

Exploring the Impacts of  
Federal Water  
Policy and Climate Change on  
Irrigated Agricultural Communities in the MDB

Sustaining Rural Communities  
Narrabri  
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# Aim of Study

Exploring the Impacts of Federal Water Policy and Climate Change on Cotton Catchment Communities in the MDB

*To predict the social and economic impacts of changes in agricultural production including cotton on community wellbeing and resilience at different scales in the context of changes to water availability arising from policy and climate change.*

*To inform the development of appropriate responses and mitigations at different geographic scales including through participatory methods.*



# Concepts

Three useful and somewhat inter-related concepts:

- Community Wellbeing;
- Community Resilience; and
- Community Sustainability.



## Community Wellbeing

- A place where members experience positive life satisfaction, an adequate standard of living for the relevant society, and opportunities to fully participate in the life of the community. This has both objective and more experiential aspects.

## Community Resilience

- The ability of a community to positively and flexibly adapt to short- and long-term stressors in the external and internal environmental, within a reasonable time and with minimal disruption, so as to maintain an adequate state of community wellbeing.

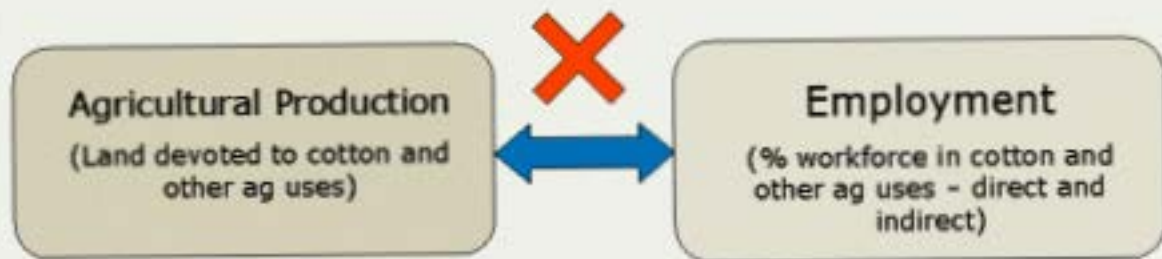
## Community Sustainability

- A community that adapts to change by optimising social, economic and environmental outcomes to maximise the wellbeing of all its members, now and in the future. It supports the engagement of members with diverse needs, values and aspirations in identifying and working toward increased wellbeing for all.

