

Valuing improved regional water security and integration: Insights and lessons from the Murray-Darling Basin in Australia

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Overview

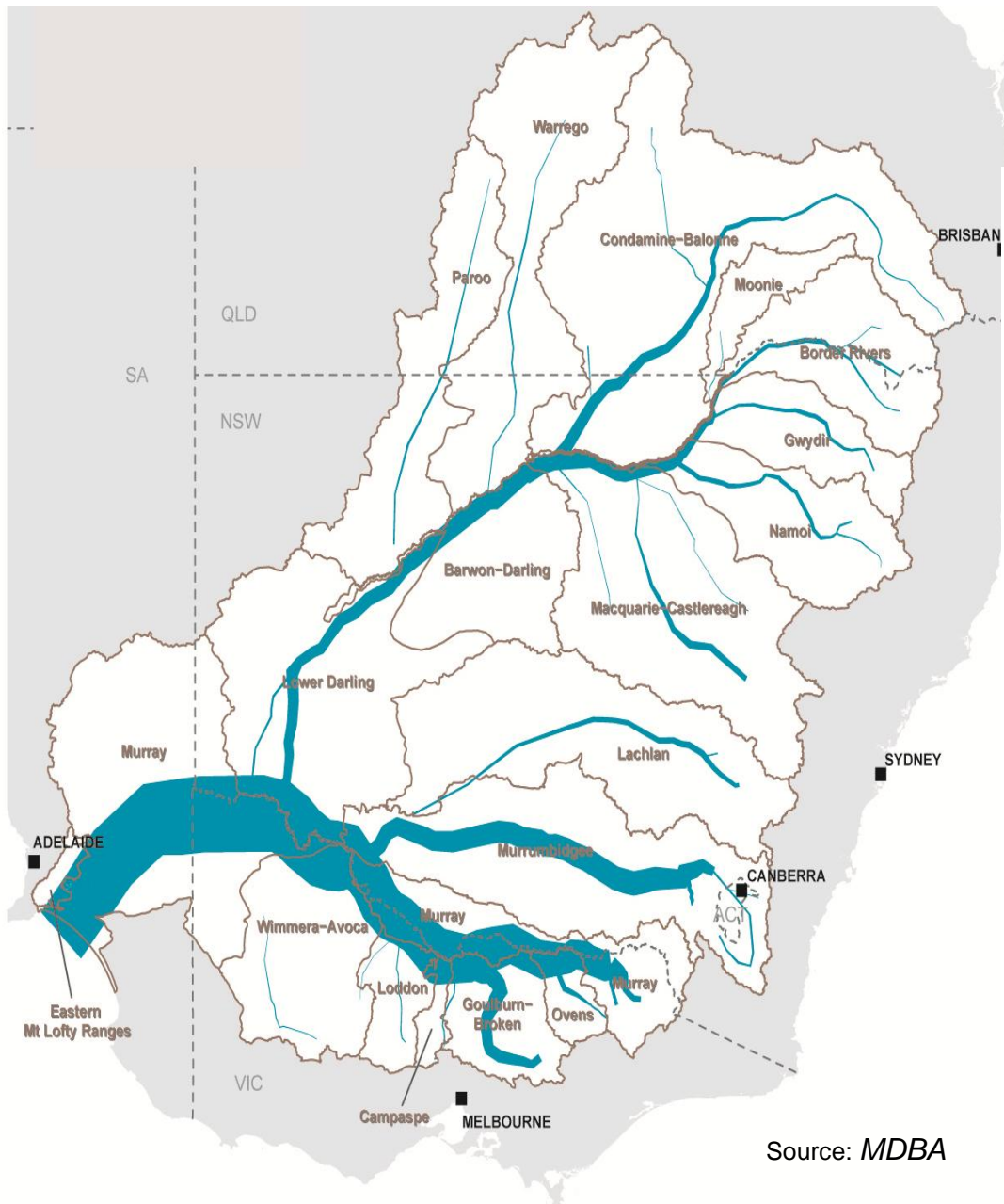
- Introduction to the Murray-Darling Basin
- Regional water policy and reform over time
- Environmental and social impacts of water reform
- Economic impacts of water reform and methodology, especially “Type 4” benefits beyond the river
- Specific example of the Basin Plan
- Key lessons

The Murray Darling Basin (MDB)



- 1,000,000 km²
- 14% of Australia (size of Spain & France)
- 80% of basin is agriculture
- 60% of Australia's irrigation with 40% of Australia's farmers
- "Food Bowl" of Australia
- Population 2,000,000, supports 20 million
- 5 jurisdictions
- Significant environmental values
- Australia's three longest rivers
- Home to 34 major Indigenous groups

