



# Resilient irrigated farm businesses

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# Today's presentation

- The problem

*How to increase returns per ML of water available at the whole farm level?*

- Research methods

- *Understanding complicated farms and their managers*
- *The need for participatory research*
- *Diversity of business types across agro-ecologies*

- What happened so far?

*Some results from case study farms*

- What's next?

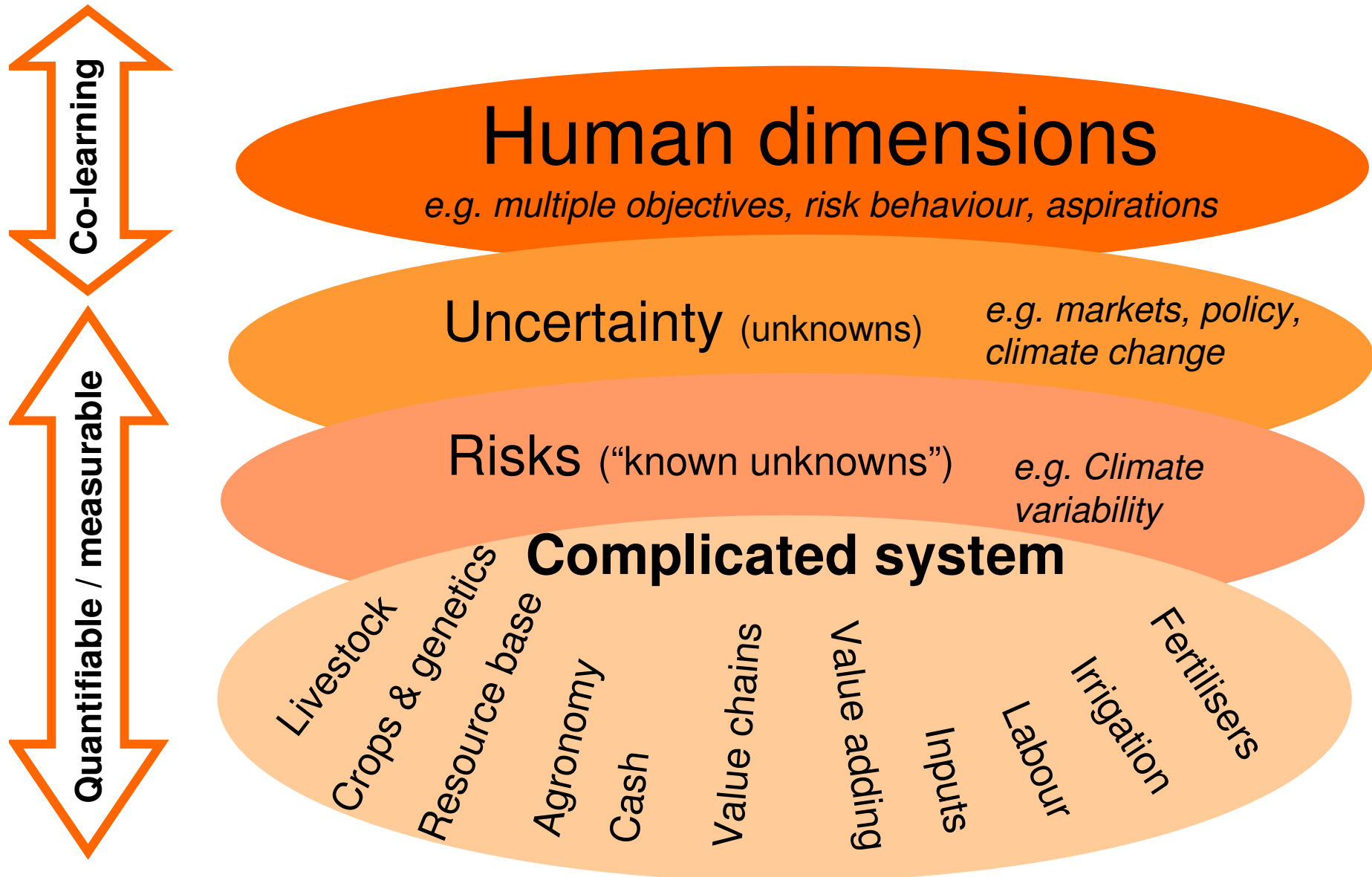
# Overall aim

Help farmers transform traditional farms into profitable and viable irrigated businesses that strategically and dynamically assess the options presented by a range of irrigated and rainfed enterprises, to maintain productivity and profitability in the face of declining irrigation water supplies

