 7 we present Pannell's framework for choosing between intervention types based on the public and private benefits likely to accrue with the NRM outcome. In this section we note a number of other characteristics that make an MBI the preferred instrument.

In section 8 we present a number of threshold and secondary questions that should be asked to refine the type of MBI to use. Threshold questions include those relating to whether a market already exists, the ease by which property rights can be generated and allocated etc. Secondary questions relate to what information and constraints are known (do you know your budget or do you have threshold quantities that you need to meet?).

6 UNDERSTANDING THE POLICY CONTEXT

This section outlines the main questions that need to be asked in order to understand the context within which an MBI is sought. Information gathered at this stage will feed into all subsequent steps. Identifying the policy context takes into consideration the nature of the natural resource problem, potential solutions, stakeholders and institutional setting.

6.1 Defining the biophysical problem – how are environmental assets threatened?

Before any intervention can be considered, an understanding of the NRM problem needs to be developed. Policy goals need to be explicit, and ideally, policy outcome based (such as specifying desired conservation goals). This situation is not common in application, with policy goals often being subjective and espoused via vague statements such as to 'protect the environment'.

This step involves asking questions such as:

- What are the biophysical resources being threatened and where are they located?
- Can you set measurable targets, can you measure movement towards the target (can you measure the improvement that an action will have on the goal?)
- Is the problem long term or short term and is it approaching a critical threshold beyond which change could not reverse the problem?

6.2 Understanding the management context of the threat

Confronted with the complexity of conservation goals, and often multiple threats from geographically and economically diverse sources, as well as a diverse mix of current policy instruments, this is a major and ongoing challenge for governments. The key factor here is integrating scientific and other advice to match key threats with known management solutions. This provides the starting point for matching possible management solutions and potential policy instruments.

Pertinent questions here include:

- What is the nature of the threat? Is it broadly across the catchment or is it localised?
- Could a management change(s) address the threat?
- Does everyone need to make the same changes to get the result or can this vary? Does it matter where in the landscape that management changes occur or will they require tailoring to different circumstances or at different times?

6.3 Why does the market fail to provide the desirable level of this good?

Essential to any form of government intervention is that policies address the fundamental causes of the problem, that is, they address the market failure(s). As will be shown, poorly aligned policies will not overcome impediments to change nor provide enduring incentives for change.

Pertinent questions here include:

- What is the source(s) of market failure?
- Are there polices already in place that are either causing the problem in the first place or that through minor adjustment could address the problem?
- What policies have been applied in the past? Were these successful, why / why not?

For natural resource management, the underlying cause of market failure is generally the lack of defined and defendable property rights and / or the high cost of overcoming information failures. This may be due to scientific uncertainty, uncertainty by landholders about the techniques available, lag times or information that is held asymmetrically. An example of how the market failures were addressed for salinity in the Wimmera catchment can be found at Attachment 3.

6.4 Understanding the community

Two types of knowledge about the community are important – the first is the socio-economic characteristics about the target community and the second is the level of willingness by the community to engage with the CMA and the proposed policy intervention.

Pertinent questions here include:

- Are landholders aware of the problem and potential management solutions?
- Is information readily available; can it be cost-effectively accessed; is there information asymmetry between landholders and Government?
- Are landholders motivated; are there community / industry networks to assist communication?
- Do landholders have a capacity to adopt solutions (eg: skills and financial resources)? Are there differences between landholder management styles, productivity and cost structures? Are some landholders operating with low margins and / or high levels of indebtedness and therefore it may be difficult to convince them to make changes.
- Are there lifestyle or risk factors impacting the adoption of management practices? For example, are there absentee landholders without time and expertise to implement solutions?
- Are there social constraints to change? For example, what is the current perception of landholders with respect of to duty of care?

7 IDENTIFYING THE CASE FOR A MBI

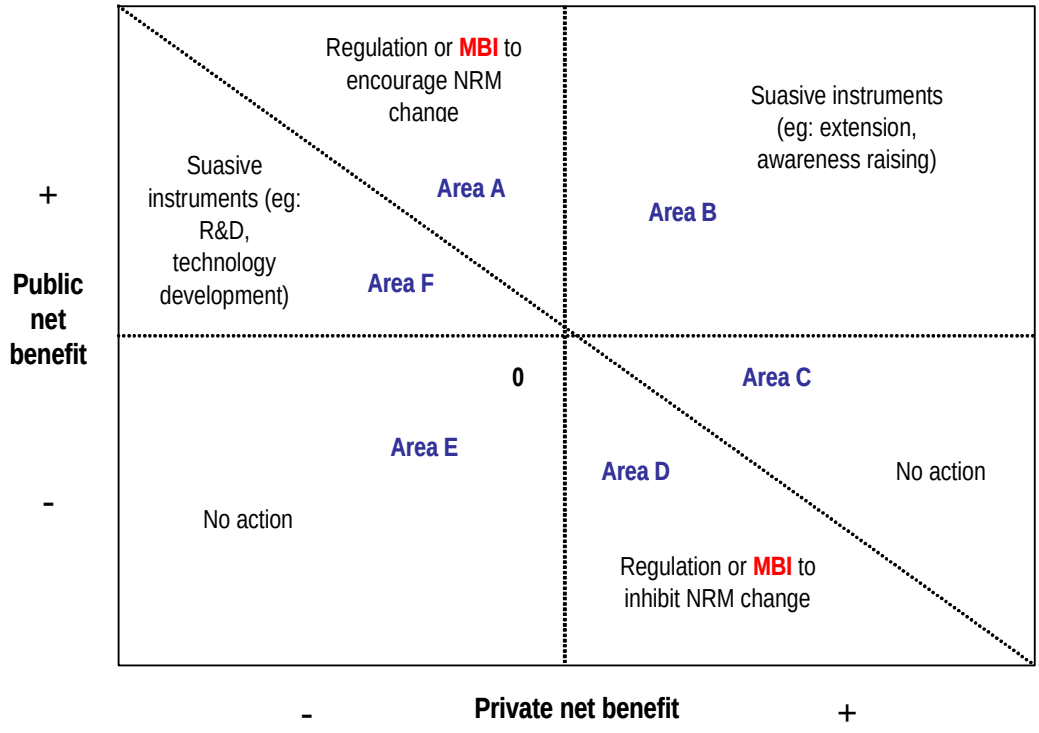
The information collected to this point will allow a preliminary assessment of the likely benefits and costs of policy interventions to public and private stakeholders, and an appreciation of key barriers or issues that will shape policy selection. This section uses this information for an initial assessment of suitability of alternative policy instruments, including MBIs.

7.1 The Pannell framework

Our framework follows the recent work of David Pannell who sets out a framework in which policy choice is made through a consideration of the likely public and private benefits that may arise from land management projects[12].

Within the framework (shown in Figure 7.1), any combination of positive or negative public or private net benefits arising from any land management project is possible.

Figure 7-1: A framework for selecting policy tools



Net private benefits refer to the difference between the returns and costs incurred by an individual as a result of a change in land use. If the private income generated by a change is greater than the private costs associated with the change (e.g. farm profits rise) then the net private benefits will

[12] Pannell, D.J. (2008). Public benefits, private benefits, and policy intervention for land-use change for environmental benefits, Land Economics (forthcoming). Available at www.sif3.org.

have increased. *Net public benefits* refer to the difference between the benefits to all of society (financial, social and environmental) arising from the change in land use and the corresponding costs associated with that change.

As shown in Figure 7.1, the various combinations of public and private benefits generate a number of situations that lend themselves to specific policy instruments. These are discussed, in turn, below.

Area A – public benefits outweigh private costs

In these circumstances there would be overall social benefits from land management change, but as private benefits are negative, direct regulation or market-based incentives would be needed. Incentives could be positive or negative price based instruments or some quantity based instruments. For example, landholders could be offered a payment out of public funds or we could charge them a tax for the environmental damage that they generate as a result of not changing land use.

Clearly, the incentive offered must be at least equal to the net private costs faced, however Pannell notes that, in reality, the incentive required might need to be greater to get landholders over the 'learning hump' and to promote more rapid adoption. Because of this, incentives to promote land use change may not be appropriate where public benefits are small.

Area B - public and private benefits occur

In these circumstances landuse change is profitable in its own right to landholders and so change will occur as long as landholders are aware of the pertinent practices. As this may not always be the case, suasive instruments such as education and training, extension and community programs would be suitable policy instruments to overcome the informational barrier and appropriate because the changes will generate positive public benefits.

The investment in extension should be limited to only the amount necessary to promote the behavioural changes sought and less than the public benefits realised. Pannell argues that small incentives to complement extension activities may also be useful to again get landholders over the 'learning hump' - the existence of positive learning costs mean that landholders may not make the transition to a new practice, even if its adoption would ultimately yield positive private net benefits. However to ensure public funds are targeted to where payoffs are greatest and most needed, incentives should only be provided when public net benefits are high and private net benefits are positive but low.

Area C – private benefits outweigh public costs

In these circumstances, land use changes should be accepted if they occur and, due to the negative public benefits, no policies should be introduced to encourage the land use change.

However, even in these circumstances, some policy interventions may be warranted due to the existence of learning costs, uncertainty and adoption lags. For land use change where net private benefits are not too different from zero, land use change may be prevented with modest incentives, or extension may accelerate the adoption of more benign practices that would not otherwise be adopted.

In these cases, however, the public benefits realised need to exceed the cost to government of the incentives or extension provided.

If it is not known whether private net benefits are sufficient to outweigh public net costs, a negative price based instrument or a quantity based instrument might be used to communicate the public net costs to land managers (e.g. a pollution tax, or a market creation approach such as tradable permits), leaving the ultimate decision about land-use change to the land managers. Inflexible regulatory tools should not be used in this case, as they might result in changes where the overall costs outweigh the benefits.

Area D - public costs outweigh private benefits

In these circumstances direct regulation or market-based incentives would be appropriate to stop land use change. Indeed as the land use change would deliver private net benefits, landholders are likely to adopt the practices unless prevented from doing so.

However, again with various informational barriers, adoption lags, and so on, adoption of these practices in the absence of regulation or market-based incentives may be very long term where net private benefits are small (for example in many instances where native vegetation on properties has not been cleared). In these instances the public outcomes from introducing the policy interventions may not be significant. In short, interventions in these instances will be most relevant where public net costs will be high and/or private net benefits low.

Area E - public and private costs occur

In these circumstances, both public and private benefits of land use change are negative, and neither party should be interested in promoting change.

Area F - private costs outweigh public benefits

Finally, in these circumstances, the cost of the available technology or practices for land use change would leave society worse off despite the conservation benefits that could be delivered, and so regulation, market-based incentives or extension approaches are inappropriate. The obvious policy option in these circumstances is to promote research and development that can deliver more cost-effective change through increasing private and/or public benefits.

Pannell argues that a particular attraction of technology development is its potential to prompt adoption of changed practices over large areas, without the need for incentives. And the role of technology development is not limited to area F; it could be an option in any part of the diagram, depending on the opportunities and the costs.

The key question for government, applicable to all publicly funded research and development, is to identify investment programs that could be expected to generate a positive outcome, taking into account research and adoption risks and costs, the ultimate costs of new technology in the field and the level of public benefits that may be generated. Accordingly, investment in technologies that would deliver land use change with higher benefits would, all other things equal, be the most attractive from a policy perspective.

When all the considerations canvassed above are taken into account, a benefit-cost ratio (BCR) of greater than 1 should be sought on any public investment. That is, policy interventions should only be pursued where expected benefits to all parties are confidently expected to be greater than the costs to all parties. Pannell argues that a BCR of at least 2.0 is probably a reasonable guide to investment given that program resources are limited and there are more worthwhile projects available than the program can afford to fund. A BCR of at least 2 might also be needed to outweigh the overhead costs of running the program. It may also be the case that the estimated transactions costs associated with some potential government policies is too high to warrant their implementation. This more targeted strategy shows that, broadly speaking:

> *… priority policy interventions are those where private net benefits are closer to zero, and/or public net benefits are more extremely positive or negative.*

A clear message in his arguments is the need for environmental managers to pay close attention to the farm-level economics of the practices they would like to see adopted. The framework presented reveals that the selection of cost-effective environmental projects is probably even more sensitive to private benefits than to public benefits.

To estimate private net benefits, one option is to invest in economic modelling. Another is to look at what farmers are currently doing. If they are choosing not to adopt a proven practice that they are familiar with, this provides a strong indication of their assessment of its private net benefits (including issues beyond just short-term financial returns).

Finally, it is important to recognise that both categories of net benefits depend on several elements. The public net benefits are not simply the value of the environmental assets involved, and the private net benefits are not simply the profits from the new land use. Indeed, the private net benefits of a project (i.e. a specific set of land-use changes) would depend on:

- the financial returns from the new land uses;
- the financial returns from the land uses that are replaced (the "opportunity costs");
- any change in risks faced as a result of the change;
- indirect impacts on other aspects of the farm system or on the farmer's lifestyle; and
- the farmer's own interest in the environmental outcomes.

The public net benefits would depend on:

- the value or importance of the environmental assets that are affected by the changes;
- the degree of degradation that the assets were facing or had already suffered;
- the extent to which that degradation can be prevented or alleviated by the changes; and

- any lags in the response of the biological or physical system to the land-use changes.

