



Climate change impacts on future water resource availability

John Williams and Avtar Singh

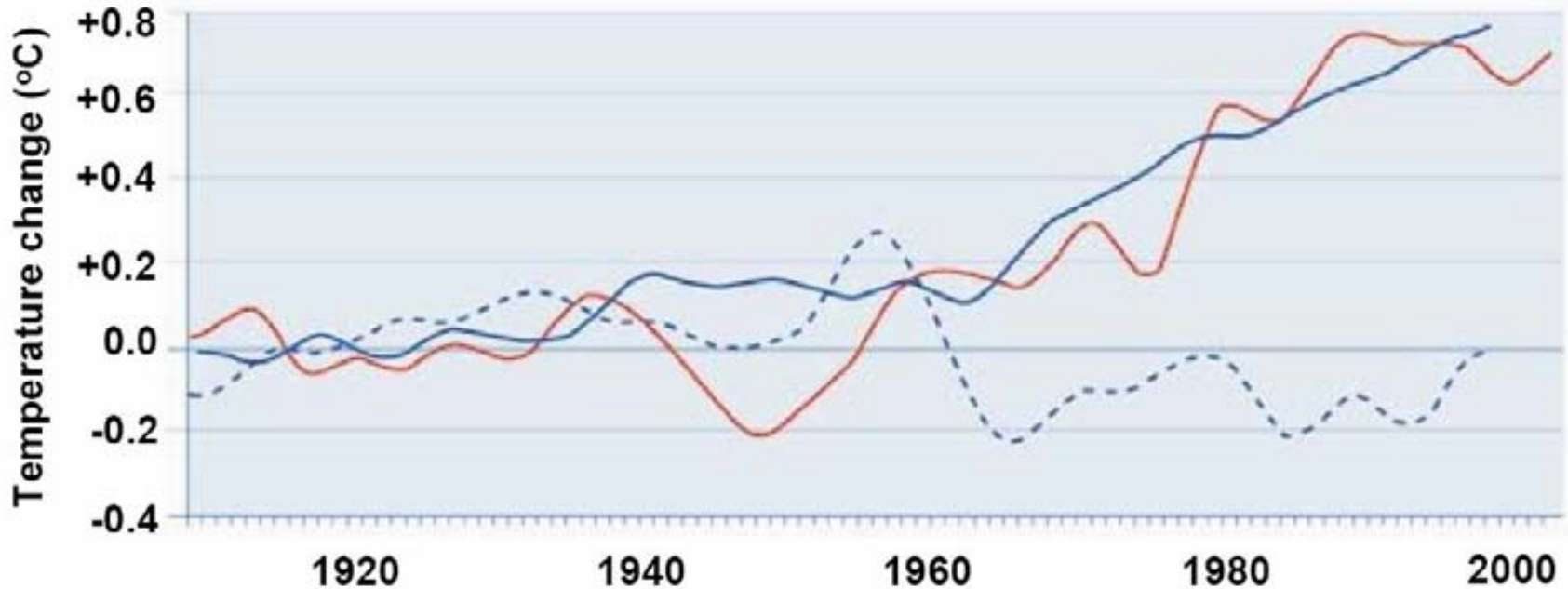
Natural Resources Commission, NSW

March 2007

In this presentation

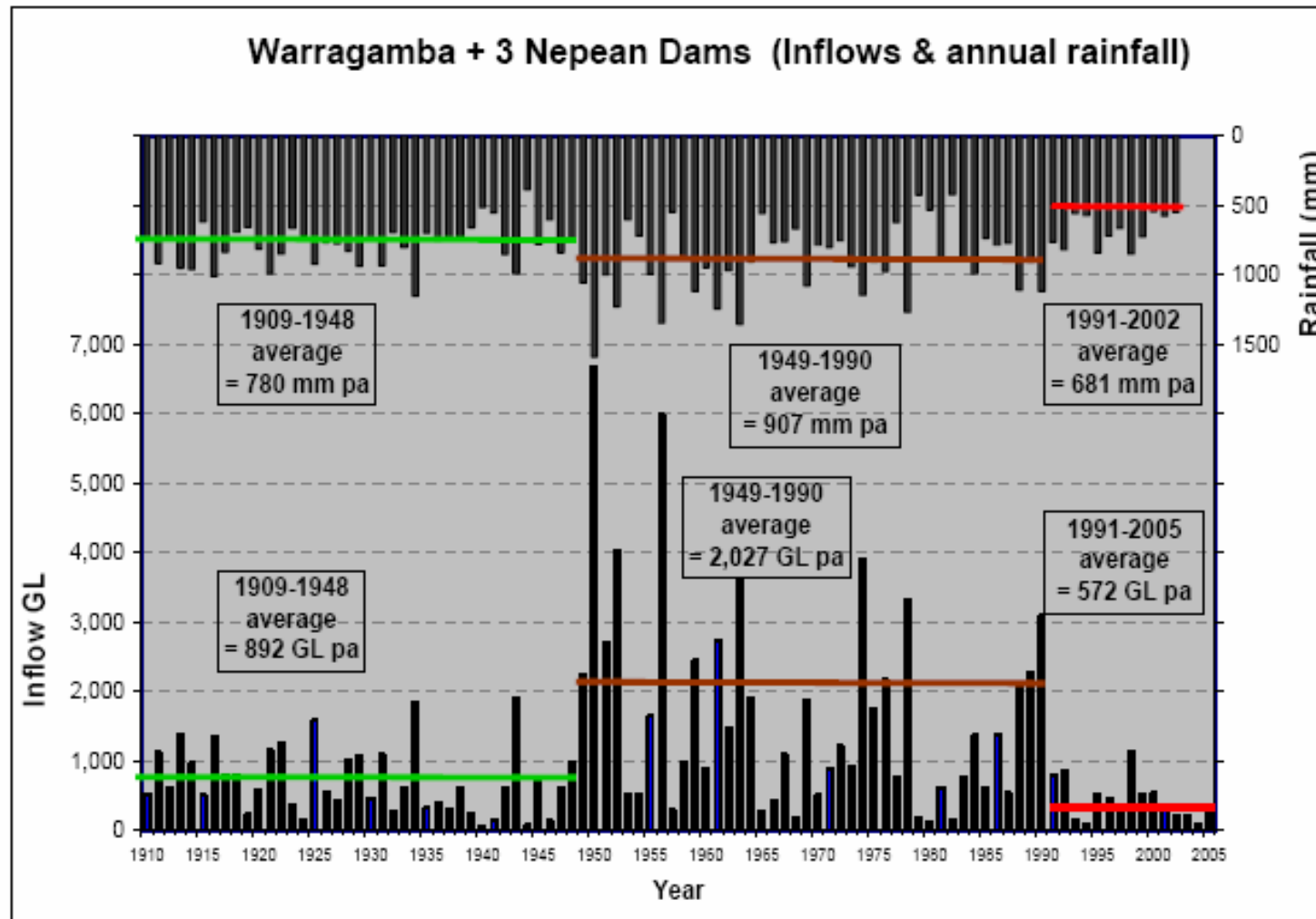
- Likely impact on water resources of both a climate shift and climate change
- Overview of current level of water resources use
- Natural resources targets for rivers, groundwater, and wetlands against this background
- Standards by which targets may be achieved

