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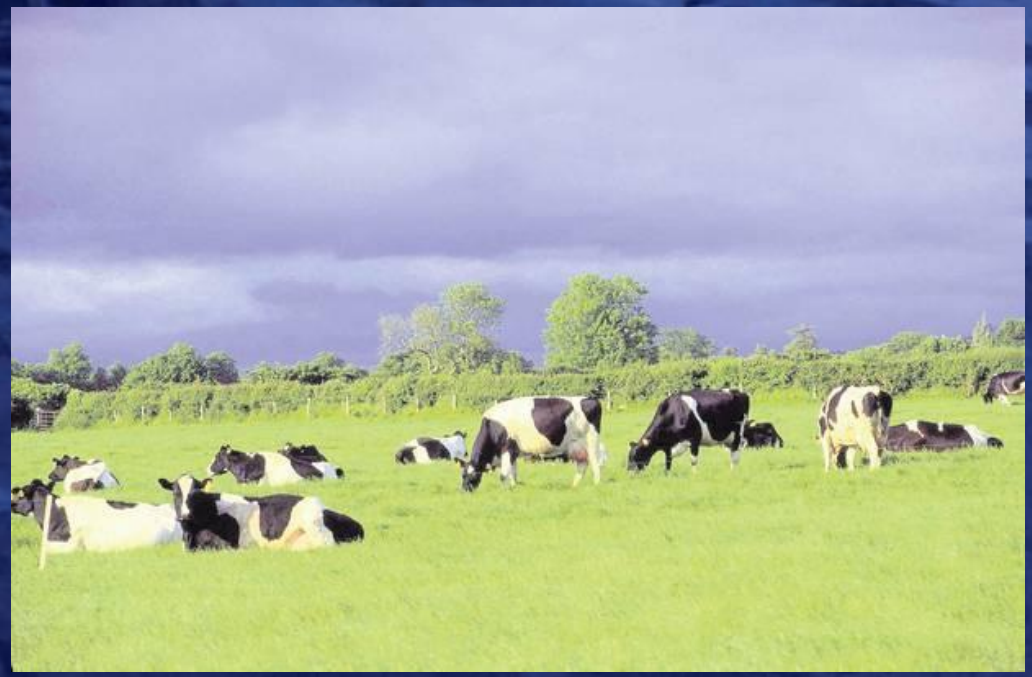
The Design of Effective Agri-Environmental Schemes

(lessons for economists)

David Pannell



Agri-environmental issues in W. Australia

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Threatened species

Water quality

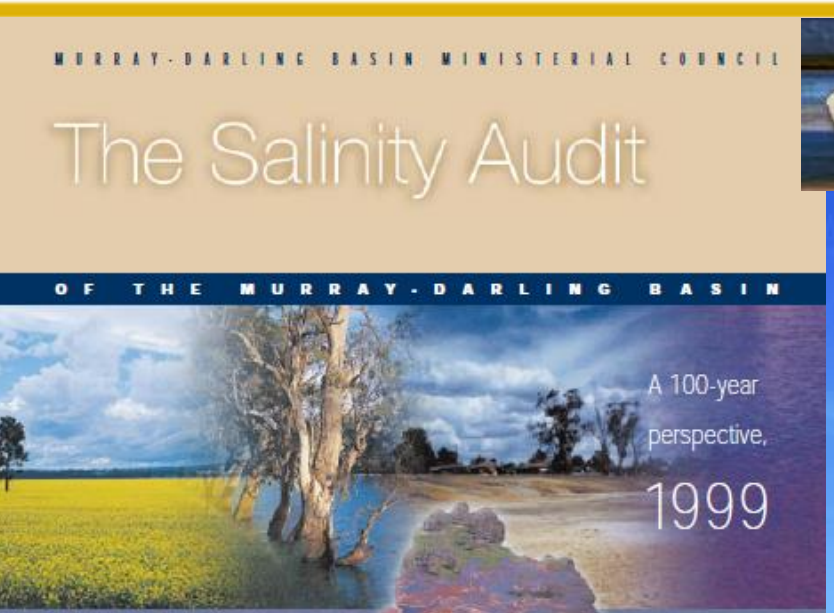
Soil salinity

Acidic soils

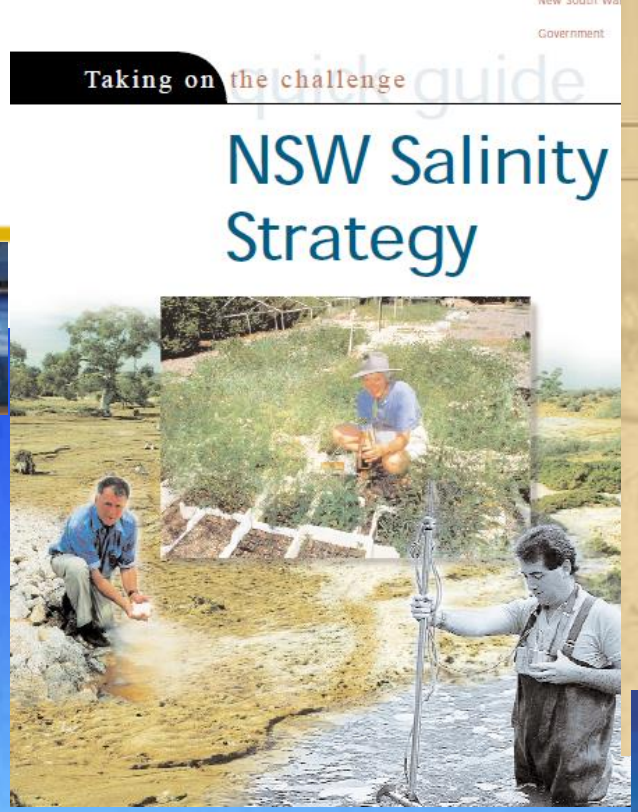
Climate/CO_2

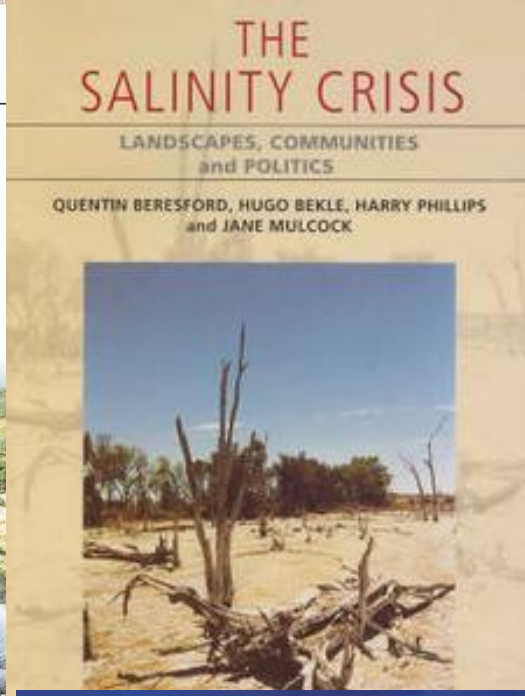
Native vegetation on farms

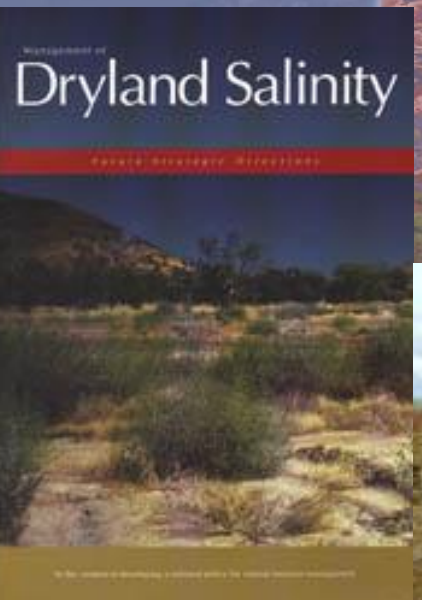
Back in 1999


MURRAY-DARLING BASIN MINISTERIAL COUNCIL
The Salinity Audit
OF THE MURRAY-DARLING BASIN
A 100-year perspective,
1999