Hydrological complexity of the Basin



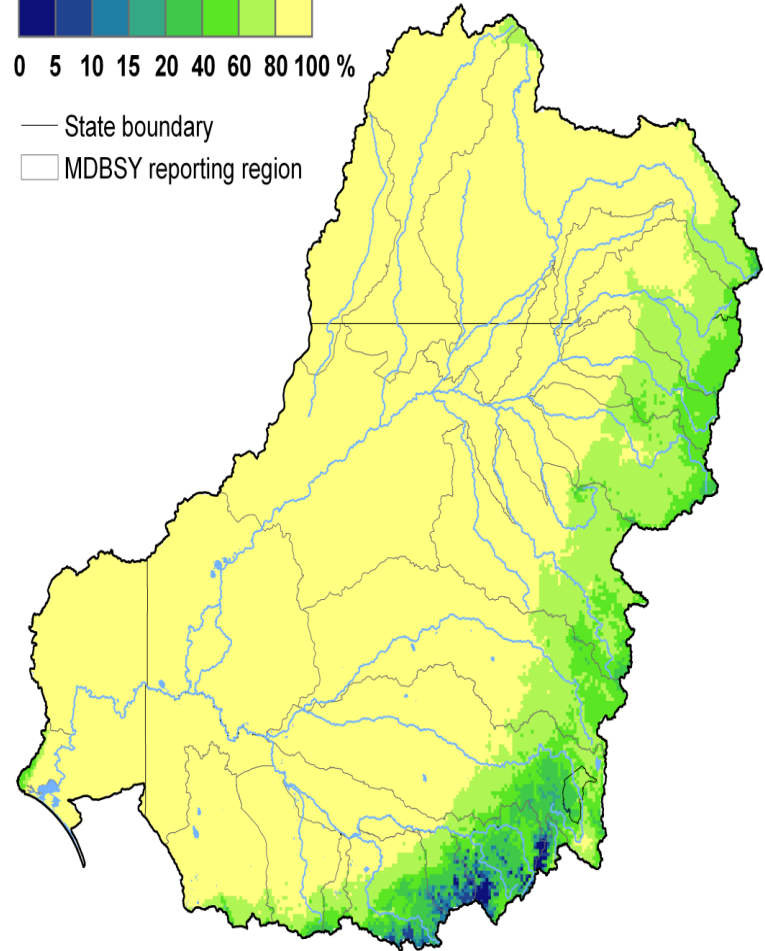
Basin Flow Generation



0 5 10 15 20 40 60 80 100 %

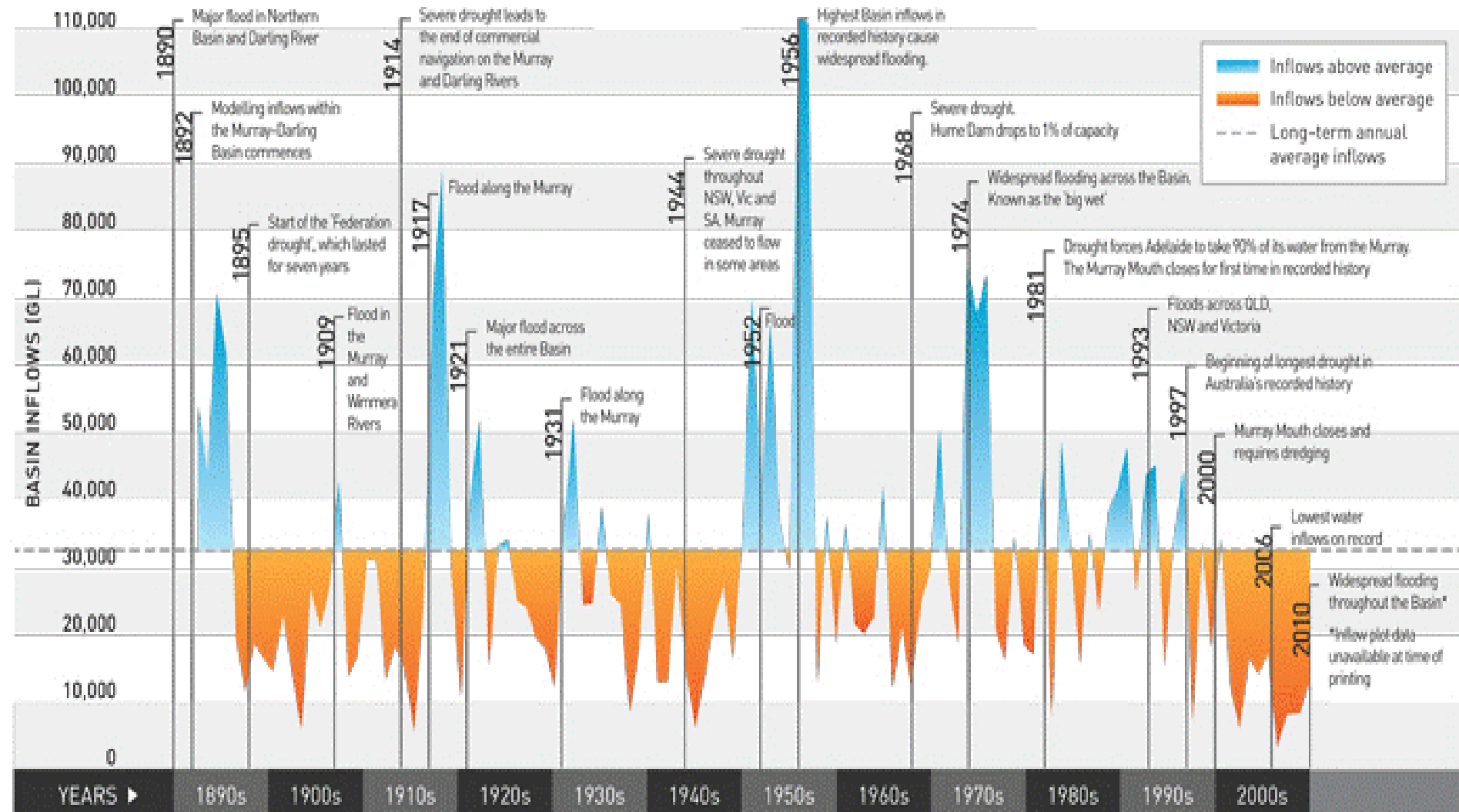
— State boundary

□ MDBSY reporting region



Source: *MDBA*

Flows in the MDB over time



(MDBA 2012)

Phases of water policy in the Murray Darling Basin

1. Exploratory phase

2. Expansionary or development phase

3. Maturation or scarcity phase

4. Transition to environmental sustainability

European settlement

1900

1980s

1994

2007

The origins of water markets

Phases of water market development

The emergence of water markets (1980s to 1994)

Water market broadening and expansion (1994–2007)

The transition to sustainable water markets (2007 onwards)

Water Policy in the Exploratory Phase



- Water rights were originally based on European common law riparian rights and vested in states
- Water was a battleground for state sovereignty in Federation (1901)
- VIC and NSW wanted water for irrigation, SA for transport

