Markets for Ecosystem Services in Australia

Practical Design and Case Studies

ECOSYSTEM SERVICES PROJECT

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RIRDC | CSIRO | BBG | GBCMA | DIPNR NSW | L&WA

Structure

- **Background / introduction**
- **Types, selection, design**
  - Market typology – regional implementation
  - When use a market – heterogeneity, participation, goal
  - Design – theory and practice (market failures)
- **Case Study – Salinity in the Wimmera**
  - Services and Actors
  - Measuring ecosystem services
  - Who Pays
  - Who sells
  - Obstacles to participation
  - Monitoring
  - Other Issues

Background & Introduction

- **PES vs MBI Terminology**
  - MBI – dominate terminology in Australia
    - alternative means of achieving change; limits expectations
- **Evolution to markets**
  - History of regulation and participative/voluntary approaches – Native Veg Clearing Regulations; Landcare

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- **National Market Based Instruments Pilots Program**

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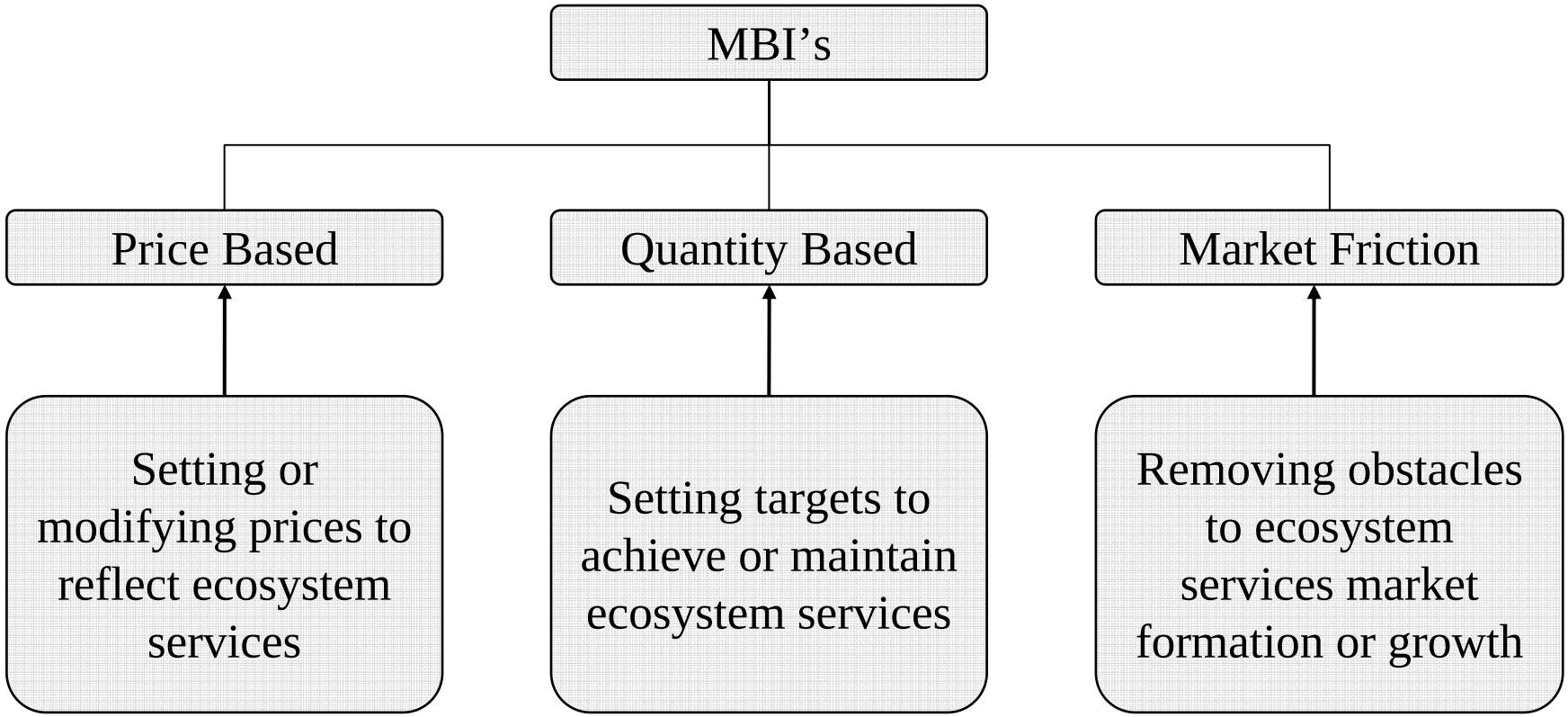
Selecting an MBI versus alternative approaches

- **Heterogeneity - need to be differences in outcomes, management options and preferences ➔**
  - Gains from trade
- **Number of participants (i.e. number needed to change for outcome).**
- **Goal/Outcome sort**