## *Expected outcomes,*

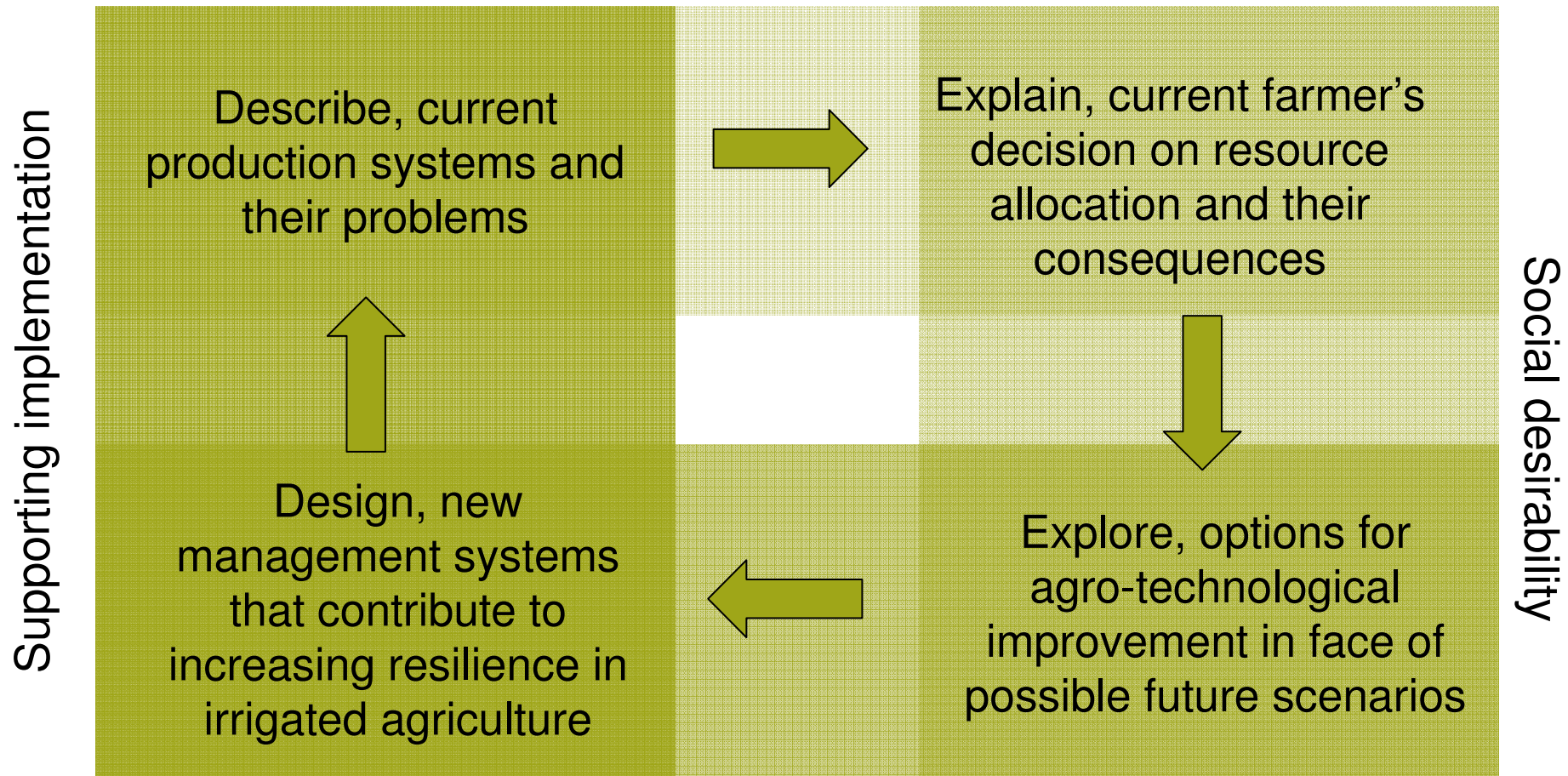
1. Improved preparedness to cope with the impact of increased climate variability and decreased reliability in water supply;
2. Reduce exposure to market volatility, and minimise the impact of the cost-price squeeze.