Australia is warming



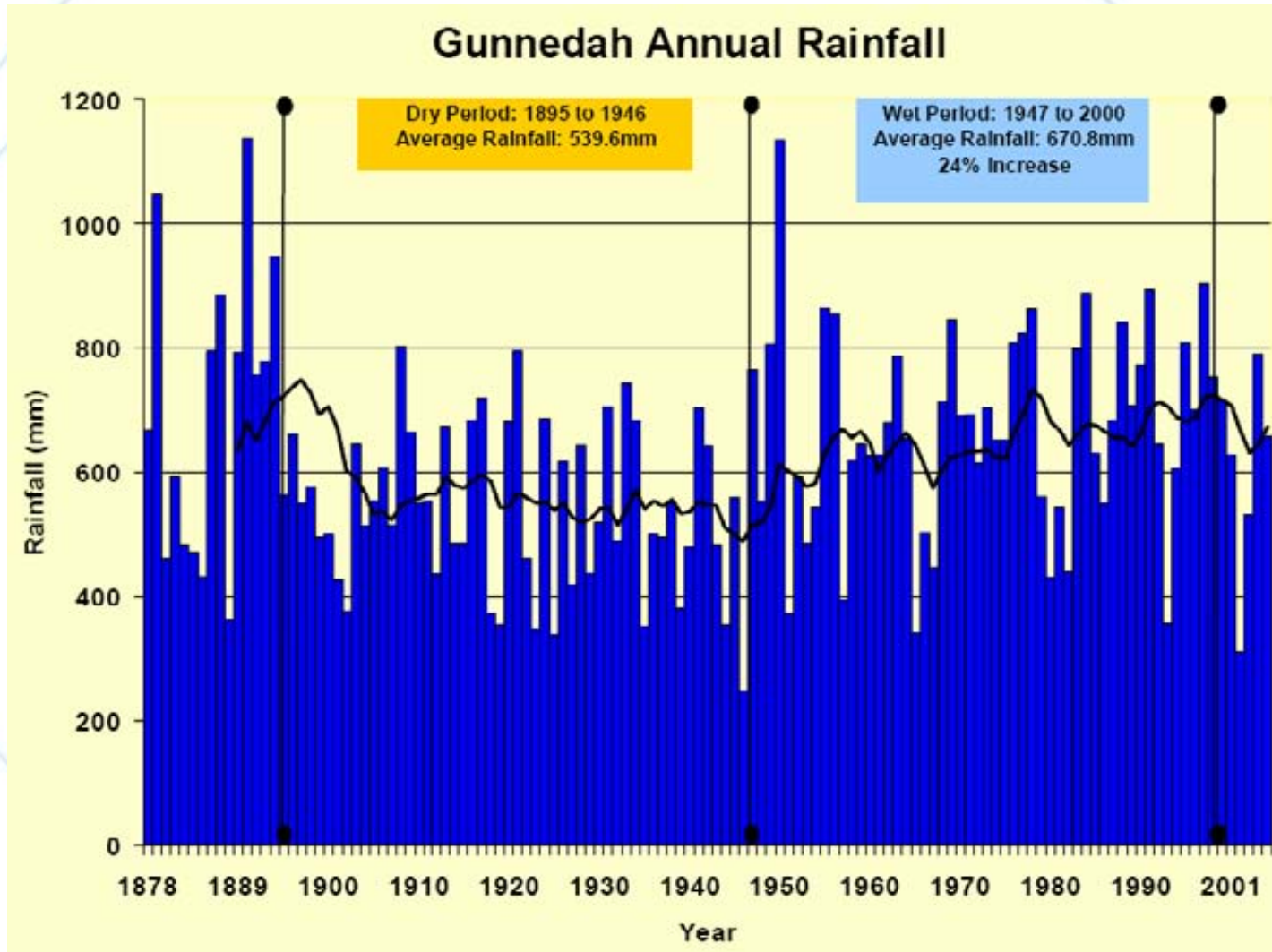
- Australia's mean temperature since 1910
- 8 Climate models with additional greenhouse gases in the atmosphere
- - - Climate models without additional greenhouse gases in the atmosphere

Rainfall trends



Source: Sydney Catchment Authority, 2006.