Types of market-based instruments



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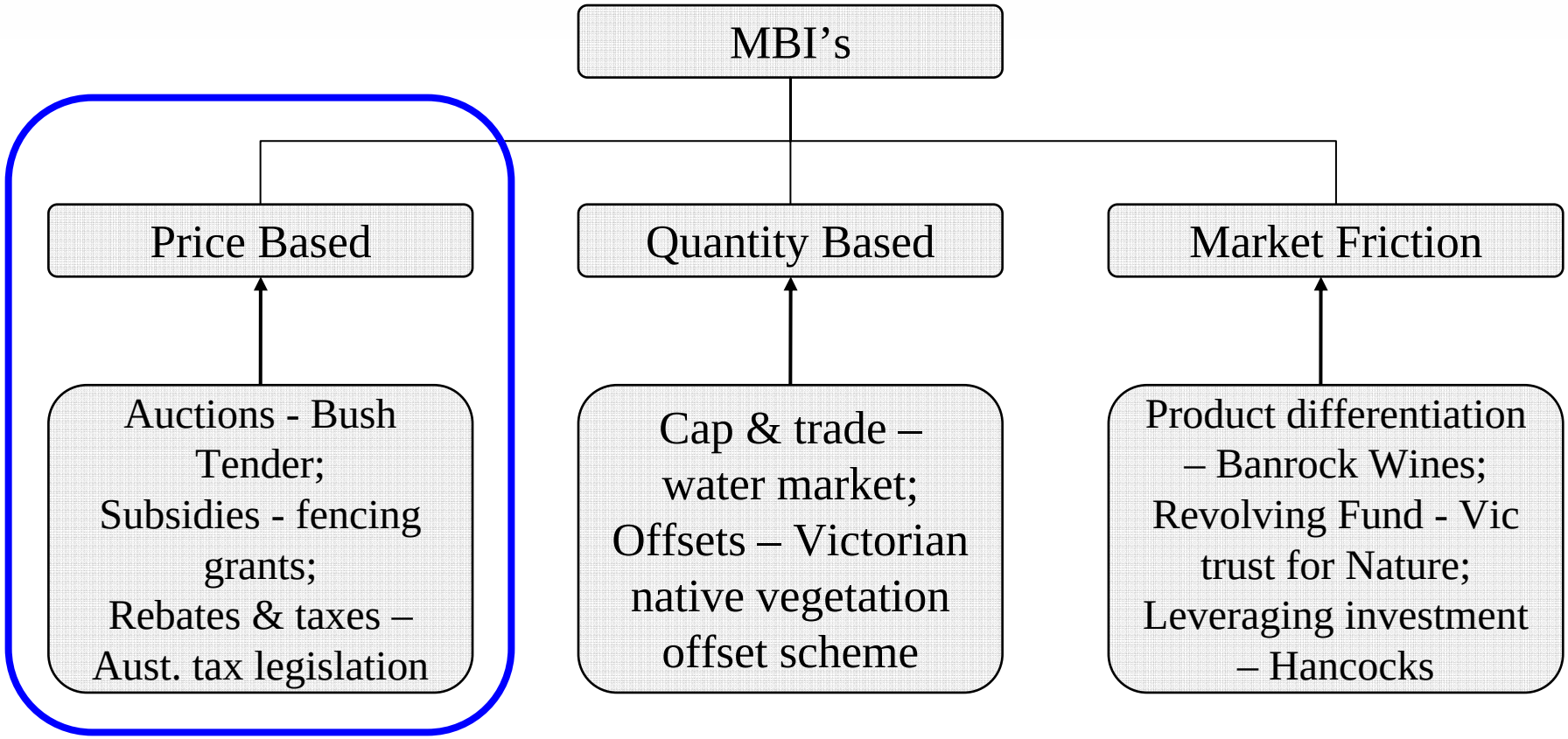

MBI Design – Theory and Practice

- **Consider elements of market failure as underpinning theory.**
  - Solution elements explicitly designed to address market failures.
  - E.G. Status of rights and information
    - What exactly are the characteristics of the asymmetric information?

Markets can still fail!

- **Markets can still fail!**
  - Information failure (e.g. tools and techniques)
  - Social resistance – efficacy, acceptance, changes to expectations
  - Minimum participant numbers
  - Scheme support
  - Duration of change
  - Assessing complex projects – e.g. interacting projects

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Consider Basic Structure of any Market

- **Producers willing to sell** **Who sells**
- **Users/buyers willing to buy** **Who pays**
  - Direct or indirect (e.g. Community represented by government)

- **Ways to facilitate exchange = rules, rights, brokers, auctions etc.**

What services, who's involved, how to measure, obstacles to participation, monitoring etc

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Case Study – Salinity Control in the Wimmera Steep Hills

- **The Issue – changes to the hydrological cycle from clearing leading to salinisation – one of Australia's greatest natural resource threats**

- **The ecosystem service is hydrological control provided primarily by vegetation (transpiration).**

Firstly - Why a MBI in the Wimmera???

- **Potential market drivers – links to heterogeneity**
  - Significant variation in ES potential across SHC
  - Range of management actions
  - Differences in cost structures (equipment and technique)
  - Differences in goals, financial and farming structures (e.g. labour)
  - Regional application and administration = easier to implement

Services and Actors

- **If service important – why no market? Market failures!**
  - Thus design context specific solutions that overcomes the characteristics of the market failure.
    - Wimmera – primarily an asymmetric information problem – but any other ignored failure will hamper scheme.
- **Ecosystem service of importance – driven by established NRM agenda**
  - One service or multiple = only when overlapping issues and actions exist! In this case – no….