# Representing complicated farms



# Participatory farm modelling framework

## Diagnosis and evaluation



Ex-ante understanding, impacts, performances & trade offs

# Case studies



Emerald, cotton-grains

Dalby, cotton-grains

St George, cotton-grains

Narrabri, cotton-grains

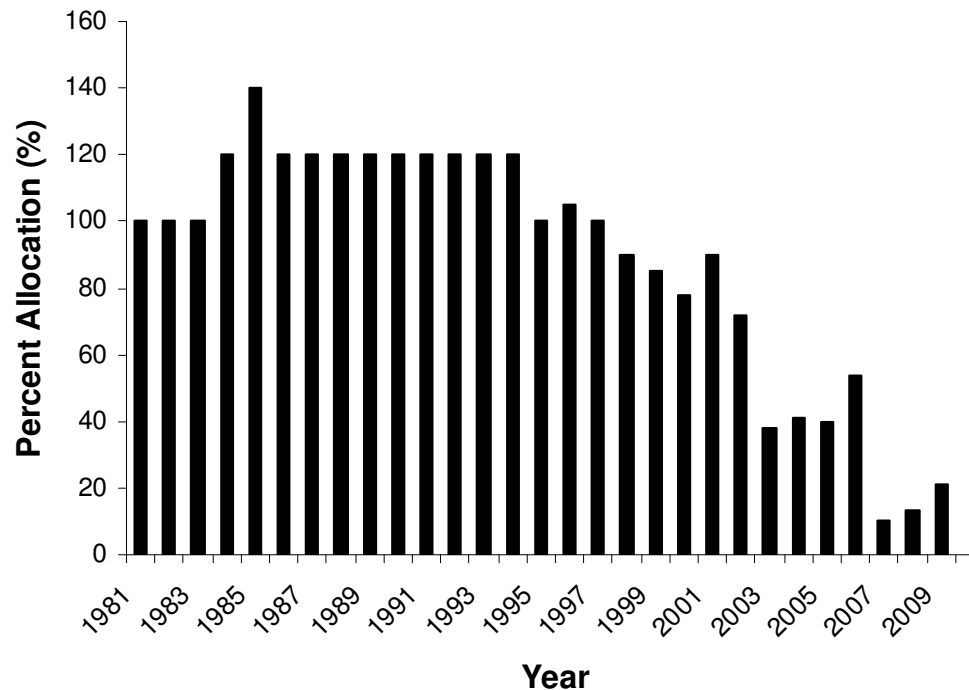
Coleambally, grains

Whitton, rice-grains

Barham, rice-grains

<http://irrigatedcropping.blogspot.com/>

# Case study from the Riverina

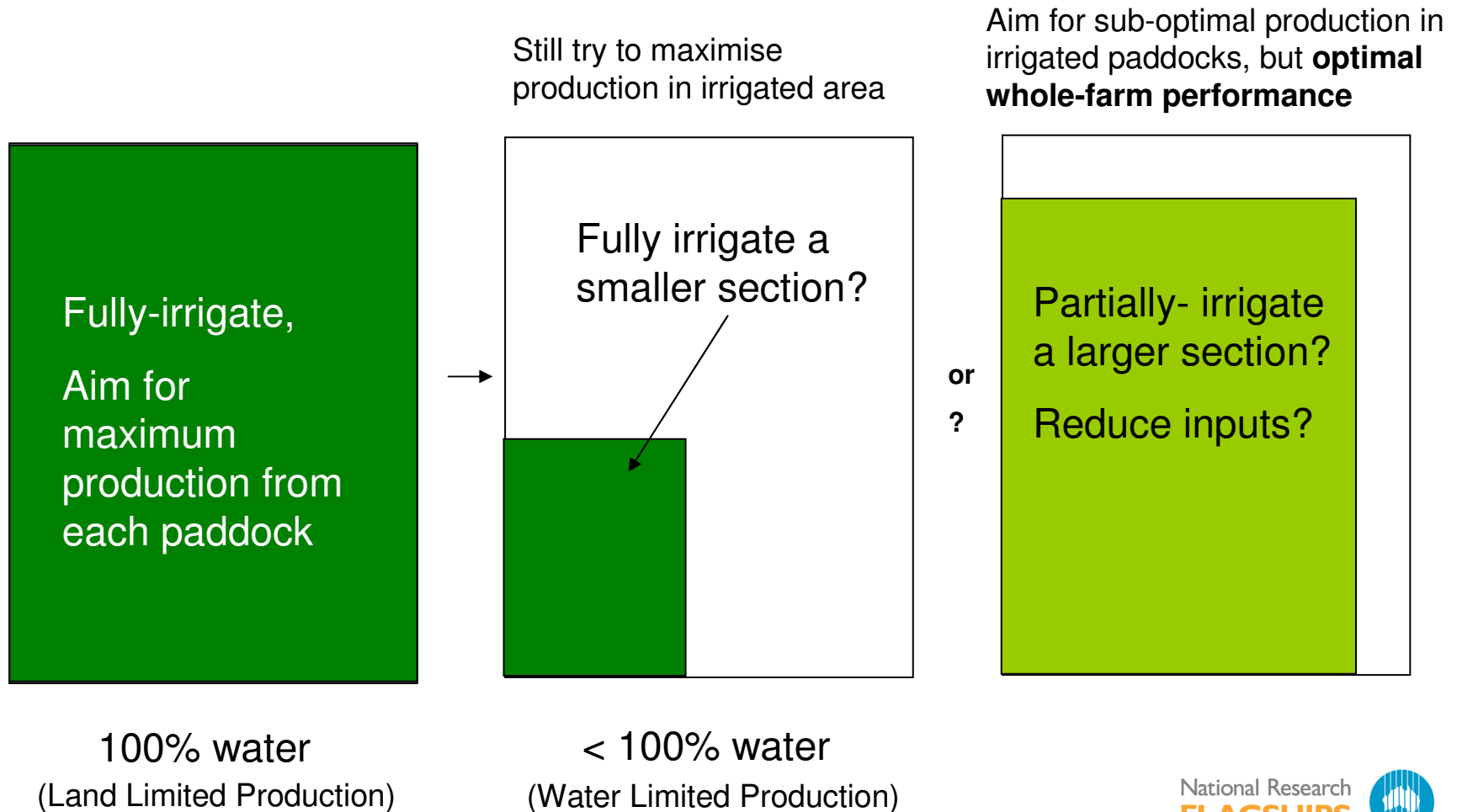


Irrigation water allocations (percentage of licensed quota) for **Murrumbidgee Irrigation Area, 1980/81 – 2009/10** seasons. The trend of 100%+ allocation extends unbroken back to 1914.

....water allocations available to broad-acre irrigators has experienced a severe downturn and a great increase in variability.....

# Case study from Riverina

- The first critical element is to recognise the implications of changing from a *land-limited* production system to a *water-limited* production system



# How can broad-acre irrigators adapt?

- Example Case study farm – Golgeldrie, NSW Riverina

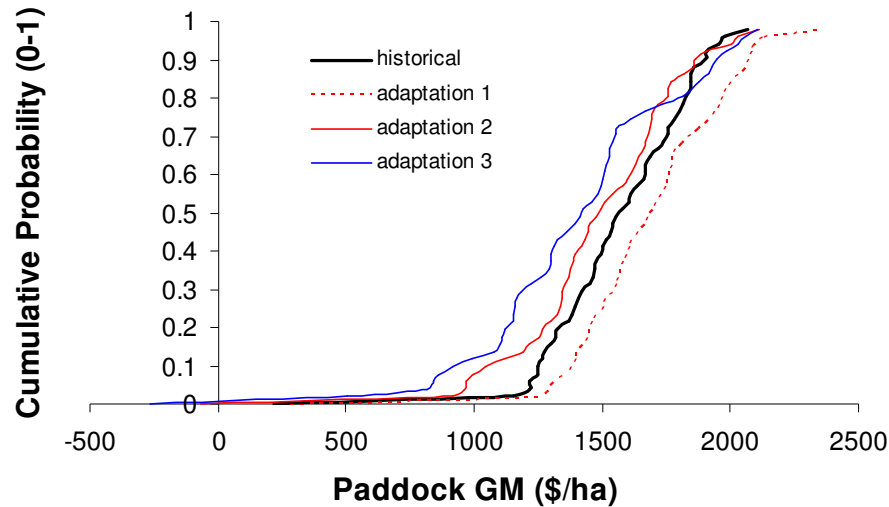
- Irrigated barley, soybeans, rice
- 600 ha, 1783 MI licensed allocation