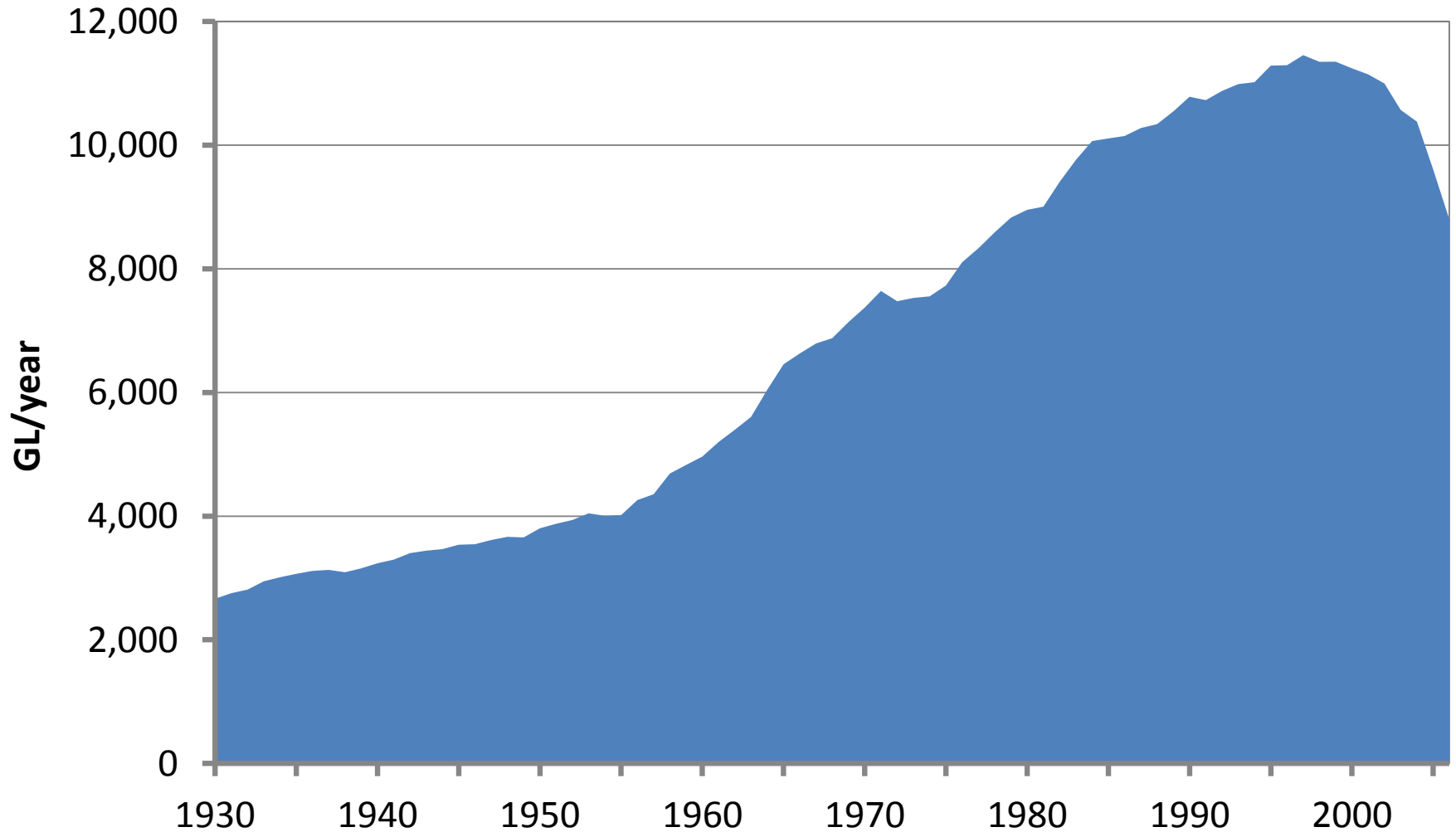
Water Policy in the Beginning Expansionary Phase