Services and Actors (2)

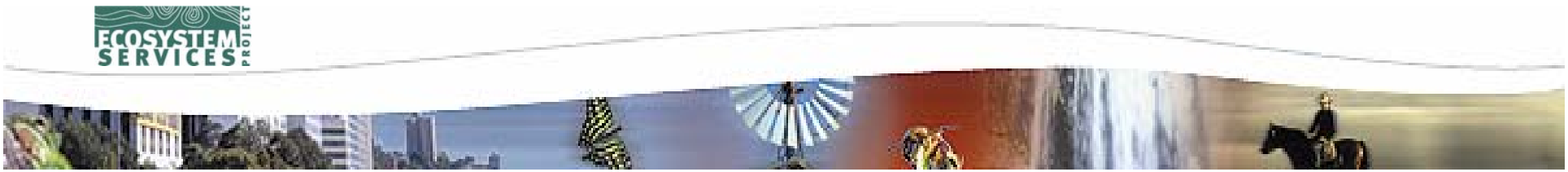
- **Spatial and Temporal Scale – sub-regional, thus aligns with regional decision making capacity.**
  - Administered within strong regional NRM structures with history of incentive delivery
  - Temporal Scale for service payments generally constrained by regional funding agendas

Measuring Ecosystem Service Benefits – Conditionality (Can we measure = metric?)

- **Metric designed to measure service provision into the future**
  - Measure actual outcome or proxy?
    - Time lag and practical constraints limit measuring outcome so proxy used (steady state salinity reduction resulting from management change).
  - Adhere to metric design principles and focus on specified target only (KISS!)

Measuring Ecosystem Service Benefits – Additionality

- **Current ownership and allocation of explicit salinity rights - what is the Duty of Care?**
  - Important for market establishment – but no salinity rights established in Australia (quasi rights relating to cover and clearing only).
- **Given no duty of care – what is the explicit baseline for service provision?**
  - Average Business as Usual in this case because limited further reductions likely (minimum cover and stocking standards)?
  - Leakage to other areas not a major concern due to extent of current landuse.
- **Metric based on management changes leading to marginal change/addition above average minimum baseline.**

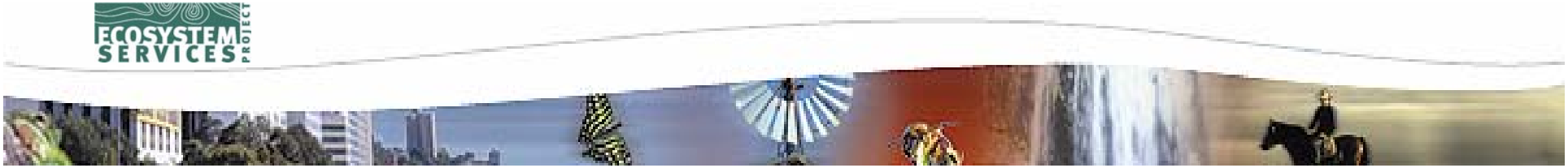


Metric design principles and solutions…

Quantity / quality	Change to salt discharge estimated from landuse change
Relative change	Measured change from BAU value Except for regeneration?
Location	Specified downstream point No path impacts, thresholds, synergies
Timing	Steady state model (all short / medium term) (Permanence dealt with elsewhere)
Risk / certainty	Probability of success of actions (BMP's only) Permanence of landuse change (metric or secondary agreement)
Irreversibility	None identified
Spillover impacts	Consider spillovers – not considered major

Measuring Ecosystem Service Benefits – Other Context Specific Issues

- **Efficacy of actions (communication)**
- **Costs of enhancing metric + time to proof (marketing manages expectations – easier to change).**
- **Transparency of metric**
- **Permanence = in metric via weighting or separate**



Who Pays

- **Driven by presence/absence of an excludable asset and existing rights.**
  - In this case - Government acting as buyer through regional NRM institution (CMA) largely overcomes lack of excludability.
  - Catalyses recognition of salinity rights.

Who Sells?

- **Potentially – all landholders of SHC**
- **Asymmetric Information Problem (primary market failure)**
  - opportunity costs are largely unknown and not studied by government (though heterogeneity exists).
  - Service provision targets and change required are not well known by potential sellers

Who Sells?

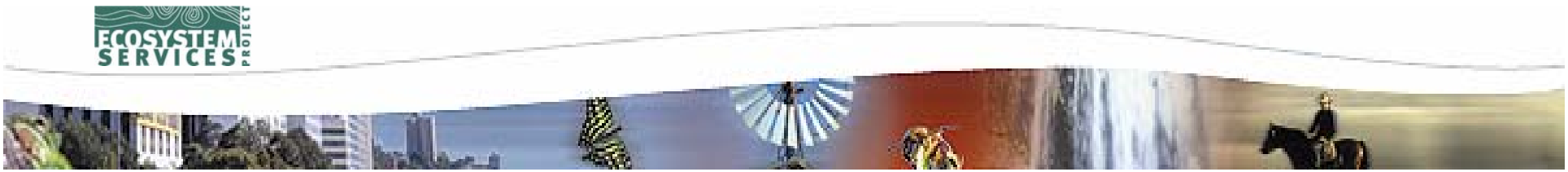
- **Use of auction mechanism designed to overcome this market failure = targets expressed by government – bids differentiate sellers**
  - Thus voluntary participation of landholders willing to "bid" and able to enter a service provision contract (differential contracts may be offered based on outcomes and method of service delivery – i.e management change offered).