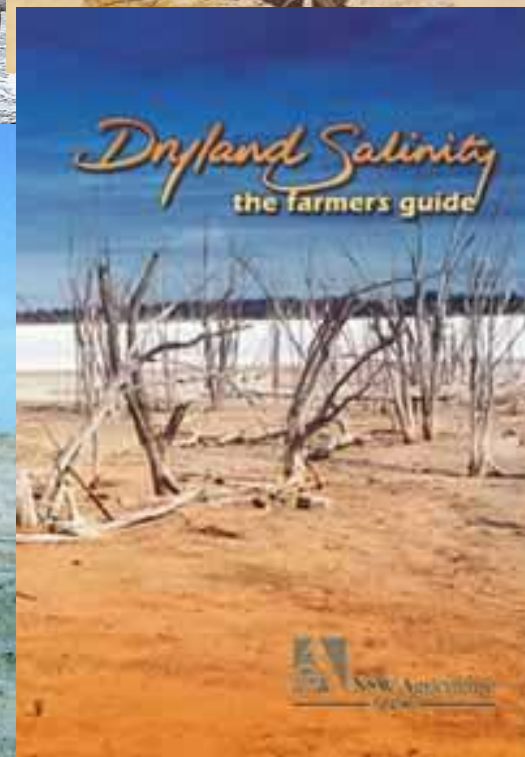

SALINITY
Australia's Silent Flood


Government
Taking on the challenge
quick guide
NSW Salinity Strategy


THE SALINITY CRISIS
LANDSCAPES, COMMUNITIES and POLITICS
QUENTIN BERESFORD, HUGO BEKLE, HARRY PHILLIPS and JANE MULCOCK


Dryland Salinity


Salinity has been called the biggest environmental threat to Australia in the 21st century.


Dryland Salinity
the farmers guide

$1.4 billion program announced by PM

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I got angry

Millions wasted fighting salinity, says researcher

By Science Writer
MARK STEENE

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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 profitable perennial crops needed to be developed so farmers could minimise salt problems and still make money.

"The core emergency thing to do is treat them (patches of salinity) on

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 usually

Given the localised nature of salinity concerns, Mr Pannell said it was going to be diffi for the community to justify ernment spending to solve i vidual on-farm problems.

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

He also attacked the leve spending on research for solutions, claiming it was "a grace" there was no governm investment in salt tolerant ind tries in WA.

"There are going to be milli of hectares affected and noth has been prepared to go on th (salt-affected land) or even begin to gone" he said

Salt plan fails to bring new ideas

Given that the new WA Gov-

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

Professor Pannell told a Rural Me-

Salinity policy: a tale of fallacies, misconceptions and hidden assumptions

by David Pannell
Associate Professor, Agricultural and Resource Economics, University of Western Australia

Past national salinity policies have been seriously flawed. The new 'National Action Plan' has positive elements but has not sufficiently escaped from the past. We need to get beyond the idea that, with small inputs of public money

the real salinity story

Western Australia is stuck with salinity.

For 30 years, people in WA have talked and worried about salinity. For the past few years, it has been a huge issue. In bringing together

chance for soils to absorb particularly heavy rainfall. Eventually, extra rain is like pouring water onto a plastic sheet, and the increased runoff increases the flood risk. In the Swan River event, floodwaters in the wheatbelt carried nutrients into the Swan, resulting in the algal bloom.

"Inland rivers are perhaps the most intractable problem

TRALIAN THURSDAY MARCH 23 2000

THE ISSUES

Big decisions called for on salinity fight

□ **Common sense must be a priority in tackling salt worries, says David Pannell and Ted Lefroy.**

MILLIONS of dollars are being spent managing salinity and the need for more money has raised the possibility of a salt levy.

For nature reserves in farming areas, drains and pumping may be the only effective remedy.

This would benefit the whole community.

As the problems gen-

New direction urged for salinity

Wasted: Horse rider Dale Cronin takes a look at a vast area of saline land in the Dumbleyung area, where his father, Terry, is a farmer. Many paddocks have been badly hit by salt problems. PICTURE: TONY ASHBY

Anger was justified

- 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.

Anger → motivation → got deeply involved

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- Collaborated with agricultural and environmental organisations to help them design and deliver AESs
- Developed tools to help
- Delivered training workshops to hundreds of agency staff
- Researched the challenges and how to address them
- Learned a lot

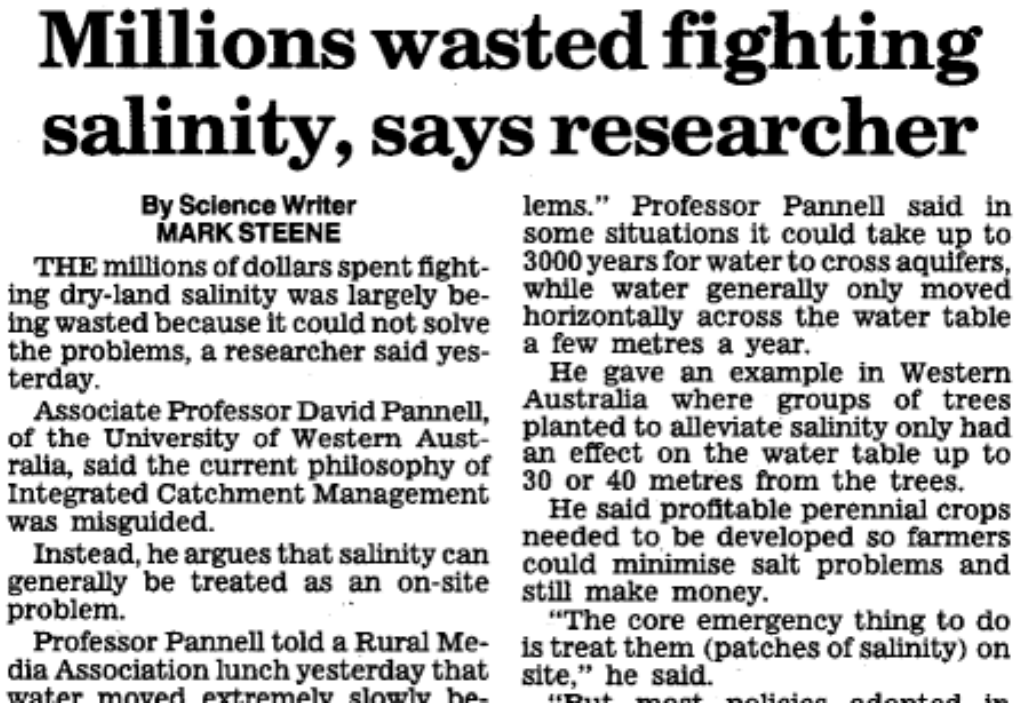
Lessons

- Agencies that design and deliver agri-environmental programs often lack basic economics
- They need economics to do their job well