In considering this framework Pannell makes a number of qualifications including;

- recommendations depend on landholders having reasonably accurate perceptions about the private net benefits of adoption. To the extent that this is not true, there may be broader roles for extension, positive incentives or negative incentives; and
- the rules underlying his framework are based on an objective of efficiency (biggest environmental benefit per dollar spent). In practice, governments often consider equity or fairness in deciding how to spend their resources.

7.2 Choosing between regulatory and market-based instruments

Through the Pannell framework, opportunities to apply regulatory and market-based instruments were identified. The next step is to determine in which circumstances a regulatory instrument or a MBI would be preferred.

Market based instruments are likely to be superior where:

- there is a known, established and enforceable duty of care;
- regulation would be difficult to design, implement and administer;
- there are a large number of potential market participants;
- there are large variations in the ability and cost-effectiveness of potential participants to provide the desired outcome;
- there is flexibility in the range of responses that will deliver the desired outcome; and
- there is scope for innovation in improving land management for environmental outcomes.

8 SELECTING WHICH MBI

Through application of the Pannell framework (Section 7.1) and consideration of the merits of using a regulatory instrument to address a NRM problem (Section 7.2), opportunities for the use of a MBI were identified. These circumstances involve situations where the policy objective is to:

- encourage a positive NRM change where there are private costs of change to landholders; and,
- discourage a negative NRM change where there are private benefits of change to landholders

In both instances, a range of possible MBIs may be employed, including positive or negative price instruments, quantity-based instruments or market friction instruments. In this section, the choice of which MBI is likely to be most applicable is examined through firstly postulating some 'threshold' questions that focus on the underlying market failure at play, and secondly through a set of secondary questions that help focus the MBI choice.

8.1 Threshold questions

In the first instance, the selection of an MBI must align with the underlying market failure if efficient, effective and enduring changes are to be achieved. Figure 8.1 presents these questions and indicates how they guide initial MBI selection.

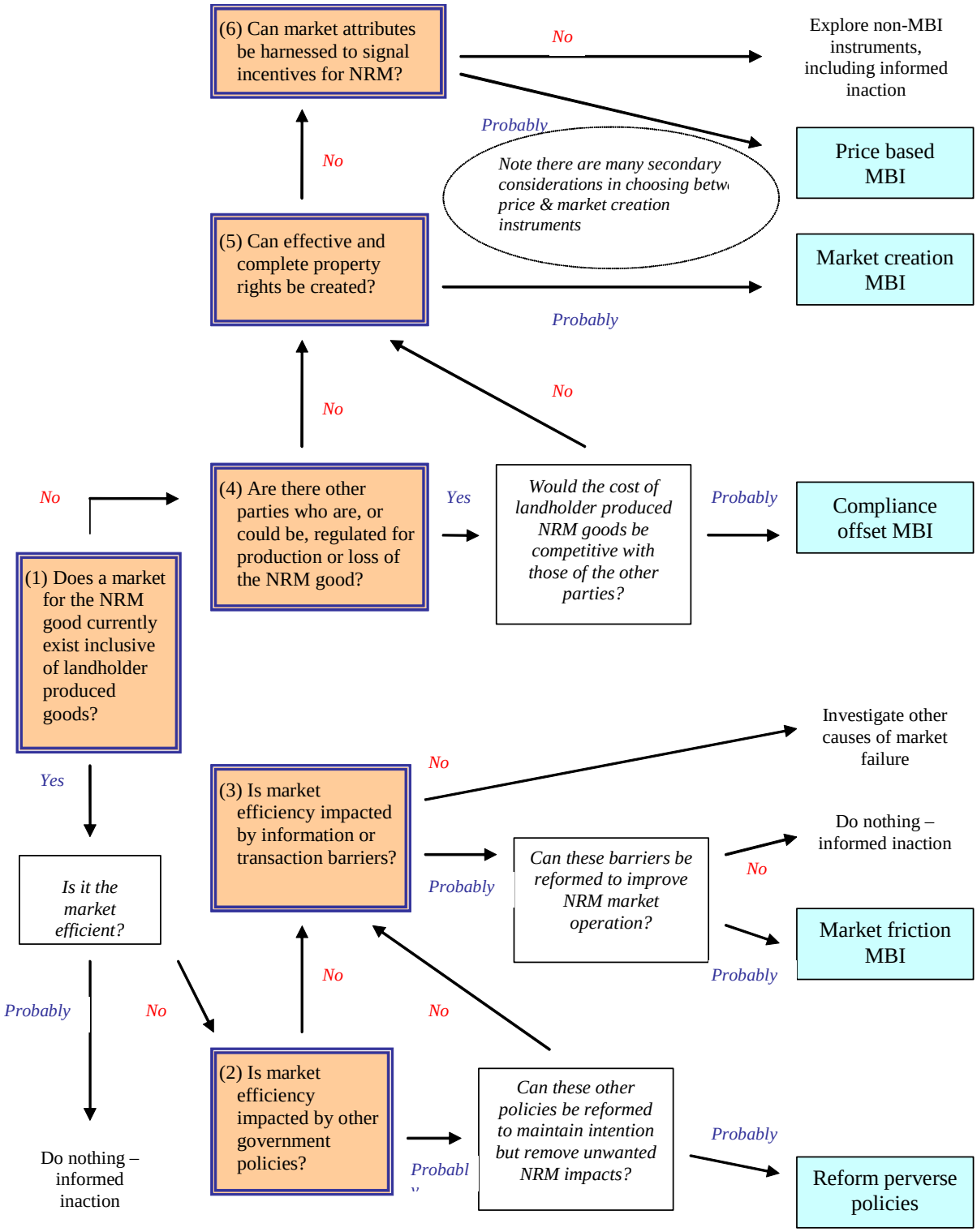
Question 1: Does a market for the NRM good currently exist inclusive of landholder produced goods?

If a market for the targeted NRM good does not exist, interventions that address the issue of missing markets need to be explored, and interest would move to threshold question 4.

If a 'complete' market does exist but NRM outcomes from that market appear to be producing sub-optimal outcomes, the specific cause of market failure needs to be identified, and interest would move to threshold question 2. If no market failure can be identified, then from an economic efficiency perspective the market outcomes are indeed optimal and no policy action is required. However governments may still choose to intervene to promote equity considerations, be that in terms of equity across the current generation or inter-generational equity.

An example of the latter would be a fishery where property rights had been allocated and based only on economic criteria. The community may maximise net present returns from that fishery through a level of fishing effort that would ultimately see the loss of the fishery. On sustainability grounds the community may wish to conserve the fishery, and so changes to property rights would be needed for this (and interest would move to threshold question 4).

Figure 8-1: Threshold questions in selecting an MBI



Question 2: Is market efficiency impacted by other government policies?

The first reason for market failure to be explored is where NRM outcomes are being negatively impacted by other government policy interventions. For example, an industry assistance program may be prolonging adjustment in an industry and the perpetuation of unsustainable management practices. If these other policies can be reformed to maintain their original policy intent but without the unwanted NRM impacts, then the policy intervention required is to reform the 'perverse policies'. If this is not possible or sufficient to realise the NRM goal, attention shifts to threshold question 3.

Question 3: Is market efficiency impacted by information or transaction barriers?

This question explores whether the market is being impacted by information or other barriers that increase transaction costs in the market and lead to sub-optimal outcomes. An example here would be where information on the (potentially) positive NRM outcomes associated with organic produce is not being transmitted to consumers. As a result, prices formed in the market cannot signal back to producers the value being placed on the associated NRM outcomes. In these instances, a market friction MBI can be explored to help the operation of the market and improved NRM outcomes. If these barriers cannot be overcome at a cost less than the NRM benefits that are likely to be accrued, than intervention is not warranted.

If no information or transaction barriers are found, and no perverse policies are thought at play, then market failure may not exist and no policy action is required. However, governments may again still choose to intervene to promote equity considerations. Other less common sources of market failure in NRM markets, such as market power, should also be explored. If the underlying failure is due to public good characteristics or externalities, then the market is not 'complete' and attention should turn to threshold question 4.

Question 4: Are there other parties who are, or could be, regulated for production or loss of the NRM good?

Where markets are incomplete, the first opportunity to promote necessary reforms may be to extend the existing market to the landholders who can provide the NRM good. An example here is greenhouse gases, where industrial activities may be liable for their discharge of these gases. If landholders can change their management practices to reduce greenhouse gas emissions (or to sequester carbon) more cost-effectively than the other liable parties, then changes to the market to facilitate this trade in abatement effort would be beneficial. That is, the greenhouse gas market could be extended to landholders by allowing liable parties to purchase 'compliance offsets' from them. If this is not possible or not likely to be sufficient to realise the NRM goal, attention shifts to more expansive market reforms addressed in the threshold question 5.

Question 5: Can effective and complete property rights be created?

In principle, the intervention most likely to minimise compliance costs in achieving the NRM goal is where complete and tradeable property rights can be created and enforced. Murtough et al 2002 describe property right characteristics essential for market operation as presented in Figure 8.2.

Table 8-1: Property right characteristics needed for creating markets

Property right characteristic	Description
1. Clearly defined	Nature and extent of the property right is unambiguous.
2. Verifiable	Use of the property right can be measured at reasonable cost.
3. Enforceable	Ownership of the property right can be enforced at reasonable cost.
4. Valuable	There are parties who are willing to purchase the property right.
5. Transferable	Ownership of the property right can be transferred to another party at reasonable cost.
6. Low scientific uncertainty*	Use of the property right has a clear relationship with ecosystem services.
7. Low sovereign risk*	Future government decisions are unlikely to significantly reduce the property right's value.

* Low in the sense that it does not prevent a market from forming. Moderate levels of risk and uncertainty are not necessarily insurmountable barriers to the operation of a market.

However for environmental goods, workable and cost-effectively administered rights are likely to be the exception. Property rights for environmental goods are difficult to determine as per Murtough et al's framework. Some of the key reasons for this are described in Table 8.1.

Table 8:2 Why property rights for NRM are hard to define in the first place

Clearly defined	For many NRM goods there is more than one service that make up that good. For example the value of biodiversity is influenced by the number of species, location, understorey structure etc. It is difficult to define one property right that captures all of these features and the tradeoffs between them.
Verifiable	There is generally a lack of knowledge between the cause and effect of land management and environmental outcomes or consequences. The cost of addressing this knowledge gap is often very large. Without knowing cause and effect it is very difficult to know if a land management action generates or violates a property right. The verifiability of a property right is also made difficult by the fact that environmental outcomes of land management actions occur over very long periods of time and space and are difficult to quantify
Enforceable	Without knowing who owns the rights and how they are generated it is then very costly to enforce them
Valuable	Without knowing who owns rights and how to trade them (or what these trades mean), rights to environmental outcomes are not valuable
Low scientific uncertainty	See above re verifiable rights
Low sovereign risk	Rights to environmental outcomes tend to be at high risk of attenuation or change and therefore of low value in a trading framework.

Because the transaction costs of defining, verifying and enforcing property rights to NRM goods are so high, markets for these goods are usually based on proxies. For example:

- if the NRM goal is biodiversity, vegetation is often used as the proxy measure;
- if achieving a viable bird population is the goal, habitat quantity and quality is often used as the proxy measure; or
- if salinity reduction is the goal, the proxy measure may be the plantation of trees in certain parts of a catchment.

Issues with property rights and proxies used for NRM goals such as biodiversity conservation, salinity mitigation and climate stabilisation are presented in Table 8.3.

Table 8:3 Biodiversity, salinity, climate change and the conditions for market creation

Property right characteristic	***Biodiversity conservation***	***Salinity mitigation***	***Climate stabilisation***
Definition	May be able to define particular aspects of biodiversity. Difficult for trans-boundary issues and biodiversity as a whole	Mitigation actions can be defined in many cases.	Can be defined using the proposed measure of tonnes of CO2 equivalent, based on global warming potentials of different gases.
Verifiable	Possible for particular aspects of biodiversity. No consensus on a comprehensive measure of biodiversity.	Partly (for example, area planted with trees).	Likely. Measurement protocols already exist or are under development.
Enforceable	Only in certain cases.	Yes, for point source problems. Difficult for non-point sources.	Yes.
Valuable	Likely to be few buyers other than governments and philanthropic groups.	Yes, salinity affects the production of primary commodities. But property right would be worthless in cases where salinity is irreversible.	Likely. Emissions an unavoidable byproduct of activities that are valued.
Transferable	In some cases.	In some cases.	Probably, given established unit of exchange (tonnes of CO2 equivalent).
Scientific uncertainty	High. Particularly a problem for offsets. Impacts likely to differ by location. Irreversibility could be a problem.	High. Relationship between mitigation activities and salinity often unclear. Impacts likely to differ by location. Long time lag between mitigation and outcomes. Some problems are irreversible.	Relatively low, since majority of scientific opinion supports a link between emissions and climate change. Carbon sequestration is more contentious.
Sovereign risk	Probably high, given scientific uncertainty.	Probably high, given scientific uncertainty.	High, unless there is a comprehensive global agreement on climate change.
Sufficient buyers and sellers for a tradeable scheme	Unlikely unless loss in biodiversity must be offset against increases.	May be unlikely, given problems often highly localised.	Yes, given common unit of exchange that is associated with many economic activities.

Source: Murtough et al 2002, p. XIV

Where it is not possible to create robust property rights and a market for the NRM good, consideration then turns to modifying signals within existing markets to promote the desired change in management practices that will deliver the NRM objective (threshold question 6).

Question 6: Can market attributes be harnessed to signal incentives for NRM?