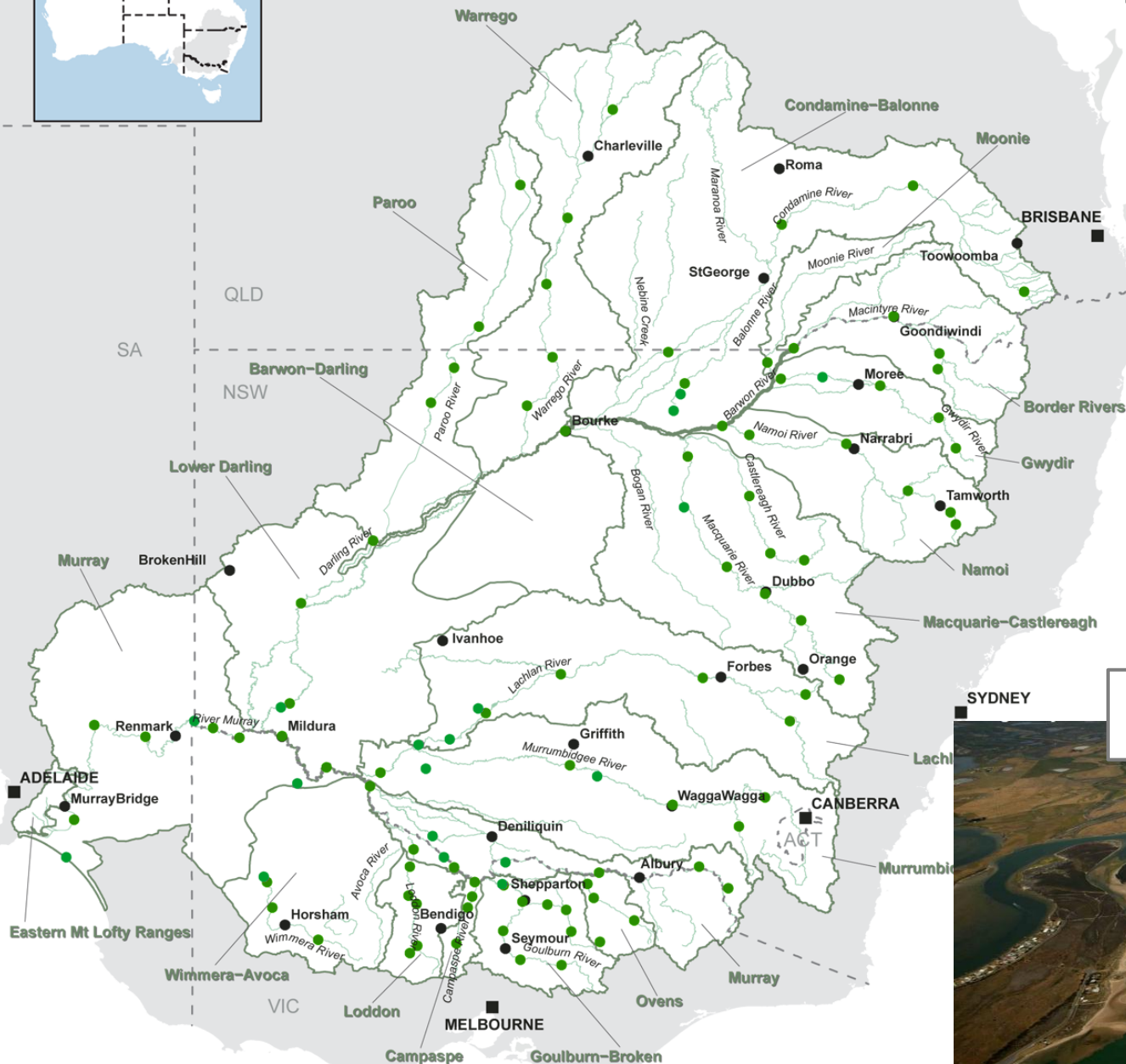


- 1914 the River Murray Waters Agreement was signed by the Cwlth Gov. and SA, NSW and VIC
- The agreement provided for equal sharing of the flow of water at Albury between NSW and VIC and guaranteed a minimum entitlement for SA
- The agreement marks the beginning of serious federal government involvement in water planning and in financing irrigation, storages and diversions



Growth in MDB water diversions





30,000 wetlands

2,442 key environmental assets
4 key ecosystem functions

106 hydrological indicator sites

Dredging the mouth of the River Murray



Irrigated Farm Differences across the MDB

VICTORIA

- Small irrigated farms, medium water entitlements (low and high security)
- Mainly permanent pasture (dairy)



NSW

- annual croppers (cotton, rice)
- have larger farm sizes
- have much larger water entitlements (mainly general security)



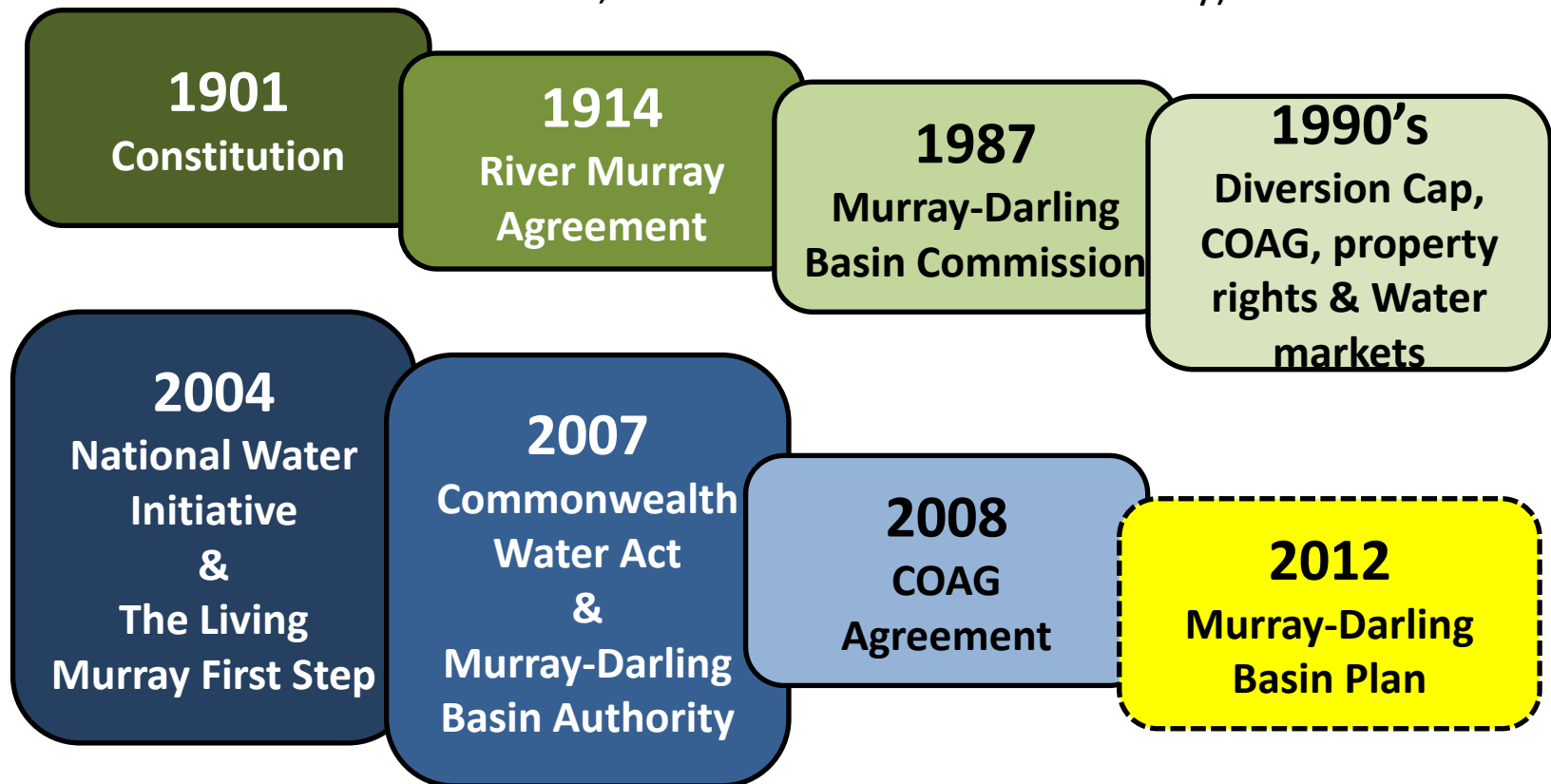
SA

- Permanent plantings (hort)
- Small farms, small water entitlements (but high security)



