



# Applying IWRM for sustainable basin management in Timor-Leste – example from Australia

16 October 2017 Dili, Timor-Leste



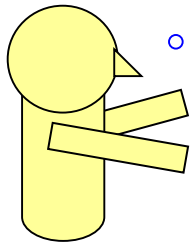
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# Integrated Water Resources Management

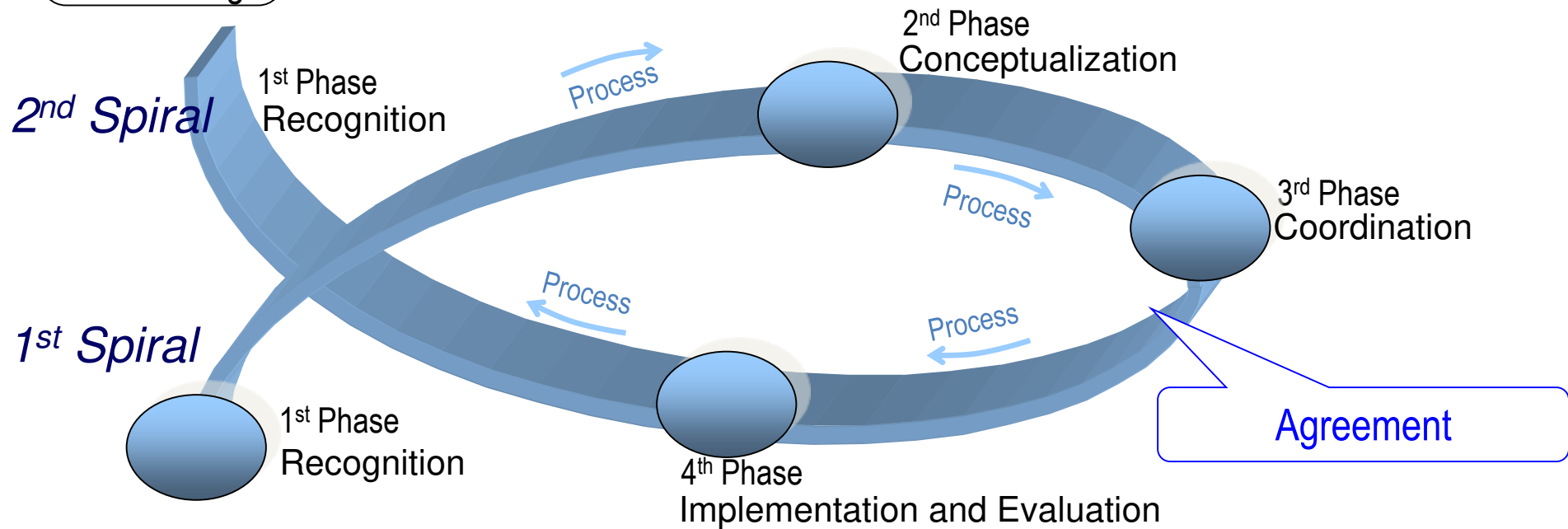
- **a step-by-step process of managing water resources in a harmonious and environmentally sustainable way by:**
  - gradually uniting stakeholders and involving them in planning and decision making processes,
  - while accounting for evolving social demands due to such changes as: population growth, rising demand for environmental conservation, changes in perspectives of the cultural and economic value of water, and climate change.
- **It is an open-ended process that evolves in a spiral manner over time as one moves towards more coordinated water resources management.**