- But … our usual approach as economists is probably not sufficient

Lessons

- It's not enough to provide criticisms, or even constructive advice
- Such advice is often ignored
  - Political constraints
  - It's too late
  - Lack of trust/confidence
  - Offence taken
  - Doesn't fit preconceptions
  - Don't understand it
  - Don't know what to do about it



Millions wasted fighting salinity, says researcher

By Science Writer
MARK STEENE

THE millions of dollars spent fighting dry-land salinity was largely being wasted because it could not solve the problems, a researcher said yesterday.

Associate Professor David Pannell, of the University of Western Australia, said the current philosophy of Integrated Catchment Management was misguided.

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

Professor Pannell told a Rural Media Association lunch yesterday that water moved extremely slowly be-

lems." 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 profitable perennial crops needed to be developed so farmers could minimise salt problems and still make money.

"The core emergency thing to do is treat them (patches of salinity) on site," he said.

- Training, support, tools can help

Lessons

- Our economic analyses take a particular (narrow) focus
- We tend to skate over some issues that are critical to success or failure of the policy

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Design of projects/investments

Think through the chain

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

- Many projects lack logical coherence
- Integrate knowledge of
  - Technical relationships
  - Behaviour change
  - Environmental values
  - Project risks
  - Costs
- Quantitative, not just story telling
- Pay attention to project design

The chain is long

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

- May be fragile – any link could break it
- Assessment of projects should account for risk of project failure

Selection of policy mechanisms

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- Mechanisms need to make sense for the particular context
- e.g. Salinity program
  - Relied on extension to promote conservation practices (zero payments)
  - For almost all farmers, the practices had private costs > private benefits
  - Adoption was minimal and temporary

Public: Private Benefits Framework

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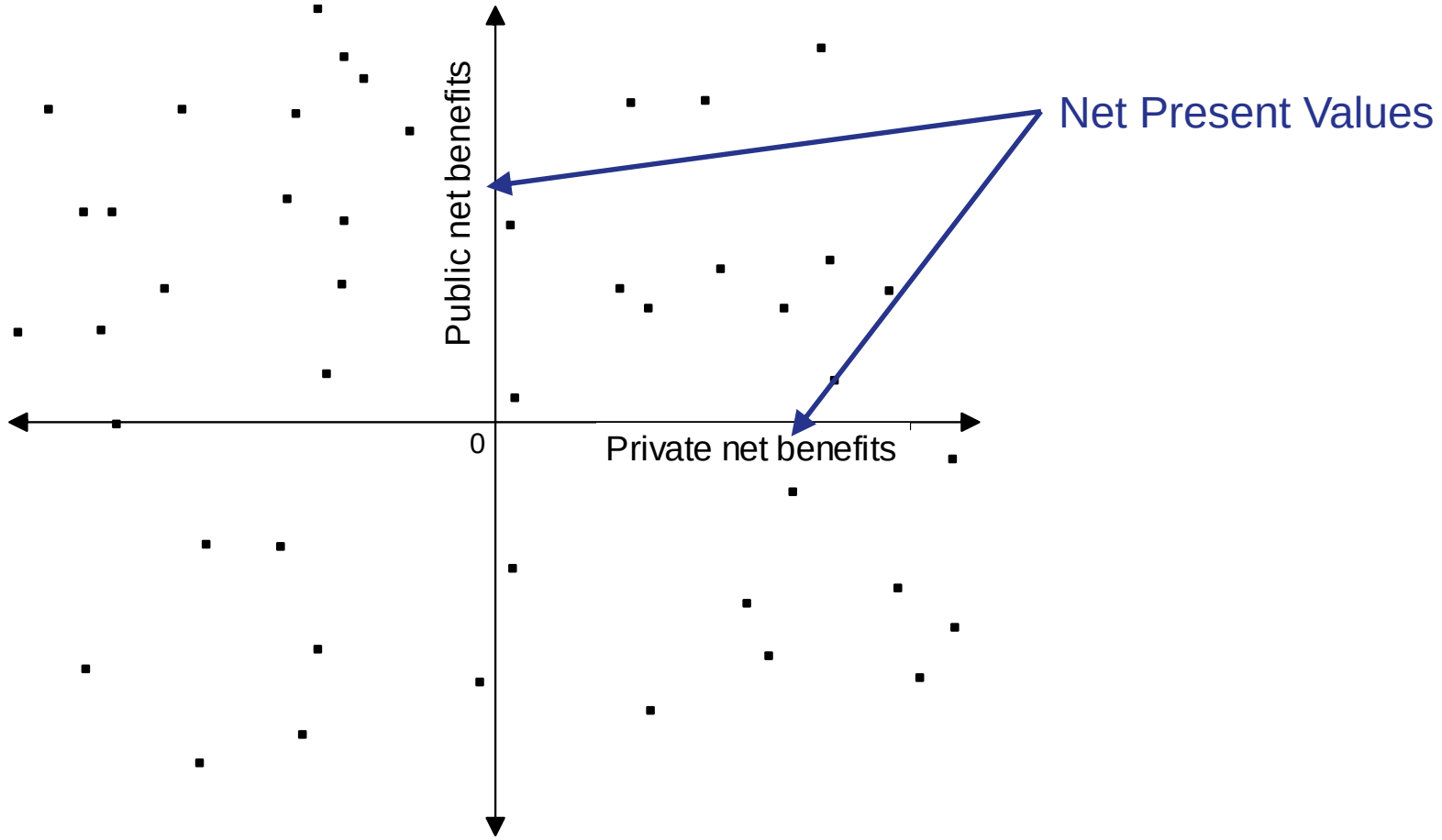
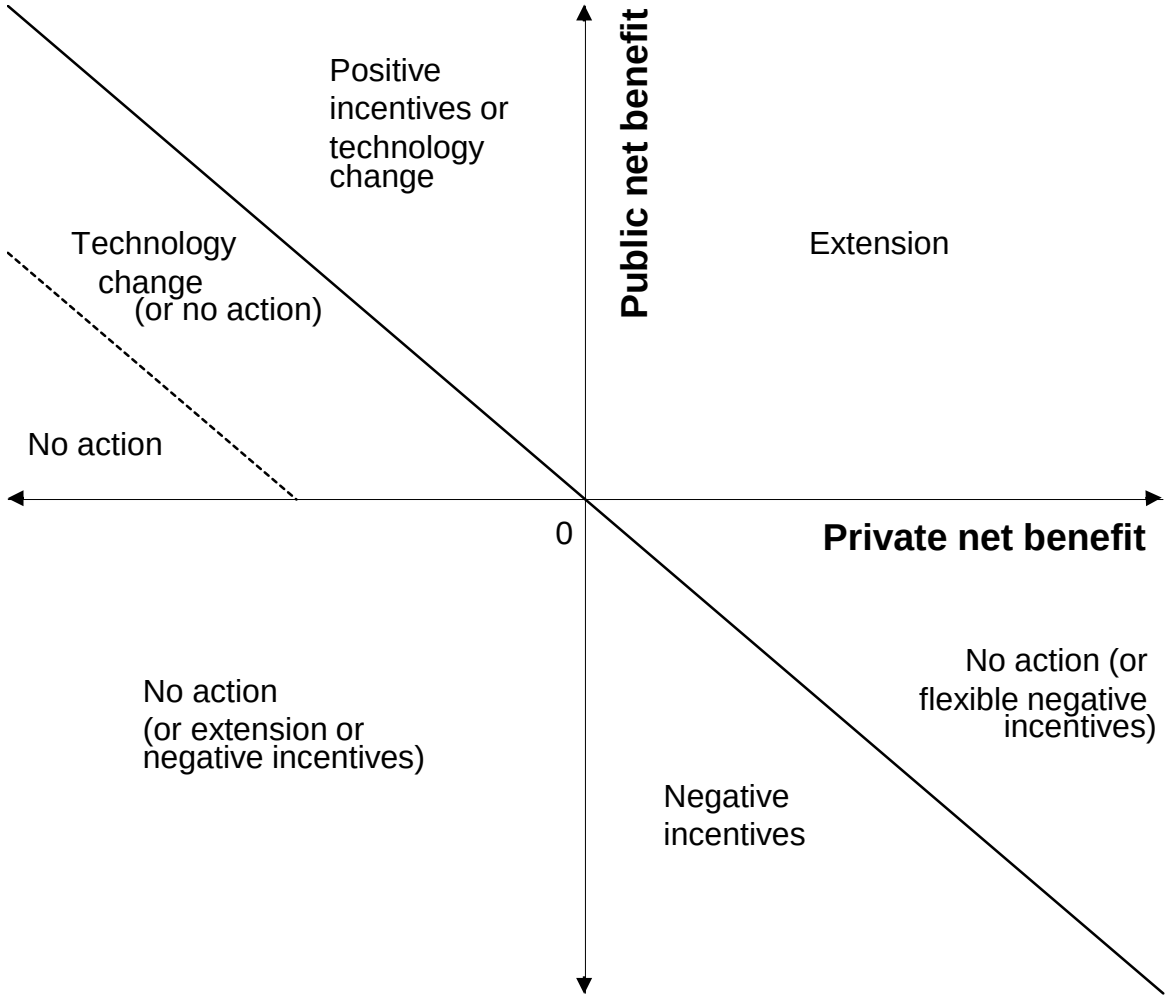
- Another tool
- “Private net benefits” relate to the landholder making the decisions
- “Public net benefits” relate to all others (externalities)
  - neighbours, downstream water users, city dwellers interested in nature

