Evaluation of the Market-based Instrument Pilot Project – Auction for Landscape Recovery (Western Australia)

Report prepared for WWF Australia

by

Susan A. Moore and Richard J. Hobbs

May 2005

School of Environmental Science, Murdoch University, Murdoch WA 6150
Ph: +61 8 9360 6076
Fax: +61 8 9360 6787
Email: S.Moore@murdoch.edu.au, R.Hobbs@murdoch.edu.au.

BIOS.

Dr Susan A. Moore

Dr Moore is a senior lecturer in Environmental Science at Murdoch University, Western Australia. She has published extensively on the social and policy aspects of biodiversity conservation, environmental policy more generally and natural area tourism. Recently her research has focused on the regional delivery of natural resource management. She is an editorial board member of the international journal *Environmental Management* and chairs and sits on a number of state and national committees involved in environmental policy and research, such as WWF's Scientific Advisory Committee.

Professor Richard Hobbs

Professor Richard Hobbs is Professor of Environmental Science at Murdoch University, Western Australia. He has published extensively on the ecology, management and restoration of altered ecosystems, particularly in agricultural areas. His current research focuses broadly on ecosystem restoration and natural resource management issues. He is a Fellow of the Australian Academy of Science, Editor in Chief of the international journal *Restoration Ecology*, a member of the Natural Heritage Trust Advisory Committee and sits on a number of other committees and advisory boards relating to biodiversity conservation and management.

Executive Summary

1. This report aims to evaluate the performance of the Auction for Landscape Recovery (ALR), and to provide the key success factors and impediments for conservation auction schemes in Australia.
2. Preparation of this report was based on developing and applying a methodology for judging the project's successes and failures and determining the associated key success factors and impediments. Judgments regarding success, failure, and the associated factors, were based on whether the project objectives were met; and whether criteria drawn from conservation planning and environmental policy evaluation were evident in the project's execution and products.
3. The pilot succeeded in applying two selection methods, systematic conservation planning (SCP) and an environmental benefits index (EBI), although only the SCP (with EBI information imbedded in it) was used to make the actual tender selections. The assessment of multiple environmental benefits proved problematic. The project's on-ground outcomes included enhanced protection for priority biodiversity assets.
4. The project succeeded in that sufficient data of a sufficient quality was acquired and analysed for tender selections to be made. Factors related to having sufficient data to make tender selections included: (a) access to both digitised, spatial data and field-collected, site-specific data; and (b) assistance in evaluating the tenders from an expert group.
5. A total of 23% of landholders, 7 out of the 31 of those who tendered and been surveyed to provide these data, were new to agri-environmental schemes. The tender process seemed politically and socially acceptable to those landholders involved.
6. Data from the ALR pilot auction suggest a significant increase in efficiency over an input-based and an output-based uniform price scheme of 315 and 207% respectively. The project succeeded in that the underpinning economic ideas were sound, and the auction design and contracting arrangements could be efficiently and effectively implemented.
7. For most landholders in the WA wheatbelt, salinity remains their highest priority irrespective of this project's objectives. In WA (and elsewhere), most landholders remain focused on production concerns and the business of farming. However, there is some evidence that the ALR succeeded in focusing the tendering process on biodiversity actions.
8. Key success factors included the following:
    a. The availability of appropriate computer software and spatial data, and the compatability of the ecological and economic models used.
    b. The availability of a person with insights into the mechanisms and the technical skills and ability to integrate data and communicate the process to a diverse range of people in the project team.
    c. The development of an enthusiastic and committed project team, which combined practical and academic expertise, who frequently contributed more time and resources to the project than the actual budget provided for.

d. The availability of resources to be able to employ community support officers and having these locally based.
e. Using an expert reference group to facilitate decision-making. To a large extent they replaced a formal analysis of feasibility and likelihood of success of projects.
f. Two bidding rounds, with transfer of learnings from the first to second round.

9. Key impediments included:
    a. The constraints imposed by project timeframe and budget.
    b. The methodology behind the EBI is complex and requires a large amount of expert assessment at different scales.
    c. The inability to develop or use effective management benefit analysis and threat/risk analysis.
    d. The SCP process is difficult to communicate, given its conceptual and computational complexity.
    e. Appropriate spatial data are not available 'off the shelf' or from a central location in Western Australia for use at a regional scale of analysis.
    f. The complex nature of biodiversity patterns in the extremely diverse SW ecoregion confound the application of simple mapping, selection and prioritisation processes.
10. Problems encountered during the project, over and above those arising from timeframe, budget etc, are symptomatic of broader issues in planning for biodiversity conservation.

CONTENTS

1.0 Introduction

1.1 Background to project and purpose of this report

In 2003 the Commonwealth Government of Australia established and funded 10 pilot projects to assess the effectiveness, efficiency and flexibility of selected market based instruments as means of effecting improvements in natural resource management. The pilots have included auctions, tenders, cap and trade and insurance-based instruments (CoA 2005). The Auction for Landscape Recovery (ALR) is a Western Australian pilot project, running over two years (2003-2005) and based on a voluntary land and nature conservation auction conducted over two rounds in the wheatbelt agricultural region of the Avon River Basin of Western Australia. Comprehensive details on the design and execution of the ALR project can be found in the project's final report (forthcoming as of May 2005).

The ALR pilot project was designed to test a number of features of auctions as a specific market-based instrument, as detailed in seven project objectives (Table 1). These objectives focus on evaluating the instrument design and its implementation; they do not explicitly address or require reporting on the achievement of environmental or biodiversity outcomes. This pilot project has been managed by WWF Australia, with partners including CSIRO, the University of Western Australia, the Avon Catchment Council, the North Eastern Wheatbelt Regional Organisation of Councils, the Department of Conservation and Land Management, Murdoch University and others.

WWF, with its partners, is responsible for reporting on achievement of the seven objectives to the Commonwealth Government. This report forms part of these reporting responsibilities. It has two aims:

A. To evaluate the performance of the ALR; and
B. To provide the key success factors and impediments for conservation auction schemes in Australia.

Table 1 ALR project objectives from the project proposal

OBJECTIVE	**DETAIL**
1. To test two alternative selection methodologies for assessing the relative benefits of individual actions by private landholders against quantitative biodiversity targets.	o Relative biodiversity conservation benefits that stem from the tender selections resulting from the two distinct methodologies o The extent to which the two methodologies select actions that provide multiple environmental benefits.
2. To evaluate the minimum information needs for applying an auction approach to delivery of NRM at a regional scale.	o The marginal value of datasets in determining environmental outcomes from the tender selection process.
3. To evaluate the relative benefits of a discriminative price auction versus a fixed price scheme and existing Landcare schemes.	o The difference in recruitment of landholder tenders o The number and % of tendering landholders that are new to Landcare activities for biodiversity conservation o The change in overall quality and quantity of environmental outcomes supplied (i.e. has the auction approach delivered a change in the work that landholders propose such that there is a change in (potential) outcomes?)
4. To analyse administrative efficiency of a discriminative price auction versus fixed price schemes.	o The difference in the proportion of administrative costs required to implement the auction versus a fixed –price scheme
5. To analyse communication strategies with landholders.	o The relative awareness of landholders of ecological threats (i.e. has their awareness of what the auction is trying to achieve been enhanced?)
6. To identify and define the 'key success factors' and 'key impediments' for conservation auction schemes in Australia and the factors which are likely to be regionally sensitive.	o Differences in the auction results between the different landscape types in the trial area* o Differences in the auction information requirements, landholder engagement, quantity and quality of bids and management interventions; administrative and communication costs, of the WA pilot and the Victorian and NSW (Liverpool Plains) conservation auction trials.
7. To communicate the pilot results to regional NRM groups and other stakeholders regionally, nationally and internationally.	o

* This point was not evaluated for two reasons: first, only one broadly similar landscape type underlies the trial area and second, the number of landholders was too small to be able to divide the sample and get meaningful results.

1.2 Methods

Methodology

Preparation of this report was based on developing and applying a methodology for judging the project's successes and failures. A central part of this applying this methodology was determining the associated key success factors and impediments.