Obstacles to Participation

- **Information Failures – sellers must know they could sell (info on recharge zones)**
- **IF – sellers must know how to provide services = check understanding of tools and techniques**

Obstacles to Participation

- **Capital constraints – in this case, large up front investment required = address via large up-front payment structure with smaller ongoing – but possibly some constraints on delivery of management changes.**
- **Costs of participation – time etc = bid payment.**



Monitoring & Sanctions

- **Principle Agent (market failure) – true service delivery only known ex-poste**
  - Partial mitigation through:
    - Bid design including detailed implementation plans.
    - Management change requirements (preferred suppliers)
  - Costs of invasive monitoring – leverage community spirit (photo points).
  - Sanctions are Generally Weak
    - Difficulty writing enforceable contracts
    - Costs of imposing
    - Blacklist??

Other Issues

- **Pursuit of side objectives = explicitly none in this scheme!**
  - Focus on accountability and outcomes - thus focussed schemes
    - Australia has a very strong preference for non-distortionary and outcome focussed incentives.
    - Pragmatic – metric is key, multiple objectives complicates matters
  - Impacts on disadvantaged groups – unlikely
  - Creation of a rural subsidy – voluntary entry therefore welfare impact at worst will be neutral.

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Other Issues

- **Interaction with other schemes**
  - In Wimmera this was a possibility due to previous incentive schemes – these are suspended to prevent gaming.
  - All MBI's/PES rely on a mix of information/incentive and regulation – must be complimentary and aligned.
- **Crowding Out (i.e. hindering good will changes)**
  - marketed as "new means of cost sharing and achieving change" not simply a PES!!!"
- **Evaluation**
  - Design in from the outset to ensure "value for money".

Conclusions

- **A MBI is not always the best approach – investigate this first!**
- **For any instrument to be effective it must explicitly address the individual market failures and local characteristics - e,g participant preferences/concerns.**
- **The development and implementation of an integrated MBI solution with multiple outcomes presents substantially increased difficulty.**
- **The path of evolution to a market appears somewhat vital to success.**
- **Metric Design is key and must focus on explicit targets.**

For more information....

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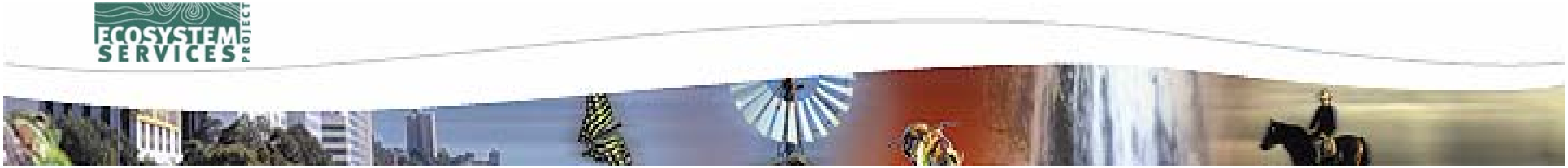
Metric design issues ...

Quantity / quality	Salt discharge estimated from landuse change
Relative change	Change from grazing / erosion DOC Except for regeneration?
Location	Specified downstream point No path impacts, thresholds, synergies
Timing	Steady state model (all short / medium term)
Risk / certainty	Consider probability of success of actions Consider permanence of landuse change
Irreversibility	None identified
Spillover impacts	Consider spillovers – not considered major

Steep Hill Country Ecosystem Services

- **Major ES is groundwater management**
  - Other issues soil stability, biodiversity and management of pest and feral animals and weeds
- **Potential market drivers – links to heterogeneity**
  - Significant variation in ES potential across SHC
  - Range of management actions
  - Differences in cost structures (equipment and technique)
  - Differences in goals, financial and farming structures (e.g. labour)



Why no market already? Market failures

Rights	**No clear definition or allocation**
Rights	**Desired ecosystem services are non-excludable**
Asymmetric information	**CMA don't know landholder net costs of changing management**
Asymmetric information	**Landholders don't know salinity benefits of changing management**
Information failure	**Landholders may not be familiar with tools and techniques to change management**
Information failure	**Scientific uncertainty about the relative and absolute impacts of landuse change**
Principle agent issues	**Success of landuse change only known later but costs incurred upfront. Difficult to monitor implementation of landuse change.**

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Market failures …

- **Rights – clear definition and allocation**
  - What is the baseline for measuring change – is there a DOC?
  - No DOC to recharge and salt movement
- **Rights – non-excludable ecosystem service**
  - Once recharge managed there is no way to prevent downstream beneficiaries from benefiting
- **Asymmetric Information – landholder costs**
  - CMA don't know true costs of changing management
  - CMA can't identify cheapest mix of landuse change to achieve target