Possible projects

Each dot is a set of changes on specific pieces of land = a project.

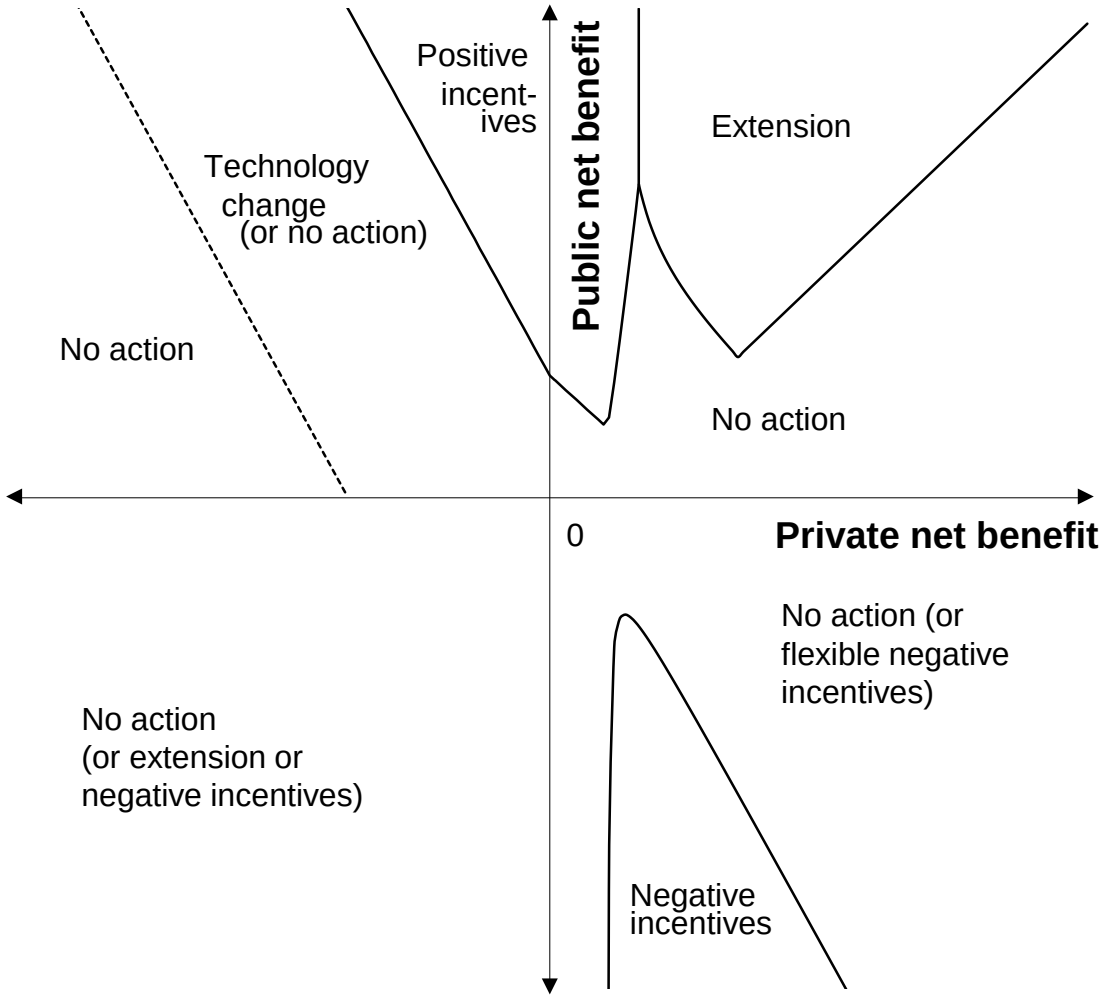


Simple public-private framework



- That was based on simple rules
- The following version accounts for additional complexities
  - Costs of learning/transition
  - Lags to adoption
  - Partial effectiveness of extension
  - Transaction costs
  - More targeted (BCR >2)