Judgments regarding success, failure, and the associated factors, were based on:

(1) Whether the project objectives (Table 1) were met; and

(2) Whether criteria drawn from conservation planning and environmental policy evaluation (Tables 2 and 3) were evident in the project's execution and products.

Table 2 Ecological principles for economic instruments directed towards terrestrial biodiversity conservation

Principle	**Explanation**
Representative samples of all ecosystems protected	Ecosystem diversity is important and every ecosystem type should be conserved in the landscape. Encompasses the ideas of comprehensiveness and representativeness.
Sites contribute to meta-population viability	Species populations have the greatest likelihood of persistence if habitat is of sufficient area, is distributed in space to reduce vulnerability to single disturbances, and is sufficiently connected to enable movements of individuals or propagules between subpopulations
Sites in best condition given priority	Sites in the best relative condition are more likely to retain greater diversity than sites in a highly modified condition.
Vulnerable ecosystems afforded priority	Conservation priorities should be based (partially) on the likelihood that an ecosystem will be degraded or lost without immediate conservation action. This must be tempered by the likelihood that the ecosystem or site is responsive to management.
Ecological processes supported through time	Ecosystems rely on processes such as disturbance, regeneration, dispersal and water and nutrient flux. Management of threatening processes is also often required.

Source: Gibbons et al. (2002)

Table 2 draws on ecological principles that have been suggested for economic policy instruments associated with biodiversity (e.g. Gibbons et al. 2002). These principles are well established in the conservation literature, and frequently used in practice. Their use may still, however, lead to unresolved issues since the criteria can be mutually exclusive – for instance vulnerable ecosystems may by their nature not be present anywhere in good condition.

Table 3 Policy evaluation criteria for determining the 'best' policy instruments for biodiversity conservation

Criteria	**Explanation**
Economically efficient	Trade-offs created by the instrument are achieved at least cost and the reassignment of property rights makes at least some one better off and no one worse off.
Administratively feasible and cost-effective	Instrument creates minimal enforcement and monitoring costs, and its requirements and associated decision-making processes are easy to understand.
Improves information availability, esp. symmetry	Instrument improves the availability and exchange of information between those involved in policy development and implementation.
Politically and socially acceptable	Instrument motivates people, and is regarded as legitimately formulated and delivered, consistent with government policy and has bipartisan support.
Equitable	The instrument, now or in the future, disadvantages no individual or group.
Flexible	Instrument can cope with changing technology, prices and climate, as well as encouraging innovation and improvement in biodiversity beyond official policy targets.
Dependable	Instrument will deliver the desired target even when knowledge about biodiversity, and the social and economic consequences of the instrument, are uncertain.
Precautionary	Instrument avoids the chance of serious, irreversible consequences, especially where there is scientific uncertainty.
Targeted	Instrument enables areas of high/significant conservation value to be identified and managed.
Educational	Those influenced by the instrument become better informed about biodiversity.

Sources: Young and Gunningham (1997), Stoneham et al. (2000), Banting et al. (2001), Moore (2001), Stoneham (2003)

Table 3 was sourced from efforts in Australia and elsewhere to develop criteria for evaluating biodiversity policies and instruments (e.g. Young and Gunningham 1997). Researchers have drawn on the widely used stalwarts of policy evaluation – efficiency, effectiveness and equity – as well as recommending criteria specific to sustainability, such as precaution and community acceptability, and to biodiversity concerns, such as dependability.

The Commonwealth Government suggested four factors thought to contribute to the success or failure of the market-based instrument (MBI) pilots (Anon. 2004, Table 4).

Table 4 Factors thought to contribute to the success or failure of the MBI pilots

Factor	Description	KTS section number
Mechanism design	• Methods employed to assist with design and underpinning economic ideas.	6.1.1
Measurement of outcomes	• Metrics employed and scientific/ecological basis of measurement employed.	6.1.2
Project planning, management & communication	• Adequacy or otherwise of planning and organisational support.	6.1.3
Engaging agents	• Mechanisms employed to exchange rights/contracts services. • Key change agents and associated mechanisms.	6.1.4 [also KTS 5: identify key change agents]

Source: Anon. (2004)

Information sources

Sources of information for this evaluation included: our observations from and participation in project meetings; review and analysis of project documentation; and interviews with team members. The results draw on all these sources unless specified otherwise. Observation and participation by the authors occurred at several science team meetings over the life of the project. Both authors actively participated in a 2-day project evaluation workshop by the science team in March 2005 and one of the authors in a half-day partner's meeting in April 2005.

Documents reviewed included an interim and quarterly reports prepared for the Commonwealth Government (Appendix) and conference/workshop papers by project partners (e.g. Clayton 2005). Final reports from the project partners were to provide the core documentation for this evaluation. As not all were not available when this report was prepared, greater reliance was placed on the afore-mentioned sources.

Informal face-to-face interviews were conducted with most of the science team members towards the end of the project (April 2005). Included were: The University of Western Australia – Michael Burton, Helena Clayton and Ben White; CSIRO (by phone) – Kristen Williams; WWF – Chris Curnow and Cheryl Gole. Questions covered the project's successes, shortcomings and associated factors.

Analysis

The following analysis (in sections 2.0 & 4.0) has been organised according to the parts of the project: tender evaluation methodology, environmental data requirements, auction design and contracts, project management and resources, and communicating with landholders. The project successes and failures, and associated factors and impediments, are presented according to the part of the project where they most influenced success or failure. A comparison of this project with the Liverpool Plains Land Management Tender (NSW) and BushTender (Victoria), as required by Objective 6 of the ALR pilot (Table 1), is included. The key success factors and impediments, as derived from these analyses, are given in section 3.0. No evaluation against Objective 7 is included as the associated tasks were still underway when this analysis was done.

For each part of the analysis (e.g. tender evaluation methodology), the successes, failures and factors have been detailed. Although it might be tempting to progress immediately to the key success factors and impediments, it was *absolutely essential* to clearly identify what the successes and/or failures of the project have been, evaluated against some standards or expectations. The 'expectations' or standards are here provided by the project objectives (Table 1) and evaluation criteria (Tables 2 & 3). As such, each of the following sections begins with these expectations and explicitly notes the related successes and/or failures. Only then is detail provided on the associated success factors and impediments, and finally the key factors. The Commonwealth success factors (Table 4, Anon. 2004) are also included in the boxes at the beginning of each section to assist with analysis.

Although we have presented the successes and failures with some confidence (given their judgment against the project objectives and criteria from the literature), our ascription of causality between the factors and project successes or failures must be treated with more caution. We have used our professional judgement, and of the project partners, to describe these factors. They should be regarded as being based on the best information available but interpreting their part in success or failure should be done with caution. A comparison across the 10 market-based instrument pilot projects would greatly improve their robustness and our confidence in their explanatory power (Yin 1994).

2.0 Successes, failures, associated factors and impediments

2.1 Tender evaluation methodology

Relevant project objective (from Table 1):

(1) To test two alternative selection methodologies for assessing the relative benefits of individual actions by private landholders against quantitative biodiversity targets.

Conservation planning evaluation criteria: *All (from Table 2).*

Relevant Commonwealth success factor (from Table 4): None.

Evaluation of successes

Did the pilot succeed in detailing the relative biodiversity benefits of the two methods? (first part of the Detail against Objective 1 – Table 1)

The pilot succeeded in applying two selection methods, systematic conservation planning (SCP) and an environmental benefits index (EBI), although only the SCP (with EBI information imbedded in it) was used to make the actual tender selections. The two methods use measures of different things in different contexts and provide different types of output – the EBI provides an estimate of EBI/$ while SCP provides contribution to target/$. Also, the SCP is primarily a regional planning tool whereas the EBI is predominantly designed to work on a site-by-site basis. Regarding relative performance, it appears that the SCP provided a more efficient solution in terms of achieving conservation outcomes within the constraints of the project.