Market failures …

- **Asymmetric Information – salinity benefits**
  - Landholders don't know salinity benefits of landuse change
  - Can't identify most effective mix of landuse change to offer
- **Information failure – tools and techniques**
  - Do all landholders know enough about recharge reducing techniques to estimate costs and effectively implement?
- **Information failure – scientific uncertainty**
  - Difficulty in estimating replicable and accurate salinity impacts of changes to landuse:
    - Absolute impact means difficulty knowing when target met
    - Relative impact means difficulty distinguishing between offers

Market failures …

- Difficult to compare relative benefits of different ES

- **Principle agent issues**
  - Significant time lag between landuse change and outcome
  - Difficulty in measuring or monitoring the quality of landuse change
  - Complicated by low returns in farming sector meaning up-front payments for landuse change with future benefits

Workshop 2 Conclusions

- **Rights – DOC not explicit for recharge and salinity**
  - But accept that only positive change should be rewarded
- **Differences between landholder costs expected**
- **Few issues with tools and techniques information**
  - Clear ability to plan actions that would feed into a competitive tender
- **Some scepticism on measuring salt impacts**
- **Acceptance that monitoring is needed but concern about intrusiveness**

Market failures – designing solutions

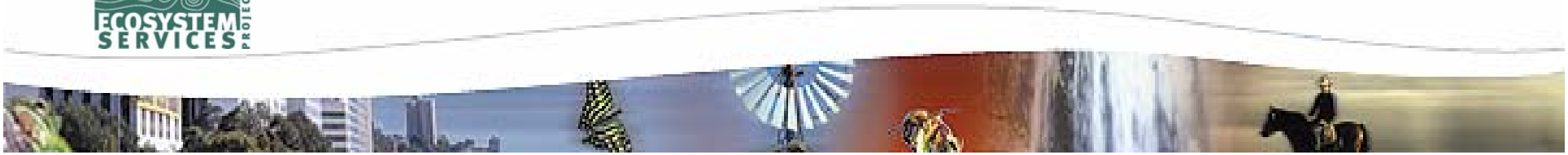
Rights – allocation	Baseline duty of care per erosion / grazing Use contracts to establish recharge / salinity rights
Rights – non-exclude	CMA acts on behalf of buyers using govt funds.
AI – landholder costs	Use a competitive tender process to reveal costs
AI – salt benefit	Provide sufficient information for good tenders Collect additional info if needed for benefit calcs
IF – tools and techniques	Tested via workshop = low risk Additional info via EOI and communications
IF – scientific uncertainty	Restrict tender options, avoid multiple issues, additional research where needed.
Principle agent issues	Supply contracts, communicating success, clear and effective monitoring

Designing solutions to market failures …

- **Rights – clear definition and allocation**
  - Baseline on DOC for soil erosion and stock management
  - Sign contracts defining rights for duration of agreement
    - Some guidance to contracts in report but seek specialist input
  - More on measuring change later …
- **Rights – non-excludable ecosystem service**
  - Solved via CMA purchasing using taxes on behalf of all consumers.

Designing solutions to market failures …

- **Asymmetric Information – landholder costs**
  - Use a competitive tender mechanism to reveal landholder costs
  - Design to avoid market power and collusion - more on design later
- **Asymmetric Information – salinity benefits**
  - Give enough information to make priority areas clear
  - Avoid costs of providing too much detail
- **Information failure – tools and techniques**
  - Risk is low but information provision could reduce further



Market failures …

- **Information failure – scientific uncertainty**
  - Confidence in overall models for salt impact = Difficulty in estimating some management changes – restrict or weight
  - Salinity dominant so restrict initial tender to salinity impact only
- **Principle agent issues**
  - Split payments to improve incentive for quality and future management
  - Consider direct supply or accreditation of key input suppliers
  - Consider monitoring improvements (intrusiveness trade-off)

Other mechanism design issues

Metric design	Estimate steady state salt discharge + consider risk and spillovers
Management action efficacy concerns	Communications strategy
Tender mechanism	Sealed bid, discriminatory price competitive tender
Acceptance of tender mechanism	Communications strategy
Interactions with existing programs	Remove overlaps where possible
Risk of over payment	Set a reserve price
Changes to expectations	Market as new way of achieving landuse change rather than “payments for ecosystem services”

Other mechanisms design issues

Minimum number of participants	Check number of landholders and likely participation rate.
Treatment of additional ecosystem services	Carbon credits may be important – pool or individual?
Tender quality	Principle agent / risk tradeoffs Require a detailed action / management plan
Permanent or temporary change	Suggest temporary in pilot (perhaps 10 year contracts)

Other mechanism design issues ...

- **Management efficacy acceptance**
  - Increases participation – include in communications strategy
- **Tender mechanism**
  - Sealed bid = no information advantage
  - Discriminatory = competition effect > gaming effect
- **Acceptance of tender mechanism**
  - Increases participation and cooperation – include in communications

Other mechanism design issues ...