Complex version



- Don't select a mechanism type before you understand the issue

Consider other mechanism options

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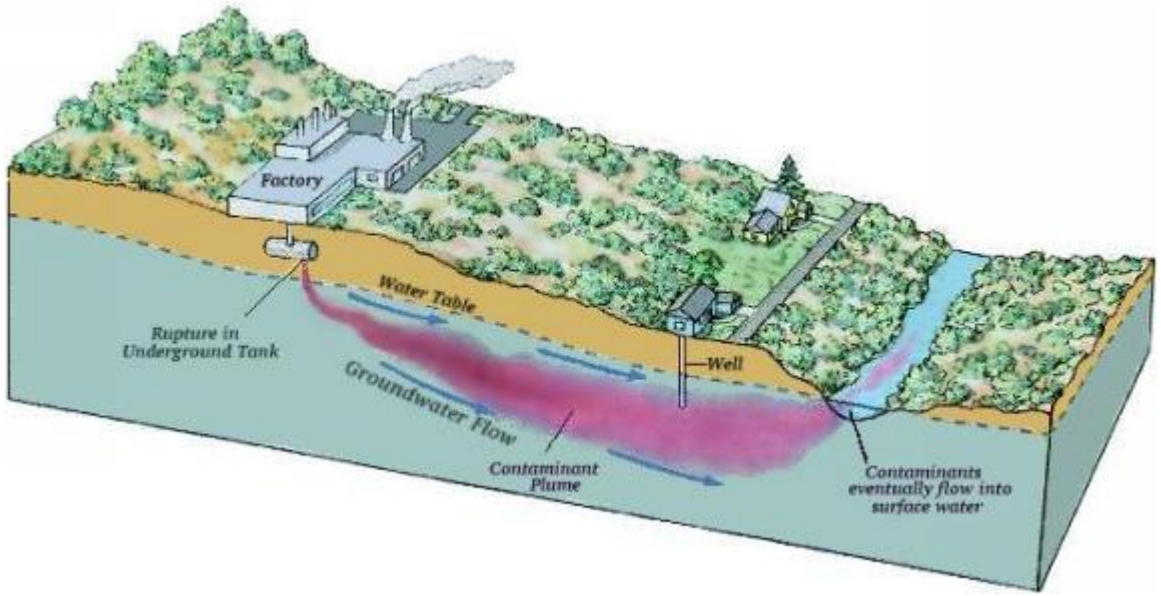
- Don’t assume that the best approach is to directly pursue behaviour change
- R&D to develop technologies/practices that benefit the environment and are attractive to farmers (e.g. profitable)
- Government investment in engineering works to mitigate impacts
  - Flooding, salinity

Time frames

Time frames for project

- Often takes 10-50 years to deliver the benefits (e.g. groundwater)
- Need long-term contracts and continuity of funding to have confidence in results
- In many programs, funding is short term (e.g. 3 years)
- When assessing investments, factor in risk of non-continuity of funding



Time frames for planning

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- Realistic time frames for planning are reasonably long
  - Australia: a brief burst of planning every 5 years, when new program announced

- Think ahead – start research/analysis early
- Opportunity for influence

Farmer behaviour

Adoption, participation, compliance

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- Sometimes taken for granted
- Often lower and slower than people assume
- If changes are unattractive
  - Need high payments
  - High cost of monitoring and enforcement
  - Reduce likelihood of delivering benefits

There's more to behavior than in our models

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- Financial consequences, risk consequences
- Complexity vs ease and convenience, labour, off-farm work, farming systems issues, age, skill requirements, links to extension, observability of results

ADOPT (Adoption & Diffusion Outcome Prediction Tool)

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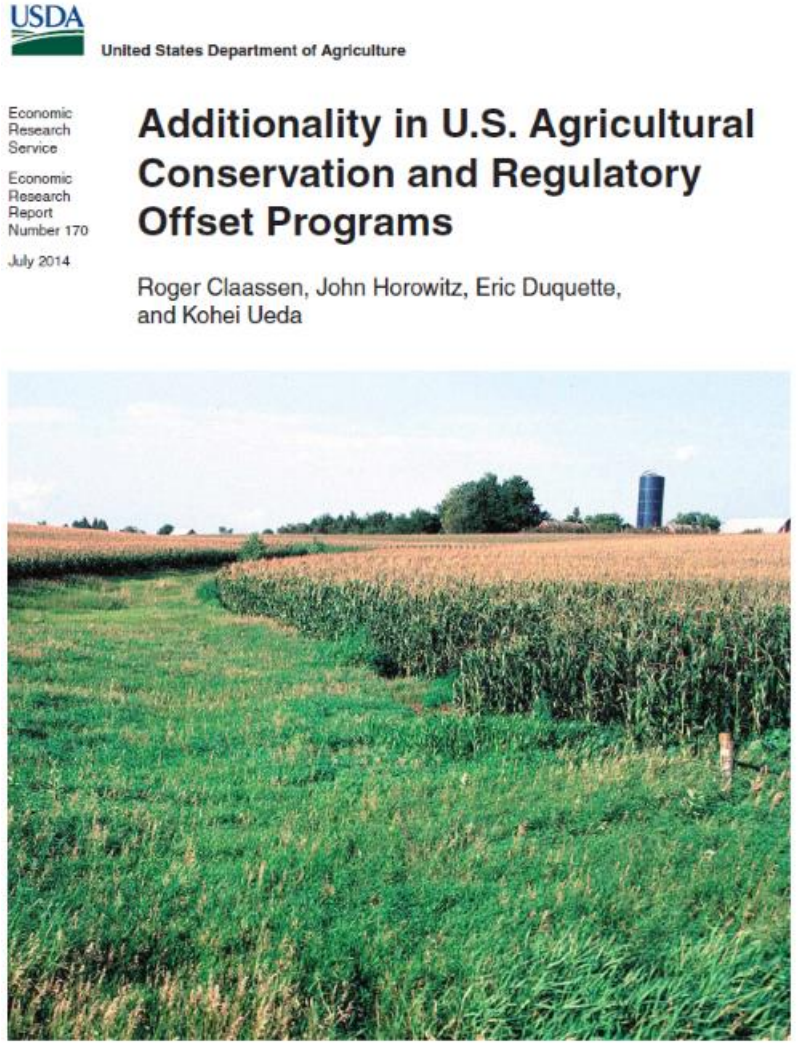
- Free online tool
- Makes quantitative predictions about peak level of adoption and speed of adoption of a new agricultural practice
- Based on 22 questions about the practice, the population of farmers, the farming context, etc.

ADOPT
PREDICT. INFORM. ENGAGE.