Did the pilot succeed in detailing the extent to which the two methodologies select actions that provide multiple environmental benefits? (second part of the Detail against Objective 1 – Table 1)

It appears that, in the end, the assessment of multiple environmental benefits proved problematic. The assessment of biodiversity benefits alone was difficult (see following

section), and the addition of other environmental benefits was hampered by the unavailability of useful predictive techniques by which to assess the likely environmental outcomes of particular management actions. A further problem was the mismatch in scale between proposed management actions arising out of the ALR process and the likely system responses. A key example of this is in relation to salinity and ground and surface water flows. The management actions proposed under the auction scheme were very unlikely to have much impact at the landscape scale at which these water processes operate.

Did the pilot succeed in meeting the conservation planning evaluation criteria? (Table 2)

The project's on-ground outcomes included enhanced protection for the following set of biodiversity assets:

- Complementary bushland remnants.
- Naturally saline wetlands.
- Granite outcrops and rocky ridges.
- Listed threatened species.
- Untargeted species vulnerable to fox predation.

The main planning criteria to which these outcomes are relevant are the complementarity and protection of vulnerable ecosystems although some funded projects also considered metapopulation viability and ecosystem processes. In heavily cleared areas such as the study region, virtually any conservation action (provided it is feasible) is liable to have some impact on the factors covered by the planning criteria.

Success factors

The success factors associated with the tender evaluation methodology included: (1) using ecological and economic models that were conceptually and methodologically similar; (2) having access to suitable data and the skills needed to manipulate and interpret these data; and (3) the pilot nature of the project that successfully brought research and practice together.

1. The ecological (SCP) and economic models worked well together. They did so because both rely on similar methods – constrained optimisation. The SCP TARGET software has been designed to capture trade-offs, as does economic modelling. It also helped that the models used (e.g. TARGET) were available 'off the shelf' but could still be modified as needed. Other reasons why the models worked well together were because those involved were experts in their fields and were willing to cooperate.
2. This is the first time SCP has been used to fund on-ground actions, here in an auction-type policy instrument. It has previously been used for conservation reserve selection. It worked because of CSIRO's commitment to acquire the data needed, because the software already existed, and because the integrator (K. Williams, CSIRO) was able to efficiently and effectively integrate data and work across relevant components to pull the whole thing together.
3. Research and practice were effectively brought together to produce useful management outcomes (funding provided to landholders for on-ground works) and research outcomes (testing of conservation planning and economic theory in real world setting). This was possible because of the pilot nature of this project (with research-focused project objectives) as well as the commitment to real world activities. This made the

project exciting for the researchers involved and contributed to the enormous amount of goodwill (=unpaid contribution) they made to the project and hence its success.

Shortcomings and associated impediments

There were also some failures or shortcomings associated with the selection methodologies, a number of them related to the EBI. Included were: (1) the time and effort required to construct an EBI and conduct the necessary assessments; (2) difficulties in assessing elements of the index, such as current condition; (3) difficulties in determining biodiversity management benefits; (4) ditto for multiple benefits; and (5) difficulties in explaining the SCP methodology.

1. The EBI proved difficult for a number of reasons. The EBI is an example of a composite index, which aims to provide a simple method of determining benefits of particular management actions (e.g., inclusion of particular remnant areas in a reserve network, fencing remnant vegetation etc). In fact, the methodology behind the EBI is complex and requires a large amount of assessment at different scales, which can only be carried out by experienced/knowledgeable individuals, and/or in conjunction with an expert reference group. The time and effort required to construct the EBI was not recognised at the start of the project. Operationally, the project used SCP as the primary tool, with the EBI being fed into SCP as a preference.
2. Part of the difficulty in using an EBI related to the inability to develop an effective and efficient method for assessing various elements of the index, including current condition, risks/threats/probability of persistence and management benefit. There are a number of contributing factors to this. Firstly, some of the information needed to construct the EBI is not available and/or difficult to collect. The EBI consists of an assessment of biodiversity condition (BBI) and outcomes plus an assessment of other environmental benefits. However, even the relatively simple requirement of assessing current condition is problematic for some of the ecosystem types present in the study area.
3. The task of determining management benefit, for inclusion in the EBI, was perhaps the most problematic since there are few available predictive techniques by which the likely outcomes of any given management action can be assessed. The LUCIS component of the BBI aims to do this, but its application remains fraught with problems (Williams 2004). A problem particular to this project was the translation of the LUCIS assessment to Western Australian ecosystems. While it appears that, early on in the project, an attempt was made to do this (Andrew Huggett, CSE, Perth), the methodology was not documented, and we have been unable to determine how this was approached. A reduced level of input from the CSE Perth lab halfway through the project meant that any learnings from this initial process were lost. This meant that there was no meaningful attempt to apply any type of LUCIS assessment, and this was replaced by the MARG assessment of management feasibility.
4. It is also difficult to judge the merit of multiple benefits when the effects of management actions such as deep drainage are unknown. Again, this reflects a broader lack of understanding of environmental responses to intervention. This is also difficult to explain to landholders in a brief space of time.
5. The SCP process is difficult to communicate, given its conceptual and computational complexity. This means that this part of information provision is likely to remain asymmetric even if the funders wished it to be otherwise, i.e. biodiversity value will remain ‘concealed’ from landholders.

How to do it better in the future

The following suggestions flow from the issues raised in the previous section:

1. For TARGET and other similar software packages to be used successfully, there is a need to have the skills to use them. Training is needed if their application and adoption for conservation planning and management is to be considered more widely. At present only a handful of 'experts' are able to drive the process.
2. There is also the potential to refine TARGET to be better able to deal with potential inconsistencies relating to aiming to fulfil percentage targets for all ecosystem types. Under this methodology, there is the potential for missing opportunities to secure all or most of the remaining examples of a rare ecosystem. If a straight target of 10% is set for all types, only 10% of a rare ecosystem is selected as well as 10% of a common ecosystem.
3. An effective method for assessing management benefit needs to be developed. In this project, the methods used in NSW and Victoria were not followed, for reasons that are not apparent from the documentation. As discussed above, however, this is a problematic area that still requires considerable intellectual input and practical testing. In the end, an expert reference group (MARG) was used to provide some assessment of management benefit, and this may have produced a good enough assessment given the limited capacity for deeper analysis. There remains a need for better ways of communicating about multiple benefits and assessing them.

2.2 Environmental data requirements

Relevant project objective (Table 1):

(2) To evaluate the minimum information needs for applying an auction approach to delivery of NRM at a regional scale.

Conservation planning evaluation criteria: Not applicable (Table 2).

Relevant Commonwealth success factor (Table 4): Measurement of outcomes: metrics employed and scientific/ecological basis of measurement employed.

Evaluation of successes

Is there a recommended set of minimum information needs – did the project succeed in this respect? (Table 1)

How did the metrics employed and the scientific/ecological basis of the associated measurement contribute to the pilot's success? (Table 4)

We are unable to provide a comprehensive answers to these questions without access to the final CSIRO report. The project succeeded in that sufficient data of a sufficient quality was acquired and analysed for tender selections to be made.

Success factors

Factors related to having sufficient data to make tender selections included: (1) access to both digitised, spatial data and field-collected, site-specific data; and (2) assistance in evaluating the tenders from an expert group.

(1) Two forms/types of data were used to make the tender selections: spatial data held by State Government agencies obtained under a licence agreement and used from the complementarity phase and site-specific data collected by the community support officers[1] and landholders. The spatial data, the modified Beard vegetation class data and geological data, enabled conservation targets to be set. The Beard classes on their own were too broad to be useful in the current context, because the vegetation of the WA wheatbelt is comprised of a complex, relatively fine-scale mosaic, which results from the interplay of biophysical and historical factors. However, coupling the Beard classes with a geological layer provided a finer resolution and included more of the mosaic nature than Beard classes alone. It took lots of work to identify an appropriate set of classes on which to base targets, but the work from Round 1 was able to be applied more easily in Round 2.

(2) There was confidence in the quality of the decisions achieved through the use of an expert group, the Management Appraisal Review Group (MARG). This group primarily assessed project feasibility. The provision of maps and spatial information to the MARG by the community support officers contributed to better decisions. In round 2, the community support officers produced a good quality farm map that proved invaluable for the management appraisal and tendering process and contributed to efficiency and effectiveness of this second round.