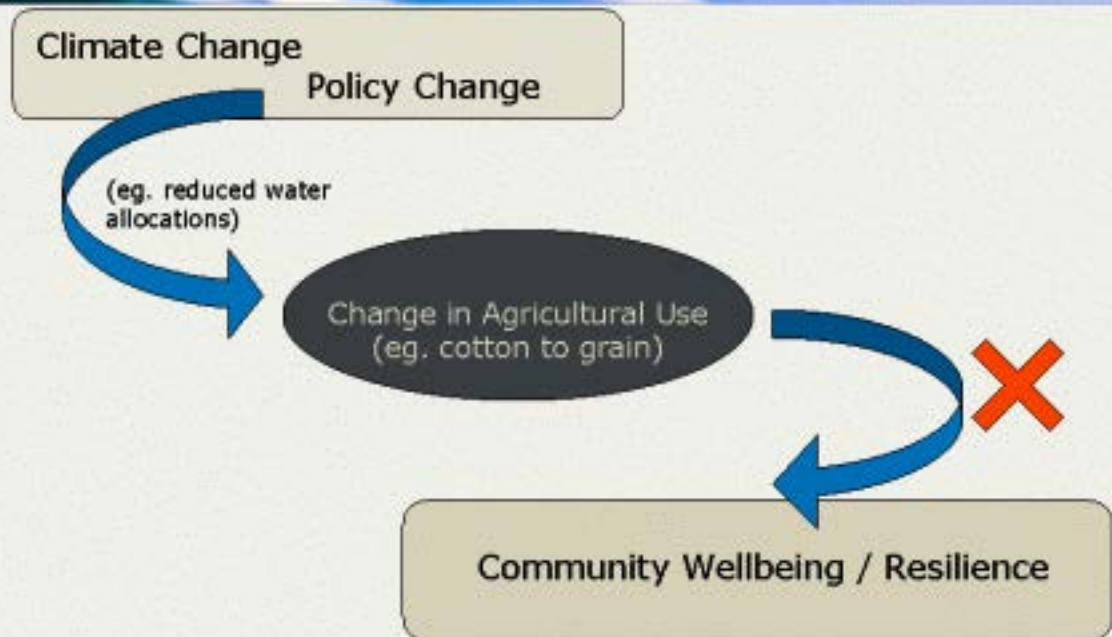
# Framework



# Research Strategy 1



# Research Strategy 2



# Research Strategy 3

Climate Change

Policy Change

Particular  
policy  
change:  
Reduced  
water  
allocations



Inputs from 1& 2 above;  
Cost Benefit Analysis, reality  
test & distributional impacts  
via interviews, engagement  
with 8 communities

Social and Economic impacts on community  
wellbeing/resilience at different scales: Farm,  
community, MDB, national

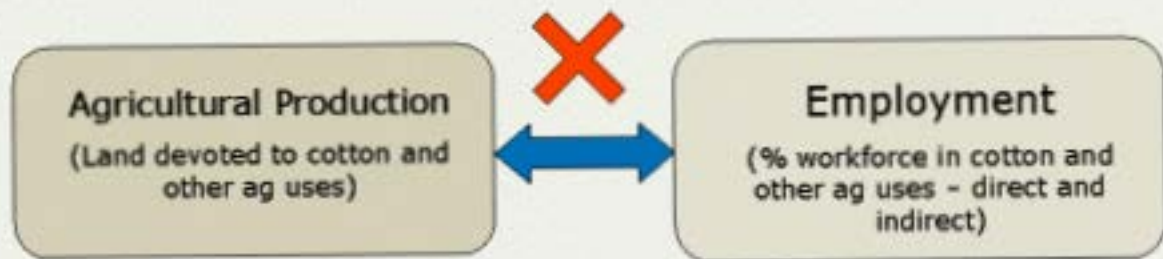
Refine CBA &  
distributional impacts via  
further interviews,  
engagement with 8  
communities



Locally appropriate  
strategies to monitor &  
mitigate adverse impacts



# Research Strategy 1 Preliminary Findings



# Research Strategy 1 Preliminary Findings

- Agriculture accounts for one-third of employment in cotton-growing SLAs in MDB
- At least 2,300 employed in cotton growing and cotton activities (e.g. ginning) in MDB
- At least 4,600 if include multiplier of '1.1' for agricultural average
- Cotton multiplier likely higher, e.g. regarding irrigation industries, earth moving, plant and equipment hire, etc?



# Research Strategy 1 Preliminary Findings

- Employment & LAND USE efficiencies in MDB/  
direct employment (FTE) per 1,000 ha :
  - Cotton = 6-7 people
  - Dryland cropping = 1.2 people
  - Dryland grazing = 0.4 people
  - Rice = 16 people
  - Grapes = 97 people
  - Fruit = 74 people
  - Vegetables = 109 people
  - Irrigated Dairy = 15 people



# Research Strategy 1 Preliminary Findings

- Employment & WATER USE efficiencies in MDB/ employment (FTE) per 1 GI:
  - Cotton = 1.2 people
  - Dryland cropping = 0.4 people
  - Dryland grazing = 0.2 people
  - Rice = 1.3 people
  - Grapes = 17 people
  - Fruit = 16 people
  - Vegetables = 15 people
  - Irrigated grazing = 4 people



# Research Strategy 1 Preliminary Findings

- If major reduction in water availability such that cotton replaced by next best uses:
  - Replacement by dryland cropping = 2,000 – 5,900 jobs lost in cotton growing areas
  - Replacement by dryland grazing = 2,400 – 7,000 jobs lost in cotton growing areas
- Major differences in distribution of social & economic impacts re size of town, reliance on ag, e.g.
  - SLA with 5,000 people = 1 non ag job per 29 residents
  - SLA with 10,000 people = 1: 9