For this example, we simulated 53 years production (using APSIM model) – assuming annual allocation of 50%

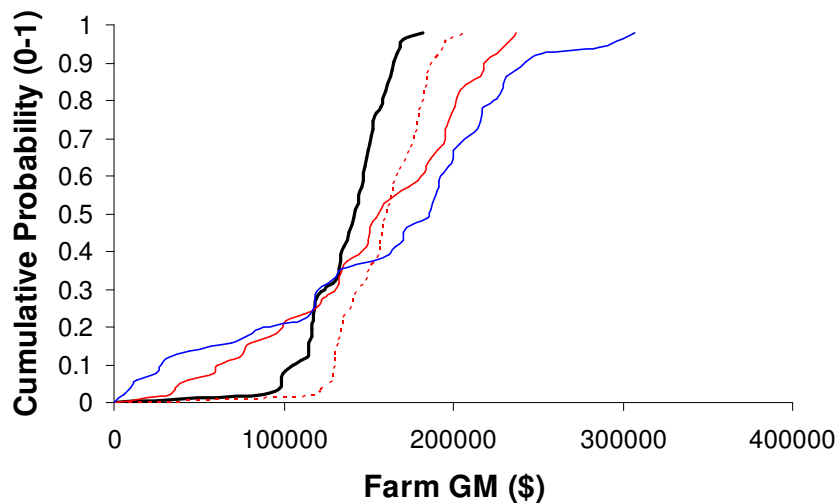
- Scenarios considered using APSIM

- Historical management (barley area = 155ha; soybean area = 66ha)
  - Barley-soybean rotation, fully irrigated, clear all stubbles
- Adaptation 1 (barley area = 162ha; soybean area = 73ha)
  - Barley-soybean rotation, increase barley row-spacing from 220-400mm, retain barley stubble through soybean
- Adaptation 2 (barley area = 264ha; soybean area = 86ha)
  - As per Adaptation 1, but reduce inputs on barley (aim for 3t crop rather than 6t), more water available for soybean
- Adaptation 3 (barley area = 358ha; soybean area = 91ha)
  - As per Adaptation 2, but rainfall-based sowing rule for barley rather than 'watering-up'

# How can broad-acre irrigators adapt?



- The adaptations with decreased inputs had lower gross margins (GMs) in each paddock