Building on past water reform

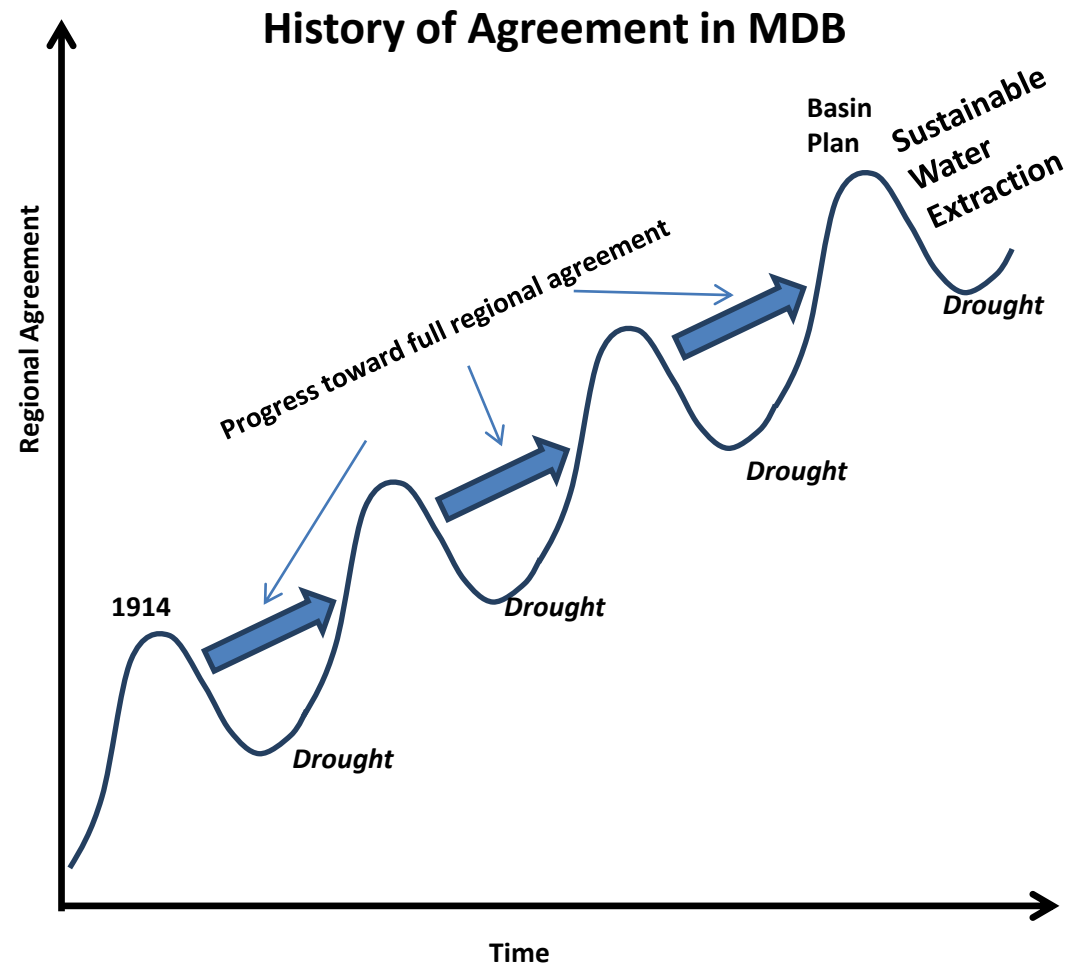
- 1990s saw strong agreement that states could not manage water policy, and in 1992 a Murray-Darling Basin Agreement was established, included in 1994 in COAG framework
 - After an audit of water resources, a cap was officially put in place in 1997
- Again, recognition of state failure to manage the MDB meant the National Water Initiative was established in 2004
- The NWI led to large-scale government programs to address over-extraction (Water Act, MDB Plan, National Plan for Water Security)



Valuing reducing regional water conflict in the MDB?

Includes: social, environmental and financial impacts

- First: History Matters:
 - 1914 River Murray agreement allowed the development of irrigation
 - Allowed water markets across state borders to be established from 1990s onwards
 - Allowed for a national plan on environmental sustainability to be developed and established
- Hence: the first requirement is to establish the period of time studied or the agreement in question