- **Interactions with existing mechanisms**
  - Continuing creates gaming issues
  - Also may increase costs because multiple mechanisms for 1 outcome
- **Risk of overpayment**
  - Set a reserve price to avoid excessive overpayment
- **Changes to stakeholder expectations**
  - May mean cannot effectively return to past mechanisms
  - Market scheme as a new way of cost sharing or achieving change

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Other mechanism design issues ...

- **Minimum participant numbers**
  - Ensure sufficient catchment and forecast acceptance rate
- **Additional ecosystem services**
  - Carbon is only likely ES
  - Decide whether to include and pool or direct to buyer
- **Tender quality and past behaviour**
  - Better tenders = higher chance of success
  - Suggest management action plan as part of tender

Other mechanism design issues ...

- **Permanent versus temporary change**
  - Temporary likely to be more cost effective
  - Most temporary change will be permanent
  - Could use 10 year contracts for revegetation
- **Application concern**
  - Tender payment to cover costs of application
- **Multiple/group tenders**
  - As for regular tenders

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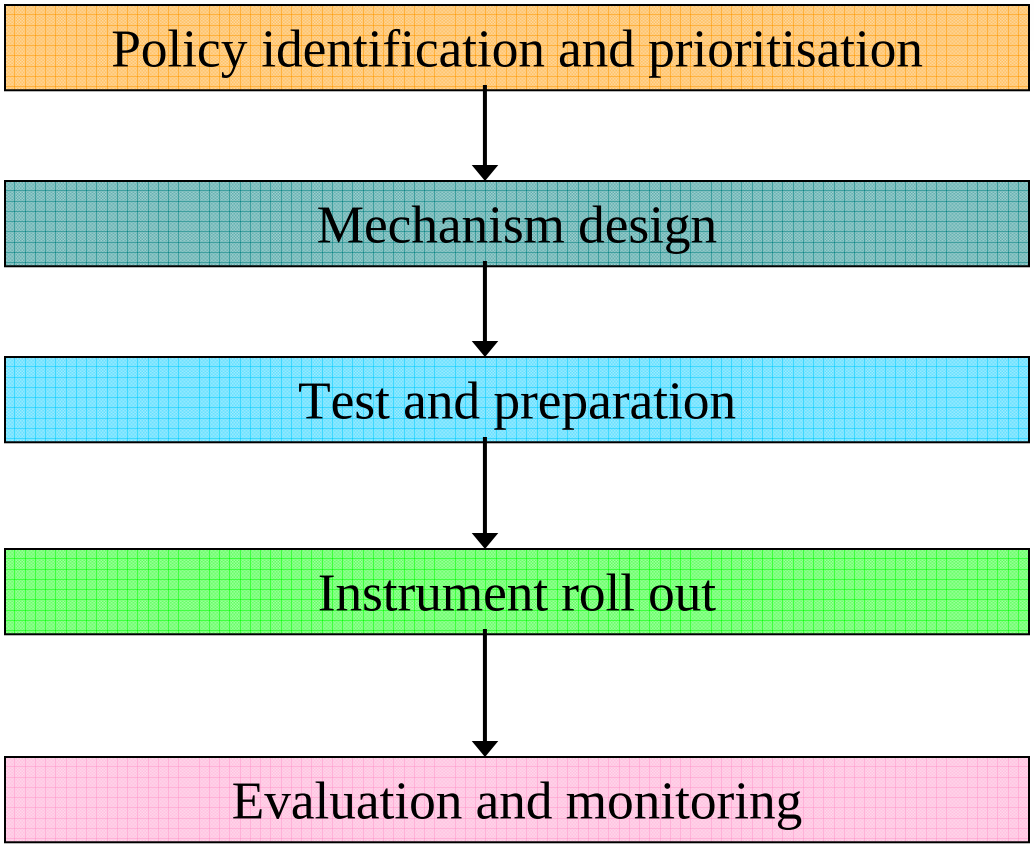
Implementation Plan