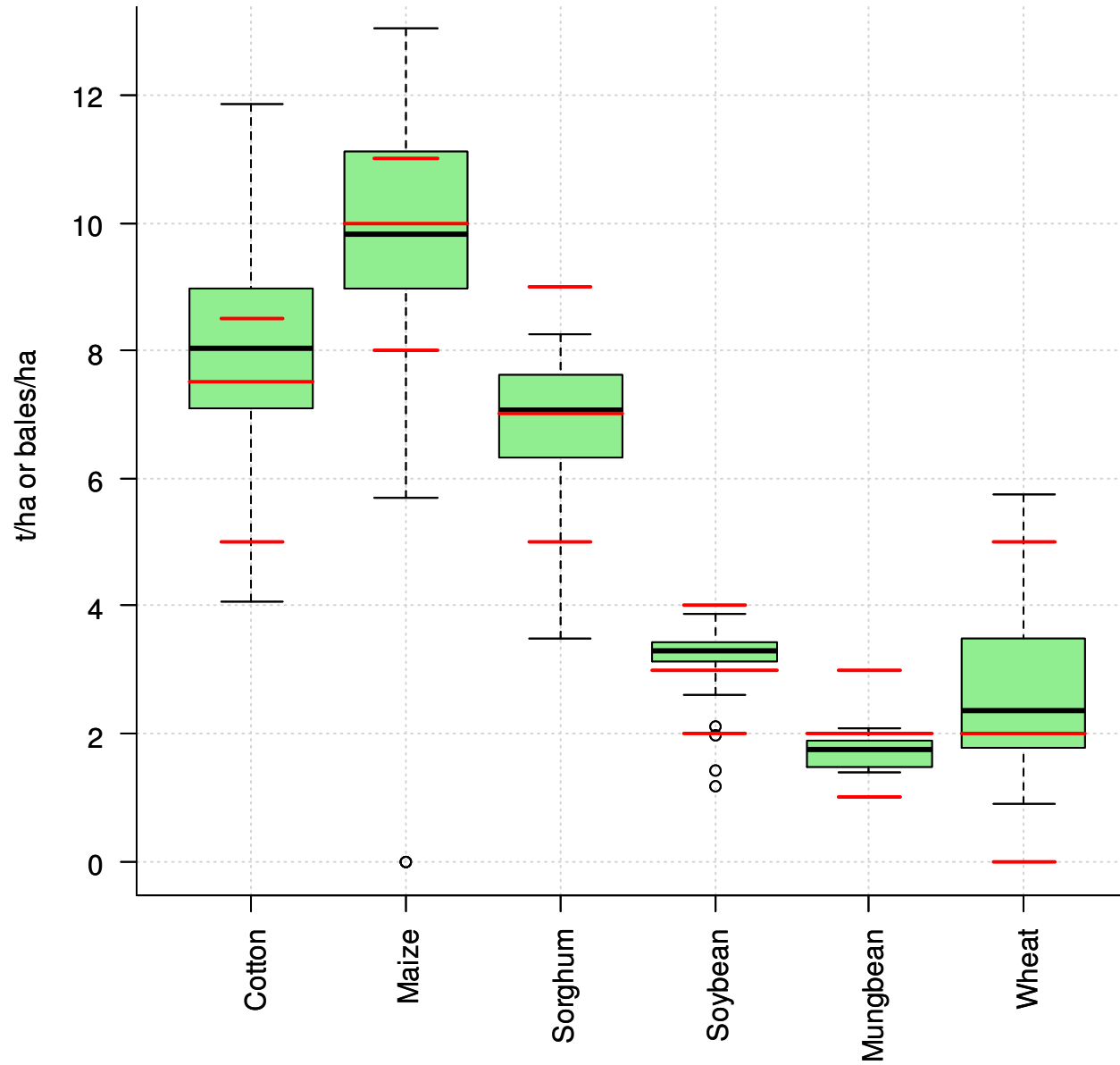


BUT, because more area was planted in those adaptations, the whole-farm GM was increased

# Dalby case study

- Approx. 800 ha cropping area, and 3 storages with combined capacity 1350ML
- 500 ML annual bore allocation
- Approx. capture overland flow ~ triangular distribution (0,700,1450 ML/year)
- Crop rotation: summer grain (sorghum or maize), cotton, cotton (dependent on stored water).

# Dalby model performance

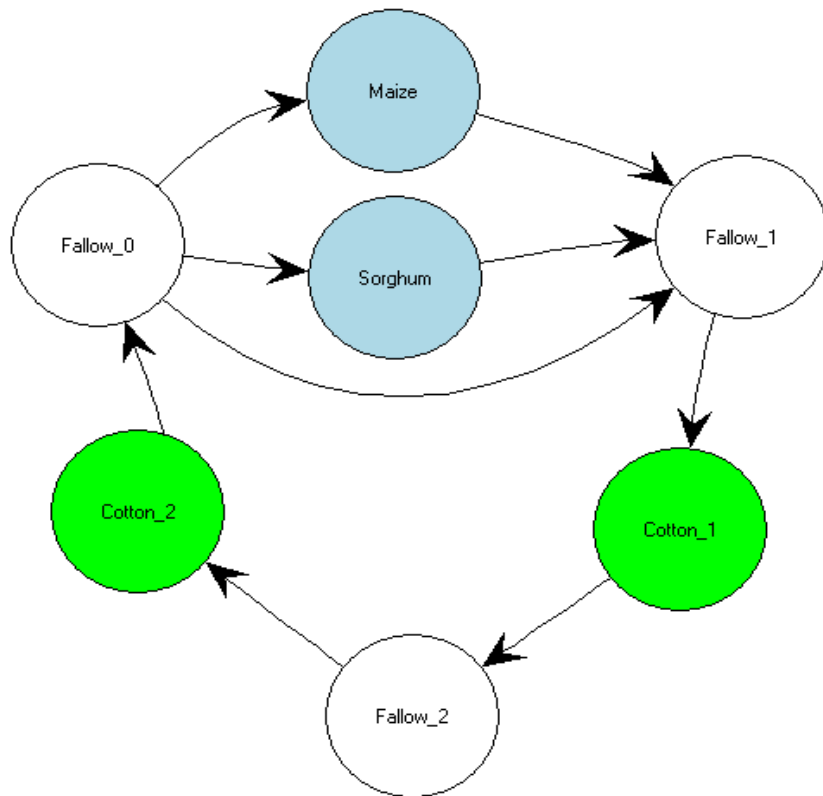


# Dalby case study

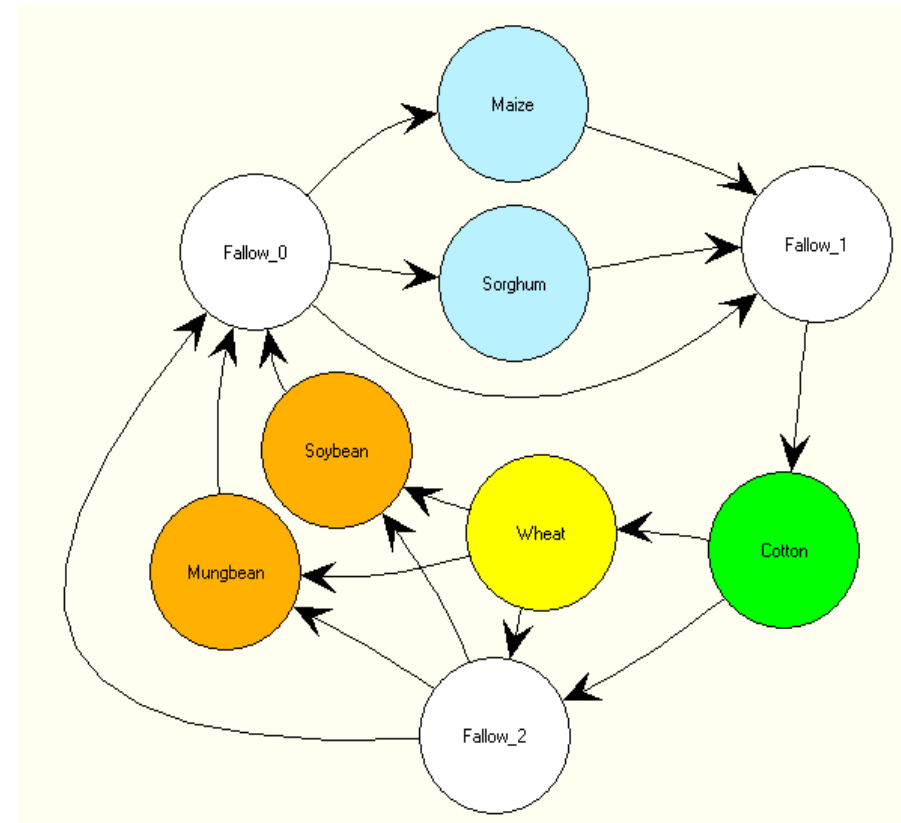
*Interested in having break crops and legumes in the rotation though he was concern about the profitability of the new rotation...*