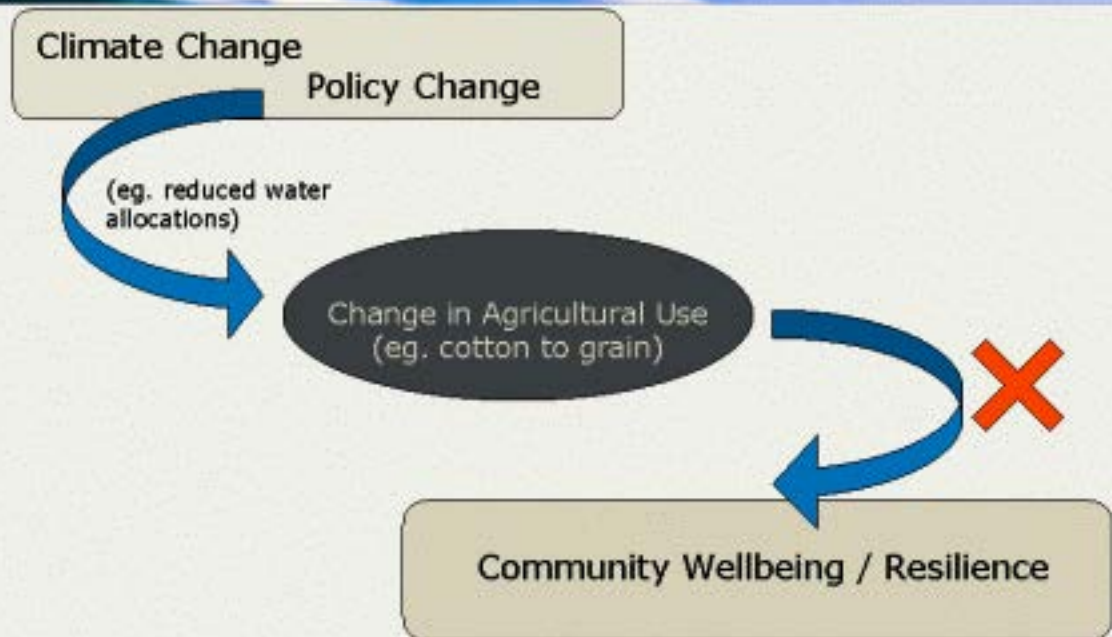


# Research Strategy 1 Preliminary Findings

- If water allocated to other uses (via permanent out of area trading or differential SDLs):
  - May be significant increase in employment in MDB with open trade in water depending on where water sourced
  - Would expect major differences in social and economic impacts at different geographic scales and different 'communities of interest' related to:
    - Indicators of wellbeing and resilience
    - Mitigating factors (e.g. ability to trade water, next best use, access to alternative economic activities)



# Research Strategy 2



# Research Strategy 2 Preliminary Findings

- Qn 1: *Do increasing levels of employment in cotton lead to more positive indicators of community wellbeing and resilience?*
- *Wellbeing Indicators– very slightly less so:*
  - *Slight increase in Chronic Ill Health*
  - *Slight decrease in Premature Death*
- *Resilience Indicators– very slightly more so:*
  - *% employment decrease one-third agriculture*
  - *Younger workforce & population*
  - *Higher skills base*
  - *Lower youth unemployment*



## Research Strategy 2 Preliminary Findings

- Qn 2: *If the availability of water and thus agricultural mix were to change in cotton communities within the MDB, would there be a change in indicators of community wellbeing and resilience within these communities?*
  - *Note - next best use for Cotton Communities with reduced water generally dryland ag*
  - *Most indicators of wellbeing and resilience not sensitive to industry, especially ag mix*



# Research Strategy 2 Preliminary Findings

## *Nonetheless...*

- *Primary impact from change to dryland cropping or grazing is **total employment loss**, differently distributed:*
  - *Marked social impact depending on social and economic context:*
    - *Loss of population*
    - *Older population*
    - *Increased concentration of disadvantage*
    - *Increase in concentration of Aboriginal people*
    - *Decrease in key services/diversity*