Behaviour response to changes in prices will vary. For some actions, a large price incentive would be needed to generate change while for other actions the incentive may be smaller. Where the action response to a change in incentive (positive or negative) is large, then the best policy response may be to harness this market attribute. A price based MBI such as the competitively allocated payment for a management action or a tax to stop a certain negative behaviour may be appropriate.

Where it is not possible to intervene such that the benefits exceed the costs, then an MBI that seeks to harness the market attributes is not warranted. However as noted in the Pannell framework, private landholders may be willing to take on modest costs in the public interest, particularly where this would be publicly acknowledged (for example Land for Wildlife). Therefore suasive instruments in these circumstances could be revisited as a potential policy approach.

8.2 Secondary questions

In addition to the threshold questions, there are a number of additional or secondary questions that will influence the type of MBI selected.

Question 1: Do biophysical thresholds exist?

Quantity based mechanisms are often preferred when there are environmental thresholds attributed to a good. For example, if there is a critical point whereby pollution levels allow for safe swimming in a lake, it may be more efficient to set a quantity-based target at or below this threshold rather than embarking on a trial and error process of trying to establish the price incentive that would yield the same outcome.

Other considerations include the potential for spillover or hotspots to occur. For example, creating a new market to manage water quality could lead to a pattern of trade allowing increased pollution in a region that reduces water quality and impacts sensitive environmental amenities at that location, although improvements in overall water quality generally occur. The potential for spillovers or hotspots may not limit the choice of instrument, but needs to be factored into instrument design.

Question 2: Is environmental or cost uncertainty of greatest concern?

Related to Question 1 is managing uncertainty related to price and quantity instruments. With price instruments, compliance costs imposed on landholders will be capped by the incentive provided.

However uncertainty will exist as to landholder responses to the incentives provided and hence the realisation of environmental targets. Where there are issues of irreversibility and / or urgency in realising the environmental goal, a quantity based instrument may be preferred. Of course the corollary applies here, in that compliance costs imposed by the instrument will not be known with certainty.

Therefore the choice of a price or quantity based instrument will be influenced by the policy priority placed on managing environmental outcome or compliance cost uncertainty (although it should be noted that design elements in both price and quantity instruments can be included to limit, but not totally negate, these concerns).

Managing uncertainty will also be influenced by the perceived scale of costs and benefits. When there are large marginal benefits from supplying more of an environmental good (a steep marginal benefits curve), or the marginal costs of supplying more of the environmental good is low (a flat marginal cost curve) a quantity based mechanism is preferred. Weitzman (1974) argues that in this situation the cost to the community (in terms of lost benefits) of setting the wrong price is very high. Conversely, if there are very high costs of supplying more of the environmental good or the benefits are small then a price instrument is preferred for the same reasons.

At the commencement of any type of instrument it is very likely that large changes can be gained at small marginal cost. There is likely to be a point, however, where the marginal cost of an additional unit of environmental good is very high and the benefit low so much so that it compromises the potential cost effectiveness of the approach (costs far outweigh the benefits) (Weitzman 1974). If this is likely, and if there is an absolutely fixed budget, scheme operators would minimise the risk of overspending by selecting a price based instrument.

Question 3: Beneficiary pays or polluter pays?

Differing instruments will have differing cost-sharing implications. Instruments which impose costs on those creating environmental impacts are generally termed 'polluter pays' while those who impose costs on parties who will benefit from improved environmental outcomes are termed 'beneficiary pays'.

Negative price incentives will impose costs on landholders through either the costs incurred in changing management practices or paying the NRM charge or fee, and so are polluter-pays instruments. Funding for positive price instruments generally derive from governments on behalf of taxpayer beneficiaries and so the incidence of costs is beneficiary pays.

Quantity based instruments can be crafted as either polluter pays or beneficiary pays, or indeed almost any sharing of costs between these parties. For a cap and trade instrument, this will depend on how the tradeable rights are allocated and secondly how stringent the cap is. For example, a

system where tradeable rights to pollute are freely allocated and the cap is set at a level close to current emission levels is primarily beneficiary pays in nature as the only (polluter-pays) liabilities imposed will be in relation to increased emissions that may have arisen under a business-as-usual circumstance. On the other hand, if the initial rights to pollute were auctioned, the instrument would clearly be polluter pays.

The polluter pays approach is often used when the outcome will incur relatively low costs or there are clear perceptions that the community holds the environmental property rights. The beneficiary pays approach tends to be used when the outcome may impose significant and 'unreasonable' costs on a small number of stakeholders.

Question 4: Is there a duty of care?

As indicated in secondary question 3, differing instruments will have differing cost-sharing implications. How the burden of increased resource conservation should be shared between landholders and other members of the public will depend upon who the community believes *implicitly* holds the rights to these resources and impacts arising from their use.

Binning and Young (1997) and the Productivity Commission (2001) have referred to society's expectation of landholders as a duty of care – an implicit property right. This duty of care reflects the social responsibilities sought and an allocation of rights between landholders and broader society for externalities from land use. The allocation is largely implicit as statutory rights often have not been modified or established. Notably, the duty of care is a dynamic allocation of rights, changing over time to reflect changing community desires for conservation and improved environmental outcomes.

In relation to managing native vegetation, ANZECC has adopted the principle that incentives should generally not be paid to landholders to meet their duty of care, although:

> *'where community expectations resulting in legislative or policy changes cause duty of care to be shifted significantly over a short period of time, financial assistance may be provided to speed the transition to the new arrangements and maintain community support. Such payments should be one-off in recognition of the need to adjust to a new regime' (ANZECC 1999*).

Prevailing views as to any duty of care applicable to the NRM good in question should be considered to assist instrument selection, design and implicit cost-sharing. Indeed the implied duty of care embedded in a new MBI will itself contribute to how rights to the NRM good are perceived when formulating subsequent policy interventions. This will be important where pilot instruments are first introduced ahead of broader interventions.

Question 5: Who has jurisdictional powers over the property rights?

Legislative reforms are often required to underpin market based instruments.

In the case of quantity based instruments, overall targets must be set and allocated including the initial allocation of rights, and rules about the conditions under which trade can take place and how rights will be monitored and enforced need to be established. Quantity based instruments tend to require significant institutional change. Therefore, it is often difficult for agents such as Catchment Management Authorities to implement them without lengthy negotiation and support from other levels of government.

Price-based instruments may also require legislative reforms to underpin negative price instruments such as taxes and charges, although positive price instruments can often be administered solely through contractual means. Similarly, some market friction instruments can be implemented without legislative support, however this may not be the case where minimum standards associated with the instruments are sought – such as with certification schemes or producer levies to fund R&D initiatives.

It is also important to consider how well different MBIs will integrate with the existing institutional framework and culture. In some instances there may be an institutional inertia or regulatory culture that would work against instruments requiring legislative changes. Policy makers need to also consider the level of sovereign risk that is likely to occur in the future in relation to the NRM issue being targeted. Where such risk is prevalent, newly created rights may not be seen as secure, which will impede efficient market responses.

Question 6: How quickly is change required and are outcomes enduring?

Many environmental outcomes are dependent on longer term hydrological and ecological processes. For example, revegetation with the ultimate goal of reducing saline discharge to streams and rivers may take several years to have a demonstrable impact. Once established, the private benefits of maintaining the vegetation may mean ongoing incentives are not necessary.

However where this is not the case and management changes need to be locked-in for long periods, short-term price incentives may not be sufficient. While it is possible in principle to secure longer term management changes through contract terms or statutory means such as covenants, costs associated with monitoring and enforcement need to be considered.

Quantity-based approaches are also often reliant on converting long-term outcomes into short-term management goals, often annual or shorter. Market demand for these rights may diminish if the market believes the outcomes associated with the traded rights are not being maintained.

Question 7: How significant will be transaction costs associated with the new instrument?

Price and quantity based instruments may incur different costs in design, implementation or administration. These costs may be incurred by either government or the private sector and are generically termed 'transaction costs'. Transaction costs will tend to increase with the number of participants involved, the more complex the engagement process with the instrument, and the greater and more complex monitoring that is required amongst many other factors. Whether price or quantity-based instruments have lower transaction costs depends on circumstances.

For example, if there are a large number of potential participants who will be engaged by an instrument, but few of whom need to change management practices to achieve the desired outcome, then the larger costs of engaging with all participants within say a quantity based cap and trade framework or negative incentive such as a tax versus the few within a 'self-selecting' positive price instrument favours selection of the latter.

Question 8: Will the available budget limit instrument choice?

The extent of public funds available will influence the choice between a price and quantity based instrument. If the budget is limited it may not support the scale of funding required for a positive price instrument. A quantity based instrument is likely to require more funding in the development and establishment phase, but generally only modest ongoing funding to support administration and enforcement. Further, these ongoing costs are sometimes recouped through the periodic sale of rights (where initial rights are time limited) or through administrative charges applied to the trading of rights between participants.

Question 9: What are the skills and capacity of the implementing authority?

The level of complexity of the instrument chosen will be restricted by the capacity of the staff directly involved in designing, implementing and administering it. CMAs can draw on external resources to provide specialised skills, however the pool of appropriate professional MBI practitioners is limited and comes at a cost. An appropriate balance between the development of skills within a CMA and sourcing external expertise will vary between instruments.

Consideration should also be given to the level and type of resources, administration structures and training needed to support different instruments.

Question 10: Is there more than one market failure at work?

In some cases there may be more than one market failure present. For example, in the case of biodiversity conservation, there are clearly 'missing markets' information failures as to appropriate and efficient management actions. In cases of multiple market failures, multiple policy interventions

are generally needed. Interventions that either ignore broader market failures or seek to correct for multiple failures are likely to be ineffective.

Question 11: Is the sequencing of instruments important?

In some cases it may be useful to introduce pilot instruments to generate information and in order to establish proof of concept. As understanding and experience with the instrument grows and data collected from the instrument informs scientific knowledge, the instrument(s) may evolve. For example, new players may be introduced, the geographic scope of the instrument may increase, or the type of trades allowed may be increased.

Also, an evolution of instruments can sometimes be developed to strategically address multiple failures. For example, a pilot subsidy delivered via a competitive tender can reveal information on available management actions and costs that can inform subsequent instrument designs to address underlying externalities.

Question 12: Can robust metrics be defined, monitored and enforced?

The effectiveness of any MBI chosen will hinge on whether direct and robust metrics can be defined, monitored and enforced at reasonable cost.

A number of metric design principles have been postulated based on experiences with establishing metrics in the Wimmera catchment (see Attachment 4). While not all of the metric design principles will necessarily be important for all MBIs this framework provides a check list that will aid practitioners in developing suitable metrics.

While not wanting to underestimate the importance of metric design, a balance needs to be struck between the increasing costs of further development of metrics and the additional benefits of further refinement. There is no such thing as a perfect metric, but a MBI practitioner will need to seek advice as to what is considered an appropriate level of investment in metric design.

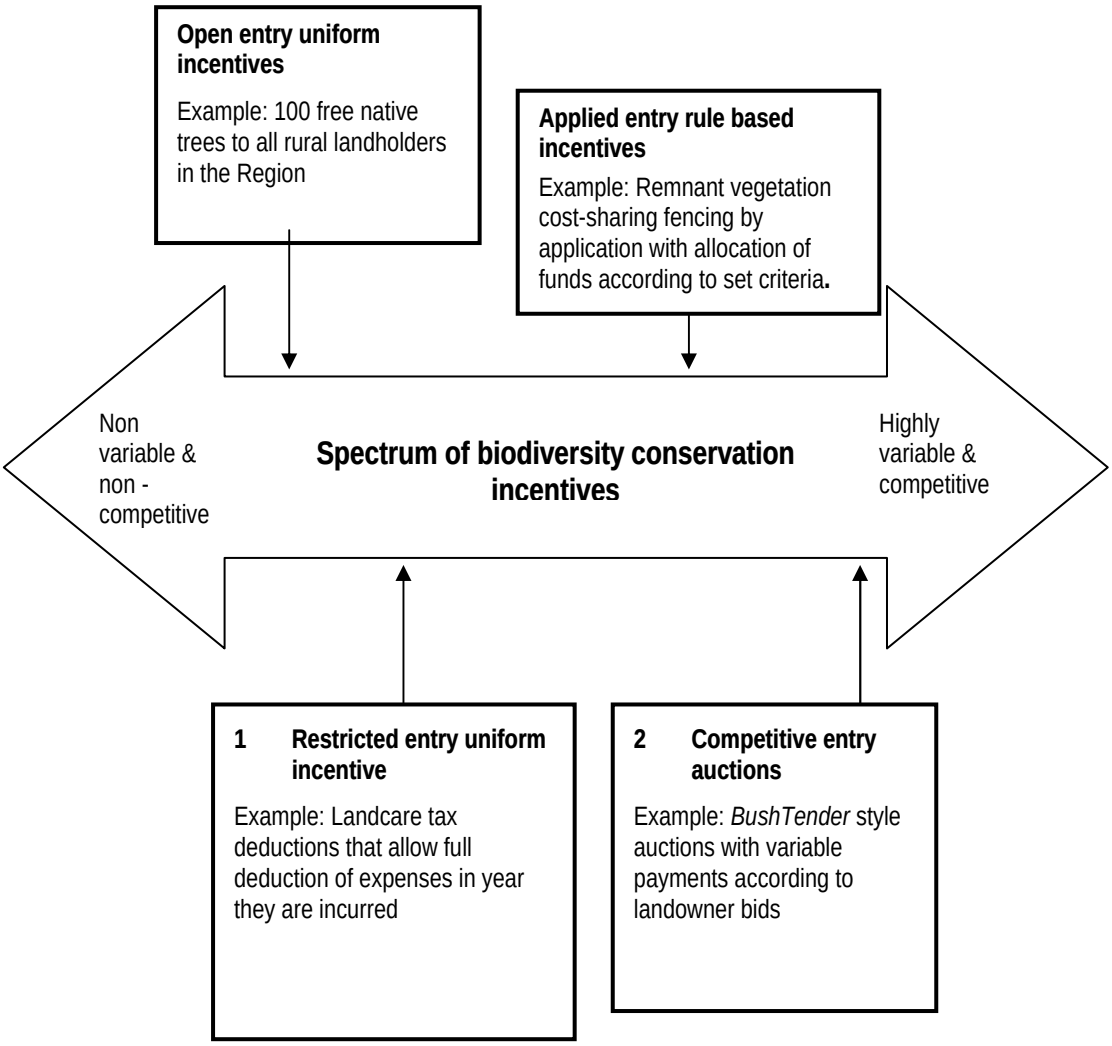
Question 13: How precisely will the instrument need to be targeted?