*“... if cotton is the most profitable crop would I be better off with more cotton in my rotation ....”*

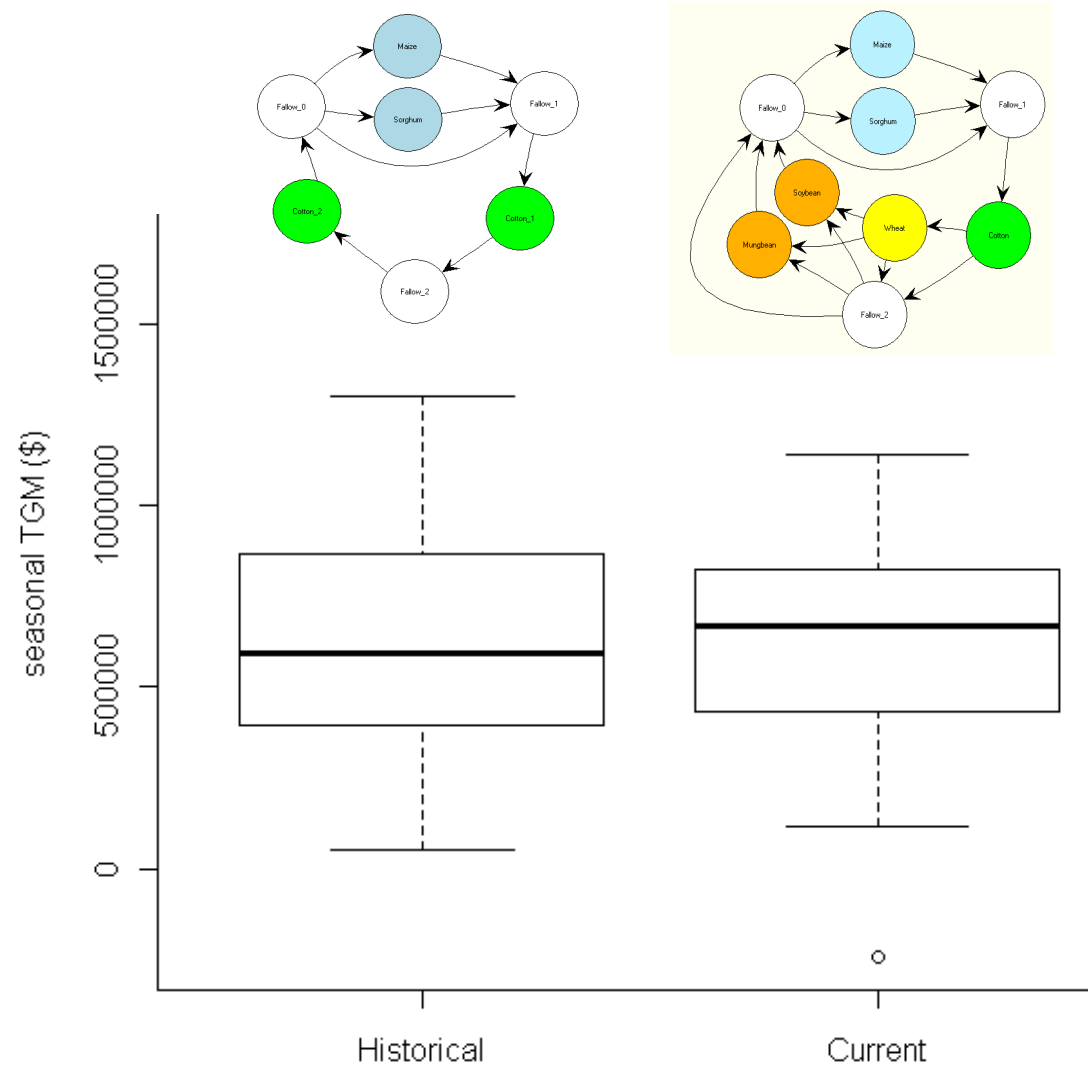
## Historical rotation



## Current rotation

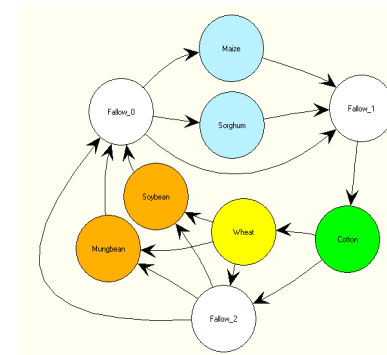