# IWRM Process and Phases in the Spiral Model

Like "Plan, Do, See" Process

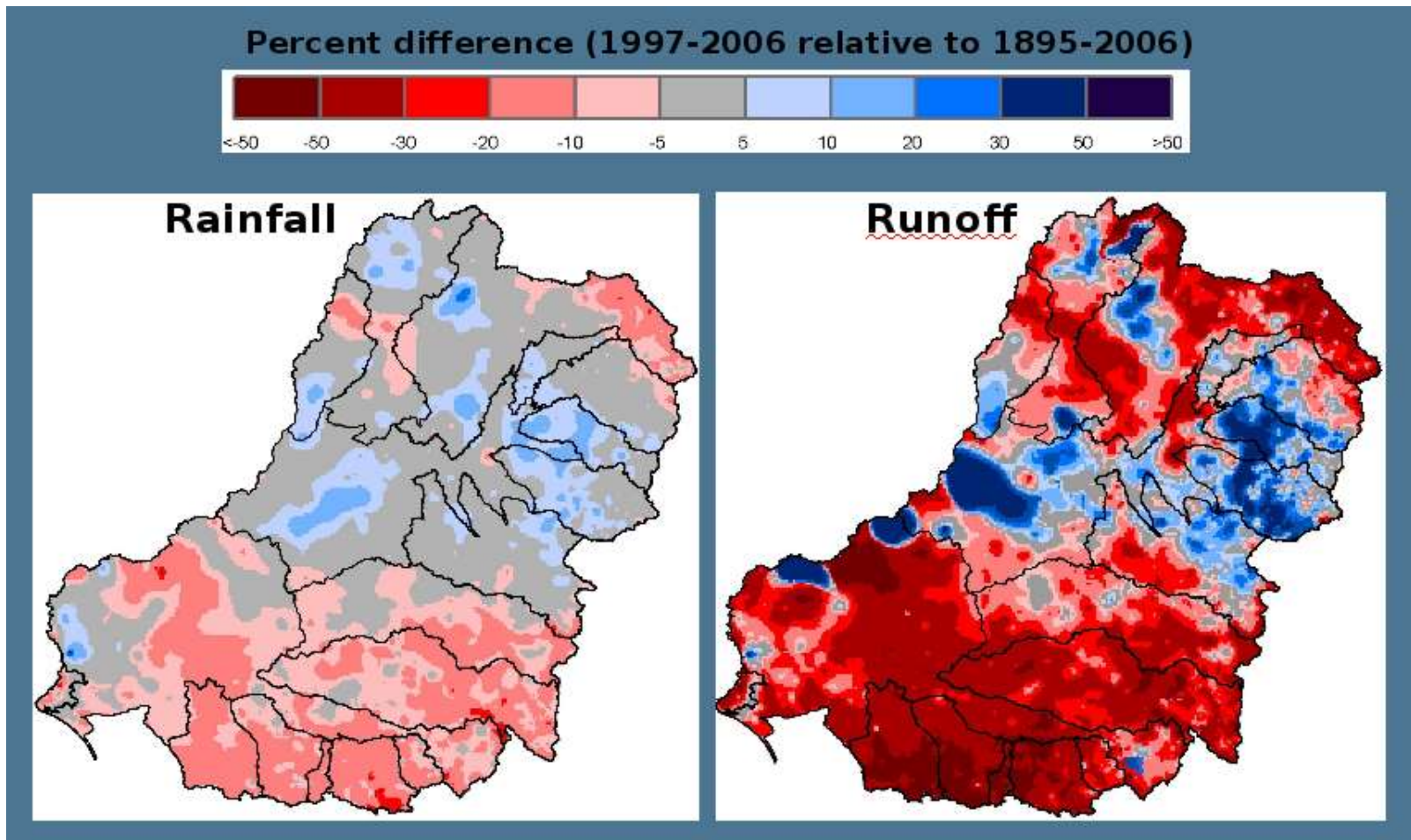


Water Manager





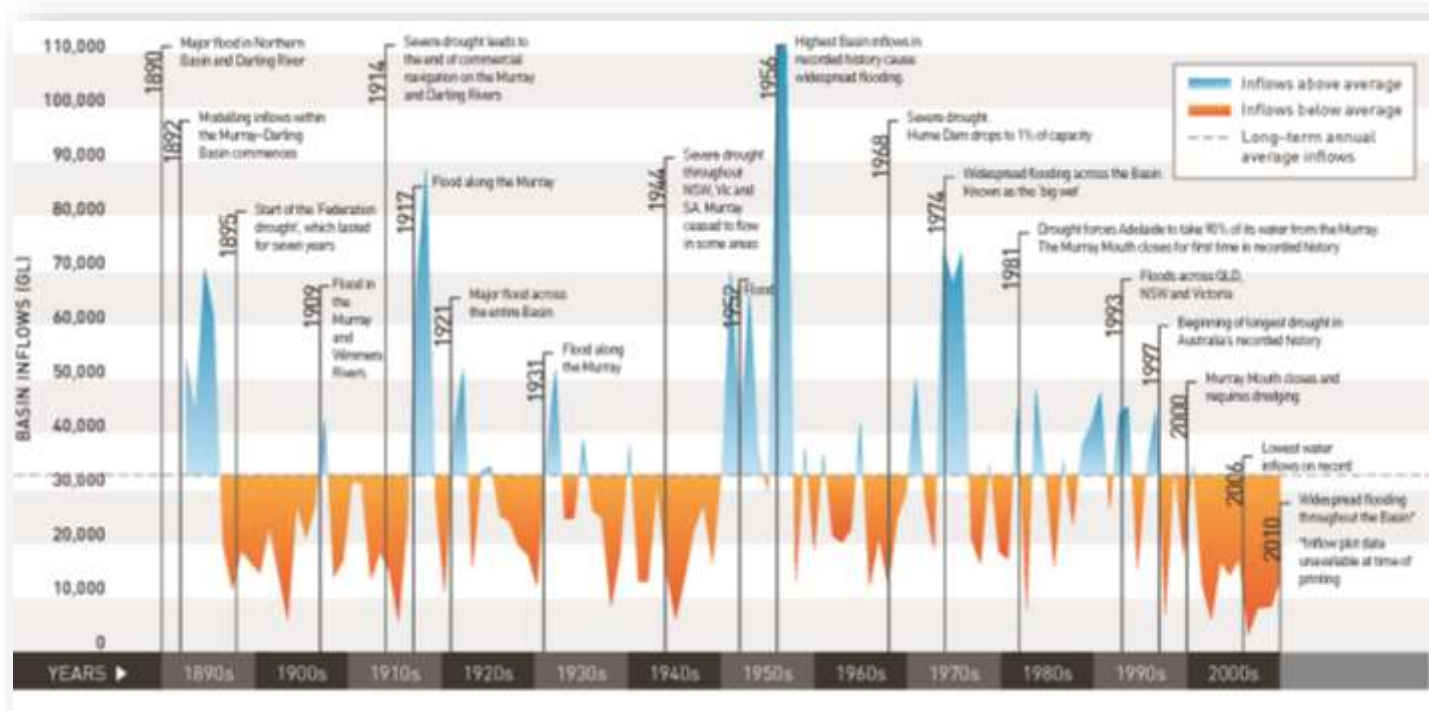
# Changes in rainfall and runoff



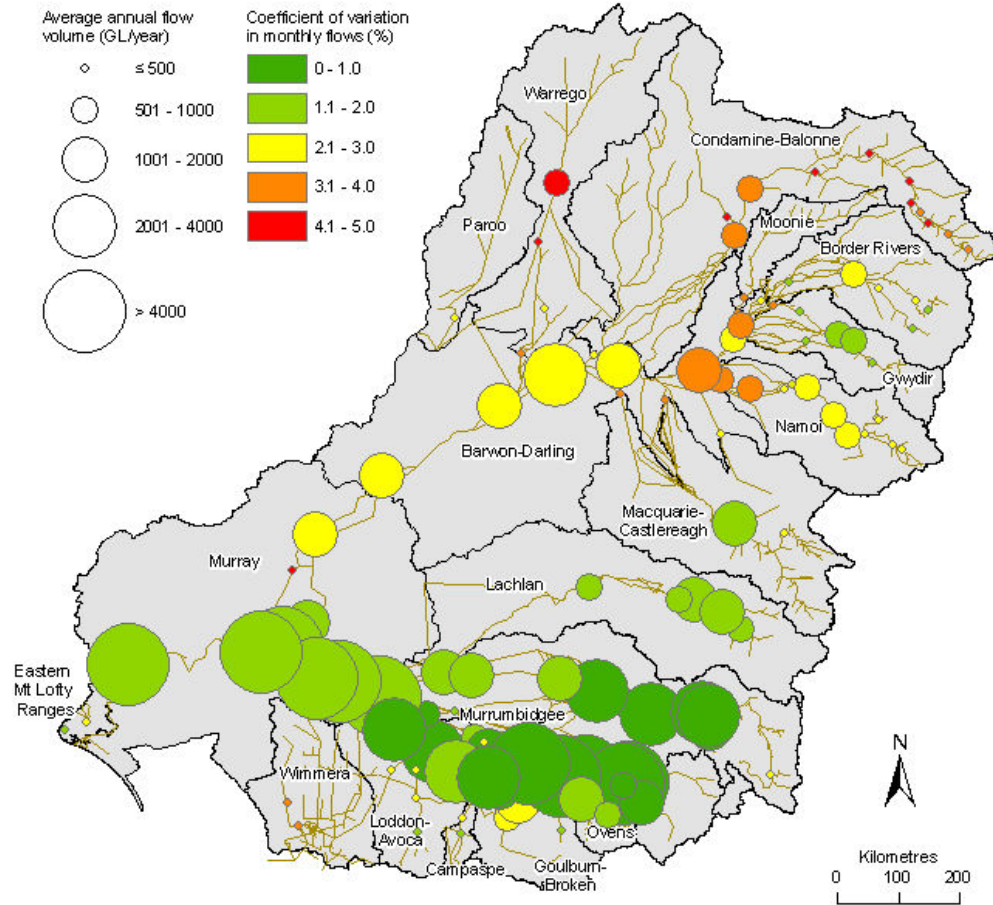
# Ratio of maximum annual flow to minimum annual flow for selected rivers

<b>COUNTRY</b>	<b>RIVER</b>	<b>RATIO BETWEEN THE MAXIMUM and the MINIMUM ANNUAL FLOWS</b>
<b>BRAZIL</b>	<b>AMAZON</b>	<b>1.3</b>
<b>SWITZERLAND</b>	<b>RHINE</b>	<b>1.9</b>
<b>CHINA</b>	<b>YANGTZE</b>	<b>2.0</b>
<b>SUDAN</b>	<b>WHITE NILE</b>	<b>2.4</b>
<b>USA</b>	<b>POTOMAC</b>	<b>3.9</b>
<b>SOUTH AFRICA</b>	<b>ORANGE</b>	<b>16.9</b>
<b>AUSTRALIA</b>	<b>MURRAY</b>	<b>15.5</b>
<b>AUSTRALIA</b>	<b>DARLING</b>	<b>4705.2</b>

# Highly variable supply



# Regional Flow Variation





# Current Condition of MDB

In recent decades, the ecological condition of the MDB has been in focus as the effects of drought and long-term over-extraction have resulted in a stressed, degraded river system:

- the climate is highly variable (seasonally and decadal);
- the river system is highly regulated with large storages in the headwaters of most catchments;
- regulation of flows is dominated by irrigation demands; and
- irrigators and environmental assets are suffering from reduced, and unreliable, water allocations.