The instruments that can be selected will vary according to the extent to which they can target particular landholders or will be broadly applied. Generally speaking, the costs of administering a targeted instrument are greater than one broadly applied, but the outcomes achieved from a targeted approach may more effectively meet the NRM goal.

An appropriate targeting of instruments needs to balance instrument costs with potential benefits. An example of the range of approaches that can be applied to biodiversity conservation is provided in Box 8.1.

Box 8.1: Targeting price instruments – the example of biodiversity conservation incentives

Price-based incentive instruments can vary from an automatic right (say through the provision of a free native tree to all residents in an area) or a payment (say a payment for areas of native vegetation regardless of quality) through to a competitive and conditional instrument (such as competitive tenders for fencing subsidies). The range of incentives is illustrated below.



These incentive mechanisms leverage change in different ways and are therefore suited to differing opportunities and objectives. The selection between approaches represents a number of tradeoffs. For example, open entry incentives could be cheap to run but poorly targeted while auctions may be expensive to design and run but well targeted. In some cases there will be a number of potential policies available that could effectively encourage adoption but with different modes of operation or potential costs of design, implementation and ongoing management.

9 OPPORTUNITIES AND IMPEDIMENTS TO THE USE OF MBIs FOR NRM

This section outlines the experiences that CMAs have had with MBIs to date and then considers impediments and opportunities to the broader adoption of MBIs by CMAs.

9.1 CMA experiences with MBIs

MBI implementation to date has been limited to competitive tender schemes and other price based instruments (primarily grants programs). In this section we provide some insight into what has lead some CMAs to adopt a tender approach to NRM provision, how they did this, what they learned and what they saw as critical in the application of this, as well as impediments to broader application of price based and other MBI types in NSW.

To develop this section we spoke to a number of CMAs across NSW capturing experiences from both inland and coastal CMAs. In most sections, the information is presented broadly to maintain the anonymity of the discussion participants.

For those CMAs that had implemented a competitive process the decision for this tended to be a result of:

- Recognition of the value for money outcomes of the Victorian BushTender auction.
- Involvement of key staff in previously run competitive initiatives such as the (then) DLWC's Environmental Services Scheme.
- Support from the CMA board to try innovative funding allocation measures.

9.1.1 What was critical to doing an MBI

There were a number of factors that were considered to be critical in implementing an MBI:

Knowledge and capacity

An in-house champion, preferably with prior experience and confidence to drive MBI concepts and implementation at CMA Board level was critical to instrument uptake. The champion provided the immediate point of contact and communication in understanding MBIs and their requirements.

Corresponding to an in-house champion, access to external experts was found necessary to support MBI design and implementation and in providing CMA staff confidence in their approach. The type of expertise required is likely to vary according to the knowledge needs of each CMA. In some cases it will primarily be support with mechanism design and implementation, while in others it will be to provide specialist biophysical input.

CMAs internal skills and capacity are also challenged by the changes to day to day operational pressures on field staff. For example, the field staff engaged in site assessment for the MBI have traditionally operated as extension staff on an 'as needed' basis. Within an MBI process field assessments are undertaken within a much more formalised and time constrained way which focuses specific staff effort during the auction period and perhaps sees less general extension to all landholders. One CMA spoken to is attempting to overcome this by allowing expressions of interest and corresponding site visits to occur at any time of the year but still holding discrete auction rounds (where the bids formulated from these site assessments can be submitted).

Data collection and assessment process

Effective MBIs (and indeed effective policy) are data dependent. They require adequate baseline information and a standardised, transparent, robust and repeatable method for collecting and assembling relevant information about the environmental commodity and proponent.

The PVP Developer toolkit developed to support the *Native Vegetation Act 2003* provides such an approach for native vegetation, salinity and water quality impacts from agricultural landuses. Many CMAs use this toolkit to conduct their native vegetation approval and permitting role under the *Native Vegetation Act 2003.* Several CMAs have used the PVP Developer to conduct vegetation assessments within an auction process. All the CMA staff spoken to noted that using the toolkit, whilst valuable, required significant upfront effort to populate with data. Also, supporting data required to populate the PVP Developer toolkit is not available for the entirety of NSW potentially constraining its use in MBI support and more generally.

Further limitations are presented by the lack of equivalent tools or metrics for other NRM outcomes that a CMA may target or for use within broader offset frameworks (with the exception of the BioMetric assessment tool developed within BioBanking). Without a suitable metric supported by corresponding data, assessing changes in non-vegetation outcomes in an MBI framework is very difficult.

9.1.2 Some observations from MBI experiences in NSW

MBIs in urban/coastal areas

A number of CMAs in NSW encompass both rural and urban coastal land. The land use types, demographics and issues associated with land management of rural and urban/coastal land vary considerably and it is recognised that while the CMAs have NRM priorities covering both landscapes, delivery of these priorities will vary (NRC 2006).

Of particular note to CMAs with urban areas is the fact that the *Native Vegetation Act 2003*, on which so many of the CMA rural NRM activities are based, does not apply in urban areas. The lack of native vegetation authority in urban areas has resulted in a less detailed native vegetation

planning and assessment tools than those available in rural areas (NRC 2006). A less developed assessment tool is currently a significant impediment to the application of MBIs in urban areas. That said, however, the NSW DECC is finalising arrangements for the BioBanking scheme (discussed in Section 3) which will largely apply in urban areas and contain a native vegetation assessment metric that will better suit urban environs.

A large proportion of NSW CMAs cover coastal land (of both urban and non urban nature but dominated by lifestyle, amenity and recreational uses) as well as rural land dominated by primary production uses. A number of CMAs with these types of catchment have included both of these land types within competitive tender rounds. Analysis of tenders in these landscapes has found that coastal land is significantly more expensive to contract for conservation than rural land.

CMA MBI practitioners put forward a number of explanations for this. Landholders in the coastal areas generally have full time jobs off the land and therefore either don't have the knowledge about the types and cost of work required or do not have the time to do the work (or both). As a result, a large proportion of coastal landholders engage contractors for a quote on the work, it is generally observed that neither contractors nor the coastal landholder cost-share on this work.

It was also noted that a large proportion of coastal land is managed by public authorities; bids from these agencies to conduct vegetation management work also tend to be at full cost recovery and is not competitive when compared with works proposed by private landholders elsewhere in the catchment. Given the high value of this land, it is likely that the opportunity cost of vegetation on this land is higher when compared to rural land.

CMAs that have coastal land within the catchment have made a number of inclusions in their MBI design to account for the high cost of works on coastal land or have begun to consider other means to engage coastal landholders in NRM activities. When Southern Rivers CMA ran a competitive tender that included tableland and coastal landholders, a minimum dollar amount was specified for expenditure on the coast. The HCRCMA split their contracts into small and large grants with different conditions; the small grants are more suitable for small landholders on the coast. Where specific objectives are identified that have high value but high cost (eg riparian habitat), these are considered in a separate assessment process to the broader scheme.

Further attention to diverse stakeholder needs in MBI design may be necessary to build on these reforms while keeping in focus the efficiency and effectiveness improvements of MBIs. For example, engaging third-party service providers in MBIs targeting time and expertise poor landholders may improve costs and outcomes but could reduce outcomes in areas dominated by extensive primary production (where service provider costs may also be higher).

With a large proportion of CMA priority 'significant for conservation' land on the coast owned by public agencies, and the observation that these agencies are not cost competitive in a broad

tender system, CMAs are seeking other ways to engage this land for conservation. HCRCMA regularly partner with local councils to manage significant coastal land. The HCRCMA also act as a broker between philanthropists and landholders in exchanges of significant land.

Southern Rivers CMA recognise the importance of the bush regenerator industry in the NRM market place and are considering ways in which these operators can be engaged more cost effectively to conduct NRM. New models of partnership and collaboration will be important in achieving success in these locations where primary constraints are implementation and management costs rather than opportunity costs – perceived or otherwise.

Working with lifestyle and non-primary production landholders

In NSW, rural land located close to urban centres is increasingly being operated by 'lifestylist' property owners. These new landholders generally have little experience in land management and many of these property owners do not live on their property (it is used as a weekend/hobby activity rather than an income source). While lifestylist property owners can bring some positives to land management (less intensive agricultural use and greater cash resources, for example), they can also present some challenges to CMAs who wish to run an MBI with these types of landholders.

The Southern Rivers CMA was particularly conscious of the challenges presented by lifestyle landholders in a competitive tender MBI. Staff at Southern Rivers CMA noted that a competitive tender MBI is run when the land management actions and costs are not known by the authority but known by the landholder (therefore to reveal hidden information), but that lifestyle landholders are generally less experienced in land management and associated costs.

Feedback from auction participants revealed that lifestyle landholders had a lot of trouble working out their bid amount and often needed assistance from the CMA to do this. While the auction saw significant land management extension to new landholders, it was postulated that there were probably better and cheaper ways of doing this. Some suggestions put forward by SRCMA focussed on information provision type incentive schemes. One idea put forward was for the closer operation of the CMA with the local real estate industry to develop and disseminate land management packages information packages for new owners.

The key message is that a mix of measures is generally required, each component of which may be attractive to different landholders or which may form part of a continuum in improving land management.

9.1.3 The future use of MBIs by CMAs

CMAs and NSW State Government policy officers are already considering broader MBI applications. In this section we discuss two likely avenues for future implementation pathways and partnerships.

Building and optimising relationships with local council

Local councils hold land use planning and approval powers which can significantly influence NRM. CMAs that had coastal land within their jurisdiction were particularly aware of the need to partner with local councils to achieve catchment NRM targets due to the additional development pressures many are experiencing along with the inability to use the Native Vegetation Act to protect vegetation in urbanising settings. At present CMAs are limited to linking with local councils in their delivery of incentives and by partnering to conduct works. One option available to CMAs is to seek further influence NRM in urban areas by engaging with local government to develop MBIs such as development offsets that move beyond the biodiversity focus of BioBanking.

Biodiversity certification and banking (BioBanking)

The BioBanking framework provides an opportunity for CMAs to act as Brokers. The Biobanking approach provides a biodiversity assessment and contracting framework that could be used in any catchment. CMAs can act as brokers in enabling a property to establish a Biobank site and generate credits. These credits could then be sold as an offset to a development (if considered appropriate), could be purchased by CMAs if the biodiversity and management was consistent with CMA targets, or held by the CMA as an investment asset.

The landholder who generates the credits is then locked into a management arrangement for an ongoing stream of stewardship payments. The Biobanking initiative may be a relatively straight forward rights based instrument that could be particularly useful to CMAs in areas that are not covered by the *Native Vegetation Act* as an aid in the protection of vegetation assets in areas undergoing development.

Biodiversity certification is a related tool that can improve opportunities for collaboration with local governments. The Minister for the Environment can certify a local government's Environmental Planning Instrument if it is thought that there will be an overall improvement or maintenance of biodiversity values as a result. Certification is tied to a local government's local area plan and regional conservation plan. If plans are deemed to improve biodiversity, certification will last for 10 years.

CMAs should consider their local governments' participation in these schemes when considering further MBIs. CMA roles include as a broker in plan implementation, an investment partner in achieving the stated change or as a service provider assisting local governments to plan and protect areas of high biodiversity value or with identifying the relative benefit of different investment strategies, locations and activities.

9.2 Impediments to MBI application

CMA interviews along with broader consultation have revealed a number of overt and less obvious impediments to MBI implementation in the NSW CMA context. These impediments include: institutional and legislative limits; funding parameters; timing and related implementation issues; data limitations; skill constraints; and satisfaction and comfort with existing approaches.

9.2.1 Institutional and legislative

MBI implementation to date has been limited to competitive tender schemes and other price based instruments (primarily grants programs). Discussion with CMAs and NSW policy officers indicate that quantity based instruments would be difficult for CMAs due to the lack of direct statutory powers. That is, CMAs are unable to create new rights or entitlement structures that would be necessary to support quantity based MBIs or broader development of some price-based instruments.

From a cultural viewpoint, it was also noted that any cap required for a quantity based MBI would tend to 'force' landholders to make a change and incur costs rather than being rewarded for voluntarily making a change. Imposing management requirements on landholders is a significant departure from CMA approaches to date and departs from the separation of policing and management functions that was part of the rational for CMAs. Furthermore, CMAs indicated a perception that beneficiaries should pay for environmental improvements as is the case under the existing entrenched cost-sharing perspective.