Shortcomings and associated impediments

The following comments relate to data issues generally, rather than being restricted to 'minimum' information needs. Issues include: (1) ensuring good quality information is

[1] The ALR pilot employed 3 part-time community support officers (CSOs) to encourage and support landholders to become involved in the project.

provided by landholders; (2) limited resolution of available spatial vegetation data; and (3) spatial data access and use issues.

1. In round 1, the information provided by landholders was of limited use and suitability. It was initially assumed that landholders could and would include all information needed to assess their tender. Round 2 was more prescriptive, with the provision of minimum standards related to some management actions (for example, minimum width of corridor 40m; minimum species diversity for revegetation = 10 species; site preparation, including weed control and ripping, required; large-scale baiting programs to be targeted to particular taxa). Landholders could still submit tenders that didn't include these, but it was made clear that the projects would not then be considered feasible, and feasibility is the first 'mask' (or selection filter) applied to tenders.
2. Above we identified as a success factor the availability of spatial data, which allowed the development of a set of ecosystem types against which targets could be set. However, there were also significant limitations relating to using such data for this purpose. As discussed above, the Beard vegetation classes are, on their own, virtually useless for priority setting within any given region. While the incorporation of geological data improved this somewhat, there is still cause for concern given the mosaic nature of WA wheatbelt vegetation and the rapid species turnover across the landscape (Hobbs and Yates 2003, Hopper and Goia 2004). This is a particular issue in the extremely diverse SW ecoregion and one that confounds the application of simple selection or prioritisation processes.
3. The project was slowed down by several issues related to accessing and using spatial data: lack of knowledge of the availability of existing data sets; difficulty in accessing existing sets in a timely way; and a lack of spatial data. For example, salinity risk data were not available in a timely way, except at an unsuitably low level of resolution. These access issues proved problematic in Round 1 but were largely resolved in Round 2. The project was also slowed down by spatial data being available at different and disparate scales and residing in different locations/agencies. This is a widespread problem in Western Australia. Such data are not available 'off the shelf' for use at a regional scale of analysis meaning that it is time consuming to convert/interpret for regional use.

How to do it better in the future

Data issues require ongoing consideration. Data availability, scale of resolution and cross-compatibility are critical factors determining the ease and degree of success with which projects such as this can be completed. This is a key factor likely to impact all regional decision-making processes. A prime example in the current context is the need for salinity risk data at the appropriate scale.

2.3 Auction design and contracting – landholder matters

Relevant project objective (Table 1):

(3) To evaluate the relative benefits of a discriminative price auction versus a fixed price scheme and existing Landcare schemes. This objective includes evaluating the difference in recruitment of landholder tenders and the number and % of tendering landholders that are new to Landcare activities for biodiversity conservation. [The last part of this objective is covered in section 2.6.]

Policy evaluation criteria (Table 3): Politically and socially acceptable, equitable.

Relevant Commonwealth success factors (Table 4): None.

Evaluation of successes

What was the difference in recruitment between the ALR and existing Landcare schemes – the number and % of tendering landholders that are new to Landcare? (Objective 3 – Table 1)

A total of 23% of landholders, 7 out of the 31 of those who tendered and been surveyed to provide these data, were new to agri-environmental schemes, although of these 3 had undertaken Landcare-type activities in their farms. There was a positive relationship, significant at the 5% level, between participation in the ALR and previous success in environmental schemes, recent assistance from a Landcare Coordinator and membership of a Landcare group. (The other significant influence was crop yield, as a surrogate for income).

Did the pilot succeed in meeting the environmental policy evaluation criteria of political acceptability and equity? (Table 3)

The tender process seemed politically and socially acceptable to those landholders involved. For example, of those surveyed by the University of Western Australia (UWA), who had participated in the ALR, 30% (n=31) had participated because of its different approach to other environmental schemes. The differences were identified as the tender approach and flexibility in the content required in the application forms. It was acceptable and interesting to a number of the landholders involved. The University of Western Australia also surveyed 31 'ALR-aware' non-participants of whom 66% said they would participate in the future (5 and above on a 1–7 scale).

For fairness, 52% of the landholders surveyed (n=31) scored the ALR tender selection process at 5 and above (on a 1–7 scale, where 7 was excellent). However, 35% responded that they didn't know whether the process was fair or not. Based on these results, it's difficult to make any meaningful comments on fairness and hence equity.

Success factors

Particular attention is given here to the influence of design features on participation. Those potentially contributing to participation included: (1) the flexibility of a tender-based process; (2) simple, clear application forms; (3) locally-based project officers providing technical support and enthusiasm; and (4) site visits by these officers.

1. Landholders, in interviews with UWA, said they liked the flexibility of a tender-based process. They liked being able to identify their own projects and develop their own budgets (23% of respondents, n=31). Three quarters of the landholders surveyed who

commented on the costs involved in the tender submission process were satisfied (74%, n=19), where satisfaction was identified as 5 and above on a scale of 1–7.

2. The landholder-friendly application process contributed to participation. They liked the simple, clear documentation, particularly the forms for the Expression of Interest and the Tender itself. The guidelines had a mixed reception, with 60% scoring them as 5 and above on a scale of 1–7 (n=30), while 16% (n=31) were concerned about a lack of information on the expected on-ground and ALR outcomes.
3. The community support officers provided technical support for tender development as well as inspiration and enthusiasm. Most landholders (87%), n=30) were satisfied with the assistance they received, scoring it as 5 and above on a scale of 1–7. This reliance on local technical assistance reflects the findings of Moore and Renton (2002), from their work with landholders in the WA wheatbelt. They identified locally based Community Landcare Coordinators as important information sources on biodiversity management for two-thirds of landholders.
4. A visit to a landholder's property to undertake a site assessment (required to provide data for the tender selection process) was highly regarded by landholders and potentially contributed to their participation. A total of 88% of landholders (n=25) scored their satisfaction with the site assessment as 5 and above on a scale of 1–7.

Shortcomings and associated impediments

Participation may have been reduced by: (1) design features such as lack of ongoing funding and the small amount of money available; (2) a lack of landholder understanding of the scheme; and (3) concerns regarding the adequacy of feedback to 'failed bidders'.

1. Several design features of the ALR may have affected participation – being a one-off scheme with no certainty/possibility of ongoing funding or access to more funding and the small amount of money available ($100K per round). Would larger, more innovative bids been attracted if more money was available?
2. The level of engagement by landholders may have been reduced (i.e. a reduced number of Expressions of Interest) by confusion regarding the type and intent of the project due to its name. The project was a tender process rather than auction and landholders weren't sure what 'recovery' meant. The reason most given by 'ALR-aware' landholders for not participating and assigned a high importance, was a lack of clear understanding of the scheme (32% of respondents, n=19).
3. The feedback to failed bidders after Round 1 was identified by some as inadequate – they wanted to know why they weren't successful and where their tender fitted into the whole set. In Round 1 a generic letter was sent to unsuccessful landholders. In round 2 specific feedback to each applicant was added to the generic details. This was time-consuming to do, but evoked a positive response from landholders.

How to do it better in the future

The challenge for the future is to get the balance 'right' between flexibility and applications that contain an adequate amount of information for assessment and that can be assessed. As such, there needs to be a balance between the amount of guidance provided by the fundor and the opportunity for innovation and creativity by the tenderer.

The uncertainty about how to assess the benefits of deep drainage contributed to their exclusion from round 2. In round 2, as a result, the tenders were a lot more homogeneous.

There is a tension here: flexible, innovative projects (including activities such as deep drainage) may have real benefits but they are currently impossible to evaluate in terms of potential outcomes. The risk is that by restricting projects to a narrow set that can be easily evaluated innovation may be reduced or lost.

2.4 Auction design and contracting – administrative efficiency

Relevant project objective (Table 1):

(4) To analyse administrative efficiency of a discriminative price auction versus fixed price schemes.

Policy evaluation criteria (Table 3): Economically efficient.

Relevant Commonwealth success factors (Table 4): Mechanism design (methods employed to assist with design and underpinning economic ideas), engaging agents (mechanisms employed to exchange rights/contracts) and key change agents.