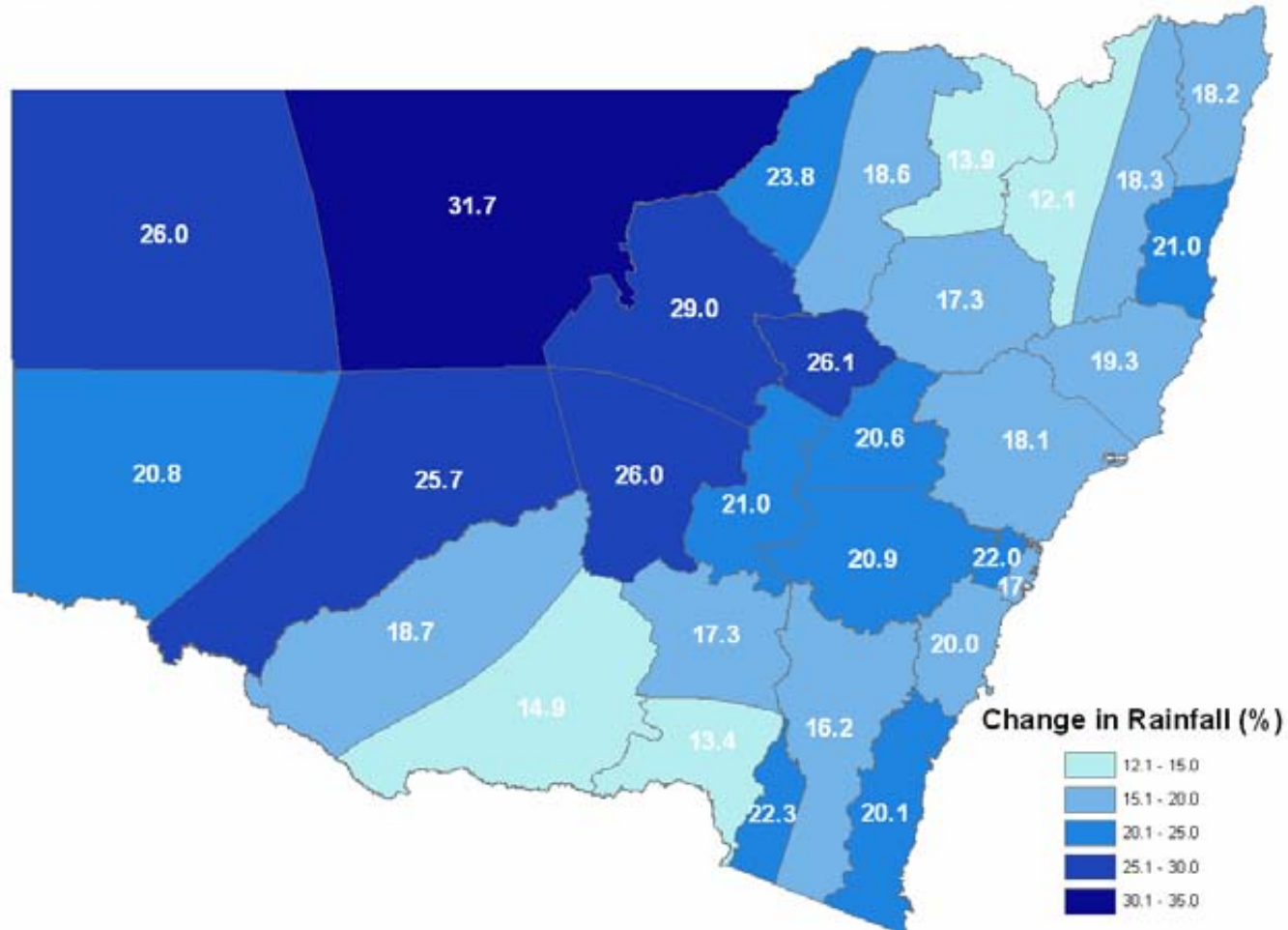
Rainfall trends...*contd*



Source: Barry Hanstrum, Bureau of Meteorology

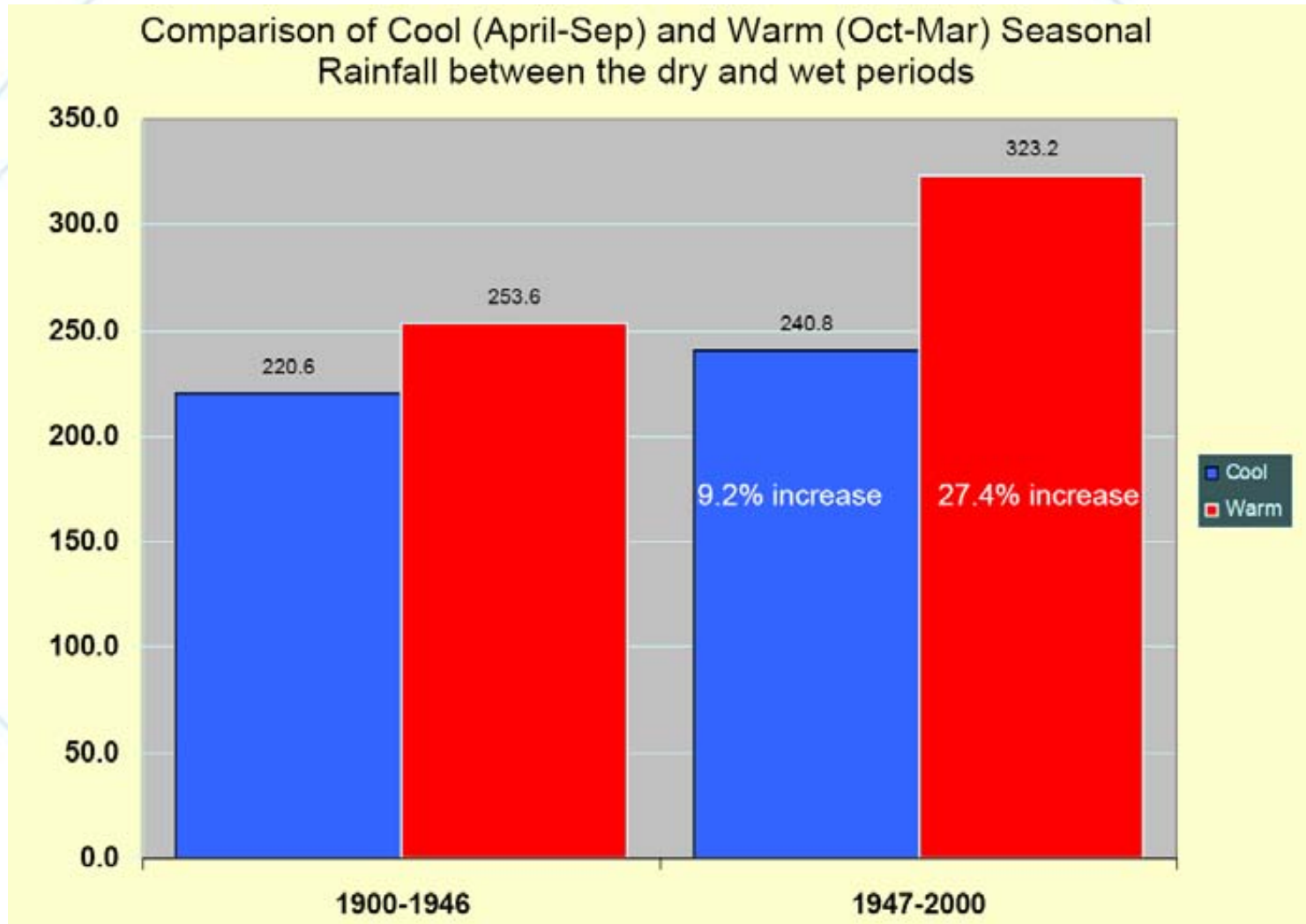
Rainfall trends...*contd*

Change in annual average rainfall between the two periods 1900-1946 and 1947-2000



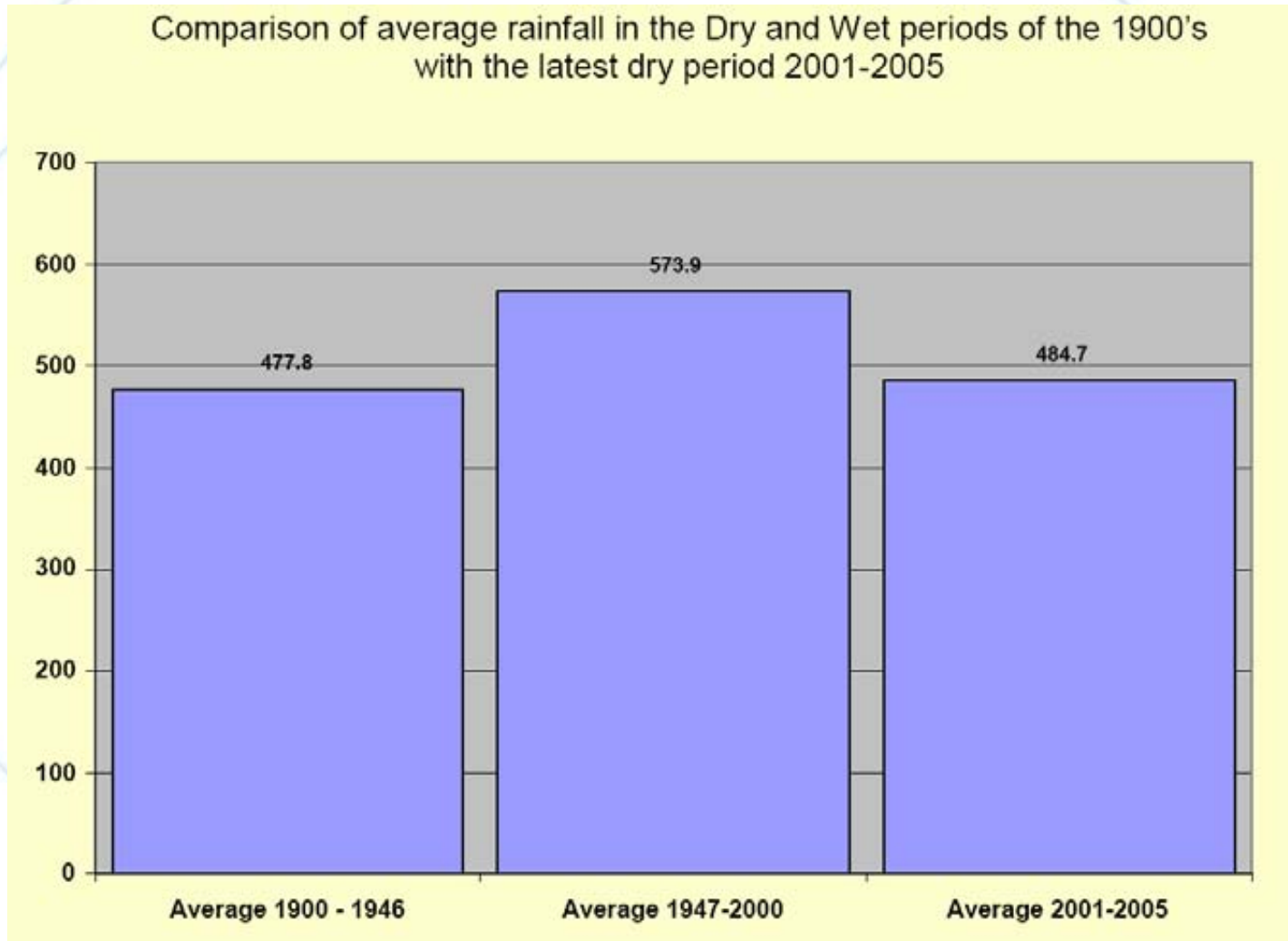
Source: Barry Hanstrum, Bureau of Meteorology