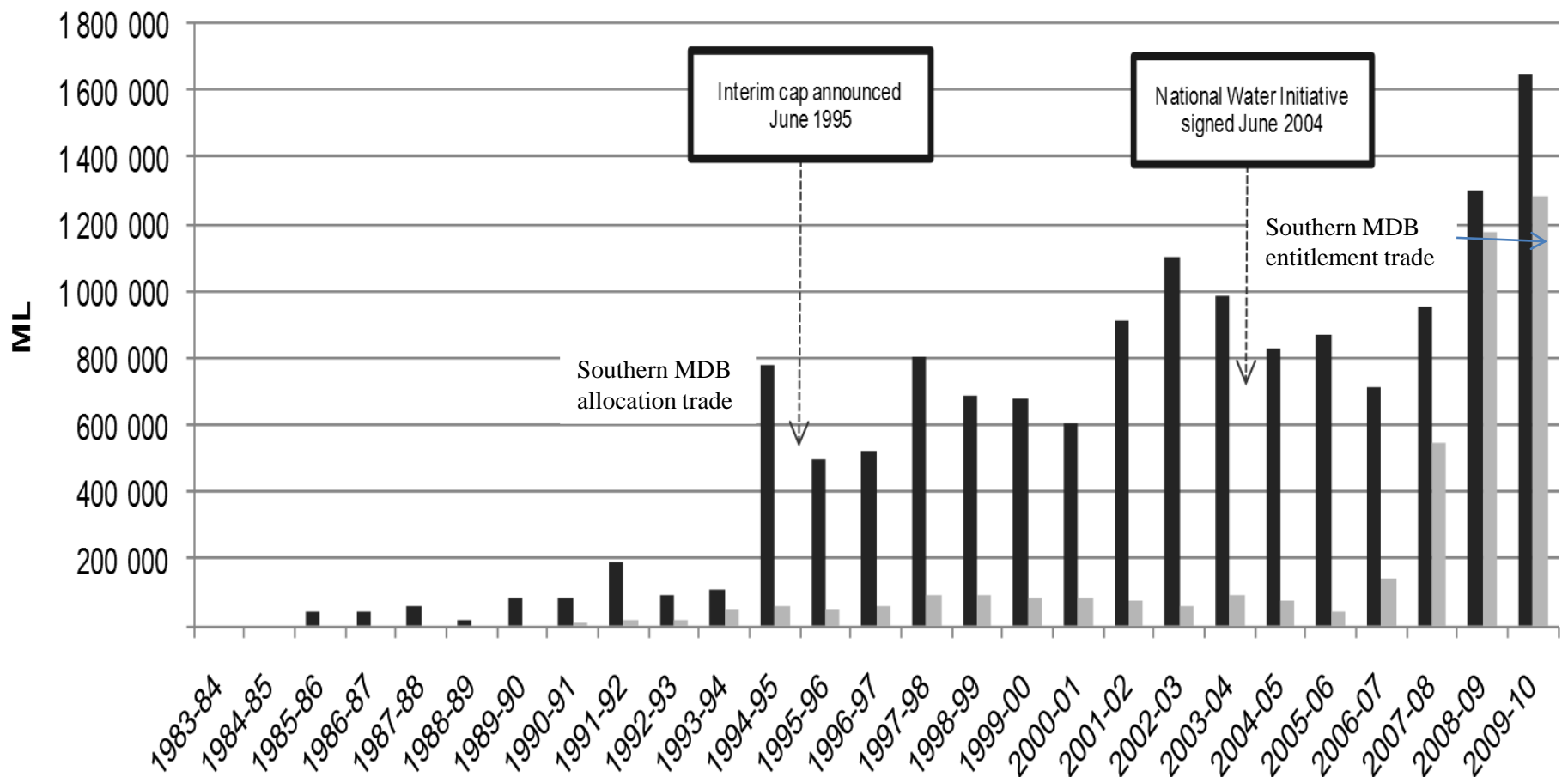


Achievements of environmental reforms: 1990s onwards

- Currently, 20% of consumptive water entitlements in the MDB have been bought back and returned to the environment
- Increased awareness of environmental water
- Improved water plans to promote environmental water management
- A view expressed on how much is needed for sustainability (versus how much can be spared)
- Institutional arrangements in place for
 - Purchase of entitlements for environmental purposes
 - Environmental water managers established
- Conditions on licences (particularly in absence of extensive water plans, i.e. TAS, NT, WA)
- Billions of dollars invested in water reform to do so

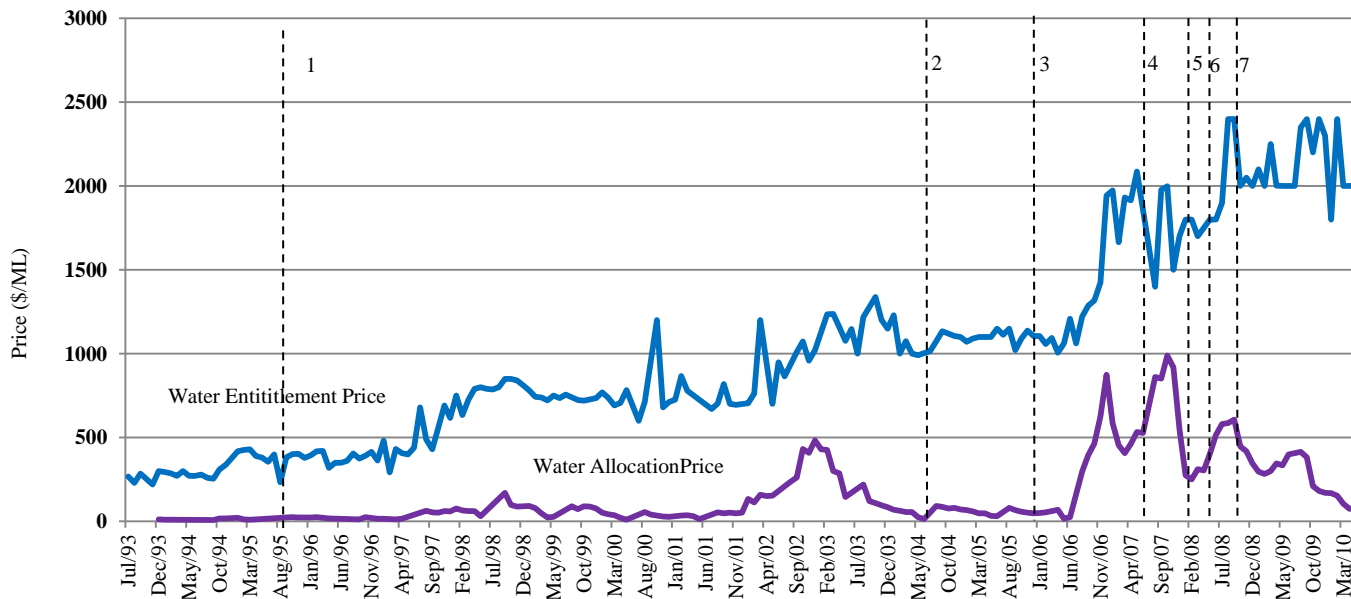
Type 4 Benefits: National policy developments & Water Markets

- Severe drought in the 1940s saw informal trading, with other trading in states occurring from late 1960s onwards
 - SA issued moratorium on any new water entitlements in 1969
- Drought in 1981 saw the Murray Mouth closed for the first time, NSW stopped issuing new entitlements
 - More informal trading allowed in the early 1980s, formal pilot of trade in 1986/87
 - Legislation backing trade between districts and private diverters was implemented 1995



Type 4 Benefits Continued:

- Major cost was the activation of sleepers & dozers in the mid 90s
- Major benefits in managing the Millennium drought in the 2000s, facilitating autonomous adjustment, accessing finance, and encouraging investment
 - Allows real option approaches by farmers to be applied
 - Policy should support adjustment rather than coping strategies
 - Develop risk-management strategies users can apply when they need
- Realising benefits at farm, industry and regional level
- Total trade in 2008-09 of around \$2.8 billion, up 95% from the previous year