Evaluation of successes

What was the administrative efficiency of the ALR, as a discriminative price auction versus a fixed price scheme? From the policy evaluation criteria – was it economically efficient? (Table 1)

Data from the ALR pilot auction suggest a significant increase in efficiency over an input-based and an output-based uniform price scheme of 315 and 207% respectively (White and Burton 2005). In these analyses, inputs include hectares of revegetation, kilometres of fencing, while the output is an amount of environmental benefit, as calculated using an EBI or some other summed score. The ALR was economically efficient compared to fixed price approaches. White and Burton (2005) recommend using the lowest estimate of efficiency when both input and output schemes are feasible, i.e. making a conservative judgment about relative efficiency between schemes.

How did the mechanism design and engaging agents contribute to the pilot's success? (Table 4)

We are unable to provide a comprehensive answer to this question without access to the final University of Western Australia report. The project succeeded in that the underpinning economic ideas were sound, and the auction design and contracting arrangements could be efficiently and effectively implemented.

Success factors

A critical success factor for the success of the project, as a pilot project, was having two rounds, although efficiency relative to fixed price schemes declined between the rounds. Burton (pers. comm. 2005) attributes the increase in tender prices in Round 2 relative to Round 1 to landholders costing the minimum standards recommended for proposed activities (such as fencing) into this second round.

1. The two rounds were initially proposed as part of the auction design, but became important as a means of enabling all involved to learn and improve their approach. Examples of core parts of the ALR pilot that were improved between rounds included the SCP analysis becoming more streamlined and more guidance being provided to landholders to help them prepare explicitly biodiversity-focused tenders (see forthcoming project report for more details).

Also, landholders learned what was funded the first time. For example, drainage proposals with unclear biodiversity benefits were not funded so landholders didn't attempt to get such work funded in Round 2. This flow of information, from the fundor to the landholder, is an example of reducing the asymmetry in information that is suggested as being centrally problematic to natural resource management (Stoneham et al. 2000) and what market-based instruments such as this pilot project have been designed to address.

Shortcomings and associated impediments

No shortcomings were apparent. Hailu and Schilizzi's (2004) work suggests some caution with regard to broadscale adoption of repeat tenders over time. Their modelling work suggests that the differential benefits between one-off schemes, such as the ALR, and fixed price schemes may erode over time. They attribute this erosion in efficiency to individuals learning from their own previous bids and adjusting their next bid accordingly.

2.5 Project management and resources

Relevant Commonwealth success factors (Table 4): Project planning, management and communication; adequacy or otherwise of planning and organisational support.

Evaluation of successes

This project succeeded in developing and implementing two rounds of tenders with landholders in the WA wheatbelt, within time and budget.

Success factors

The success factors relate predominantly to how the human resources in the pilot project were selected and managed, including: (1) having an 'integrator'; (2) having a mix of expertise, with the necessary skills; and (3) appointing locally based community support officers. Other success factors were: (4) having the project run by WWF and (5) good external and internal communication.

1. Of critical importance to the successful running of this pilot was having one person (K. Williams, CSIRO) with the skills to run the SCP as well as integrating across field staff, project management and auction design requirements. Contributions also included creating a framework for field data entry as well as linking State spatial data sets, field data and the SCP as a decision making tool.
2. Having a 'science team' who collectively held the necessary skills and expertise also contributed to the project's success. Through the partnership arrangements, leading economists, conservation scientists and modellers were integrally involved in the project. The cross-disciplinary synergies within this group helped bridge the potential divide between economic policy instruments, biodiversity planning and on-ground management.
3. Appointing locally based community support officers gave the project a local face and helped landholders become aware of the project and submit tenders. They were widely identified as pivotal to the success of the project (see section 2.3 above). Although they were very good at engaging landholders, their limited experience and skills affected the technical input they could make. This impacted on site assessment, for example being

able to accurately identify vegetation communities, and the delivery of well-planned on-ground projects. Their skills and knowledge increased over the project, emphasising the benefit of two rounds.

4. The project being run by WWF gave it a 'neutral credibility' with landholders. Such neutrality may not be ascribed by rural landholders to state government departments, such as the Department of Conservation and Land Management, who have statutory responsibilities for managing public lands for nature conservation as well as protecting rare flora irrespective of land tenure. As such, their interest in private property with nature conservation values has been met with suspicion on occasions (e.g. Munro and Moore in press). This Department may have found it more difficult to achieve the level of engagement in the time frame available.
5. Regular meetings, by the project manager, and often members of the science team as well, with other project partners and their staff, including NEWROC, CALM, Department of the Environment, Department of Agriculture, Avon Catchment Council, and with WA's regional natural resource management groups ('catchment councils') contributed to recognition of the pilot and general support. The science team, although its members were spread across Australia, was brought together on several occasions. Key members met more frequently with the project manager. Closer proximity may have contributed to more frequent meetings and a greater shared understanding of the tender evaluation process and hence more contributions to resolving problems early on.

Shortcomings and associated impediments

The main impediments, in terms of project management and resources, were: (1) a short, tight timeframe; and (2) under-resourcing.

1. The short, tight timeframe of the project did not make it conducive to high quality work. For example, it meant beginning the tender process with landholders before testing the tender evaluation methods.
2. With only half of the requested budget provided but the original project objectives retained, under-resourcing was a significant issue. The reduced budget had a number of implications. For example, the lack of sufficient funding for CSIRO to develop a WA wheatbelt specific EBI, plus a lack of suitable data, made determining an EBI for this pilot problematic. For both this pilot and the Liverpool Plains one (another of the 10 national MBI pilots) (WWF 2004), designing and organising data collection, plus providing adequate information and assistance to landholders, proved time-consuming beyond initial expectations.

   This problem seems to be a combination of initial under-resourcing combined with unexpectedly time-consuming elements of the project. As such, running these projects as pilots was a sensible approach so that these issues can be revealed and addressed before broadscale implementation is considered. Under-resourcing forced a strong reliance on co-investment, goodwill and the in-kind contributions of individuals, agencies and NGOs.

   A final issue with regard to resourcing was the lack of funding for compliance monitoring or for the evaluation of biodiversity outcomes. Although biodiversity outcomes were not detailed as a project objective, they are critical interest. And, if compliance costs of different schemes cannot be observed it makes it difficult to judge the relative efficiency of different approaches (White and Burton 2005). Without monitoring, the value or otherwise of this particular instrument can't be determined.

2.6 Communicating with landholders

Relevant project objectives (Table 1):

(5) To analyse communication strategies with landholders, and specifically, their relative awareness of ecological threats.

(3) To evaluate the relative benefits of a discriminative price auction versus a fixed price scheme and existing Landcare schemes. In this section, this objective includes evaluating the change in overall quality and quantity of environmental outcomes supplied.

Evaluation criteria (Table 3): Educational.

Relevant Commonwealth success factor (from Table 4): None.

Evaluation of successes

The intent of analysing the pilot's communication strategies is here narrowly focused on the effects on landholders' awareness of ecological threats. Communication has been analysed more broadly in previous sections, as part of the analysis of landholder participation in the auction design and contracting evaluation section (2.3) and in the project management and resources evaluation (section 2.5).

Did the pilot's communication strategies succeed in changing landholders' awareness of ecological threats? (Objective 5 – Table 1)

What was the change in overall quality and quantity of environmental outcomes supplied (interpreted to mean 'has the auction approach delivered a change in the work that landholders propose such that there is a change in (potential) outcomes')? (Objective 3 – Table 1)

Did the pilot project have an educational effect? (Table 3)

There is not a simple answer to this question and given the information available in preparing this report, can only be answered indirectly. First, a clarification – it is more valuable to judge whether the project changed the types of activities undertaken by farmers (more biodiversity related activities due to the pilot) rather than focusing on awareness. A wealth of attitudinal work has shown that we all purport to be environmentally aware but whether that translates into actions is another matter. Landholders surveyed by UWA indicated that nature conservation was a core part of farm management (70% of respondents, n=62). Vanclay and Lawrence (1995) have described how such attitudes are only one of a number of factors influencing adoption. Thus, for the purposes of this evaluation, the focus is on actions not attitudes.

