The Design of Effective Agri-Environmental Schemes

David Pannell
Back in 1999
$1.4 billion program announced by PM
I got angry

Economist puts salt on tail of big debate

SALT concerns must be addressed as a local problem, and not a catchment concern, if progress is to be made in overcoming dryland salinity.

University of WA resource economist David Pannell has warned of the damage caused by the common “whole valley” approach to solve salinity concerns.

While acknowledging his approach as “almost heretical”, he described the whole valley approach as a national mistake, saying most salinity concerns arose on site and could be addressed on site.

He said many WA Wheatbelt valleys had very low transmission of water by soils and low slopes, meaning water readily

Given the localized nature of salinity concerns, Mr Pannell said it was going to be difficult for the community to justify permanent spending to solve individual on-farm problems.

He said the implications of community salt levy were extreme when there was a transfer of benefits off-farm off-site.

He also attacked the level of spending on research for solutions, claiming it was a “grace” there was no government investment in salt tolerant industries in WA.

“There are going to be millions of hectares affected and nothing has been prepared to go on the (salt-affected land) or even begin to move,” he said.

Salt plan fails to bring new ideas

Given that the new WA Government has spent millions largely to date, Pannell said-generated on-farm problems.

Instead, he argued that salinity can generally be treated as an on-site problem.

Professor Pannell told a Rural Mental Health Conference that Professor Pannell said in some situations it could take up to 3000 years for water to cross aquifers, while water generally only moved horizontally across the water table a few metres a year.

He gave an example in Western Australia where groups of trees planted to alleviate salinity only had an effect on the water table up to 30 or 40 metres from the trees.

He said profitably perennial crops needed to be developed so farmers could minimize salt problems and still make money.

“The core emergency thing to do is treat them (patches of salinity) on the real salinity story

Western Australia is stung with salinity. For 30 years, people in WA have talked and warned about salinity. For the past few years, it has been a huge issue. In bringing together science, politics and business, there is a chance for salinity to play a significant role in the future of the state.”

The real salinity story

Big decisions called for on salinity front

For millions of hectares across Western Australia, the real salinity story is now

In recent years, there have been a series of high-profile salinity events, including a devastating blow to the state’s wheatbelt in 2001, which led to a $50 million federal funding package to help farmers cope with the problem.

Common sense must be a priority in tackling salinity problems, says David Pannell and Ted Jackson.

Millions of dollars are being spent on research and development, but the issue has not been fully resolved. However, the state government has indicated it will continue to invest in salinity management strategies.

The issues

For farmers impacted by salinity, finding practical, cost-effective solutions is the key to managing the problem. A variety of options are available, including land management practices, irrigation systems, and chemical treatments. But it’s essential to consider the long-term implications of any action taken.

The state government has also introduced a series of initiatives to support farmers in managing salinity, including grants and technical assistance. These programs aim to help farmers find sustainable solutions that balance environmental and economic considerations.

In summary, managing salinity in Western Australia requires a multi-faceted approach, involving the cooperation of farmers, researchers, and government agencies. By working together, we can ensure that the state’s agricultural industry remains sustainable and resilient in the face of this challenging environmental issue.
Eventually took a constructive approach

- Collaborated with agricultural and environmental organisations to help them design and deliver AESs
- Developed tools to help
- Delivered training workshops
- Researched the challenges and how to address them
Success seems elusive

- Australian National Audit Office (2008)
  - Lack of evidence of significant progress towards preventing, stabilising and reversing trends.
  - Where there was evidence, progress was frequently less than one per cent of the longer-term target.
Success seems elusive

- ECA (2017) report on Greening in CAP
- “the budget allocation for greening is not justified by the policy’s environmental content.”
- “The green payment remains, essentially, an income support scheme.”
Elements of best-practice

- Design of programs/institutions
- Design of projects/investments
- Ranking projects/investments
- Managing uncertainty
- Managing people’s biases, preconceptions, self interest
- (Managing transaction costs)
Design of programs/institutions
The critical factor

- Determined commitment to environmental outcomes
- Deal with other objectives separately (income support, rural social capital, …)
Design of programs/institutions

- Most AESs lack a real determination to achieve environmental outcomes
- European Court of Auditors (2011)
  - In 39% of contracts examined:
    - no evidence of water pollution
    - no evidence of marginalisation or abandonment
    - no evidence of threats to exceptional plant diversity
    - no evidence of soil degradation
    - no threats to animal populations or animal biodiversity
    - no threats to plant communities
    - no evidence of landscape degradation
Commitment to outcomes means ...

- Realistic time frames for planning
  - Australia: a brief burst of planning every 5 years, when new program announced
  - EU: “planning … takes place before adequate, relevant data are available as regards spending and results from previous periods.” (ECA, 2018)

- Realistic time frames for projects
  - Often takes 10-50 years to deliver the benefits (e.g. groundwater)
  - Need long-term contracts and continuity of funding
Commitment to outcomes means …

- Taking farmers seriously
- Understanding and respecting the drivers of farmers’ decisions
- Considering this early in the design of programs
Adoption, participation, compliance

- Often lower and slower than people assume
- If changes are unattractive
  - Increase required payments
  - Increase cost of monitoring and enforcement
  - Reduce likelihood of delivering benefits
ADOPT (Adoption & Diffusion Outcome Prediction Tool)

- Free online tool
- Makes quantitative predictions about peak level of adoption and speed of adoption of a new agricultural practice
- Based on 22 questions about the practice and the population of farmers
Design of projects/investments
Think through the chain