Rainfall trends...*contd*



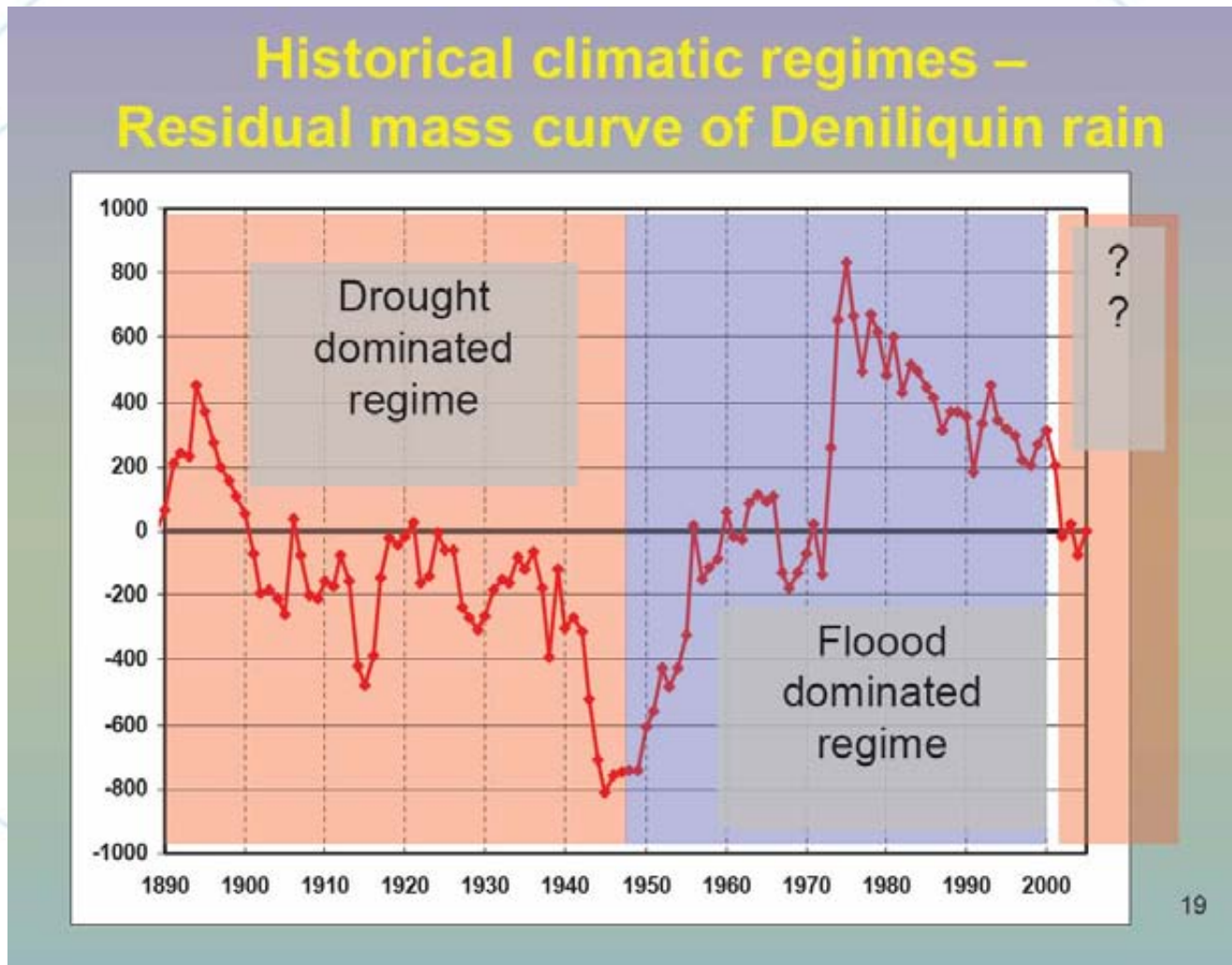
Source: Barry Hanstrum, Bureau of Meteorology

Rainfall trends...*contd*



Source: Barry Hanstrum, Bureau of Meteorology

Rainfall trends...*contd*



Rainfall trends...*contd*

Summary findings worst case climate change modelled scenario

Average annual result	% Change in valley			
	Macquarie	Gwydir	Namoi	Border Rivers
Headwater storages inflow	-26	-20	-43	-14
Irrigation extractions	-21	-11	-7	-1
End of system flows	-28	-19	-48	-19

22

Water resources in 1995-96 (GL)

Murray-Darling Basin	Total divertible fresh resource	Total use in 1995-96	% Utilisation
NSW	5,850	6,750	115
VIC	6,590	3,790	57
QLD	950	370	39
SA	20	500	2500



Source: *Water and the Australian economy* (Photo: Darling River)

SWMA 'Development' categories in NSW

Category number	Category description	Number of SWMAs (%)
1	Low Level Resource Development	30
2	Medium Level Resource Development	21
3	High Level Resource Development	5
4	Over Developed Resource	44

SWMA – Surface Water Management Area

Source: Australian Natural Resource Atlas

Groundwater resource

GMU - Name	Total abstraction (ML/y)	Total allocation (ML/y)	Sustainable yield (ML/y)
Upper Namoi Alluvium	81800	279176	118000