# Research Strategy 2 Preliminary Findings

- *Marked economic impact depending on social and economic context:*
  - *Employment multipliers – most significant in smaller and more remote communities*
  - *Contraction of local economy*



# What are the key factors?

*What are the key determinants of community wellbeing and resilience?*

- Findings of LRA 303 SLAs in MDB support literature:
  - Remoteness
  - Degree of urbanisation (size, proximity to larger centre)
  - Indigenous population
  - Degree of economic diversity (e.g. access to mineral resources)
  - Natural attributes (amenity, environmental factors)
- Case studies support importance of qualitative factors in resilience (e.g. leadership, social capital)
- More complex when look at the impacts of policies on individual case study areas



# Research Strategy 3

Climate Change

Policy Change

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# Research Strategy 3 Preliminary Findings

## Social and Economic Impact Assessment:

- Quantified e.g.
    - Cost Benefit Analysis (National and Basin-wide)
    - Quantification of employment and population loss from various SDL scenarios, and related impacts on Indicators of wellbeing and resilience
  - Qualitative and locational factors:
    - Previous adaptation to change
    - Mitigative factors, e.g. trade, next best use
    - Other factors in resilience
- = Likely social & economic impacts /different scales



## Other factors?

- Recent changes in water availability:
  - Drought – a 'real time simulation' for reduced allocations (SLDs) or climate change?
  - Trade out of area (government or open market) – also different impacts at different scales
- Understanding how a community has responded in to past stressors can help understand how they **and others** may respond in the future



# Research Strategy 3 Preliminary Findings

## 1.1. Remoteness Average

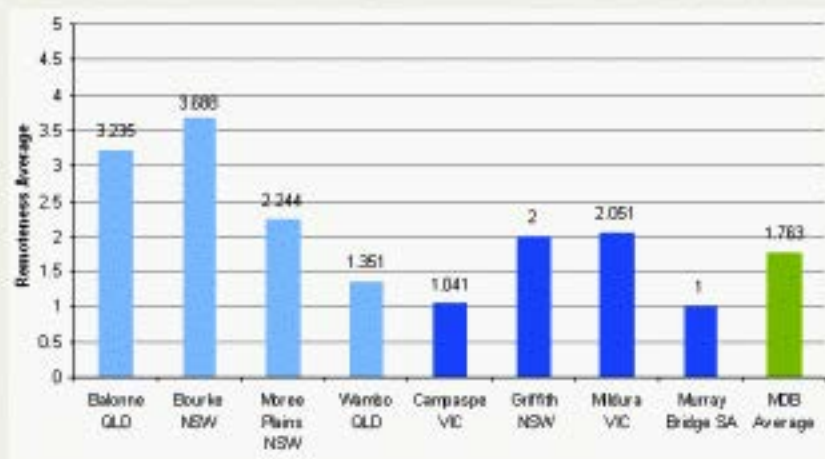


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Source: ABS (2006) Census of Population and Housing, Special Order. JSA (2009)



# Research Strategy 3 Preliminary Findings

## 1.1. SEIFA Disadvantage

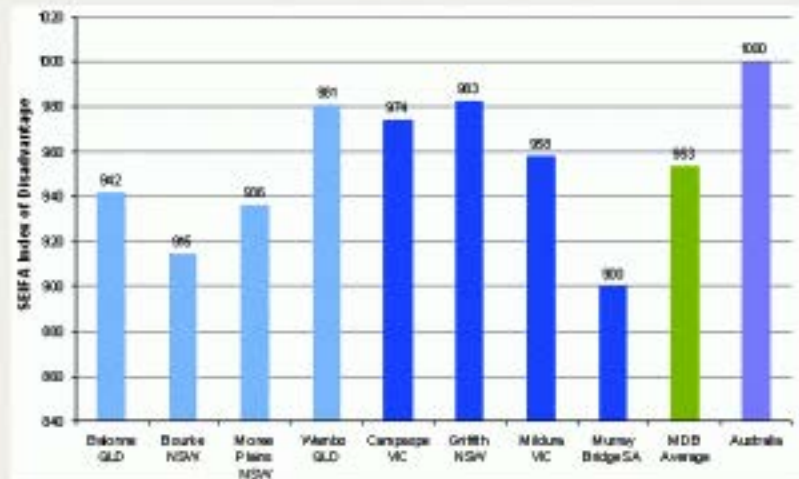


Figure Error! No text of specified style in document.: 1: Socio-Economic Index for Areas (SEIFA) Index of Relative Disadvantage