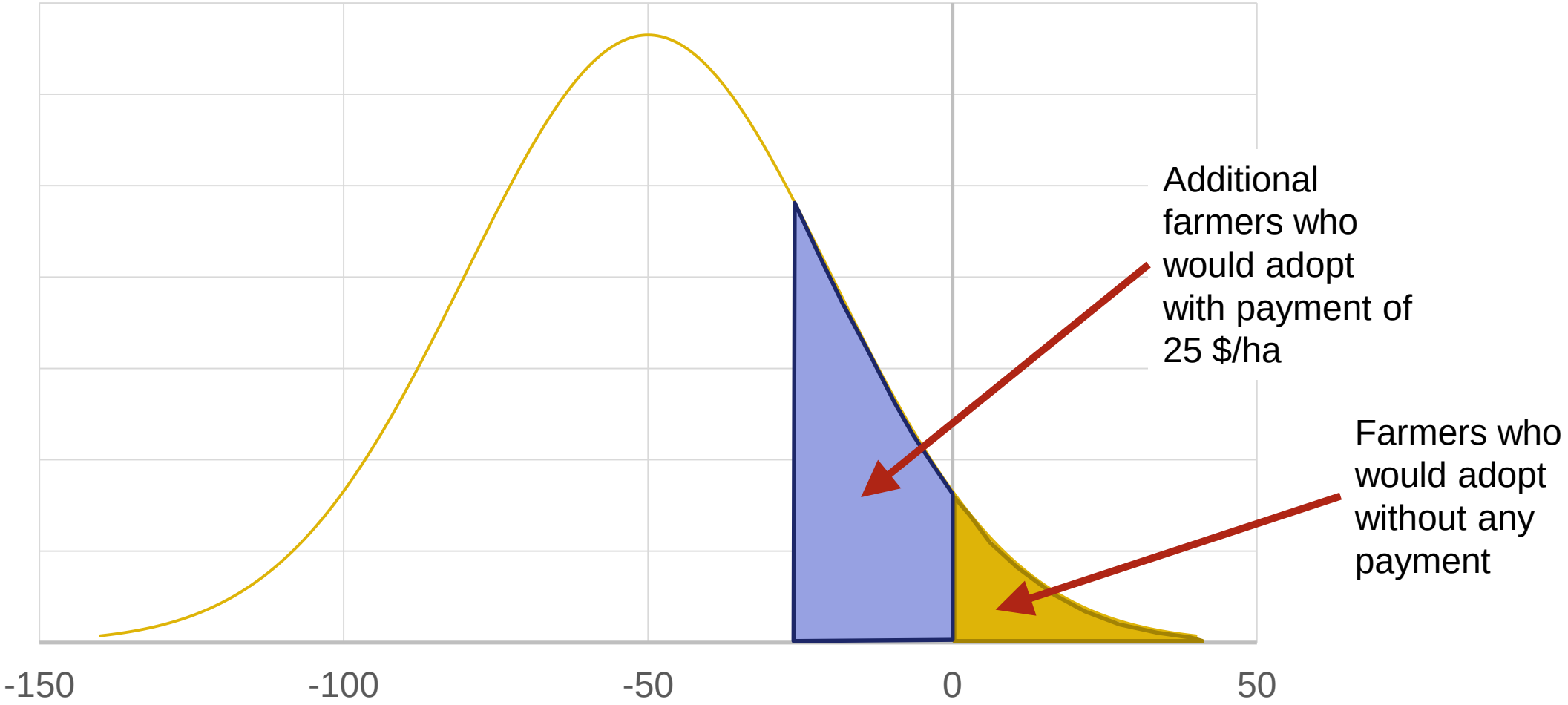
Additionality

Additionality

- Rule of thumb: Don't pay farmers to do things 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
- Optimal additionality < 100%