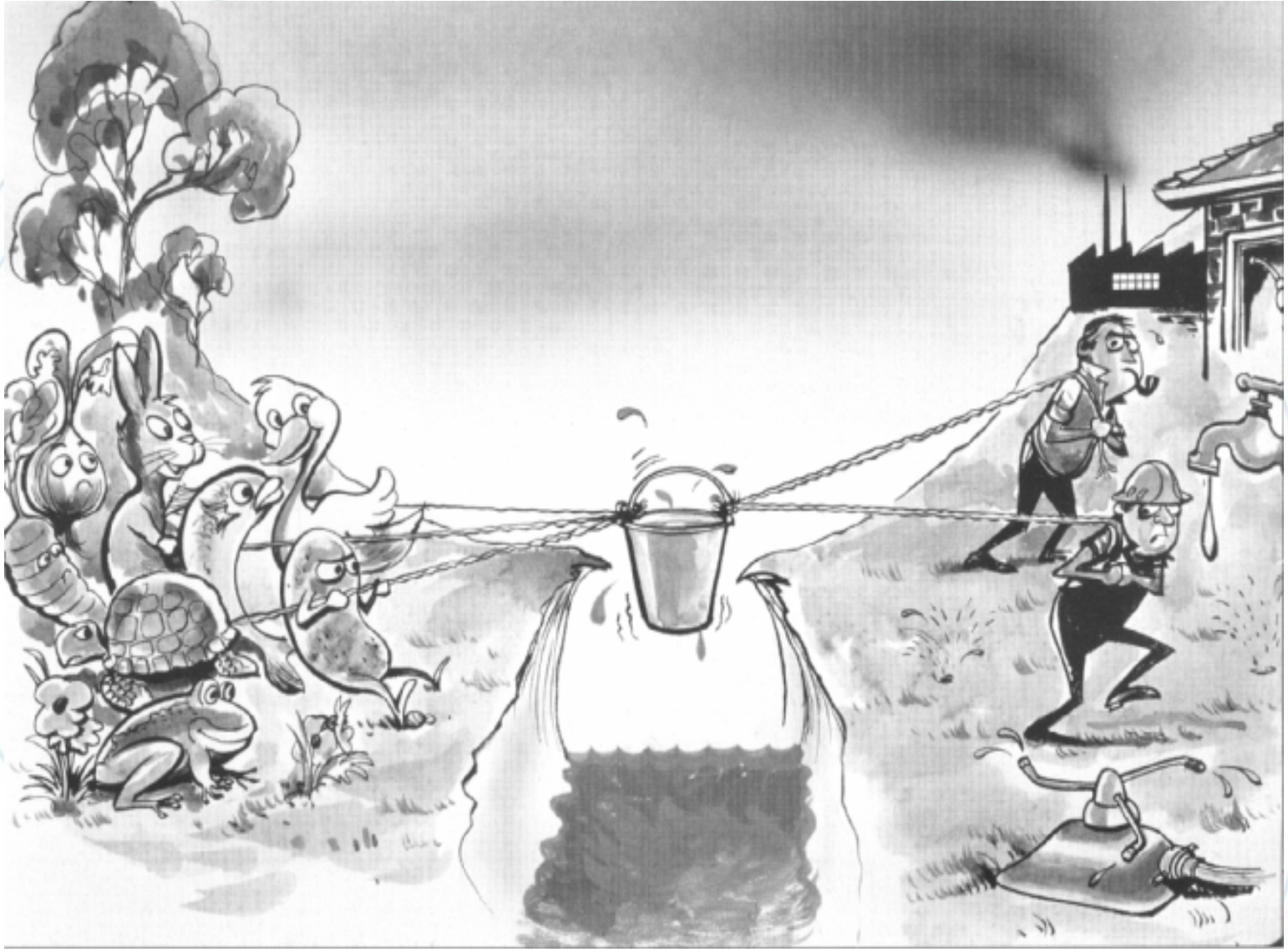
	Abstraction	Allocation
Category 1 (% of Total)	44	27
Category 2 (% of Total)	24	16
Category 3 (% of Total)	16	7
Category 4 (% of Total)	16	51

Source: Australian Natural Resource Atlas



Tension between water extraction and water for river health





Impact of climate change

- Australia's mean temperature is projected to rise by 1.0 to 1.4°C by 2030
- We appear to be heading for an unusually dry winter
- Average in-river flows over the next 5 years has fallen by 10%
- MDB water quality is showing degradation
- Namoi groundwater is declining

Against this background we have state and catchment **targets** to improve by 2015 for river and groundwater health



Response to climate change

- Adapt climate change into planning and policy
- Environmental water management
- Moratorium on further extractions from the MDB waters
- Involve CMAs in developing and implementing the basin wide plan

- NSW CMAs have developed catchment targets for water in their catchment action plans
- *Standard for Quality Natural Resource Management* will help address the impact of climate change

CMA Catchment target – Water

Border Rivers Gwydir CMA

- By 2015 maintain or improve the condition of all sub-catchment based on the scores from the 2001 Riverine Condition Assessment Index

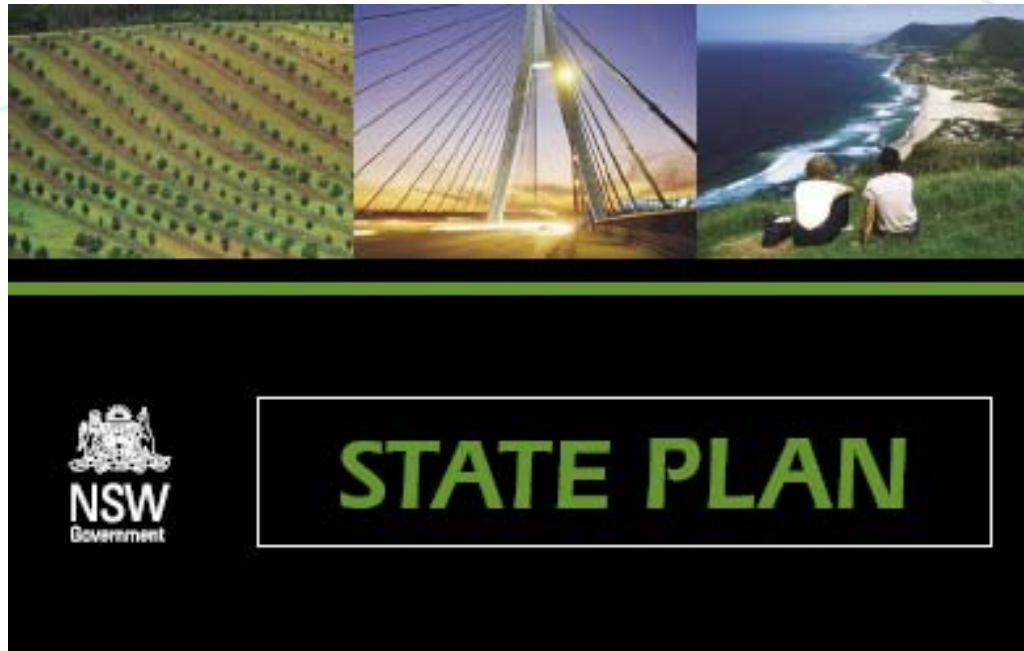
Namoi CMA

- From 2016, there is an improvement in the condition of surface and groundwater ecosystems

CMA Catchment target – Water

Central West CMA

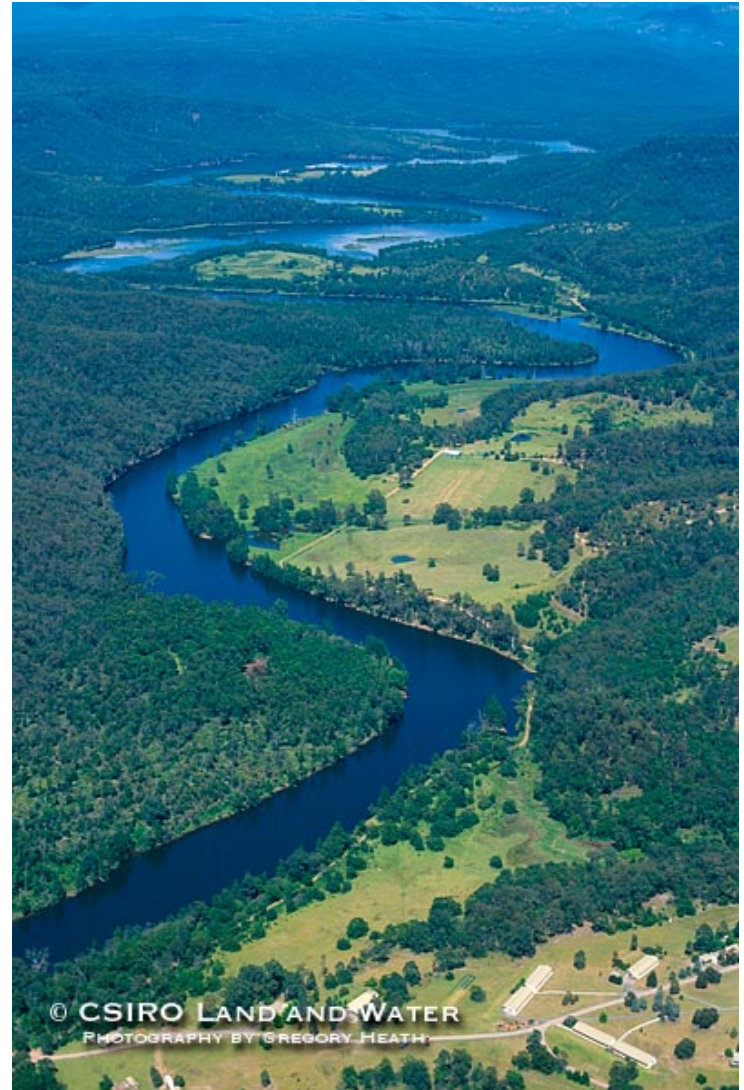
- By 2016, improve surface and groundwater system health across the catchment, as measured by:
 - a 5% reduction in the modelled result for suspended sediment
 - temperature to be restored within 2C of median levels
 - a reduction in the duration of blue-green algal blooms
 - no detection of hazardous chemicals above ANZECC guidelines
 - faecal coliform reduced below primary contact levels at key sites
 - flow rules in operation to meet the long term extraction limit and environmental water requirements, as defined in water sharing plans.