Did this project change the actions proposed by landholders, compared to their core business (agricultural production) and as funded by other schemes? The first but not the second can be answered from the information available. In both the ALR and the Liverpool Plains pilot landholders showed, through the actions detailed in their tenders, a strong continuing interest in production-oriented environmental activities. In the ALR this appeared as drainage proposals and in Liverpool Plains as an interest in pasture establishment and refurbishment (WWF 2004). In WA (and elsewhere), most landholders remain focused on production concerns and the business of farming (Cary et al. 2001).

There was, however, clear evidence of 'learning' what the fundors wanted between the two rounds of the ALR. In Round 1, 30% of landholders proposed engineering interventions (drainage and pumping) while in Round 2, following directed guidance in the tendering

process, only 1 engineering project was received. As such, the ALR succeeded in focusing the tendering process on biodiversity actions.

It can also be asked whether landholders need to change their actions and awareness. For most landholders in the WA wheatbelt, salinity remains their highest priority irrespective of this project's objectives. Many have correctly identified that if they don't address salinity then biodiversity conservation may become impossible (Cramer and Hobbs 2002; Hodgson et al. 2004). As such, they don't need to have their 'awareness' improved. What seems most important is continuing to pursue landscape-level, multiple benefits approaches to biodiversity conservation.

Success factors

The most important success factor contributing to the change in focus between rounds was more closely directing the tender preparation by landholders (1). Another contribution to communication (and potentially to the actions proposed by landholders in their tenders) was the various efforts to enrol bidders (2).

1. The more directive approach taken in Round 2 resulted in almost all (except one) tenders having a biodiversity focus.
2. Communication was effective in enrolling bidders. Face-to-face meetings were the means of engaging the majority of participants. At catchment group and LCDC meetings, 50-90% of attendees completed Expressions of Interest. Shire Council meetings provided an important forum for information exchange, as did sporting and other social gatherings. Farmers did not report using the website as an information source. Local newsletters and posters developed 'brand recognition'. Regional newspapers did not stimulate responses from within the region.

Shortcomings and associated impediments

Impediments are associated with: (1) biodiversity still being outside core business for farmers; and (2) a lack of understanding of the concept.

1. The results from this pilot and Liverpool Plains suggest that biodiversity is still not core business, even when a 'market' is created for it. In the Liverpool Plains pilot, even when the Catchment Investment Strategy recommended funding projects for native vegetation regeneration, the tenders and subsequent funding has gone to other activities (e.g. pastures). Those involved commented that the Liverpool Plains landholders can only cope with gradual changes in management, for example, from cropping to pasture rather than the more dramatic change to native vegetation regeneration (WWF 2004).
2. It is difficult for landholders to protect biodiversity if they don't know what 'it' is. Much of the problem associated with developing suitable projects and then detailing work of a suitable standard relates to this issue. In a recent survey of wheatbelt landholders, most (96%) gave a limited definition of biodiversity (Moore and Renton 2002).

2.7 Comparison with Liverpool Plains and BushTender pilot projects

Relevant project objective (Table 1):

6. To identify and define the 'key success factors' and 'key impediments' for conservation auction schemes in Australia and the factors which are likely to be regionally sensitive.

All three projects were based on voluntary tenders with rural landholders (Table 5). They all had a central interest in biodiversity, although the Liverpool Plains project was more broadly focused on environmental benefits. The WA project had the smallest budget allocated for successful bidders and the smallest number of contracts signed. All three relied on site-based assessments.

Table 5 Summary of project details for Auction for Landscape Recovery (WA), Liverpool Plains Tender (NSW) and BushTender (Victoria)

Feature and details	**ALR**	**LP**	**BT**
Project details			
Biodiversity services focus	√	--	√
Funding allocated to tenderers over project	$200K	$735K	$400K
Areal extent (no. of LGAs/catchments)	7 LGAs	1	2
Auction type			
First price, sealed bid, price minimisation and discrimination, no reserve price	√	√	√
Number of rounds	2	2 (3?)	1
Input-based tenders (where inputs include fencing, revegetation etc)	√	√	√
Site-based assessments of tenders integral to evaluation	√	√	√
Contract type			
Individual management agreements with progress payments	√	√	√
Number of contracts signed	22	35	73
Area under contract (ha)	?	7,000	3,160
Length to be fenced (km)	?	230	?

Sources: Stoneham et al. (2002), WWF (2004), Clayton (2005), White and Burton (2005), unpublished reports from ALR project (see Appendix).

The detail of this objective asks for information on the differences in the auction information requirements, landholder engagement, quantity and quality of bids and management interventions; administrative and communication costs, of the WA pilot and the Victorian and NSW (Liverpool Plains) conservation auction trials (Table 6). No data were available for administrative and communications costs so these features have not been considered. This detail is sought to answer the broader objective regarding key success factors and key impediments.

Key success factors

In terms of auction information requirements, the novelty and related success of the ALR lies in using the SCP. A factor potentially contributing to the success of all three pilots was having an expert group to assist in evaluating tenders.

Regarding landholder engagement, both the ALR and BushTender recruited 'new' landholders – interviews with ALR landholders suggest that the flexibility of the tendering process and simple, short forms were appealing features.

For quantity of bids, more tenders were received than could be funded. Additionally, there were more tenders submitted than initial Expressions of Interest (see EoI: Tender ratios in Table 6). This enthusiasm, in the ALR project at least, can be attributed to effective communication, the appeal of this MBI to landholders and the efforts of the community support officers. There is no information available to identify similar success factors or otherwise for the other pilots.

Regarding quality, all three projects were regarded as being more cost-effective than similar fixed price schemes. Because of the different assumptions accompanying each calculation (Table 6) no detailed comparative comment can be made. Contributing factors can only be as interpreted from previous research – creating a market (price-based) for environmental services while reducing information asymmetry (through revealing information from landholders about the costs of works on their lands) and taking advantage of variability (heterogeneity) in landholders' opportunity costs (Stoneham et al. 2002, Whitten et al. 2003, OECD 2004).

For the quantity and quality of management interventions, the ALR and BushTender have a clear biodiversity focus, while the majority of the actions in the Liverpool Plains tender have much more of an agricultural production slant (i.e. pasture establishment and refurbishment) (Table 6). The success of the ALR and BushTender with regard to biodiversity actions can be attributed to the explicit biodiversity focus of both these schemes, contrasted to the Liverpool Plains scheme with its broader environmental benefits focus (Table 5).

Key impediments

The only place where the ALR faced impediments relative to the other schemes was with regard to the EBI (Table 6 – Auction information requirements). Biodiversity benefits were not included in the tender evaluation and the likely land use impacts of the proposed actions proved difficult to calculate and use. The associated factors potentially include a lack of information on the relationship between proposed actions and biodiversity outcomes, the highly diverse mosaic vegetation of this region making prediction difficult, and lack of resources being available to the partner (CSIRO) supplying these data.

Table 6. Summary of information requirements, landholder engagement, quantity (and quality) of bids and quantity (and quality) of proposed management interventions

Feature and detail	**ALR**	**LP**	**BT**
Auction information requirements			
Single-price tender (no requirement for detailed costing of actions)	√	√	√
Relied on calculating an environmental (biodiversity) score for each tender to identify the 'best' tenders	X	√	√
Regional conservation priority of tender part of evaluation	√	√	?
Regional/landscape contribution of tenders *as a set* underpinned tender selection	√	X	X
Scarcity of vegetation (i.e. conservation value) included in the environmental index	?	√	√
Amount of biodiversity improvement/benefits possible through tender included in environmental index	X	√	√
Other environmental benefits (e.g. salinity management) included in environmental index	?	√	X
Land use change impact score part of environmental index	? (in R1)	√	X
Landscape-level threats (e.g. salinity) included in scoring	X	?	X
Expert panel provided advice on the practicality of tenders/finalisation of scoring	√	√	√
Landholder engagement			
Those submitting tenders who had not previously participated in agri-environmental schemes (%)	23% (n=31)	?	18% not Landcare members
Biodiversity information revealed to landholders	No	No	No
Habitat services information revealed to landholders	N/A	N/A	Yes
Feedback to landholders on lack of tender success	√	√	?
New landholders between rounds?	15 out of 24 (in R2)	?	?