Source: ABS (2006) Census of Population and Housing, JSA (2009)



# Research Strategy 3 Preliminary Findings

- Key factors in SEIFA Disadvantage in Nth MDB:
  - Indigenous population
  - Remoteness
- More complex relationships in case studies evident:
  - Murray Bridge case study area in Lower Murray:
    - Expressway 1979 - Housing Trust, cheap housing,
    - Major agricultural processing and warehousing, prison, etc
    - Waves of disadvantaged migrants and refugees
    - Regional centre for Murraylands - LGAs areas with 50%-68% employment in agriculture



# Research Strategy 3 Preliminary Findings

## 1.1. Population Change 2001-2006

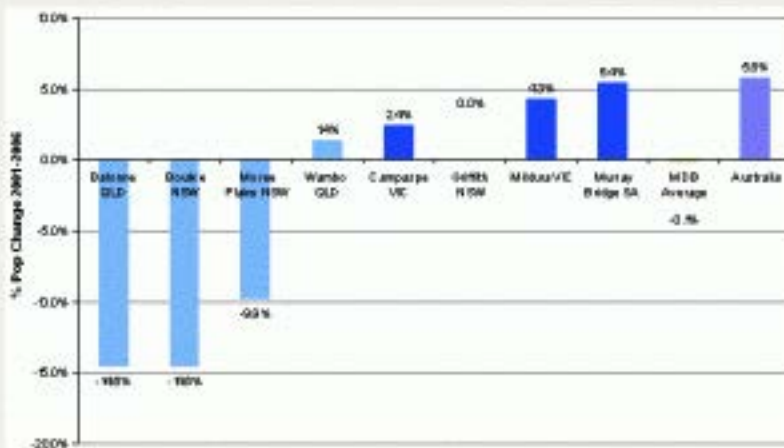


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Source: ABS (2006) Census of Population and Housing, JSA (2009)



# Research Strategy 3 Preliminary Findings

## 1.1. Employment Change 2001-2006



Figure Error! No text of specified style in document.: 1: % Change in Employment 2001-2006

Source: ABS (2006) Census of Population and Housing, JSA (2009)



- Employment change in MDB positively correlated with:
  - Increase in population\*\*
  - Indigenous people



# Research Strategy 2 Preliminary Findings

- **\*\*Key factors in population change in MDB:**
  - Industry sector (MDB +1.2% compared with +10% for Australia)
  - Remoteness
  - Indigenous population
  - Age (in-migration + more residual population)
- Increase in population also affected by:
  - Perceptions of amenity largely driving in-migration
  - Place in regional hierarchy (being or close to larger centre) /Degree of urbanisation
  - Alternative economic uses (extractive industries)
  - Quality of area/leadership



# Other factors Nthn/Sthn Basin

- More complex relationships in case studies evident:
  - **Southern Basin:**
    - Highly regulated with major upstream storages
    - Largely cushioned from the drought until 2006/07
    - Allocations 2006/07 at 60%; 2007/08 at 32% and 2008/09 at 18% for the River Murray PWC
  - **Northern Basin:**
    - Drought impacts from 2000/01
    - Historically less 'protected'/more exposed to climatic variation
- **Simple conclusions?**

*SMDB - '20 years of structural adjustment in 3 years?' Or more complex? (Below Lock 1)*

*NMDB - 'Drought in a real time simulation for SDLs and climate change'? Or more complex? (Bourke)*



## Research Strategy 2 Preliminary Findings

- There are also wider forces at work regarding whether a town 'survives' or 'thrives'
- Other factors in community 'resilience':
  - Brewarrina
  - Mungindi
  - Lockington
- Leadership, community cohesion, strategic action also key to resilience
- But is there a social 'tipping point' for towns?