A second cultural impediment to MBIs is a lack of an entrepreneurial culture. The majority of CMA staff have been transferred or recruited from a public service oriented framework. Similarly governance structures encourage a risk-averse approach to NRM management via detailed plans that must then be approved by government. CMAs are also relatively new, and in many instances are only now reaching critical mass of expertise and experience to deal with the many complex interactions that they face. Hence it is not surprising that CMAs, while staffed by many highly professional and highly motivated staff, are unlikely to demonstrate high levels of internal innovation or engagement in entrepreneurial pursuits.

Conflicts and overlaps between different levels of government (local and state) and powers over resources (rural / urban / leasehold / crown) also exist in many CMAs. This was particularly the case for CMAs with urban areas and some CMA with coastal areas. SRCMA noted that there are NRM and development conflicts between regional and state community planning and the CMAs CAP objectives. Further, a lack of connection between community development plans (eg estuarine management plans) and statutory plans (eg local environment plans) also exist which complicates the operation of the CMA. These may make targeting difficult, cause duplication in activities and

priorities and complicate permitting processes but are likely to apply to all programs and not just MBIs.

9.2.2 Availability and timing restrictions on funding

External funding of NRM investment through NSW and Federal Governments has driven MBI application through competitive tenders. A reduction or removal of this funding would limit the ability for CMAs to implement competitive tender instruments. Thinking for MBIs into the future may need to shift to rights based instruments and/or the ability for CMAs to leverage funds from third-parties.

NHT and NAP based funding also places significant constraints on the way CMA can employ MBIs. Many of the CMA officers spoken to noted that the annual cycle of funding for CMAs limited the ability of CMAs to make payments for outcomes at the end of a preferred period of time (eg: 10 years, continuously over a number of years or invest to funds to enable the generation of ongoing payments for landholders such as in a leverage fund program). It was noted by one CMA officer that it is practically impossible to hold funds for MBI projects for the time span required to ensure successful delivery of projects.

9.2.3 Time required and reporting constraints

Time constraints on expending funding from CMAs may constrain their ability to try an MBI. CMAs are required to get a significant proportion of funds on ground for works each year. Compounding timing requirements were reporting requirements based on inputs such as areas fenced or trees planted. Reporting restrictions may limit the way in which funds can be applied (including form of instrument) and the level of innovation they could apply.

The reporting restrictions place CMAs in a complex dilemma. Restrictions have been implemented in order to improve the targeting and accountability of government investments. However, increased targeting towards input based activities has the perverse impact of limiting the range of contributing activities that are eligible for funding and of limiting innovation in delivering the desired NRM outcome. Timing restrictions on expenditure and program length compound the problem by requiring reporting before NRM outcomes could sensibly be achieved.

Discussions with CMAs and personal observations indicate that timing pressures have been acute at the conclusion of the NAPSWQ. The time pressures have created severe time and capacity scarcity with the further perverse impact of limiting reflection and improvement of instrument design within an adaptive management approach. Similarly there have been few resources and little time available to develop new approaches or incorporate new information into targets.

9.2.4 Data availability

Implementing an MBI can be data intensive, especially at the start up phase, and this may be quite daunting to a CMA that may be resource constrained to begin with. In some areas poor background data compounds data problems by limiting CMA ability to understand the nature of the NRM problem and investment and to target or prioritise communication and other activities associated with design and implementation. On a positive note the systems for data collection and assembly are likely to differ little from those employed within the PVP Developer which makes it relatively easy for CMA staff to adapt to new programs and requirements.

Data availability for MBI assessment varies across issues and CMAs. Native vegetation data tends to be better and more widely available than for other NRM priorities. It is also important to note that the impacts of data limitations extend to all CMA programs and not just MBIs.

9.2.5 CMA staff expertise

There is a general lack of familiarity with MBIs and their potential in different contexts (this is especially the case for quantity based MBIs). CMAs that had trialled an MBI noted how important it was to have at least one staff member who understood the concept, process and were networked with others doing similar work. This constraint is likely to be critical for new or novel MBI forms, or refinements to tailor MBIs to specific community needs, where there are few outside examples for CMAs to learn from. Staff expertise issues extend beyond strategic design into training and mentoring site visits, appropriate database management, process and probity issues and contracting and monitoring processes and protocols.

9.2.6 Satisfaction with current incentive scheme application

Many CMAs have been using fixed grants for many years, with varying levels of competitive selection processes employed. To many, the 'new generation' competitive tender instruments are not perceived to offer significant improvements but are thought to require significant effort in development and additional effort in implementation. The comfort with the existing menu of incentive and other approaches is compounded by few demands to demonstrate innovation in engaging with landholders to achieve targeted outcomes. Further a risk-averse public sector culture tends to overly penalise failed innovations over continued application of standardised approaches.

9.3 NRC recommendations to overcome impediments

The NRC has recommended a number of changes to allow CMAs to operate more effectively, some of which will assist to overcome identified impediments to the use of MBIs (NRC 2006), namely:

- modifying NRM legislation and policies so that they are consistent across urban/coastal areas and rural areas, and giving urban CMAs the flexibility to invest more in strategic planning and coordination and less in on-ground delivery;
- reducing CMAs' reporting burden and transaction costs by negotiating more streamlined reporting and funding arrangements between the Australian and NSW Governments;
- enabling the Ministers for the Environment and for Planning to provide advice before future enhancements and amendments to CAPs are approved to reflect the fact that CAPs are whole-of-government plans for NRM delivery; and,
- improving sustainability in funding for CMAs to promote the stability and continuity that is essential for attracting investment from other sources and for achieving the 10-year state-wide targets.

9.4 Wider CMA opportunities

Consideration of MBIs at the CMA level is taking place within a wider consideration and use of market-based and market-like instruments by governments at the state and federal level and to a much lesser extent local level. Entrepreneurs including not for profits, are also creating or expanding new NRM oriented markets across Australia at a number of levels, both in partnership with CMAs and government.

Development of a more sophisticated range of MBI instruments could aid in engaging a new range of participants in contributing towards regional NRM outcomes. New players may increasingly be interested in the use of MBIs at the regional level to improve their leverage in achieving conservation goals including the not for profit sector. New instruments may facilitate direct engagement with industry sectors, particularly in order to achieve carbon neutral outcomes and development offset arrangements. In particular circumstances where the nature of the outcome rather than the specific location dominates the desired service, these forms of markets have potential to facilitate cross-catchment and cross-border markets.

With these aims in mind a number of opportunities for developing and delivering NRM outcomes using markets are explored in this section as follows:

- Potential for new commodities;
- Potential for new business models;
- Potential for new funding pathways; and
- Potential for partnerships;

The goal in each case is to briefly outline the nature of the opportunity including scale and relevance as well as the nature of obvious constraints to uptake.

9.4.1 Potential for new commodities

Although CMA activities to date have had a heavy emphasis on native vegetation and related considerations their mandate in NRM is quite broad. It explicitly covers native vegetation, environmental water allocations, and on ground works for rehabilitation and revegetation including managing joint government investment in these. Hence there are a number of broader NRM markets that are already in operation, or potentially in operation, that CMAs could participate in.

In this section a number of possible opportunities to direct participation in creating and selling commodities are discussed.

Carbon markets

The NSW Greenhouse Gas Abatement Scheme (GGAS) is already in operation. Revegetation activities may be eligible to participate under the forestry activities component of the GGAS market. CMAs could be eligible to participate directly in the market providing that contracts for revegetation explicitly cover the relevant carbon rights and these are held by the CMA (see brokerage options below).

A number of other schemes are also available that may afford CMAs the opportunity to directly participate in aspects of carbon markets, including via Green Fleet (primarily a carbon offset program for cars), or under the proposed national emissions trading program (not scheduled for introduction until after 2010).

Water quality

Trading in water quality services between point and non-point sources has received significant attention internationally. The water quality trading concept is essentially that sources with higher costs pay those with lower costs in order to meet pollution discharge requirements. In the US there are a number of schemes with trading authorised between industrial or urban point sources (always buyers) and agricultural non-point sources (always sellers) and a pilot scheme has been successfully implemented in western Sydney to assist in reaching water quality objectives in the Hawkesbury Nepean system.

Water quality trading and similar payments for ecosystem services schemes have been especially touted in water supply catchments where urban residents would purchase improved water quality outcomes in their supply catchments. Nevertheless these schemes are likely to have relatively limited application in primarily agricultural CMAs.

Salinity

The MDBC manages a salinity cap including end of river salinity targets across the Murray Darling Basin. The scheme has seen a number of investments targeting reduced salt movement into the

Murray River and its tributaries but is yet to evolve into a more widespread trading scheme. In Victorian, liabilities under the scheme are devolved to the individual level in the case of new activities that will impact the river, and allows salinity credits to also be created.

Potential exists for a more widespread salinity credit market that CMAs could directly participate in. In particular, the small scale impact of many farm scale management changes would make it difficult for a market to be sustained in the face of significant transaction costs in the absence of intermediaries, a role CMAs could potentially provide.

Wetland and habitat conservation

Wetland and habitat conservation offsets, which are essentially specialised versions of biodiversity offsets, have been widely employed in the US. For example, single species offsetting is allowed in some areas of the US in order to aid in the protection of threatened or endangered species, while wetland mitigation offsets are widespread.

To a large extent, these types of offsets are likely to be covered by the development of the BioBanking scheme in NSW. Under some circumstances CMAs may choose to utilise the BioBanking framework directly to create and manage wetlands and habitat, while in other circumstances they may seek a role as a broker (which is further discussed below).

Other commodities

Environmental commodities are essentially outcomes that can be produced in a number of alternative locations. New technologies and new community requirements will inevitably identify new demands for different or more refined commodities to those discussed above. For example, attention has been focused on bio-prospecting in areas with high biodiversity.

9.4.2 Potential for new business models

In this section a number of opportunities for CMAs to act as agents in aiding landholder participation or otherwise using new business models (as opposed to new commodities) to generate NRM outcomes in markets are discussed. To date CMAs have acted primarily as investment agents for government investments in NRM with CAPs providing the appropriate accountability and certification process. CMAs also have an opportunity to act in similar roles for other investors and as entrepreneurs in their own right.

Brokerage models

CMAs have the opportunity to act as brokers in a number of existing and new markets. In Section 9.4.1 the assumption was that the CMA invested and owned the commodity produced, thus accepting risk with respect to success and price. Alternatively, a CMA may act as a broker bringing

buyers and sellers together, and may also take on monitoring and related functions to ensure provision of the purchased commodity.

From a CMA point of view this has the advantage of focusing on CMA strengths in their community contacts and experience in managing landholder contracts. In some circumstances it can also draw on CMAs ability to bundle distributed small management changes into larger packages for on-selling - but this is more a strength of the ownership model in 9.4.1. The advantage to landholders is in reduced costs of assembling and assessing relevant information and in a single point of contact with a familiar entity.

Revolving funds

These funds operate in two main formats. In the protection format funds are used to purchase an asset (typically property) and place restrictions on its use before resale. The best known models are operated by the NSW Nature Conservation Trust and the Victorian Trust for Nature which purchase land, place a covenant restricting use on the title and then resell the land. Similar models could be used for other environmental assets such as water licences (for example restrictions on the time of year that it can be used).

A related model is an investment revolving fund which would loan funds to landholders in order to make management changes that would generate an environmental dividend. Funds are typically repayable on a low or no interest basis.

Counter-cyclical trading

Refers to the concept of buying and selling a commodity in such a way as to make a profit (a common example is currency trading). Countercyclical trading is essentially a refinement of a revolving fund. For example, it has been argued that revolving funds that covenant land act as a service provider identifying and protecting high value sites for a specific market segment that would otherwise be faced with significant costs in finding and assessing individual properties.

Counter-cyclical trade has received significant interest for use by environmental water managers who often seek relatively low cost water in wet years to top-up high flows and provide overbank waterings, and selling unneeded water in dry years when water market prices are likely to be much higher.

There is also potential for similar investment schemes in BioBanking credits or other markets as they emerge, particularly if there are readily observable cyclical patterns. However, such trading activity is inherently risky and it may be difficult for CMAs to accept and adapt to such risks.

Trust funds

The concept of a trust fund is to provide a future source of funding for environmental management into the future. Trust funds are usually invested in a bundle of income generating assets (such as the stock market) with a set of rules governing reinvestment in order to sustain future income. Remaining funds are then available for pursuing environmental goals. If a sufficiently large trust fund can be built they offer the potential of financial stability and independence from government grant programs (potential sources of funding are considered in section 9.4.3 below)

9.4.3 Potential for new funding pathways

Trust funds offer the possibility of financial independence for future investment programs. But where would funds to assemble such trusts come from? Indeed what are the opportunities to diversity the investment portfolio that CMAs manage? In this section several potential alternative sources of funding are discussed. In this context, funding differs from profits generated from commercial activities or from outside purchasers such as within carbon markets.

Catchment levies

The potential for catchment levies to supplement government investment have been widely discussed elsewhere and are not addressed in detail here. The Hunter CMA has access to a levy across part of its jurisdiction. However, to date levies have proved politically unpopular.

Utility levies and related requirements

The ACT levies a per unit charge on all water supplied that is intended to offset the costs of managing the water supply catchment. Similar levies are in place in other areas of NSW and there has been discussion of such levies on electricity and other energy sources. In many instances the CMA is best placed to manage the investment of the proceeds in sustainable land management outcomes that generate the desired water quality or carbon offset.