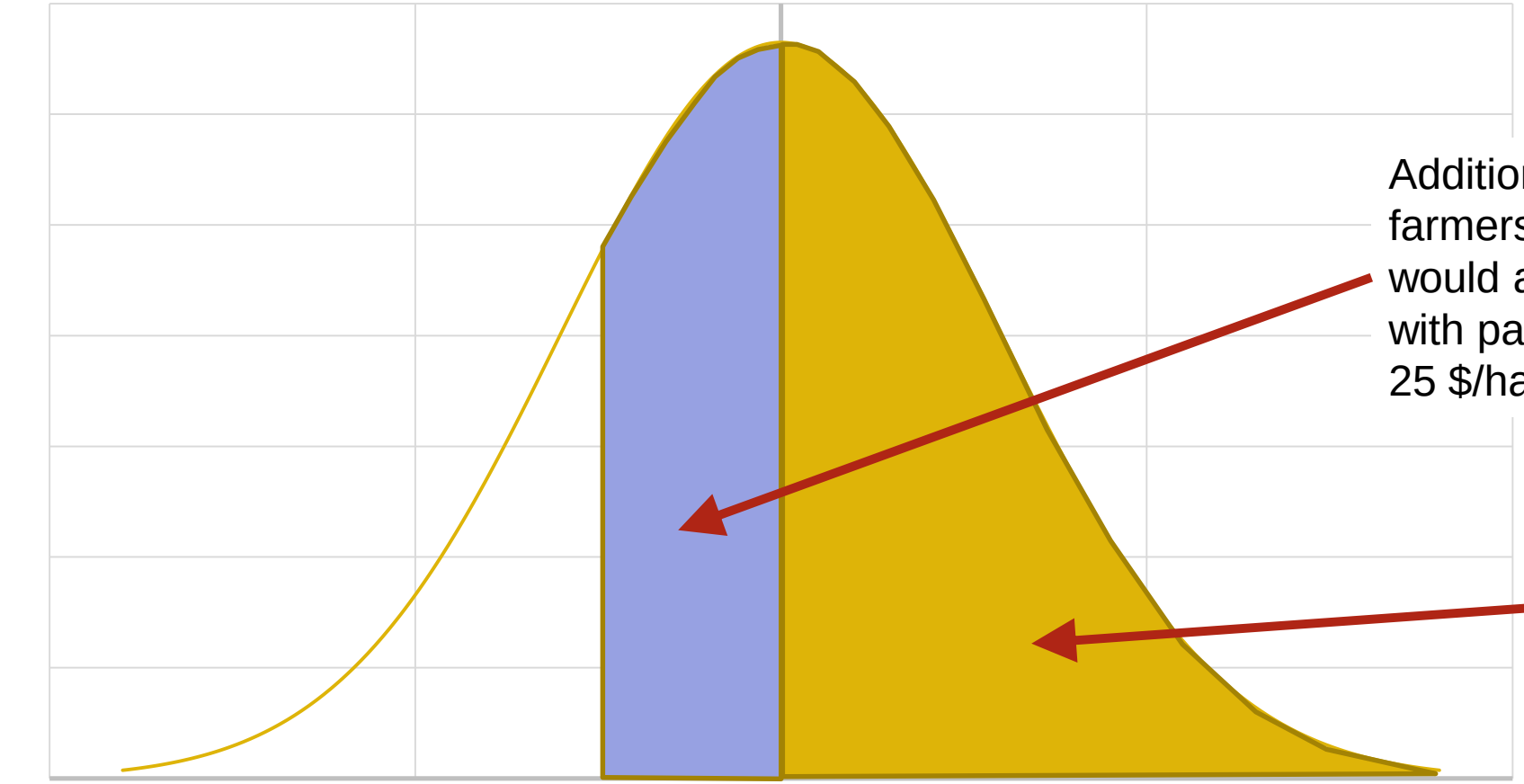


Additionality example



Reasonable additionality

Additionality example

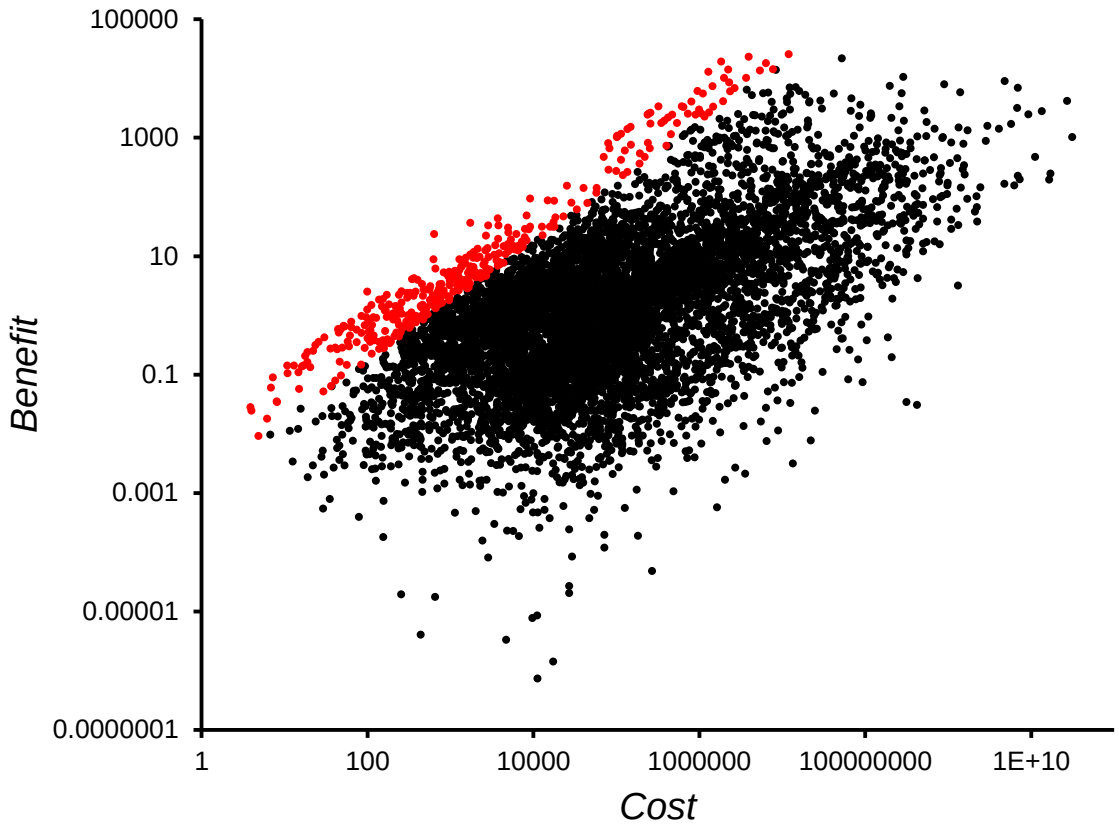


Poor additionality

Prioritising, ranking, targeting projects/investments

Why prioritising?

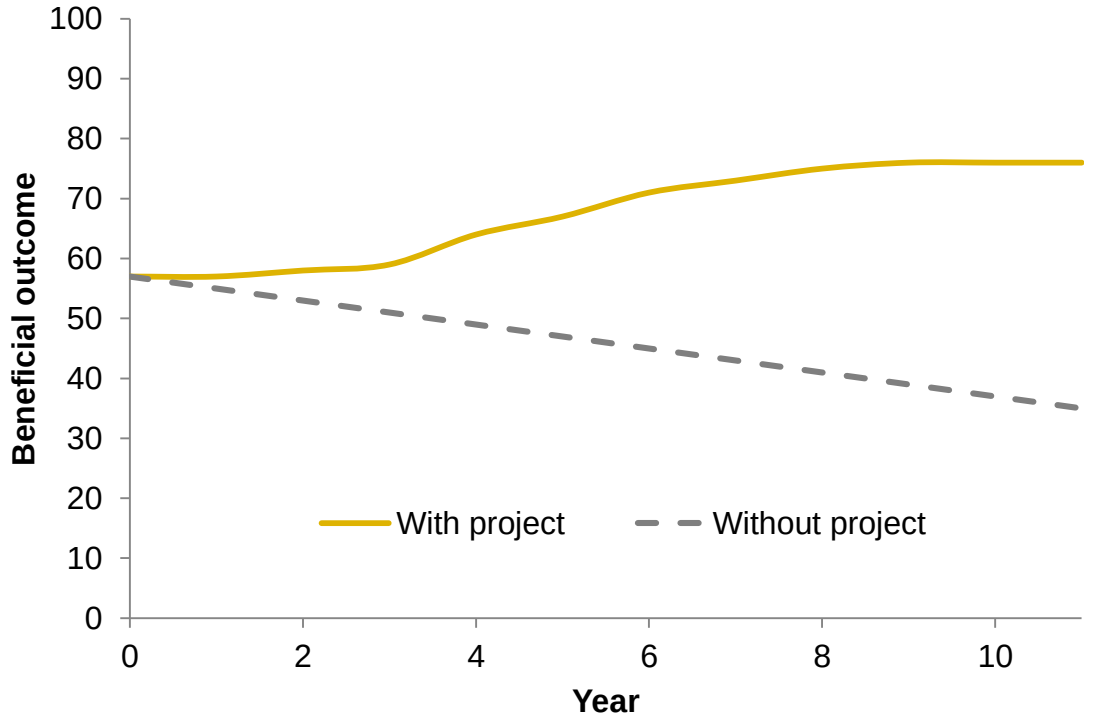
- 7000 environmental projects in Australia
- Huge range of benefits and costs
- Average BCR for best 5% = 330 times better than for median project



Source: Fuller et al. (2010). *Nature*

Common errors in prioritising

- Assume behaviour change will occur
- Ignore feasibility/effectiveness
- Ignore the with-versus-without principle
  - Maron et al. (2013): assessed 16 tools for prioritising environmental projects
  - Only one got the with-versus-without comparison right



Common errors in prioritising

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- Omit costs
  - Ansell et al. (2016): of 239 journal papers evaluating AESs, 13% considered cost effectiveness
- Subtract costs (instead of dividing) (US CRP)
- Add variables that should be multiplied (MCA) – e.g. project risk
- Prioritisation needs more of our attention – many systems in use are no better than random

Selling prioritization

- An additional rationale to put to agencies
- To demonstrate a business-like approach
- Convince financial decision makers

Managing uncertainty

Uncertainty in AESs is always high

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● Agricultural production systems and economics	?
● Environmental threats	???
● Agri-env management practices	?
● Effectiveness, reliability	??????
● Costs	???
● Behaviour change/adoption of new practices	????
● Community preferences/values (NMVs)	???