# Quantification of Local Impacts

- Bourke:
  - 8% job loss (103)
  - 9% pop loss (289)
  - Very big impacts SES – residualisation
- Balonne:
  - 9.6% job loss (220)
  - 13% pop loss (615)
  - Very big impacts SES – residualisation



# Quantification of Local Impacts

- Dalby-Wambo
  - 0.7% job loss (49)
  - 0.9% pop loss (137)
  - No impact on SES
- Moree
  - 7.6% job loss (461)
  - 9.2% pop loss (1,292)
  - Significant but wider ag base and larger – more residual pop, lower median income, increase Indigenous



# Research Strategy 3 Preliminary Findings

- Bourke Shire:
  - Unregulated river system/water insecurity
  - 2007 CAP implementation reported to lead to a two-third reduction in allocations
  - Drought meant no cotton crop 4/10 years
  - Next best use dryland grazing
  - Drought and water insecurity meant early diversification strategies failing
  - Stranded infrastructure (e.g. drip irrigation, packing sheds, nursery)
  - Stalled Water Sharing Plan – very exposed?



# Quantification of Local Impacts

- Griffith
  - 19% job loss (2,139) - but lower if rice lost
  - 25% pop loss (6,000)
  - Adverse SES re heavy reliance on irr ag - u/e, 65+, lower income
- Campaspe
  - 11% job loss (1,694)
  - 13% pop loss (4,750)
  - Significant as centre of hinterland and processing but SES not much change
- Mildura
  - 14.2% job loss (3,000)
  - 16.5% pop loss (8,196)
  - Significant as centre of hinterland and processing and increase disadvantage
- Murray Bridge
  - 2.5% job loss (201)
  - 3.2% pop loss (563)
  - Significant as centre of hinterland and processing but SES not much change



# Research Strategy 3 Preliminary Findings

CBA – Below Lock 1 there are no 'winners':

- Lower Lakes & Coorong are on 'life support' (0.7 mtrs)
- Need 2,000-3,000 GI baseline + 800 GI pa
- Significant environmental (international/national) and social benefits (Lower Murray) in 'watering' assets
- Offset by potential loss of 1,800 to 26,500 jobs if water from ag irrigation, depending on where sourced
- Additional inefficiencies from transmission losses so lower figure may be 3,600 jobs
- Obvious practicalities regarding where source water for Southern Basin:
  - Lower estimate akin to shutting down Yass
  - Upper estimate akin to 3 x Albury



## Research Strategy 3 Preliminary Findings

- Though Murray Bridge likely to be 'resilient' due to size, proximity and growth, many smaller communities also on 'life support':
  - Low allocations since 2006/07
  - Low river levels & ground water
  - Commodities prices
- High levels of recent debt as buy in water / feed
- Many inefficient operators 'shaken out' in previous modernization in SA
- Recent 'unbundling' and removal of trade out if ITs hastened exit of even 'the good operators' BUT still a net importer of water
- Limited access to Fed initiatives



# Mypolonga:

Population: 600 (stable 01-06)

Agricultural Employment: 30%


Production: Veg, Fruit, Olives, Grapes, Irrigated Dairy

Since 2007/08: Lost 85% dairy, 20% fruit, 50% vegetables

# Research Strategy 3 Preliminary Findings

- Evocative images:
  - Social
  - Economic
  - Environmental
- How 'optimise' / determine tradeoffs?
  - A question of community values?
  - A matter of distributional impacts or cost/benefit for whole community?
  - Operative provisions of the Water Act 2007:
    - What role local community input & acknowledgement of local processes?
    - What role social and economic considerations?



- 
- The best available information vital so we make 'the hard decisions' with our eyes open
  - Understanding the impacts of various scales critical
  - Understand that 'sustainability' means optimising social, economic and environmental tradeoffs for the good of all, now and in the future...with those affected.