One under explored option is road and rail and other infrastructure biodiversity offsets. Increasingly tree clearing and habitat destruction as part of road and rail developments is being offset. Roads in particular have tended to undertake such offsets within the road easement where revegetation remains at significant threat of incremental destruction through weeds, traffic, fire and other sources as well as often being highly fragmented. Investment in a landscape context has the potential to generate much larger biodiversity payoffs from a similar investment.

Development levies

Similar to utility levies, these levies may be preferred or offered as an alternative to offset arrangements. In these cases CMAs could be a preferred vehicle for investment of levy revenues.

Private sector co-investments

Large private sector companies are increasingly seeking ways to minimise their environmental footprint, in some cases through investment in environmental outcomes. Instead of asset management some companies will be looking to directly invest in regions and catchments and CMAs can provide a suitable vehicle with their existing CAPs and investment plans already in place.

9.4.4 Potential role as service providers

Discussion to date has largely centred on CMAs directly managing MBIs in one form or another with the exception of opportunities to participate in other markets as either suppliers (section 9.4.1) or direct entrepreneurial activities (section 9.4.2). The focus in this section is on the role of CMAs as service providers.

Purchase or provision

The potential also exists for CMAs to act as service providers to and from industry and government outside of direct participation in MBIs. Some examples of these types of relationships have already been supplied – probably the most obvious being CMAs aiding local government in developing biodiversity prioritisation frameworks that would then frame investment strategies.

Service arrangements within MBIs can and do flow in both directions. Firms and non-profits are already active in providing field services to CMAs. For example, EarthTech and Greening Australia have implemented a number of grant programs in NSW on CMAs behalf.

A key decision for CMAs is which skills should be in-house and which can be bought in as required. The shortage of key skills in MBI design and implementation outline the nature of this risk. Skills that are required on an ongoing basis are ideally retained in-house unless there is a strong rationale that they can be provided on a reliable and cost-effective basis from elsewhere.

For example, where there is a well functioning service provision industry such as for cleaning services, accounting and so on, these services are usually outsourced. Services of a specialist nature (such as legal advice and specialist design input) are usually outsourced, particularly if they are only required on an ad hoc basis.

MBI applications present an interesting set of issues in terms of which aspects to conduct in-house and which to outsource (particularly in light of the previous discussion). Some CMAs have outsourced site visits or other components of delivery while others have used existing staff. Some MBIs have effectively been run from outside of the catchment but most are primarily run by CMA staff.

Asset management services

CMAs are already charged with managing environmental water allocations and water conservation trusts. Under a fee-for-service arrangement CMAs may also be in a position to manage other environmental assets. These could for example include revegetation or biodiversity offset projects for large scale mining, industrial or urban developments.

Partnering for delivery

In some instances there may be opportunities to partner rather than purchase service provision where there are shared objectives and complementary skills. Industry bodies offer particular potential for partnerships that have been little explored to date. They offer a close connection to their members and the opportunity to improve the integration of conservation activities within a broader program of member services and thus may improve the appeal with member landholders. Industry bodies also often have funded extension positions already in place that can reduce the cost and time in engaging with targeted landholders.

Certification and related schemes

CMAs may also be able to act as independent certifiers to maximise the value of sustainable land management activities by landholders. In this role CMAs act in a very similar fashion to the options within section 9.4.2 focusing on new business models. However as a certifier the CMA is not directly active in the market in any form.

The key advantage of certification schemes is in ensuring market access rather than in securing market premiums. In a weak certification format the CMA simply states that the product has been produced in a sustainable fashion without definition of what this means. A more standard approach would require definition of a standard of production (such as compliance with a set of best practice measures) and a structure for identifying that it has in fact been implemented (similar to many ISO type approaches).

A stronger certification format would require the CMA to undertake some monitoring to ensure that certification is in fact being complied with. There are a number of certification schemes already in place which range from Landcare badging of products to ISO certification type programs (though not focusing on sustainability issues) for egg production in the poultry industry.

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ATTACHMENT 1: Market failures and range of policy instruments

A1.1 Types of market failure

Economies such as Australia rely principally on market processes to marshal resources and production processes to supply our needs for goods and services. Central to this is producers and consumers facing prices that reflect the full cost of the goods used in production and consumption.

In the context of land management, a range of inputs and outputs are extensively traded with market prices transmitting social preferences for more or less of these goods. However environmental outcomes associated with various land management choices often have characteristics that inhibit trade and so their value cannot be captured by landholders in exchange for their provision. Impacted environmental goods may include biodiversity and ecosystem conservation, watershed protection, groundwater recharge and land salinisation, greenhouse gas sequestration and soil conservation.

As the benefits of these 'unpriced' environmental outputs cannot be captured by landholders, there will be under production of them relative to socially desirable levels – and a correspondingly over-production of priced farm outputs such as crop and livestock produce. This misallocation of resources results in many instances, in the perpetuation of inefficient agricultural systems. As land and water resources have been significantly degraded in NSW, the community is seeking a significant increase in the provision of environmental services and a move to more sustainable production systems at the farm and catchment levels.

The identification and classification of different types of market failure is important as it helps disentangle the nature of underlying problems and provides some guidance as to policy instruments that may help solve the problem.

There are two types of market failure that are commonly identified as problems requiring government intervention: public goods and externalities. Other cases where government intervention or collective action of some kind is justified are usually where the technical conditions for perfect competition are violated. Typically these are where the transactions costs (particularly the costs of accessing information) are so high that no market exists or there is a concentration of market power (monopoly, cartels, barriers to entry, etc), which distorts the operation of the market (prices or quantities). The various forms of market failure and market imperfection that are commonly cited to justify and guide government policy interventions can be conveniently classified into four groups.

Externalities

There is an externality when a production or consumption activity has an indirect effect on other production or consumption activities that is not reflected directly in market prices. There are two

types of externality; positive and negative, although negative externalities (external costs) are more commonly of interest to policy makers.

For example, blue-green algal blooms in Australia's rivers have been caused, partly at least, by phosphates originating as phosphatic fertilisers or wastes from intensive animal industries. Water down stream becomes unusable for drinking by humans and livestock and sites downstream are unsuitable for swimming, fishing and other recreational purposes. There is an externality because neither broadacre agricultural production nor intensive animal industry production bear the true cost of the phosphates.

In these cases of pollution externalities, if the external costs could be factored into the polluter's business decision, the polluting activity would not be undertaken or undertaken in a different manner. Without some form of regulation or government imposed incentive, polluters generate more pollution than is socially desirable because they do not consider the costs it imposes on others.

Public goods

Public goods have two characteristics: they are non-rival and non-exclusive. A good is non-rival if for any level of production, the marginal cost of supplying another customer is zero. The use of a lighthouse is a classic example. Once the lighthouse has been built and is functioning, its use by an additional ship adds nothing to its running costs. The use of a highway during periods of low traffic volumes is another example. Because the highway already exists and there is no congestion, the additional cost of driving is zero.

The provision of information, R&D and education and training are examples of direct relevance to this study. The use of information by one person does not diminish its availability. Unless property rights are adequately defined, the information may be passed on and used by others at no cost. The implication is that, under these circumstances, the information will not be produced in the first place because the cost of generating the information is greater than its value to any individual.

The second characteristic of a public good is that it is non-excludable. This means that people cannot be excluded from consuming it. If an agricultural pest is eradicated (e.g.; rabbits or locusts), all landholders will benefit irrespective of what contribution individual landholders make to the eradication program. It would be virtually impossible to exclude a particular farmer from the benefits of the program. In these circumstances, even though the benefits to individuals and society as a whole may be large, the product may not be produced by the private sector as it would be difficult to force any individual beneficiary to pay (they will benefit whether or not they pay).

Much of the infrastructure that can be used to address water quality issues from diffuse sources, such as pollutant traps, reed beds, wetlands and stormwater and sewerage systems, have the non-rival and non-exclusive characteristics of public goods. For many water quality issues there

could well be more than one type of market failure at play; *externalities* in the creation of the problem and *public good* characteristics of the solution to the problem.

Market power

Market power may occur in a number of forms. One is natural market concentration (monopoly and oligopoly), where there are very high fixed costs which preclude the emergence of a sufficiently large number of firms from entering the market for the market to be competitive.

There may be other barriers to entry (apart from high fixed costs) such as monopolising key technologies via intellectual property rights or trade secrets which can lead to prohibitive costs of entry to the industry.[13] Where, for example, a natural monopoly exists, it has an incentive to exploit its exclusive provision of a good by restricting supply and increasing the sale price (compared to what it would be in a competitive market) to the detriment of consumers.

Market power is unlikely to be a significant source of market failure relevant to natural resource management in NSW.

Transactions costs

If transactions costs are high, the market system will not operate efficiently. One way in which transactions costs can be high is if consumers (of final products or factor inputs in the case of farmers) do not have accurate information about market prices, product quality or specific characteristics of the product. This lack of information may give producers an incentive to supply too much of some products or too little of others. Similarly, consumers may buy too little of a product or too much.

For example, farmers may buy stock food that is purported to enhance weight gain of livestock only to find it has no growth enhancing qualities. Incomplete information may also mean farmers are unwittingly causing damage to others (eg through spray drift, excessive application of nitrogen which runs off into streams etc).

Government may facilitate the provision of information where there is a clear public interest in ensuring that consumers are well informed about the characteristics of particular goods and services. This, of course, can be highly relevant to many examples of natural resource management, where a lack of knowledge and understanding of the environment means that activities are undertaken by individuals and firms that can be detrimental to the broader environment and resource base.

In the context of this study, incomplete information manifests itself in a number of ways and is referred to differently according to the nature of the information problem. These include:

[13] Careful consideration of this is required as in some cases property rights over intellectual property and maintaining trade secrets are essential to creating an incentive for desirable production behaviour.

- Lack of information – the data and knowledge simply does not exist.
- Lack of awareness and understanding – the information exists but it is either not known or its implication are not understood. The information that exists may also be held asymmetrically. That is that one side of an exchange holds information on the social benefits of a land management action whilst the other side holds information on the cost of changing land management but the cost for market participants to put all of this information together is prohibitively high.
- Scientific uncertainty – information exists but there is uncertainty about its veracity and/or relevance in the situation of interest.

A1.2 Range of policy instruments

There are four main categories of policy instruments: suasive instruments, regulatory instruments, market based instruments and public provision of services and infrastructure. Each is discussed, in turn, in the following sections.

Suasive instruments

Suasive approaches are policy tools that encourage changes in behaviour through the provision of information. They can also include broader approaches such as capacity building and community engagement. Suasive instruments can be successful if they can persuade people it is in their private interest to change their behaviour or practices and there is sufficient information and advice to help make the changes. In general, the changes need to have a private benefit for these approaches to be successful. Some changes to promote largely public benefits may be possible if the costs of changing behaviour are small.

Types of suasive instruments include:

- general education programs, guidelines and codes of practice;
- training programs and extension services;
- community programs; and
- social recognition schemes and philanthropy.

General education programs are useful where there is a lack of awareness of the sources and impacts of resource degradation. They are often used where there are simple ways to reduce impacts that can be applied broadly that also provide private benefits or involve minimal cost. Education programs have been used extensively to assist in managing acid soils and localised incidents of waterlogging and salinisation, with simple messages to encourage behavioural changes such as changing pasture systems, stock management, the strategic planting of trees and landforming.

Guidelines and codes of practice are useful where there is awareness of the impacts of resource degradation but there is a lack of knowledge of how to reduce the impacts. Guidelines are suitable where fairly simple generic advice is applicable across an industry or landholder group. Development of guidelines is common for managing nutrient pollution in runoff in rural environments. Most Australian States and several industry associations have guidelines or codes of practice for various industry groups.

Training programs can also be used for these situations and may be preferred if the solutions have greater technical complexity. Extension services can be useful where there is a need for interpretation or tailoring of information to the specific context of a landholding. Agricultural extension services are commonly used, and advice on environmental management such as soil conservation and nutrient management are sometimes integrated into the overall service.

Research and development is necessary where it is not clear which sources are causing problems or how to reduce impacts from those sources. Over recent years an extensive research program has, for example, been investigating salinity and groundwater recharge at catchment and basin levels.

Community programs are useful when there is a willing and interested community. In this case, effort can be focused on capturing the enthusiasm of communities through voluntary agreements aimed at conservation activities or the use of conservation covenants placed on land title. In many cases, landholders will be willing to undertake activities which result in a small private cost in order to deliver a net public benefit.

Social recognition schemes are also useful when there is an engaged community audience. In these instances, the use of Landcare field days can be a useful mechanism for recognising the efforts of pioneering landholders. Government can also promote philanthropic investment in NRM as a means of achieving NRM objectives. For example, philanthropic funds obtained by Birds Australia are used to purchase agricultural properties which are then established and maintained as conservation reserves.

Regulatory approaches

Regulatory approaches require changes in behaviour by introducing penalties for parties who don't comply with the regulatory provisions. Regulatory approaches can be very effective where a high level of certainty of the environmental outcome is required, the link between the source of pollution and environmental outcome is clear and regulations can target known low cost abatement practices. However, prescriptive regulations that do not provide flexibility to affected parties can impose significant costs.

Types of regulatory instruments include:

- mandatory standards (including planning instruments);

- licensing and mandatory management plans; and
- statutory duty of care.