Project mechanisms → On-farm changes → Reduced emissions → Environmental changes → Benefits

- Take project logic seriously
- Quantitative, not just story telling
- Requires knowledge of
  - Technical relationships
  - Behaviour change
  - Environmental values
  - Risks
  - Costs
Selection of delivery mechanisms

- Mechanisms need to make sense for the particular context
- e.g. Natural Heritage Trust (Australia)
  - Relied on extension to promote conservation practices (zero payments)
  - For almost all farmers, the practices had private costs > benefits
  - Adoption was small and temporary
Public: Private Benefits Framework

- “Private net benefits” relate to the landholder making the decisions
- “Public net benefits” relate to all others (externalities)
  - neighbours, downstream water users, city dwellers interested in nature
Possible projects

Each dot is a set of changes on specific pieces of land = a project.
Simple public-private framework

- Positive incentives or technology change
- Extension
- No action (or extension or negative incentives)
- Negative incentives
- No action (or flexible negative incentives)
Consider other mechanism options

- Regulation
- R&D to develop technologies/practices that work and are attractive to farmers (e.g. profitable) – drive their own adoption
- Technical support
- Government investment in engineering works to mitigate impacts
  - Flooding
  - Salinity
Additionality

- Don’t pay farmers to do things that they would have done anyway.
  - Example: Claassen et al. (2014) for US
    - Conservation tillage 50% additional
    - Nutrient management 30% additional
  - Perfect additionality requires perfect price discrimination (e.g. reverse auction).
  - If there is a standard price for an action, some non-additionality is unavoidable.
Additionality example

Private net benefit from adopting practice (€/ha)

Additional farmers who would adopt with payment of 25 €/ha

Farmers who would adopt without any payment
Prioritising, ranking, targeting projects/investments
Prioritising, why?

- 7000 environmental projects in Australia
- Huge range of benefits and costs

Source: Fuller et al. (2010). *Nature*
Prioritising, why?

- 7000 environmental projects in Australia
- Huge range of benefits and costs
- Average BCR for best 5% = 330 times better than for median project

Good targeting can deliver much greater benefits overall. Many projects not worth funding.

Source: Fuller et al. (2010). *Nature*
Prioritising, why?

- To demonstrate a business-like approach
- Convince financial decision makers
Prioritising, what?

- Projects! Investments!
- To prioritise, you need to consider costs, project risks, effectiveness, behaviour change, ...
- Can only do that for a particular investment (certain interventions in certain places)
- You can’t validly prioritise locations or issues without defining projects
- Multiple projects possible for each location or issue
Prioritising, how?

- Get the maths right
- Get the economics right
- Include all relevant info
  - Values
  - Threats
  - Feasibility/effectiveness
  - Adoption
  - Risks
  - Time lags
  - Costs

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\text{BCR} = \frac{[V(P_1) - V(P_0)] \times A \times (1 - R)/(1 + r)^L}{C + M}
\]
Prioritising, how?

- **Common errors**
  - Omit costs
  - Subtract costs (instead of dividing) (US CRP)
  - Add variables that should be multiplied (MCA)
  - Assume behaviour change will occur
  - Ignore feasibility/effectiveness
  - Ignore the with-versus-without principle (Maron et al. 2013)
Managing uncertainty
Uncertainty in AESs is always high

- Agricultural production systems and economics
- Environmental threats
- Agri-env management practices
- Effectiveness, reliability
- Costs
- Behaviour change/adoption of new practices
- Community preferences/values
Most common response to U in AESs

- Completely ignore it
Other possible responses

- Document knowledge gaps
- Score uncertainty for the options
- Seek robust strategies (sensitivity analysis)
- Invest in research instead
- Feasibility study
- Do a pilot project, designed for learning
- Active adaptive management (monitoring)
- Seek to detect and stop failing investments
Managing people’s biases, preconceptions, self interest
Managing people’s biases etc.

- When devising projects or programs, people often exaggerate benefits or under-estimate costs or time required.

- Various reasons
  - Vested interest
  - Wishful thinking, ignore difficulties or risks
  - “The planning fallacy”, Daniel Kahneman

- To address it, need
  - A consistent framework to assess options
  - Independent review of the assumptions
Managing people’s biases etc.

- People think their existing prioritisation process is pretty good
- Most are terrible
- Changing this requires
  - Training
  - Leadership
  - Incentives (consequences for not fixing it)
Managing people’s biases etc.

- People argue against prioritisation, targeting, ranking for various reasons
  - They argue for broad participation, irrespective of environmental benefits
  - They have pet projects that they suspect will not pass rigorous scrutiny
  - Accept prioritisation but prefer a subjective/fuzzy/emotional approach

- Bad reasons

- Need commitment to environmental outcomes
Key strategies for success
Key strategies

- Skill up – many facets to get right
- Don’t confound objectives
- Long-term program continuity
- Long-term projects
- Understand farmers – be realistic
- Locally relevant solutions
- Technical support, trust
- Think through project logic
- Don’t limit thinking to behaviour change
Key strategies

- Set out to learn and adapt
- Be prepared to abandon failing projects
- Targeting is crucial – don’t fund everyone
- Target each issue separately
- Target at a fine scale
  - Based on information and analysis
- Pay for outcomes, where feasible

Determined commitment to environmental outcomes
Lessons from past schemes
Selecting policy mechanisms
Measuring environmental values
Ranking projects
Metrics for ranking
Additionality
Understanding adoption
Predicting adoption
Uncertainty
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