Implementation plan 1

Policy Identification and Prioritisation

Identify Opportunities and Select Leader – Report 1

Market Failure Analysis and Community Workshop

- **Completed with Research Report 1 and 1st workshop**

Implementation plan 2

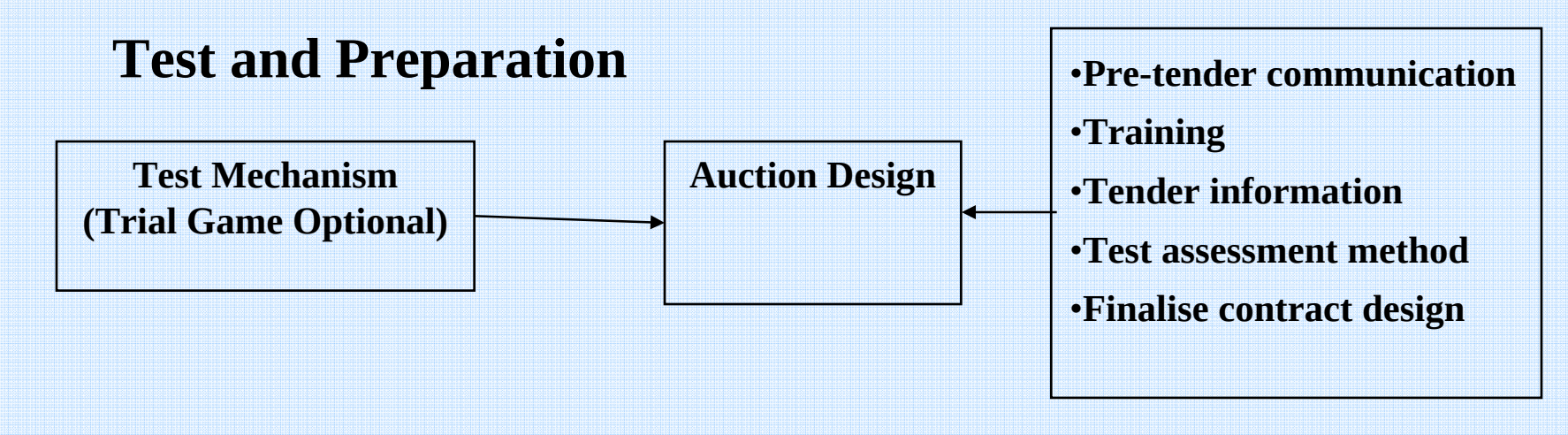
Mechanism Design

Resolve Outstanding Design Issues

- **Measurement Metric.**
- **Risk Balance.**
- **Auction Type.**
- **Auction Bid Design.**
- **Auction Rules 1**
- **Communication plan**
- **Start contract design**
- **Monitoring design**
- **Evaluation design**

- **Once decision to go ahead made this is the main planning phase**

Implementation plan 3



- **Prepare and test systems**
- **Train personnel – these are crucial to success**
- **Pretest mechanism**
  - We suggest this is part of the communication strategy

Implementation plan 4

Instrument Roll Out

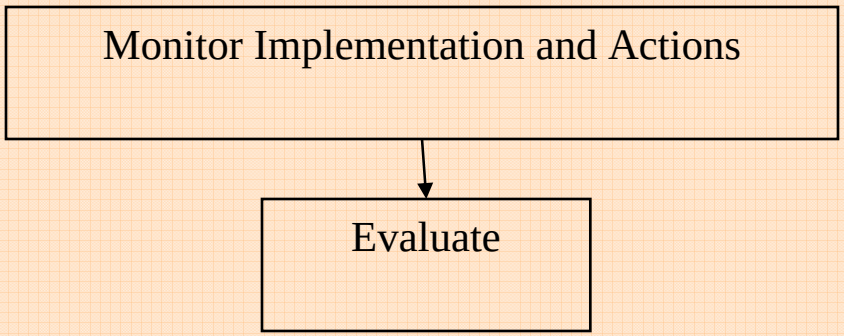
Implement Auction

- Call for expressions of interest
- Site Visits
- Open the tender period
- Assess tenders
- Notify successful offers
- Negotiate and sign contracts
- Start making payments
- Commence Monitoring

- **This is the main event after all the behind the scenes work**

Implementation plan 5

Evaluation & Monitoring



- **Ensure value for money outcomes are achieved**
- **Identify lessons for future policy development**

CSIRO roles in implementation

- **Specialist advice where needed**
- **Mechanism pre-test**
  - based on mechanism design and hypothetical farms
- **Evaluation and recommendations**
  - Future roll outs and other policy

Wetland Ecosystem Services

- **Major ES is biodiversity**
  - Other issues include? Feral animals, weeds …? Water quality?
  - Which aspects of biodiversity can be influenced locally?
- **Potential market drivers**
  - Variation in ES potential?
  - Range of management actions?
  - Differences in cost structures?
  - Differences in goals, financial and farming structures (e.g. labour)?

Wetlands market failures

Rights – allocation	**DOC for grazing management** **But likely to be poorly enforced and inadequate to achieve ES goals**
Rights - excludability	**Desired ecosystem services are largely non-excludable** **Some potential for beneficiary contributions (duck hunters)** **Potential for upstream impacts on water quality and quantity**
Asymmetric information	**CMA don't know landholder net costs of changing management** **Will they vary significantly?**
Asymmetric information	**Landholders don't know environmental benefits of improved management** **Will they vary significantly?**

Wetlands market failures

Information failure	**Landholders may not be familiar with tools and techniques to change management**
Information failure	**Scientific uncertainty about the relative and absolute impacts of management changes**
Principle agent issues	**Success of landuse change only known later but costs incurred upfront** **How difficult is it to monitor implementation of landuse change?**

Possible solutions wetlands market failures

Rights – allocation	Baseline duty of care per erosion / grazing Use contracts to establish improved management
Rights – non-exclude	CMA acts as broker and distributes govt funds (maybe free-riding here) Explore upstream impacts
AI – landholder costs	Use a competitive tender process to reveal costs
AI – environmental benefits	Provide sufficient information for good tenders Collect necessary information to calculate benefits
IF – tools and techniques	Test via workshop Additional info via EOI and communications
IF – scientific uncertainty	Investigate extent of IF – research and tactical design to overcome.
Principle agent issues	Clear and effective monitoring Incorporate measures to reduce