Standards are often used where generic requirements can be applied to a wide group of activities. They are applied to a wide range of activities and relevant standards may fall under planning, environmental, resources or other legislation. Examples relate to chemical use, the management of pests and application of manure on farms.

Planning instruments are particularly used to place restrictions on new developments or changes in land use. Plans may be developed at a number of levels, for example at the state, regional, local or individual development level. Planning instruments may restrict the land uses allowed to be carried out in a particular location and/or may require certain new activities to obtain consent from a planning authority. Through planning instruments authorities can set standards relating to environmental management. Examples of planning instruments include catchment action plans (CAPs), water sharing plans and property vegetation plans (PVPs).

Licensing is suitable where there are a small number of activities with a significant environmental impact and requirements need to be site-specific. Administrative costs become a barrier where there are a high number of activities. Thresholds based on factors such as size, and proximity to waters, are often used to minimise the number of licensed activities. Mandatory management plans can also be used to enforce site-specific requirements.

The Australian common law system, established to protect private rights, has only recently seen reference to the concept of duty of care. The Industry Commission (1998, p. 134) proposed that an environmental duty of care be defined in legislation to "require everyone who influences the management of the risk to the environment to take all reasonable and practical steps to prevent harm to the environment that could have been reasonable foreseen". Young et al (2003) note that the aim of the duty of care is to internalise externalities but only to the extent that it is economically efficient to do so. The obligation here is to do what is reasonable which could be interpreted by a land manager as 'to remain current". Duty of care essentially sets the minimum required of stakeholders with penalty and discouragement used to bring recalcitrant landholders up to the minimum and rewards and encouragement used to bring stakeholders to a level above the minimum. The balance between penalty and reward needs to be carefully considered when the duty of care is likely to increase over time.

Market based instruments

Market instruments are policy tools that encourage certain behaviours through market signals rather than through explicit directives. In this way, governments do not require detailed information on who is best placed to make changes and how, rather this information can be 'revealed' by the market. By 'harnessing market forces', market instruments can reduce overall environmental

compliance costs by encouraging the firms that face the lowest costs to make the greatest improvements.

Accordingly market instruments are best used when there are a range of individuals who can make changes, where there is diversity in the means of achieving the environmental outcome, and importantly, where there are significant cost differences between these ways and agents. In these situations, market instruments through the trade of improvement efforts, can 'open up' low cost abatement options to deliver environmental gains at lower cost. Market instruments generally operate as either a price or quantity based instrument (see Figure 2.1).

Price based instruments assign a price to environmental impacts within existing markets through the imposition of charges, taxes, direct grants or subsidies. Firms then respond to the modified market signals and adopt the resource use or management practice that offers them the greatest benefit and, if the policy is effective, leads to a better environmental outcome. While these instruments cannot guarantee the extent of changes, they act to cap the costs incurred under the instrument.

Quantity based or 'tradeable rights' instruments create a market in the rights to engage in an activity associated with specified resource uses or environmental damage, by restricting the total level of activity and allocating rights to participate in that activity. An efficient allocation of rights is then determined through a market mechanism. Tradeable rights instruments tend to be used when it is important to get a certain environmental outcome - for example, when the extent of land clearing is close to a level that may cause irreversible loss or unacceptable degradation of biodiversity.

Where the marginal benefits and costs of using the resource are well-understood, similar outcomes and efficiency of resource use can be achieved using either a price or a quantity instrument. In these circumstances the administration, monitoring and enforcement costs of each alternative will be important factors to consider when choosing between price and quantity instruments.

'Market friction' instruments try to improve environmental outcomes by making existing private markets work more effectively. They 'oil the wheels' of an existing market.

Public provision

The provision of a public good is often used as a tool to manage problems of land degradation. It may be appropriate where the management solution to the land degradation problem displays the characteristics of public goods. That is, the management solution is "non-rival" and "non-exclusive". Examples include provision of salt interception schemes, stormwater infrastructure and ecological services (such as through public reserves, environmental flows, etc).

In the case of promoting conservation outcomes, Commonwealth and State Governments have actively purchased land for inclusion in conservation parks and reserves, where land uses are

highly constrained and land rehabilitation activities pursued to maximise conservation values (such as the control of introduced species, revegetation, etc.). This has the advantage of government assuming full control of the environmental amenity including future management needs, provided that there is sufficient ongoing funding.

The main disadvantage of this instrument is that it is expensive to purchase property outright. Given the expense, it is also unlikely that enough land will be able to be bought to obtain an optimal environmental outcome for a region or state. This has been discussed widely in relation to biodiversity.

A related idea is to purchase land, attach a permanent conservation covenant to the title, and then re-sell it. The funds are then used to purchase another piece or property and so on. This is called a revolving fund, and is used by groups such as Trust for Nature. This is a more cost-effective manner of achieving land use change. A revolving fund also has the advantage of attracting new landowners with high conservation ideals (Agtrans Research 2003). This approach is most efficient in areas of high biodiversity value and high turnover such as the Melbourne 'tree change' belt.

ATTACHMENT 2: Experiences with MBIs for NRM

A2.1 Price based instruments

1. NSW Environmental Services Scheme

This scheme was established in 2001, with $2m to fund 20 properties which provided environmental services (Grieve and Uebel 2003). The range of environmental services targeted included salinity benefits, biodiversity conservation, carbon sequestration, acid sulfate soils mitigation, soil retention and water quality improvement. Landholders were paid for the environmental services that they were to provide. The range of land use activities covered included tree planting, establishment of perennial pastures and saltbush, regeneration of native vegetation and watering of wetlands and engineering works.

Six environmental services indices were developed and provided to landholders. Environmental services were selected on the basis of competitive tender. Bids were ranked according to their environmental benefits, cost effectiveness and demonstration value.

The average payment to landholders for all sites was $190 per ha over the 5 years of the contract period. In comparison, the costs for land use changes quoted under the Murray Catchment Blueprint ranged from $100 per ha for managing existing native pastures for conservation purpose up to $3000 per ha for restoring conservation areas in riparian zones.

2. The TARGET Project (NSW)

TARGET – Tools to Achieve Landscape Redesign Giving Environmental/Economic Targets, was a project funded by the then NSW Department of Natural Resources under the State Salinity Strategy. It was aimed at salinity management in three catchments, Warrangong and Mid-Talbragar, Little River, Weddin and Castlereagh/Dunedoo.

The objective of the project was to explore a range of different policy mechanisms to manage salinity. A range of alternative policy approaches were trialled, including carbon, salinity and biodiversity credits, and Environmental Management Systems (EMS).

One of the approaches in this project was to fund environmental services, based on an assessment of their environmental benefits and also a predetermined cost sharing ratio. The cost sharing ratio was set at 50:50. The difficultly with such an approach is the inability for a government agency to determine the correct cost sharing ratio. In fact, one of the primary benefits of a market approach is that the market reveals this information through the bidding process.

A tender was also conducted in the Castlereagh/Dunedoo catchment with landholders asked to put in a bid for funding. A reserve price was calculated, using the standard costings and a cost sharing

ratio and any bids lower than the reserve was eligible for funding. Forty seven landholders put in expressions of interest. Impediments identified in this project included the lack of farm labour and the existing farm debt structures. It was also identified that the timing of funding needs to fit with other farm operations and there was also a significant lag between funding and uptake by landholders. [14]

3. Bush Recovery Program – Northern Rivers CMA

With funding received from the NSW Native Vegetation Act, Northern Rivers CMA has run two tender rounds. The focus is on funding the protection of land that has native vegetation on it, with land required to meet certain criteria before eligible for funding. Bids are assessed with an off-site pre assessment, a site assessment and action plan development and then a ranking. Ranking is based on a number of factors which are multiplied together. Landholders sign contracts with the duration of the contract up to the landholders. The CMA prefers longer term contracts, and contract length is one factor included in the ranking. Round 2 has funding of $700,000 and is currently underway[15].

4. Hunter Central Rivers CMA Auction Rounds

The Hunter Central Rivers CMA has used bidding processes since 2005/06 to allocate funds for on-ground works. They have done three rounds of large scale projects and eight rounds of small grants. They call for proposals, with applicants placing a bid on the activities they will deliver. Bids are ranked according to an environmental score and cost effectiveness. They CMA have found this approach to be very effective, particularly in delivering vegetation protection. Their main barrier to implementation is the "budgeting process and Australian Government deadlines" which have made it difficult to structure the payments as they would like, over five years. They use their priorities as defined under the management targets in the Catchment Action Plan to allocate funding.[16]

5. Liverpool Plains Tenders

The Liverpool Plains Land Management Committee, in partnership with the World Wildlife Fund, introduced natural resource auctions (land management tenders) in 2001. Funded, binding contracts were offered for proposals that addressed the impacts of clearing native vegetation and changes in land management. Proposals included soil conservation, dealing with dry land salinity, improving water quality and quantity, riparian zone management, floodplain management and protecting biodiversity. The bids were assessed in terms of their achievement of predetermined objectives. Rankings allowed for both a transparent process and equity amongst participants.

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14 Information obtained from: http://www.dnr.nsw.gov.au/salinity/science/pilot-target.htm, accessed 29 June 2007

15 Source: http://www.northern.cma.nsw.gov.au/pdf/bushrecovery_infosheet.pdf, accessed 6 July 2007

16 Source: Personal Communication, Fiona Marshall, Hunter Central Rivers CMA, July 2007

There have been three tenders, the first in 2001, and then 2003 and 2005. In total, $1.8m of public funding has been spent and $5.6m from private contributions. Nearly 17,000 ha have undergone land management change (LPLMC and WWF undated). Bids are assessed against an Environmental Benefits Index. Projects are approved and then contracts exchanged, with payments made throughout the contract as on-going management milestones are met. In general, projects that have multiple and broad benefits are encouraged.

For each successful tender, a management program specified how and when the project works were undertaken, generally over a three-year period. Participants received 30% of the total payment on signing the contract and the rest on achieving milestones.[17]

6. Auctions with outcome bonuses – An Application to Ground Nesting Birds in the Murray Catchment (NSW)

This project aims to improve contract design for conservation contracts auctioned to private landholders. In particular, it proposes to test alternative input-based and outcome-based contracts. Landholders will be offered a choice between an input and an output based contract and the difference in prices between the types of contracts will be compared. The project will implement a pilot auction called Nest Eggs, with on farm management actions aimed at three priority bird species.[18]

7. Southern Rivers CMA Bush Incentive Scheme

The scheme funds the management of selected sites that support native vegetation communities, particularly those that are officially listed as threatened, have been largely cleared or exist only as small remnant patches in the landscape.

The scheme uses a tender process to identify bids that offer the best value for money in protecting vegetation. Following a site visit, the landholder identifies the services they can provide in a management plan prepared with CMA staff. The landholder then submits a bid, indicating the amount of money required to provide the services outlined in the plan. The bids are assessed by the CMA in terms of conservation value divided by the funds sought. The conservation value is made up of the conservation significance of the site, how well its connected to other native vegetation in the landscape, condition of the site, size of the site and the landholder management actions.

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17 Source: DECC 2006 and LPLMC and WWF undated.

18 Sources: NAP web site http://www.napswq.gov.au/mbi/mbi-round2.html, Nest Egg, Working with Farmers to Improve Habitat, Murray CMA and CSIRO and personal communication, Stuart Whitten, CSIRO, July 2007

Landholders can sign a five or ten year agreement with the CMA. Payments are made on an annual basis after acceptance of an annual report by the CMA. Although not explicit, longer contracts are preferred by the CMA.

The CMA has determined a threshold environmental value below which the CMA has determined there is no biodiversity benefit from funding works. [19]

8. Auction for salinity in the Wimmera Catchment, Victoria

Two auction rounds were implemented in 2006 to target salinity. It was determined that a hectare of deep rooted vegetation established in a high recharge, high salt content zone would reduce salt movement much more than a hectare in a low recharge zone. For this reason, landholders could only enter the auction if they were located in the upper catchment, on land with a slope of greater than 20%. The only land management action that was to be funded would be revegetation, involving site preparation, tree planting and on-going management of pests, weeds and feral animals. In the first round, $280,000 was spent on revegetation of 360ha and in second round $457,000 on 402 ha. Evaluation of the two rounds by CSIRO determined that the auction had been about 60% more cost effective than the alternative fixed price scheme that had been in operation.[20]

9. BushTender, Victoria

The BushTender incentive scheme is a competitive auction or tender-based payment mechanism for improved biodiversity conservation. In was first introduced in Victoria in the north east and north central regions of Victoria.

The Habitat Hectares metric was developed to estimate the biodiversity outcome of a set of proposed management action compared to a benchmark. The benchmark allows comparison of competing bids. Other important aspects of BushTender included: the support provided to potential participants in developing and submitting bids (via site visits); flexibility in the range of acceptable management actions; and the potential for payments to be made over several years with site inspections to ensure acceptable outcomes.

The BushTender mechanism has been trialled extensively in Victoria. One area was the Box Ironbark ecological communities on private land in the North East and North Central regions of Victoria (Stoneham et al. 2002a). Box Ironbark ecological communities are an under-reserved priority community with significant habitat occurring on private land. These ecological communities have previously been targeted unsuccessfully through voluntary management agreements and fixed price grants.