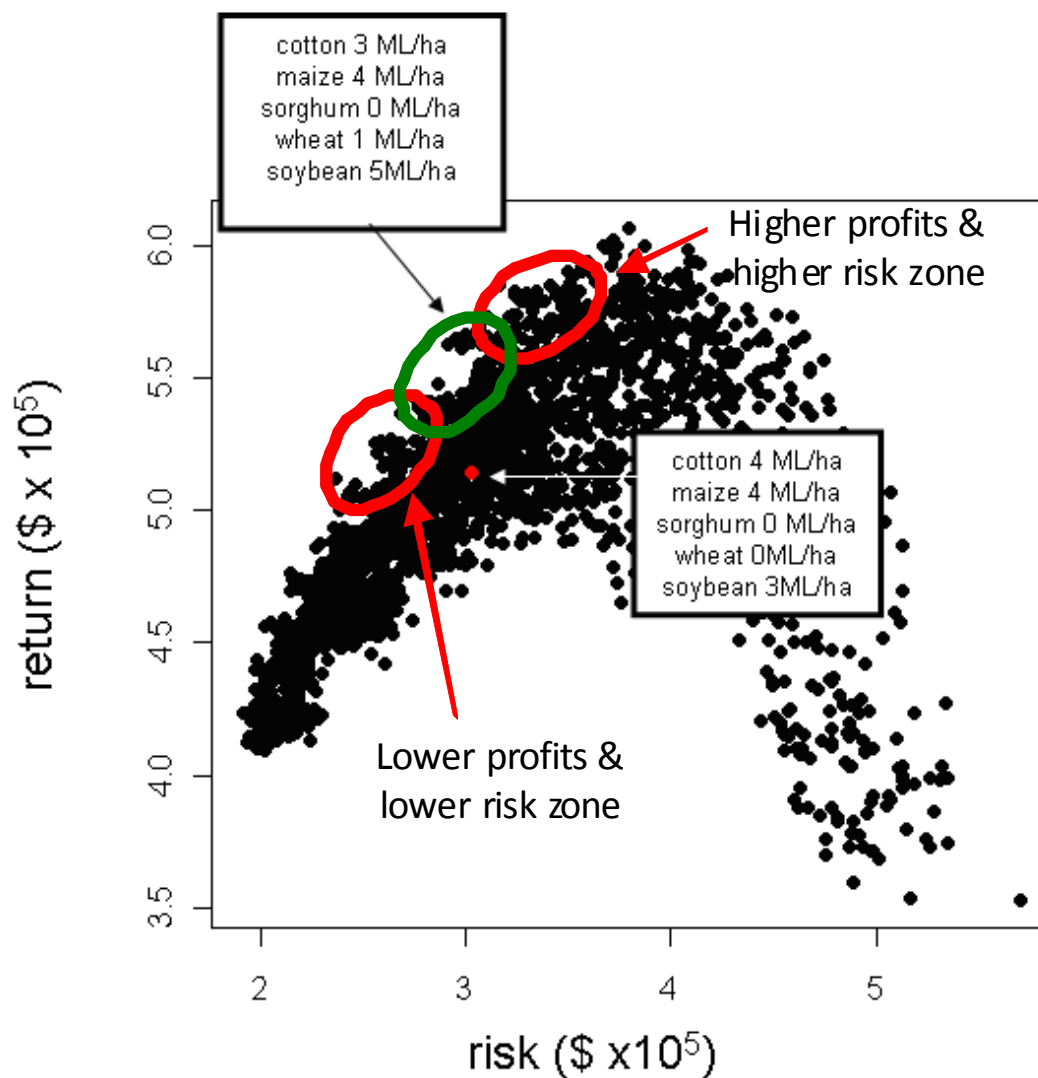


# Dalby case study



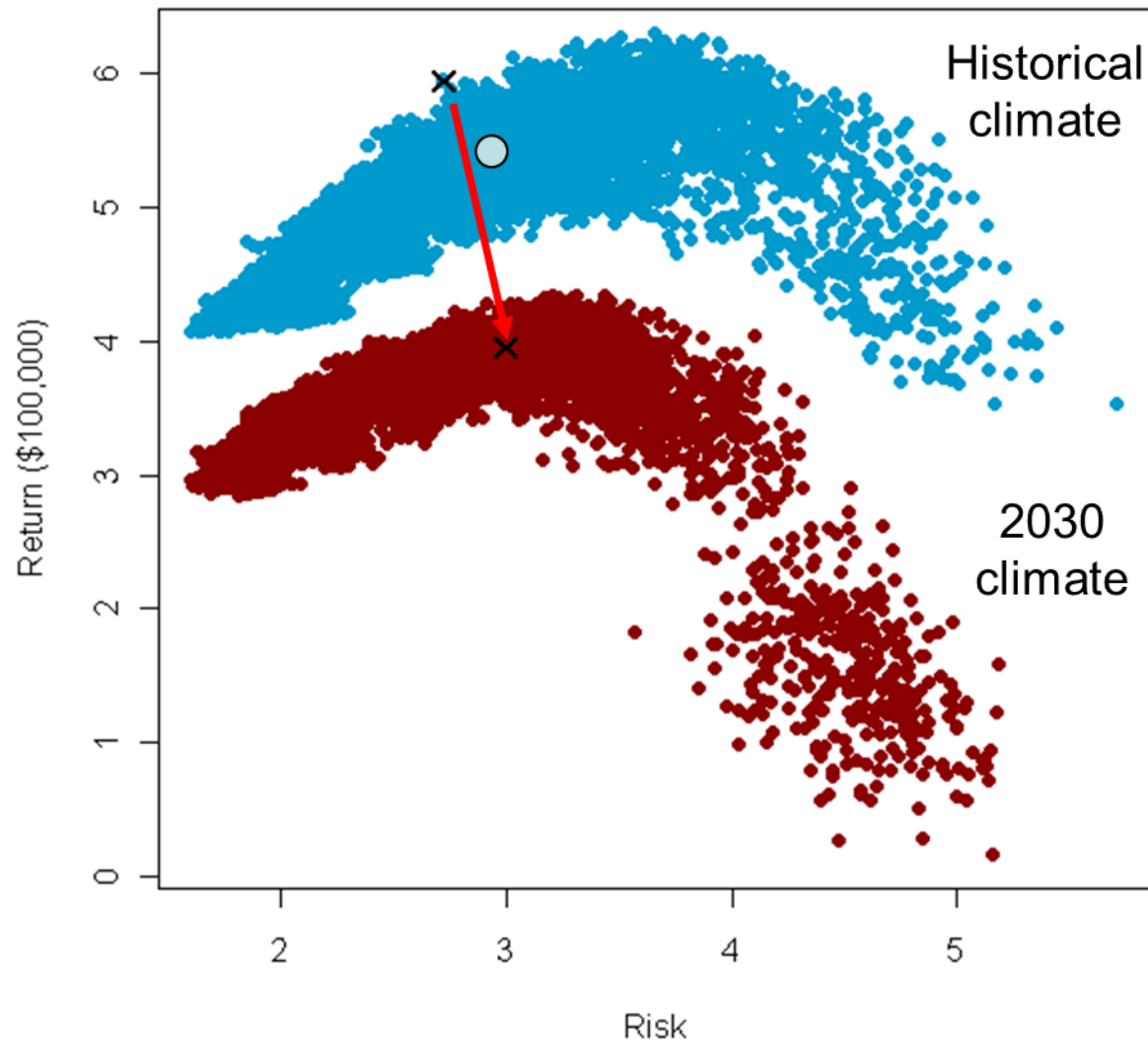
*“... Is it possible to improve the management of the current rotation? “*