Other wetlands mechanisms design issues

Metric design	**Are existing metrics suitable for wetlands?**
Management action efficacy concerns	**?**
Tender mechanism	**Likely to be similar (sealed bid, discriminatory price tender) but need to check**
Acceptance of tender mechanism	**?**
Interactions with existing programs	**Remove overlaps where possible**
Risk of over payment	**Set a reserve price**
Changes to expectations	**Market as new way of achieving landuse change rather than "payments for ecosystem services"**

Other wetlands mechanisms design issues

Minimum number of participants	Likely to be small numbers?
Treatment of additional ecosystem services	Are there additional ES that need considering? E.g. indigenous values?
Tender quality	?
Permanent or temporary change	?
Multiple owners	Do wetlands cross property boundaries? What are the impacts?
Other issues	???

Metric design issues ...

Quantity / quality	Habitat hectares? What is missing?
Relative change	Change from grazing DOC? Or from existing outcomes?
Location	Path impacts, thresholds, synergies?
Timing	Steady state model or a dynamic model?
Risk / certainty	Consider probability of success of actions / outcomes
Irreversibility	Are there irreversibility issues?
Spillover impacts	Consider spillovers?

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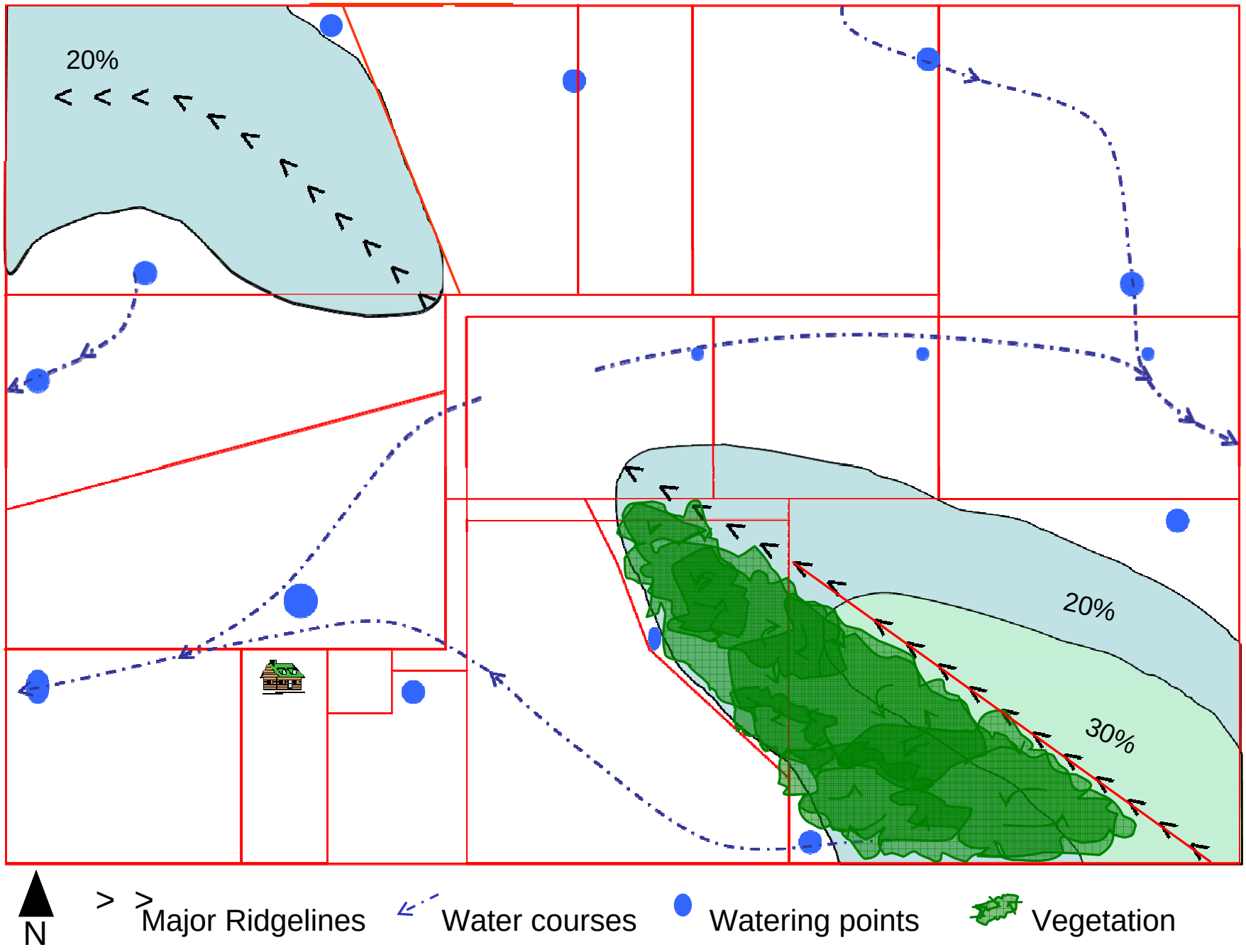
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Major Ridgelines
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