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19 Source: DECC 2006 and http://www.southern.cma.nsw.gov.au/pdf/SRBI-QA.PDF, accessed 12 July 2007

20 Source: RIRDC 2007

There are many different approaches available to manage remnant Box Ironbark (from reduced grazing to fencing, with or without extensive weed management). The flexibility and support measures incorporated in the BushTender approach not only overcame the low participation in previous schemes but also achieved a significant improvement in the cost-effectiveness of the outcomes achieved. Using the BushTender model the Victorian Government was obtain similar outcomes using $400,000 of incentive payments as they could achieve using $2.7 million in a non-competitive framework (Stoneham et al. 2002b).

A2.2 Quantity based instruments

1. Hunter River Salinity Trading Scheme

The NSW Environmental Protection Agency (EPA) operates the Hunter River Salinity Trading Scheme. This cap-and-trade scheme regulates discharges of saline water from coalmines and power stations in the Hunter River catchment above Singleton. The program was introduced as a trial scheme in 1995 after extensive consultation with the (then) NSW Department of Land and Water Conservation (DLWC), the Coal Industry Association, the Hunter Catchment Management Trust and Pacific Power.

The objective of the scheme is to manage saline water discharges so as to minimise impacts on irrigation, other water users and on the aquatic ecosystem. The scheme manages salinity by restricting discharges to a share of that which can be safely diluted within a high flow event. The total salt that can be discharged during the high flow event is calculated according to the ambient salinity in the Hunter River and concentration targets at key points in the river (Denman and Singleton). A comprehensive system of real time monitoring is used to ensure that participants do not exceed their pollution entitlement. Monitoring is the responsibility of permit holder, with the EPA and DLWC conducting regular audits to verify the accuracy of the monitoring data. It is estimated that the scheme costs between $150 000 and $200 000 per annum to administer (ABARE 2001a). This cost is covered through a fee levied on participants based on credit holdings.

The scheme was introduced as a pilot scheme. The environmental targets were achieved during the pilot period despite a series of seasons with low flows that made it harder for participants to manage their discharges (ABARE 2001a). The evolution of the scheme shows how MBIs can evolve from traditional command and control regulation. Initially the scheme was managed through EPA licensing with credits allocated to coalmines and power stations in the region and including a reserve held by the EPA. More recently, the pilot has moved to a permanent footing under separate legislation. A number of innovations have accompanied introduction of the permanent scheme, including extending the life of credits to 10 years and allowing third party ownership. In order to

maximise the potential benefits from trade and facilitate new entrants, twenty percent of credits expire every two-years and are reallocated via auction.[21]

2. BioBanking

Currently, biodiversity offsets are developed on a case by case basis in NSW. A number of offsets have been negotiated during the development consent process. The Department of Environment and Climate Change (DECC) is proposing to implement a biodiversity offsets and banking scheme called BioBanking to formalise the offsetting process. The objective of the scheme is to stop the decline in biodiversity as a result of development by requiring biodiversity values to be maintained or improved and allow consolidated areas of biodiversity to be protected .BioBanking will allow 'biodiversity credits' to be generated by landowners who commit to enhance and protect biodiversity values on their land. These credits will be protected by conservation agreements with landholders. These credits can then be sold. Developers can buy these credits and use them to offset the impacts on biodiversity values that are likely to occur as a result of development.

A BioBanking assessment methodology is being developed to determine the number and type of biodiversity credits that a development site will require in order to offset its impacts. It will also be used to determine the number and type of credits that a biobank site could create and sell to protect and manage biodiversity values.[22]

3. Native Vegetation Offset Tools

Under the *NSW Native Vegetation Act 2003*, farmers may be able to offset any negative impacts of clearing by improving or planting native vegetation elsewhere on their property, or potentially offsite. Offsets are only permitted if they meet the following three conditions:

- offsets are of vegetation types of equal regional value to or greater regional value than the vegetation proposed for clearing;
- improvement in the configuration of vegetation is commensurate with losses from proposed clearing; and
- improvement in the quality and quantity of vegetation is commensurate with losses from proposed clearing.

A central 'bank' of offsets has been proposed for the *Native Vegetation Act 2003*. Procedures and principles have not yet been developed.[23]

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21 Source: Whitten et al undated and http://www.epa.nsw.gov.au/licensing/hrsts/how_the_scheme_works.htm, accessed 13 July 2007

22 Source: http://www.environment.nsw.gov.au/threatspec/biobankscheme.htm, accessed 13 July 2007

23 Source: http://www.nativevegetation.nsw.gov.au/fs/a_new_approach.shtml, accessed 6 July 2007.

4. Riverbank

The NSW Riverbank has been funded with $105 million over five years to purchase water from willing sellers to be used for environmental purposes. It will operate from 2006 to 2011 and will target the State's most stressed and 'valued' inland rivers and wetlands. The volume acquired in any year will depend on the volume available for sale in the market.[24]

5. Green Offsets for Sustainable Development

This project was part of the National Market-based Instrument Pilots Program, under the National Action Plan for Salinity and Water Quality. The project managed salt loads to stressed rivers in the Murray-Darling Basin by undertaking pilot offsets in three areas of regional NSW where industry is expanding. The three pilot participants were:

- Ulan Coal Mine near Mudgee (Macquarie and Hunter catchments)
- Norske Skog Paper Mill in Albury (Murray catchment)
- Moree spa baths (Gwydir catchment).

The project began in August 2003 and was completed in June 2005. However, the offset measures established under this project will be ongoing, and DECC will continue to work with each of the participants to ensure that they establish and maintain appropriate offset programs, as needed.

The report highlights the following outcomes:

- The substantial implementation of a cost-effective offset program based on land management changes at Ulan Coal Mine has avoided the need for a desalination plant and will save the company about $91 million over the next 20 years.
- A greater than 40% reduction in the amount of salt that is discharged to the Mehi Creek from spa bath operators in Moree. The spa bath operators are planning to develop a system that will reclaim the salt content of the saline water that is still being discharged, as a saleable product for animal feeds and fertiliser. They are also investigating short-term offsets to address the discharge until a longer-term solution can be set up. The possibility of using offsets to reduce their impact in a cost effective way has helped to leverage this improvement.
- The investigation of a number of options to offset the additional salt that Norske Skog would discharge to the environment if it proceeds with its plant expansion plans.

[24] Source: http://www.environment.nsw.gov.au/candc/purchase.htm, accessed 29 June 2007

The programs for Norkse Skog and Moree spa baths are still at the stage of formulating offset programs. DECC will continue to work with Norske Skog and the group of Moree spa bath operators to establish effective offset programs.[25]

6. Tradeable net recharge credits for Coleambally Irrigation Area

The overarching goal of this study has been to explore the potential application of a cap and trade approach to manage net recharge in the Coleambally Irrigation Area. A biophysical assessment of the area identified three distinct impact zones based on geological characteristics. An aggregate cap on net recharge was determined as well as sub-caps for each of these zones. Property rights to the recharge were allocated amongst the landholders in the zones and were to be attached to water supply contracts. Modelling of the potential gains from trading were found to be very small, based on agricultural production impacts alone. The project concluded that while it was feasible to design a system of property rights and a cap for salinity in this instance these gains were not sufficient to precede with this policy instrument. [26]

7. Offsets for Aquatic habitats

NSW Fisheries has a policy of 'no net loss' for developments that damage aquatic habitat. Developers can compensate for damage by:

- transplanting seagrass or constructing fishways, or
- making payments into a Conservation Trust Fund used for strategic rehabilitation projects throughout NSW waters.

A monetary bond may be required as insurance against the offset action failing. For example up to $250,000 per hectare for seagrass. Habitat compensation is calculated on a 2:1 basis for vulnerable habitats. Consent conditions require an annual progress report for the offset action.[27]

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25 Source: http://www.environment.nsw.gov.au/greenoffsets/epapilots.htm, accessed 29 June 2007

26 Source: CSIRO and BDA Group 2005.

27 Source: Information obtained from Fish Habitat Protection Plan 2: Seagrasses, http://www.fisheries.nsw.gov.au/__data/assets/pdf_file/5050/protplan_2.pdf, accessed 5 July 2007

ATTACHMENT 3: Addressing the market failure for salinity management in the Wimmera catchment

Market failure	What did this market failure mean for Wimmera?	Solutions to the market failure
Property rights – the need for clear definition, allocation and measurement	Rights to redistribute salt in landscapes are unclear. Duty of care requirements are only indirectly related to salt and water balances and there is a lack of effective rights relating to land management and salinity control. The lack of rights is exacerbated by the lack of a consistent measure of the salinity impacts of alternative land management actions.	Establish and define a baseline on the duty of care. Use contracts to agree on a new distribution of rights.
Property rights – desired ecosystem services are non-excludable	Landholders reducing salt export have no way of identifying who will benefit and ensuring beneficiaries pay for these services. Government could act on behalf of potential buyers thus removing this problem.	Government acts on behalf of potential buyers by paying for the benefits. Government is the broker of public benefit.
Asymmetric information – about landholders' costs of changing management	There is no market price for reduced salt loads that could be used to purchase changes to land management. Therefore, the CMA does not know what price or which landholders will need to be paid to facilitate changes to land management.	Use a competitive tender process to reveal those that can supply valuable actions and the costs of doing so.
Asymmetric information – salt benefit from changing management	Governments know, or can estimate, the likely reduction in salt movement from changing land management but landholders do not. Landholders need information about changes to make and where in the landscape to make them.	Provide information during bid development on relative benefit of actions and location. Collect information to estimate benefits.
Information failure – tools and techniques	The tools and techniques required to establish and maintain landuses that reduce salt movement may be unfamiliar to landholders. Government may already know this information or innovation may be needed to work out what works best where.	Provide information via scheme support staff or as part of expression of interest process.
Information failure – scientific uncertainty	Uncertainty remains about the absolute and relative outcomes for salt movement from alternative land management actions.	Identify key uncertainties and whether there are cost-effective ways to reduce. Restrict actions that can be funded. Minimise complexity of issues targeted. That is, only target multiple issues where strong synergies offset increased measurement complexities.
Difficulty measuring and monitoring success	Successful implementation of the management actions can only be measured well after they have taken place but costs are incurred up-front. Therefore, it is difficult to design payment structures that give appropriate incentives for best practice implementation without intensive monitoring.	Consider contracting for key actions. Communication targeting drivers of success. Establish clear and cost-effective monitoring strategy. Split payments between upfront and later on outcome.
Market power	Too few landholders may be interested in participating to allow competitive outcomes under an MBI solution.	Involve landholders in the design, allow adequate time for bid development etc.

ATTACHMENT 4: Principles of metric design - Wimmera

Design principle	*Description*	*What did this mean for the Wimmera metric?*
1. Quantity/Quality	- A metric is a physical quantity or cardinal index of a biophysical outcome. - There are usually a number of measures that deliver different messages to landholders and represent different outcomes. For example, estimating salt discharge differs from estimating change to recharge volumes. - Direct measurement of outcomes is preferred but usually estimated using a proxy based on changes to inputs. For example, using models relating input changes (area and location of vegetation) to changes to salt outcomes.	Salinity outcomes of alternative management changes in tonnes of salt were estimated at a specified end point. Management changes are incorporated using input based proxy measures based on changes to vegetation cover and other salinity reducing management actions across the designated site. X action will lead to Y salinity reduction.
2. Spatial relationships	Two potential spatial relationships arise with respect to the relative location of proposed management changes in the landscape: 1. Do any packages of management change generate synergistic outcomes? For example, corridors over scattered vegetation, revegetation in the neighbourhood of existing large remnants compared to more scattered activities? and 2. Are there any biophysical thresholds that are likely to be created crossed or impacted in different pathways?	While spatial relationships do exist they are likely to be relatively small and very difficult to incorporate. Hence, they were ignored in the initial Wimmera application.
3. Change relative to a baseline	Important if the goal of policy is to improve outcomes from a baseline, rather than to pay for some absolute maximum quantity or secure ongoing provision. The baseline is usually defined as the higher of a specified duty of care and the outcome without management change.	Change should be measured relative to a uniform benchmark for the salt export impacts of business as usual. This reduces the difficulty of collecting baseline information from each site and creates an implied minimum duty of care.
4. Location – relative values	The location where change occurs can generate different values to the community. Locations closer to the community might be valued more highly, or there may be places where the production of the ecosystem service is greater, or that path to	The contribution of individual changes was measured at the best downstream location for determining their relative values. The path or stream contributing to that point was not identified as being important, only the aggregate impact at the

	the point at which the ecosystem service point is measured may be important (such as for water quality).	downstream point.
5. Timing	All things equal, earlier outcomes are preferred over later ones.	A steady state estimate was favoured due to the relatively short time horizons predicted for outcomes on steep hill country and the uncertainty about actual time needed to achieve outcomes.
6. Risk / certainty of implementation success	Some management changes may be more likely to succeed than others. The key factor in success may be the initial establishment or the on-going management. Likelihood of success can either be considered within the metric design or the payment mechanism.	Weighted by estimated probability of successful implementation.
7. Risk / certainty of outcome success	Even with successful establishment of the management change there may be uncertainty about the eventual impacts on outcomes. For example, this may be the case with management changes for which less is known about their impact on recharge.	Weighted by estimated probability of outcome being achieved.
8. Irreversibility	Irreversibility is related to risk. Where thresholds are anticipated, such as extinction of species, there is a case for favouring less risky actions that achieve change sooner.	None identified
9. Spillover impacts	Spillover impacts are consequences elsewhere in the system of a local management change. For example, reducing recharge in Wimmera SHC will also reduce base-flows in streams and rivers in the catchment. In some cases this can lead to a perverse outcome whereby the salt concentration in the remaining flow can be higher.	None identified