# Return versus risk (Dalby)



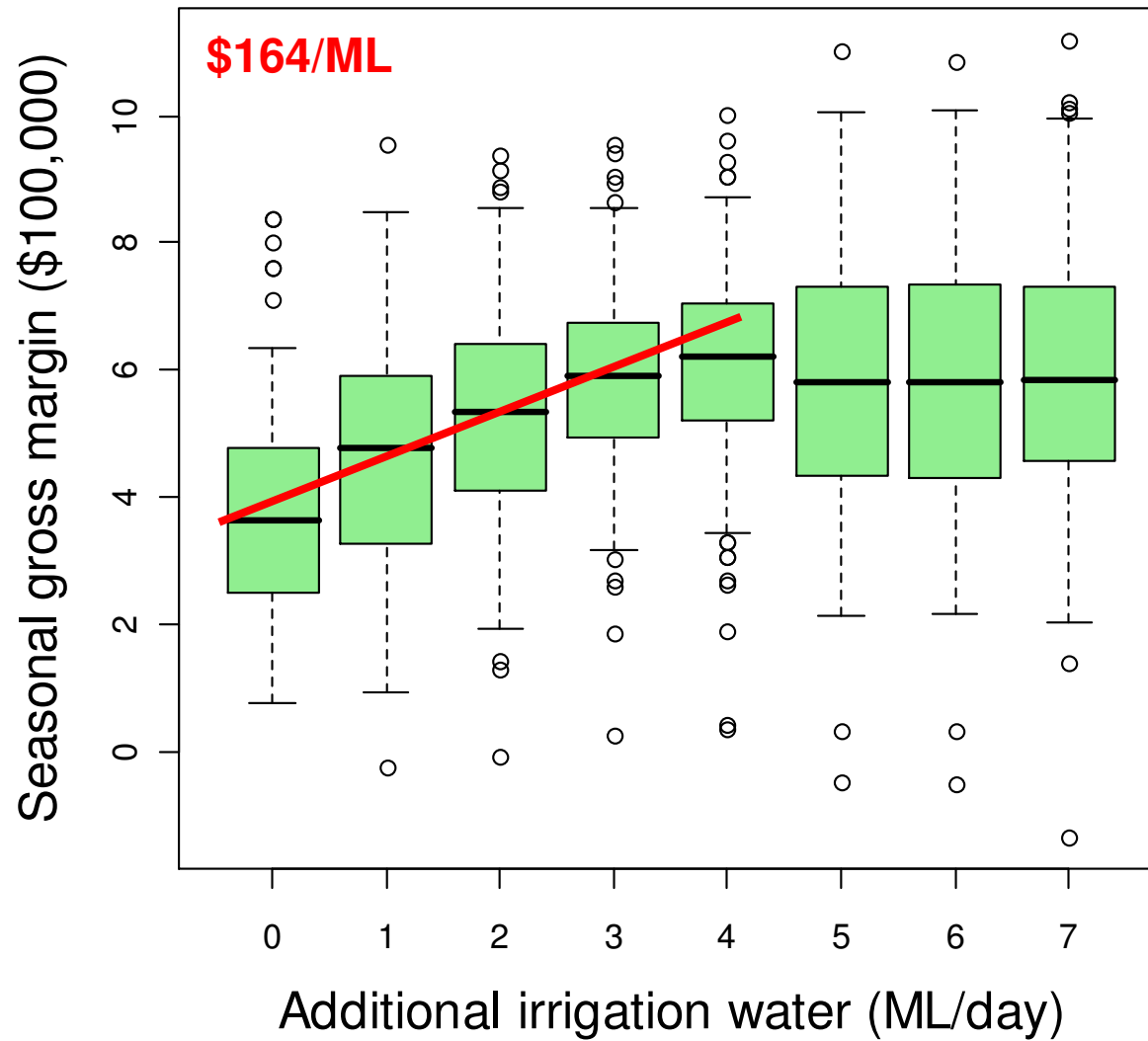
*“... And how are we likely to be affected by changes in climate..”*

# Return versus risk (Dalby)



*“... What about coal seam gas water, what price should that water have? .. “*

# CSG water from reverse osmosis plant (Dalby)



# What is next?

Continue engagement with participating growers to extend analyses:

- Water allocation scenarios
- Price scenarios (commodities, inputs, water)
- Climate scenarios, (decadal climate prediction)
- Transformational changes (selling/buying water)
- Tactical and strategic options

Workshops, media engagement, research publications and conference papers

Follow up project: Extending learnings via an analysis of typologies and regional upscaling with new case studies