Table 6 (cont.)…

Quantity (and quality) of bids			
Number of EoIs submitted (total)	72	?	126
Number of tenders submitted (total)	88	?	148
EoI: tender ratio	1: 1.22	?	1; 1.17
Number of tenders awarded	22	35	73
Cost-effectiveness ($) relative to fixed-price scheme*	2 times	3-5 times	7 times
Quantity and quality of management interventions			
Revegetation	57[1]	--	37[2]
Fencing to exclude stock	81[1]	--	87[2]
Control rabbits	29[1]	--	91[2]
Retaining large trees		--	82[2]
Native pasture establishment and refurbishment	--	40[3]	--
Improved pasture establishment and refurbishment	--	44[3]	--
Native vegetation establishment and refurbishment	--	6[3]	--

* Each calculation is based on different assumptions: ALR figure based on a comparison with fixed payment per unit of input scheme (White and Burton 2005; these authors also explore other efficiency estimates); LP figure based on estimates of costs for similar works given in their Regional Investment Strategy (WWF 2004); BT figure based on a fixed price scheme where it is assumed to pay the marginal price determined from the auction (Stoneham et al. 2002).

[1] Calculated as the percentage of contracts within which this action is proposed.

[2] Calculated as the percentage of sites where this action is proposed.

[3] Calculated as the percentage of the total area under contract where this action is proposed.

Sources: Stoneham et al. (2002), WWF (2004), Clayton (2005), White and Burton (2005), Anon. (n.d.) unpublished reports from ALR project (see Appendix).

3.0 Key success factors and impediments

3.1 Key success factors

1. The availability of appropriate computer software; ability of software to capture economic tradeoffs.
2. The ecological and economic models worked well together, largely because they define variables in a similar way.
3. The availability of spatial data to set conservation targets.
4. The availability of a person with insights into the mechanisms and the technical skills and ability to integrate data and communicate the process to a diverse range of people in the team (not having a person or people with similar skills/abilities would be a key impediment).

5. The development of an enthusiastic and committed project team who frequently contributed more time and resources to the project than the actual budget provided for.
6. An effective mix of practical and academic disciplines to run and analyse the pilot project.
7. Availability of resources to be able to employ community support officers and having these locally based.
8. Using an expert reference group to facilitate decision-making. To a large extent they replaced a formal analysis of feasibility and likelihood of success of projects.
9. Two bidding rounds. Originally conceived as part of auction design, the two rounds enabled key learnings from Round 1 to be instituted in Round 2. The pilot was much stronger, with more reliable results, because of this.

3.2 Key impediments

1. The project timeframe impacted on many aspects of the project.
2. The budget also constrained many aspects of the project, including the actual operation of the tender process and ability to fund projects with meaningful environmental outcomes. The project relied, critically, on significant in-kind contributions and this did not always provide the necessary resources or input at key times. It also caused strain with a key partner at a critical time.
3. The methodology behind the EBI is complex and requires a large amount of assessment at different scales, which can only be carried out by experienced/knowledgeable individuals, and/or in conjunction with an expert reference group.
4. The inability to develop or use effective management benefit analysis and threat/risk analysis. Methods already used in other projects are of questionable value, especially when transferred to a new environment. A dedicated research program is required to develop this area and provide workable and meaningful methodologies. Reliable scientific information on the nature of the relationships between land use change and ecosystem impacts is critical for the functioning of environmental markets (Whitten et al. 2003).
5. The SCP process is difficult to communicate, given its conceptual and computational complexity.
6. While we identified above, the availability of spatial data as allowing the development of a set of ecosystem types against which targets could be set as a success factor, there were also significant limitations relating to using such data for this purpose. This is a particular issue in the extremely diverse SW ecoregion and one that confounds the application of simple mapping, selection and prioritisation processes.
7. Appropriate spatial data are not available ‘off the shelf’ or from a central location in Western Australia for use at a regional scale of analysis, meaning that it is time consuming to convert/interpret for regional use.

4.0 Discussion and conclusions

The ALR project has attempted to use biodiversity decision-making tools to design and run a conservation auction process at a sub-regional scale. The project had a number of limitations imposed by timeframe, budget, personnel availability and the characteristics of

the selected study area. Despite this, the project succeeded in pulling together a number of different approaches, deriving a set of conservation targets, and assessing tenders against their likely contribution to these targets.

Problems encountered during the project, over and above those arising from timeframe, budget etc, are symptomatic of broader issues in planning for biodiversity conservation. The prime tensions in all attempts to prioritise conservation actions centre on the following set of considerations:

1. The desire to produce meaningful, simple and easy to apply indices of biodiversity benefits in terms of current and future conditions *versus* the need for comprehensive data on current biodiversity patterns and condition and a systematic assessment of these data.
2. The alternative approaches of applying priority setting on a case-by-case basis in the face of incomplete information *versus* attempting to derive a complete-as-possible data set from which to make systematic decisions (recognising the near-impossibility of achieving a complete dataset and the need to use surrogate measures).
3. The requirement to determine priorities based on multiple factors including current biodiversity value, degree of threat, and likelihood of successful management outcomes (Hobbs and Kristjanson 2003, Hobbs et al. 2003)
4. The recognition that quantitative analytical methods can only provide decision support tools, not complete selection methodologies, and that subjective and value-based decisions are required. Hence the likely need to involve expert reference groups (such as the MARG in this project) to interpret the analyses and assist with decisions.
5. Funding limitations always mean partial solutions and hence tradeoffs among the factors discussed in (2) are inevitable. These will require value-based judgements regardless of the quality of information available. For instance, is it better to fund projects on high value biodiversity assets that have a relatively low chance of successful outcomes or lower value assets with a higher chance of success?
6. The current and potential biodiversity values comprise both site and landscape components. Individual sites sit within a landscape context which may currently add or subtract value, depending on whether it enhances viability, connectivity etc. Again, there is the potential for variables to confound one another.
7. This needs to be recognised when aggregate indices such as BBI or EBI are used: high scores on site-based parameters may be negated by low scores on landscape parameters, or vice versa. The problems associated with constructing apparently simple metrics such as BBI have been discussed in detail by Williams (2004).
8. The need to key local actions into sub-regional and regional priority setting exercises, usually in the face of incomplete information, and uneven distribution of willingness and ability of landholders to participate.
9. The need to set biodiversity priorities in the context of other major land use issues, such as salinity management, with the likelihood that biodiversity management may either operate at a different scale from other processes and/or that biodiversity management per se may be irrelevant if the other issues are not tackled effectively at the same time.
10. All of the above points need to be considered in the broader context of community understanding of the concept of biodiversity. While regional groups are being asked to set regional biodiversity targets, there is frequently still a poor understanding of what is

meant by biodiversity and what it consists of (Moore and Renton 2002). This militates against both a consistent approach to the issue and broad community buy-in to it.

The following influences on landholders' responses to this scheme are also of fundamental importance in the further development of biodiversity policy instruments:

1. Natural biodiversity, the focus of the ALR, is not well understood by many landholders. Often they do not share the same definition as scientists and others involved in scientifically based conservation planning (Moore and Renton 2002). Landholders preparing biodiversity tenders may not clearly understand what outcomes are expected of them.
2. Farms are run as businesses so families and companies expect to make a positive economic return from them. Landholders are most attracted to conservation actions that provide an economic return. Price-based instruments, such as tenders, thus have appeal. This appeal is tempered by the risk-adverse nature of many landholders (Vanclay and Lawrence 1995, Munro and Moore in press) combined with their persistent adherence to traditional agricultural pursuits.
3. Although these auction schemes have led to increased biodiversity activity, there has been a continued focus on broader production issues. This creates a conundrum – to achieve widespread adoption, instruments need to appeal to broader production concerns, but the evidence to-date is that when they do, the attention given to biodiversity is limited (as evidenced by the Liverpool Plains results). Any development of policy instruments must remain cognizant that psychological, cultural and political factors may dominate over economic ones (Sterner 2003).
4. While it is important to understand landholders' attitudes, they are not good predictors of behaviour (Vanclay and Lawrence 1995). It is critical to move the discussion beyond trying to 'change farmer's attitudes' to determining the factors that enhance the adoption of changed practices. These market-based pilots provide an excellent example of real-life experiments to investigate the impediments and incentives for change.