State-wide targets for natural resource management (Biodiversity, *Water*, Land, Community)

State-wide target – Water

- Riverine ecosystems
- Groundwater systems
- Wetlands
- Marine waters and ecosystems
- Estuaries and coastal lake ecosystem

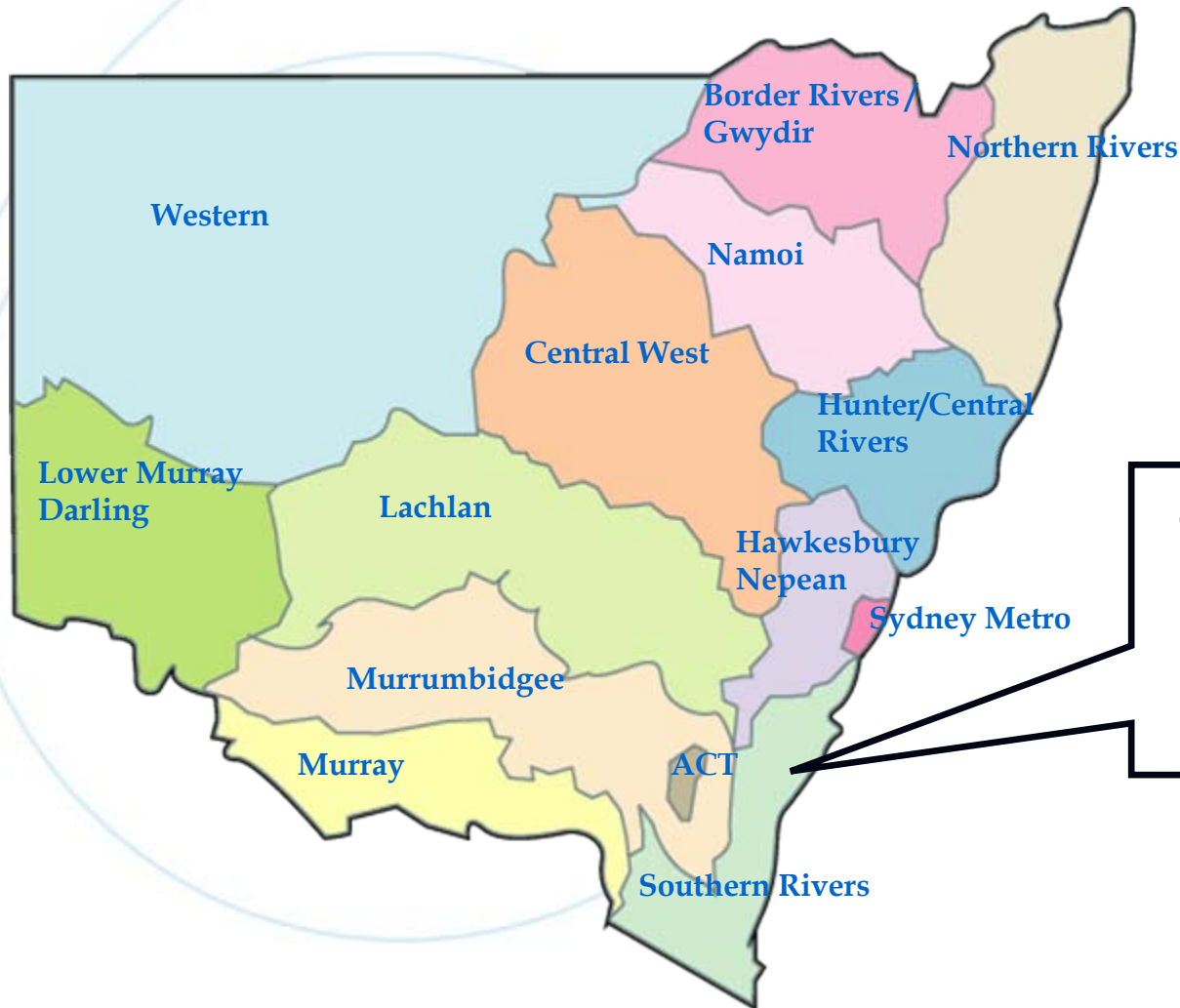


How the targets will be delivered

- Catchment Action Plans (prepared by Catchment Management Authorities)
- Monitoring and evaluation
- *Standard for Quality Natural Resource Management*
- Support from other natural resource managers