● Even if using benefit transfer, info about NMVs is often relatively good compared with ecology

Most common response to U in AESs

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- Completely ignore it

Other possible responses

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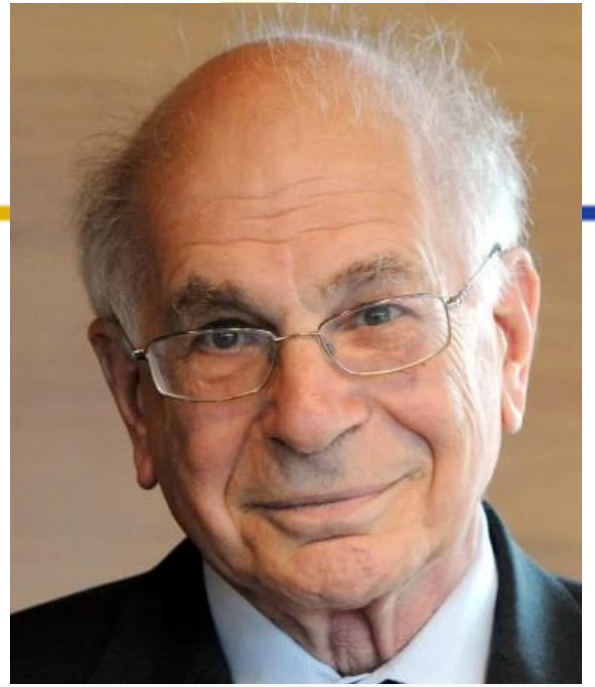
- Document knowledge gaps
- Score uncertainty for the project
- Invest in research instead of actions
- Seek robust strategies (sensitivity analysis)
- Feasibility study or pilot project
- Active adaptive management (monitoring)

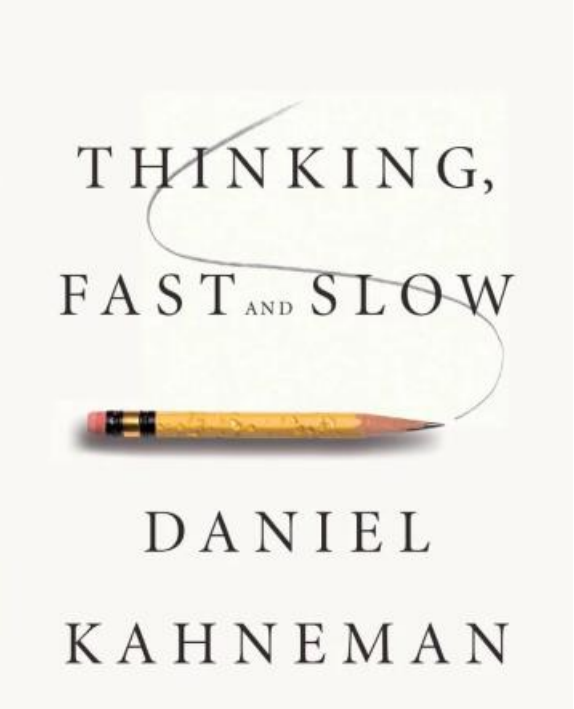
- Emphasise importance of uncertainty, but think beyond sensitivity analysis

Managing people's biases, preconceptions, self interest

“The Planning Fallacy”

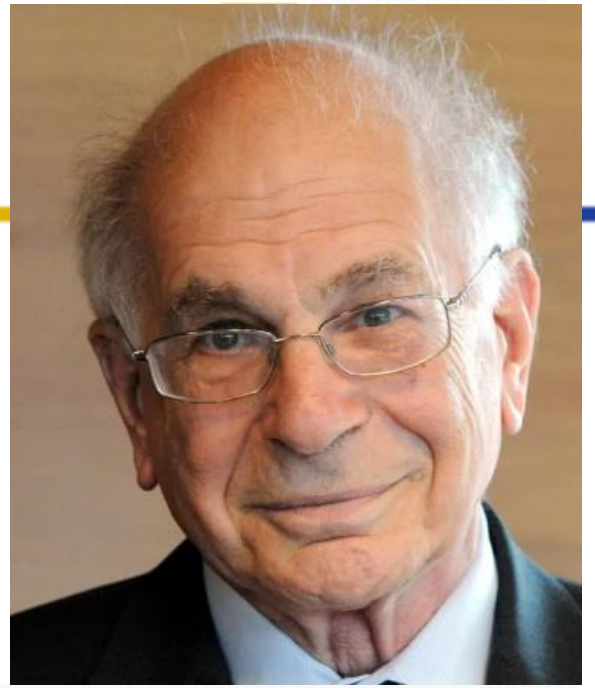
- Identified by Daniel Kahneman
- When devising projects or programs, people often exaggerate benefits or under-estimate costs or time required
- Various reasons
  - Vested interest
  - Wishful thinking, ignore difficulties or risks

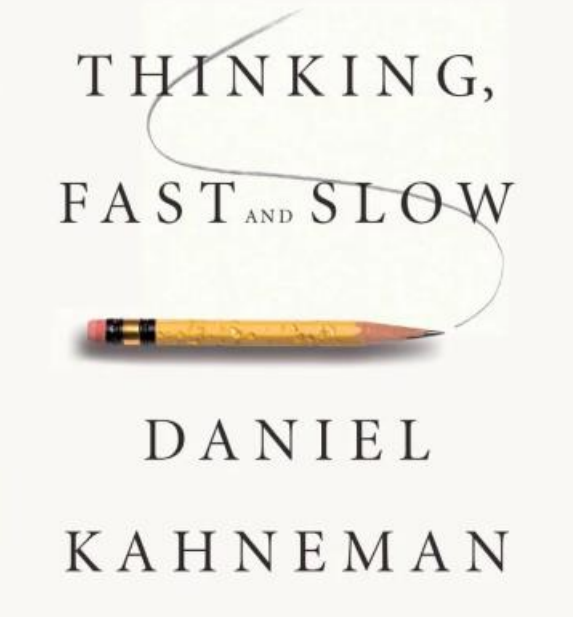




“The Planning Fallacy”

- To address it, need
  - A consistent framework to assess options
  - Independent review of the assumptions
  - INFFER: BCR × 10
- No point in prioritising projects if the system doesn’t address this aspect
- I think this is a big issue – one of the more important insights from behavioral economics





INFFER (Investment Framework for Environmental Resources)

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- Detailed training and support
- Simple but rigorous project screening
- Logically coherent project design
- Public: Private Benefits Framework
- A streamlined Benefit: Cost Analysis
- Detailed review of project assumptions
- Explicit strategy for uncertainty

- Some success, some failure, more lessons

Final remarks

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- Engaging with AESs and related policy is an eye-opener!
- My research has never been the same
- It doesn’t mean you can’t do good research
- Demanding
- Not necessarily rewarded in universities (but increasingly it is)
- Can be frustrating but also personally rewarding

www.Resources4AES.net

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- Lessons from past schemes
- Selecting policy mechanisms
- Measuring environmental values
- Ranking projects
- Metrics for ranking
- Additionality
- Understanding adoption
- Predicting adoption
- Uncertainty
- MOOC
- Blog
- INFFER