5.0 References

Anon. (n.d.). [Online] URL: http://www.deh.gov.au/land/publications/incentives-vic/section.1.html (Accessed 1 April 2005).

Anon. (2004). Knowledge transfer strategy: market based instruments pilot program. Unpublished draft by MBI Working Group, March 2004. Commonwealth of Australia, Canberra.

Banting, R., Burton, M. and Courtis, P. (2001). Policy Instruments for Native Vegetation Conservation in Western Australia. Unpublished report, School of Environmental Science, Murdoch University, Perth, Western Australia.

Cary, J., Barr, N., Aslin, H., Webb, T. and Kelson, S. (2001). *Human and Social Aspects of Capacity to Change to Sustainable Management Practices*. *Combined Report for the national Land and Water Resources Audit Theme 6 Projects 6.2.2 and 6.3.4*. Bureau of Rural Sciences, Canberra.

Clayton, H. (2005). Market incentives for biodiversity conservation in a saline-effected landscape: farmer response and feedback. Paper presented at the Salinity Pre-Conference Workshop (8 February 2005) of the 49th Annual Conference of the Australian Agricultural and Resource Economics Society, Coffs Harbour, NSW, 9-11 February 2005.

CoA (Commonwealth of Australia) (2005). *National market-based instruments program projects*. [Online] URL: http://www.napswq.gov.au/mbi/projects.html (Accessed 16 May 2005).

Cramer, V. A., and R. J. Hobbs. 2002. Ecological consequences of altered hydrological regimes in fragmented ecosystems in southern Australia: impacts and possible management responses. *Austral Ecology* 27: 546-564.

Gibbons, P., Briggs, S.V. and Shields, J.M. (2002). Are economic instruments the saviour for biodiversity on private land? *Pacific Conservation Biology* 7(4): 223-228.

Hailu, A. and Schilizzi, S. (2004). Are auctions more efficient than fixed price schemes when bidders learn? *Australian Journal of Management* 29(2): 147-168.

Hobbs, R.J. and Kristjanson, L.J. (2003). Triage: how do we prioritize healthcare for landscapes? *Ecological Management and Restoration* 4 Suppl: S39-S45.

Hobbs, R.J., Cramer, V.A. and Kristjanson, L.J. (2003). What happens if we can't fix it? Triage, palliative care and setting priorities in salinising landscapes. *Australian Journal of Botany* 51: 647-653.

Hobbs, R.J. and Yates, C.J. (2003). Impacts of ecosystem fragmentation on plant populations: generalizing the idiosyncratic. *Australian Journal of Botany* 51: 471-488.

Hodgson, G., T. Hatton, and R. Salama. 2004. Modelling rising groundwater and the impacts of salinization on terrestrial remnant vegetation in the Blackwood River Basin. *Ecological Management & Restoration* 5: 52-60.

Hopper, S.D. & Goia, P. (2004). The Southwest Australian Floristic Region: evolution and conservation of a global hotspot of biodiversity. *Annual Review of Ecology and Systematics* 35: 623-650.

Moore, S.A. (2001). Social and Economic Influences on Restructuring Landscapes for Biodiversity Conservation: Remnant Vegetation in the West Australian Wheatbelt as a Case Study. Paper presented at the workshop Restructuring Rural Landscapes in the WA Wheatbelt and Austria, with emphasis on the Social and Economic Imperatives (February 2001), pp.1-24.

Moore, S.A. and Renton, S. (2002). Remnant vegetation, landholders' values and information needs: An exploratory study in the West Australian wheatbelt. *Ecological Management and Restoration* 3 (3): 179-187.

Munro, J.K. and Moore, S.A. (in press). Using landholder perspectives to evaluate and improve recovery planning for Lake Toolibin in the West Australian wheatbelt. *Ecological Restoration and Management*.

OECD (Organisation for Economic Co-operation and Development) (2004). *Handbook of Market Creation for Biodiversity: Issues in Implementation*. OECD, Paris, France.

Sterner, T. (2003). *Policy Instruments for Environmental and Natural Resource Management*. Resources for the Future, Washington DC.

Stoneham, G. (2003). An overview of the ideas and information needed to develop and implement MBIs. Paper presented at the 6th Annual Australian Agricultural and Resource Economics Society National Symposium Market-Based Tool for Environmental Management. Canberra, ACT, September 2003.

Stoneham, G., Crowe, M., Platt, S., Chaudhri, V., Soligo, J. and Strappazzon, L. (2000). *Mechanisms for biodiversity conservation on private land*. Report prepared for Natural Resources and Environment, Victoria. July 2000.

Stoneham, G., Chaudhri, V. and Strappazzon, L. (2002). Auctions for conservation contracts: an empirical examination of Victoria's BushTender trial. Paper presented at the 46th Annual Conference of the Australian Agricultural and Resource Economics Society, 2002.

Vanclay, F. and Lawrence, G. (1995). *The Environmental Imperative. Eco-social Concerns for Australian Agriculture*. Central Queensland University Press, Rockhampton, Queensland.

White, B. and Burton, M. (2005). Measuring the efficiency of conservation auctions. Unpublished paper. School of Agricultural and Resource Economics, The University of Western Australia.

Whitten, S., van Bueren, M. and Collins, D. (2003). An overview of market-based instruments and environmental policy in Australia. Paper presented at the 6th Annual Australian Agricultural and Resource Economics Society National Symposium Market-Based Tool for Environmental Management. Canberra, ACT, September 2003.

Williams, J. (2004). Metrics for assessing the biodiversity values of farming systems and agricultural landscapes. *Pacific Conservation Biology* 10: 145-163.

WWF (2004). Land Management Tenders on the Liverpool Plains (report in progress, version dated 27.07.04). Provided by WWF Australia (Sydney Office) 2005.

Yin, R.K. (1994). *Case Study Research: Design and Methods.* Sage Publications, Thousand Oaks, California.

Young, M.D. and Gunningham, N. (1997). Mixing instruments and institutional arrangements for optimal biodiversity conservation. In P. Hale and D. Lamb (Eds) *Conservation Outside Nature Reserves* (pp. 123-135). Centre for Conservation Biology, The University of Queensland.

Appendix. Partner Reports Used

Clayton, H. (2005) Landholder post trial survey report: farmer participation response and feedback to the Auction for Landscape Recovery. School of Agricultural and Resource Economics, The University of Western Australia. Unpublished report. WWF Australia (WA).

CSO Report (2005) CSO Report. Unpublished, copy held by WWF Australia (WA).

WWF (January 2004) First Quarterly report to ABARE: Project 21 (Auction for Landscape Recovery, South West Australia). January 2004, Unpublished report, WWF Australia (WA).

WWF (February 2004) Auction for Landscape Recovery (Southwest Australia) Project ID 21 Auction design. Supplementary report to the Commonwealth, 17 February 2004. Unpublished report, WWF Australia (WA).

WWF (April 2004) Project ID 21. Auction for Landscape Recovery (southwest Australia): second quarterly report to the Commonwealth. Submitted by WWF Australia on behalf of the project partners. Corrected version, 1 July 2004. Unpublished report, WWF Australia (WA).

WWF (July 2004a) Project ID 21. Auction for Landscape Recovery (southwest Australia): interim report. Submitted by WWF Australia on behalf of the project partners, July 2004. Unpublished report, WWF Australia (WA).

WWF (July 2004b) Project ID 21. Auction for Landscape Recovery (southwest Australia): third quarterly activity report to the Commonwealth. Submitted by WWF Australia on behalf of the project partners, 14 July 2004. Unpublished report, WWF Australia (WA).

WWF (October 2004) Project ID 21. Auction for Landscape Recovery (southwest Australia): fourth quarterly activity report to the Commonwealth. Submitted by WWF Australia on behalf of the project partners, 14 October 2004. Unpublished report, WWF Australia (WA).