Catchment Management Authorities

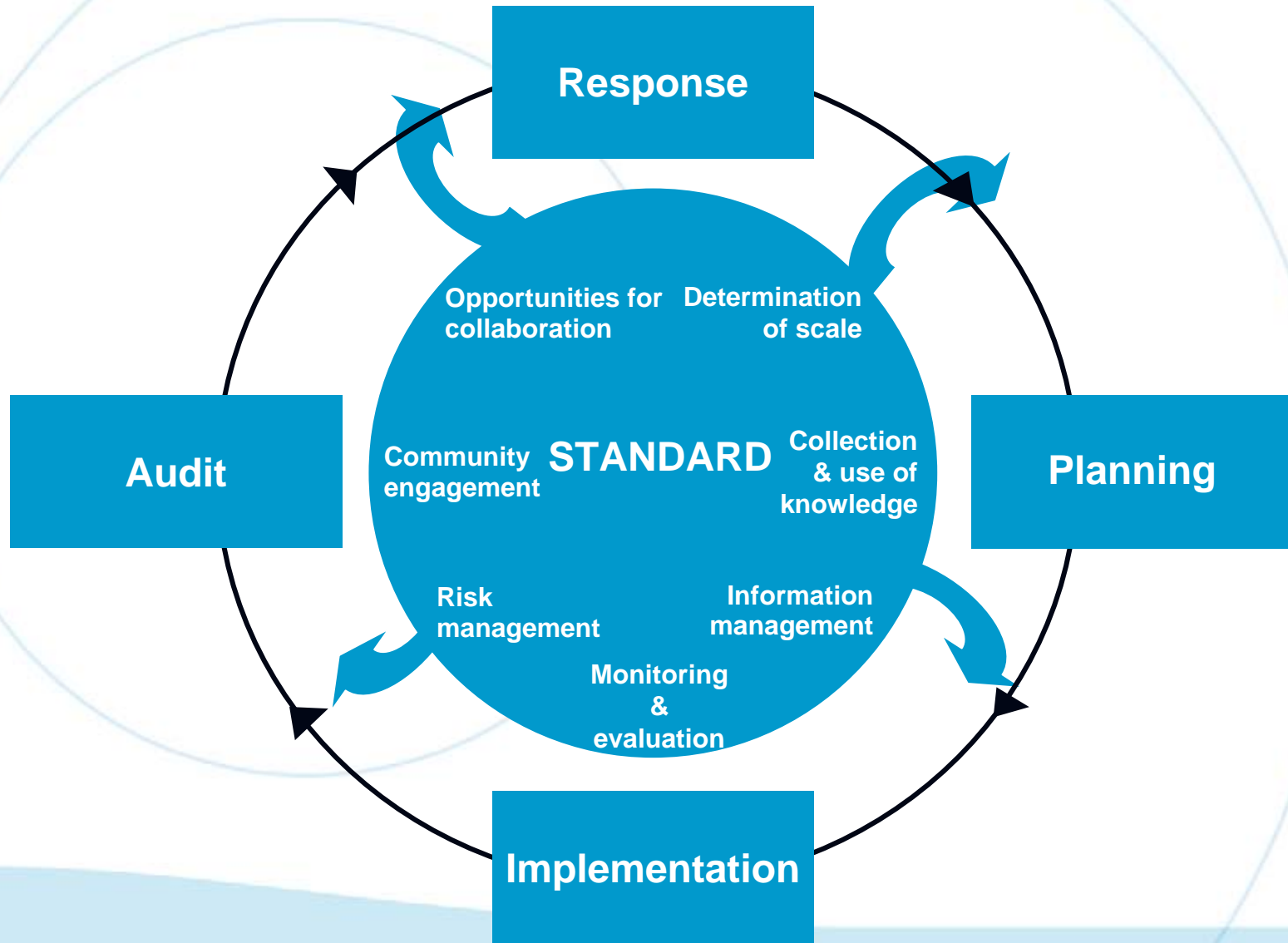


Community board
General Manager
Staff

Catchment Action Plans

- Ten-year strategic, non-regulatory plans
- Identify regional natural resource management priorities and their linkage to state and national priorities
- Prospectus for government and private investment
- Guide best actions to deliver integrated natural resource management outcomes

Standard for Quality NRM



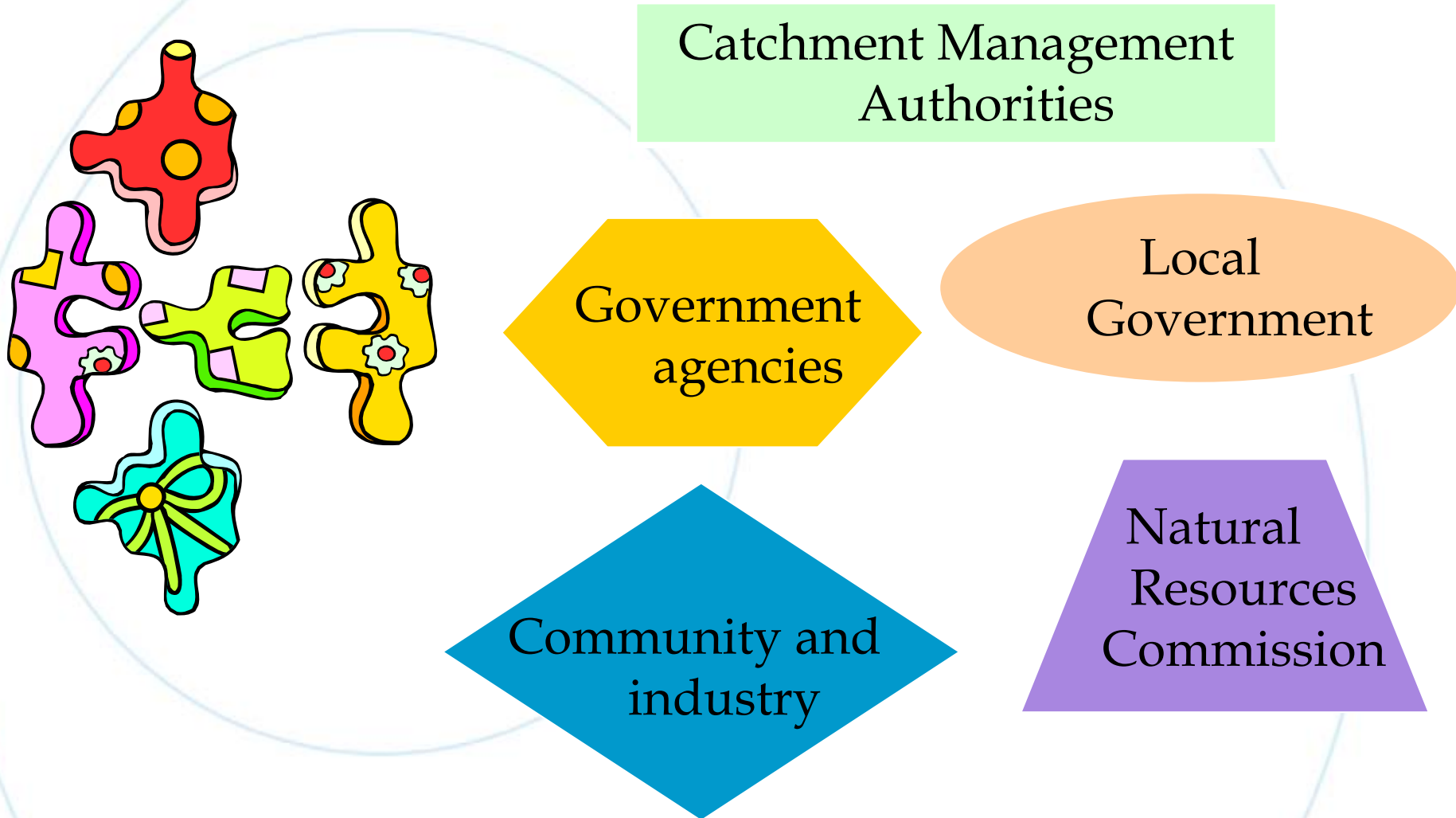
Example of application of Standard

- Risk management – requires CMAs to systematically assess and manage all risks associated with NRM activities.

This includes:

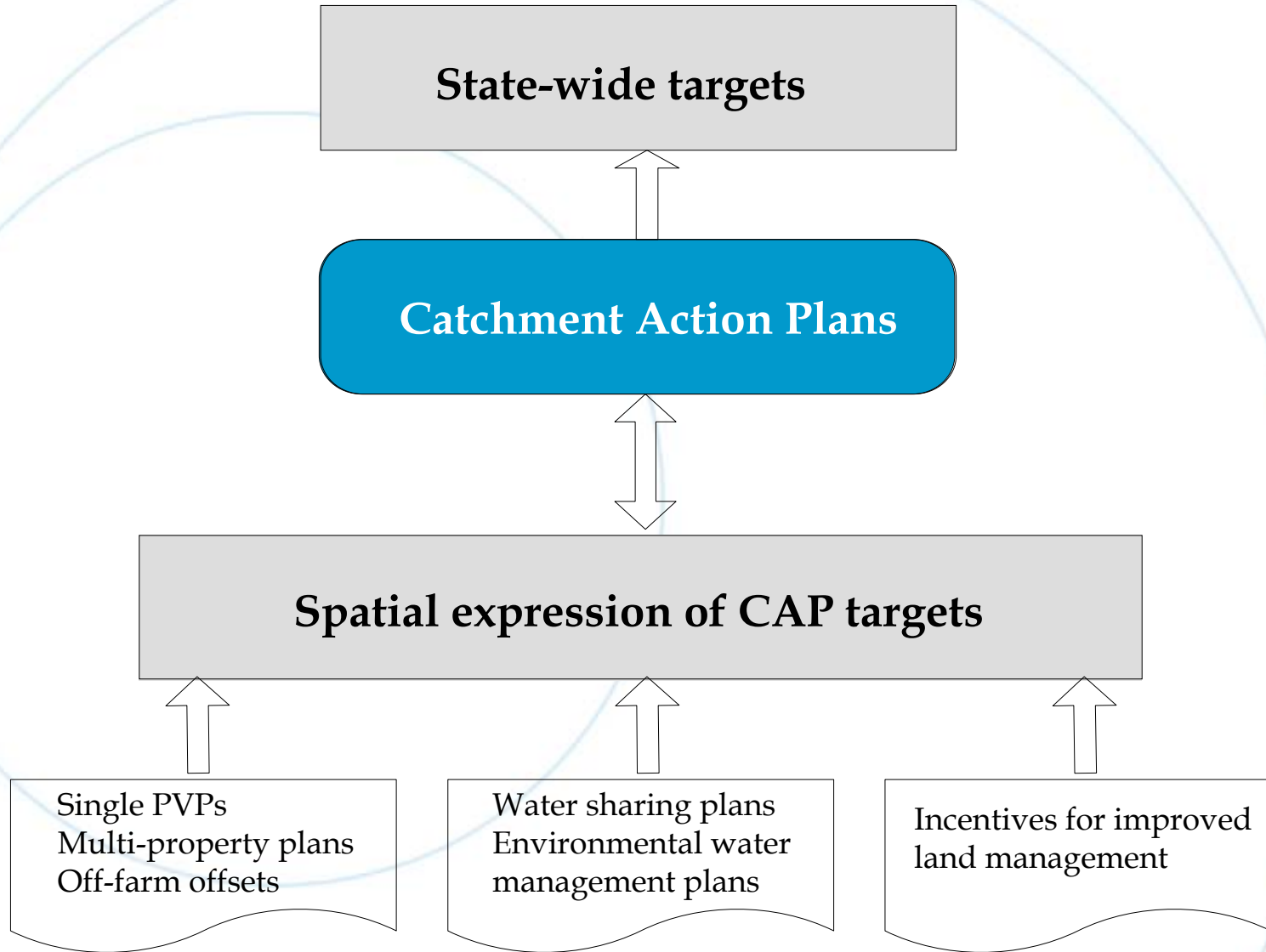
- anticipating changing trends and putting and mitigating their impacts, or
- adapting to them as they occur.

Roles in the new NRM scene



Natural Resources Commission

- Independent advisory body
- Not subject to Ministerial control re: preparation and content of any advice or recommendations
- Recommend state-wide standard and targets
- Recommend approval of Catchment Action Plans
- Audit effectiveness of implementation of Catchment Action Plans
- Undertake other inquiries into natural resource management issues, as required



Catchment
Action Plans
(CAPs)

LEPs

Land Use
Strategies

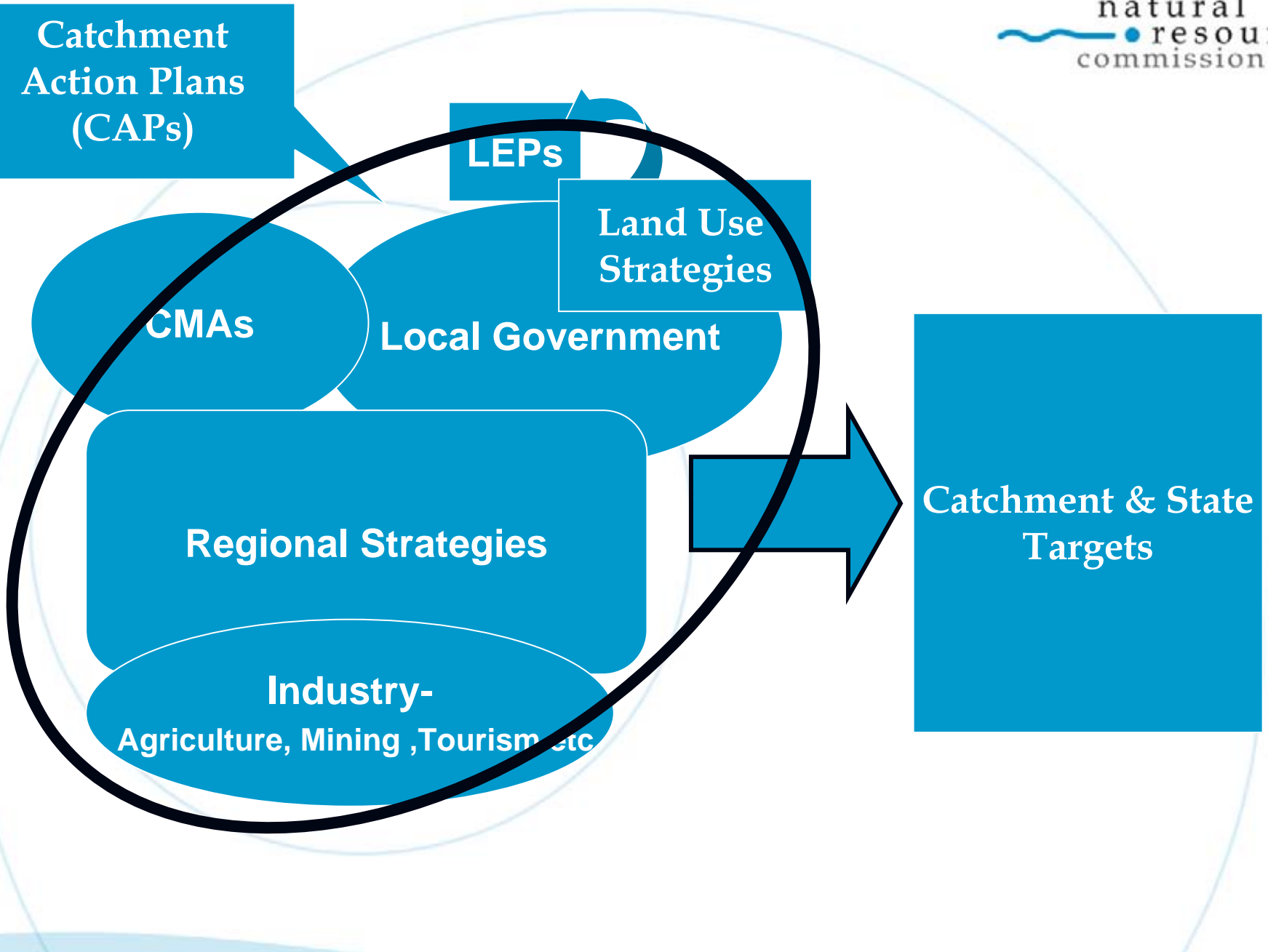
CMAs

Local Government

Regional Strategies

Industry-
Agriculture, Mining, Tourism etc

Catchment & State
Targets



Way forward

- Recognize that access to water resources will be decreased because of climate shift and change
- Recognise that industry, community and government are committed to water reform to return over-allocated rivers and groundwaters to sustainable levels of extraction
- Water reform and climate shift and change are underway together
- Thus to meet the state and catchment targets for managing our water resources