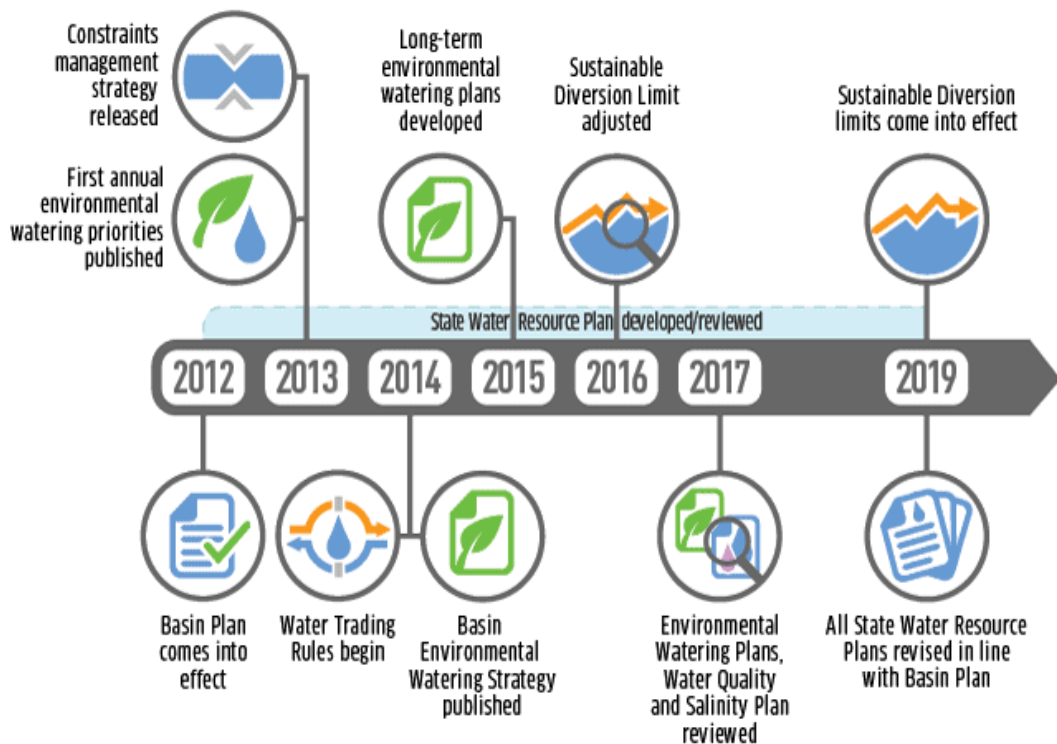


Victorian Water Prices \$/ML with significant policy implementations at various points in time

Valuing a Specific Regional Agreement: MDB Basin Plan example – Just one more step along....

- Overall objective is to coordinate water policy across 4 states and one territory
- Sets sustainable diversion limits
- Ensures consistent water trading rules across MDB
- Develops environmental watering strategies
- The environmental, social and economic outcomes achieved from a 2,750 GL reduction target are the benchmark outcomes against which all SDL adjustments are measured

BASIN PLAN implementation steps



Conflict on an Australian Scale

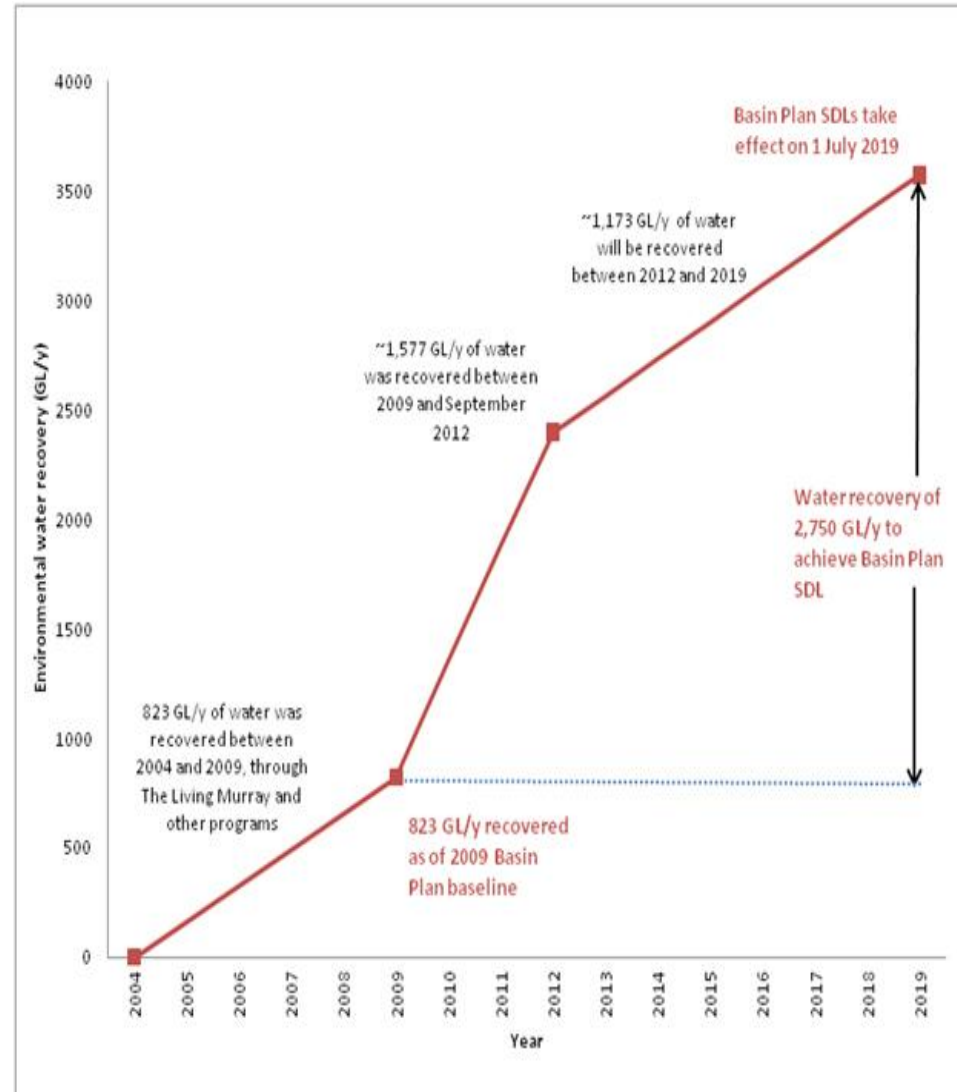


Assessing the net benefit of MDB reform of returning 2750 GL from consumptive to environmental use

- No one method
- Any formal assessment needs a ‘with’ and ‘without’ policy scenario
- Large amount of different studies done (of varying quality):
 - Baseline socio-economic circumstances (profiling using population and census data)
 - Economic modelling and analysis
 - ABARES AusRegion CGE model, UQ’s state contingent model, Monash COPs model,
 - Local profiles and assessments
 - Surveys of farmers to suggest exit probabilities
 - Indicators of community vulnerability & adaptive capacity
 - Effects of change in water availability on indigenous population
 - Assessment of benefits
 - Literature review of willingness to pay studies for water improvements, use & non-use values
 - Attempt at Cost-benefit analysis – a regulatory impact statement was written
- Costs of Consultation?

Assessing the net benefit... Continued

- Net Assessments of 'use' benefits
 - \$100 million per year (benefits to tourism, floodplain agriculture, recreational and commercial fishing, recreational boating, as well as benefits from avoided costs)
- Significant 'non-use' benefits
 - estimated around \$3 to \$8 billion
- Costs:
 - \$109 million in foregone agricultural profit from reduced water use
 - Additional administrative costs of \$100 million a year
 - Costs are not even across regions, most impact will be felt in NSW Murray & Murrumbidgee
 - Jobs lost
- Costs:
 - But – no benefits were given to the adaption of reforming water markets, etc



Adaptation benefits of water markets going forward...



VICTORIA

- In the drought, dairy farmers bought feed, stopped watering pasture and sold water allocations. Others sold permanent water and retired/sold farm

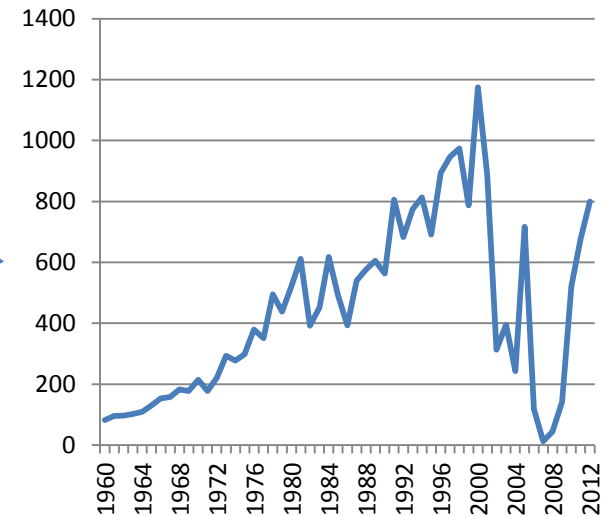
NSW

• Annual farmers stopped farming, sold water allocations

SA

• Perennial farmers bought water allocations to keep their plantings alive

• Large amount of adaptation benefits



Aus Rice Production (1000MT)

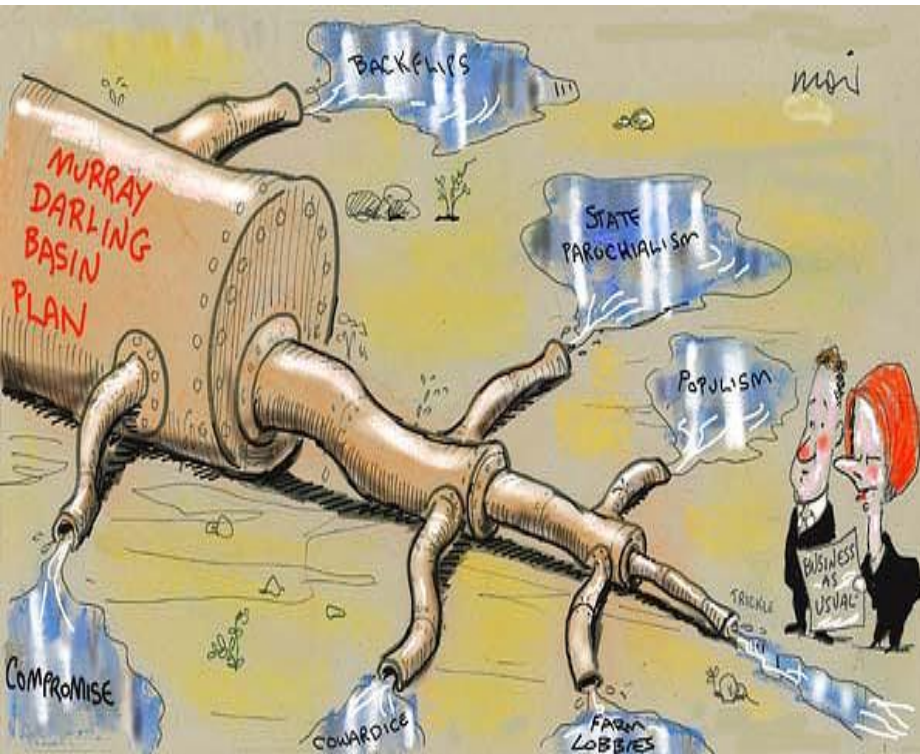


Assessing Net benefits of Reforming Water Market Policy

- Many regional boundary issues still exist in water markets. For eg:
 - Caps: 4-12% limits have been placed on the amount of water that can be traded out of a state within a given year
 - Trade suspensions: Storage issues led to water allocation trade being suspended halfway through the seasons from 2010-12
 - Carry-over: Different rules for different states across different years
 - Exit fees: Some irrigation operators charged large exit fees for irrigators to sell permanent water and exit, rules were needed to reform this process
- Many Australian studies have been conducted on the impacts of water markets:
 - Qureshi *et al.* ([2009](#)) found trading increased and improved economic efficiency
 - Peterson *et al.* ([2004](#)) estimated the gains from trade in a dry year at AUD \$495 million
 - Using CGE modelling, NWC (2010) suggested that water trading increased Australia's gross domestic product by \$220 million in 2008–09, and NWC (2012) found interregional and intraregional water trade increased economic gains between AUD \$1.05 to \$1.2 billion from 2007-2009
 - Jiang and Grafton ([2012](#)) use a hydro-economic model to show that with inter-regional water trade, the on-farm impacts of climate change in periods of much reduced water availability is mitigated compared to without inter-regional water trade

Key Lessons from Australia

- Decide the period of time involved, and what agreement to focus upon. Path dependency exists.
- Drought is the main driver of regional water policy reform
- Regional leadership is required, as well as Federal leadership
- Many water trade benefits are driven by diversity of agricultural production
- Many benefits from agreements are derived beyond 'the river', but are often not accounted for in evaluation



- Before agreements are put in place, there needs to be:
 - Good hydrology understanding
 - Sustainable diversion limits established
 - Enforcement and metering possible
 - Water rights unbundled from land
 - Flexibility with agreements and institutions
- Finally, there should be a limit to how much valuation one undertakes. Quality is better than quantity



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