# Lachlan river image taken in January, 2008

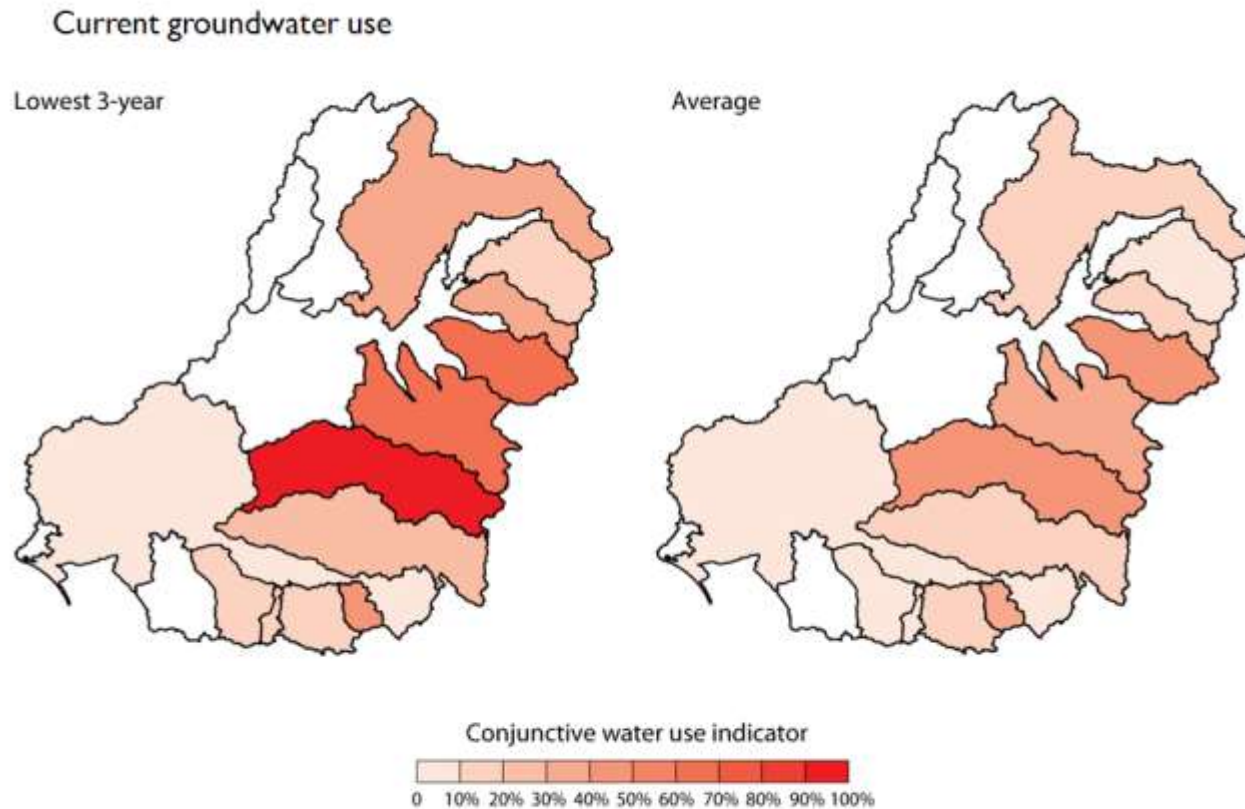


# Vegetation Condition of Wetland



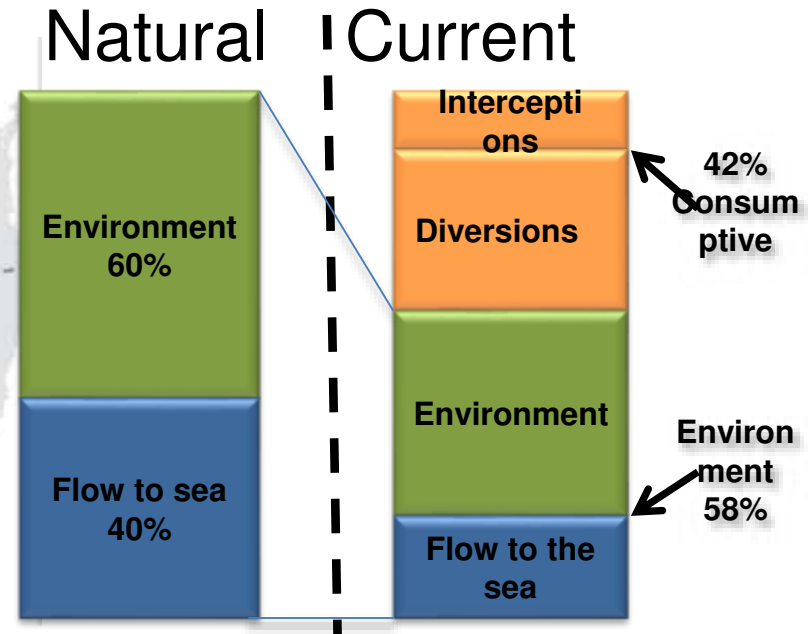
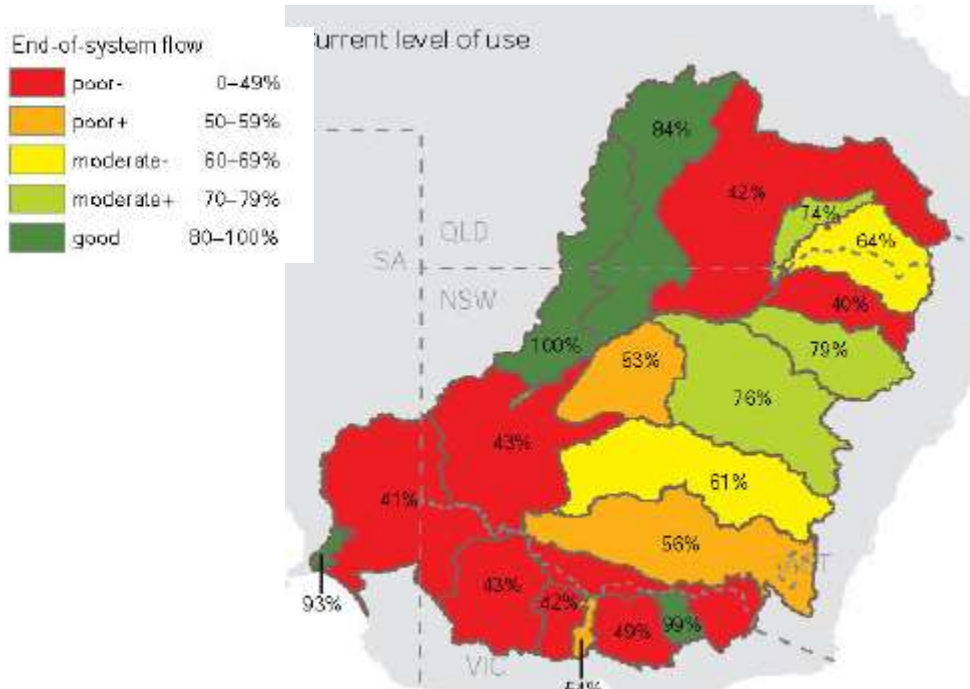
Changes in Extent and Condition of the Vegetation Communities of the Macquarie Marshes Floodplain 1991-2008 (*By NSW Department of Environment, Climate Change and Water, Sydney*)

# Pressure on Groundwater Resource



Variation in the percent of groundwater use to total water use in the 18 regions of the MDB for the three-year period of lowest surface water use (left) and for the average surface water use (right)

# Imperatives for further reform



Health rating	Valley
Good	Paroo
Moderate	Border Rivers, Condamine
Poor	Namoi, Ovens, Warrego
	Gwydir
Very poor	Darling, Murray Lower, Murray Central
	Murray Upper, Wimmera
	Avoca, Broken, Macquarie
	Campaspe, Castlereagh, Kiewa, Lachlan, Loddon, Mitta Mitta
	Murrumbidgee, Goulburn



Mouth Closure



Drying of Lower Lakes

Ecological health

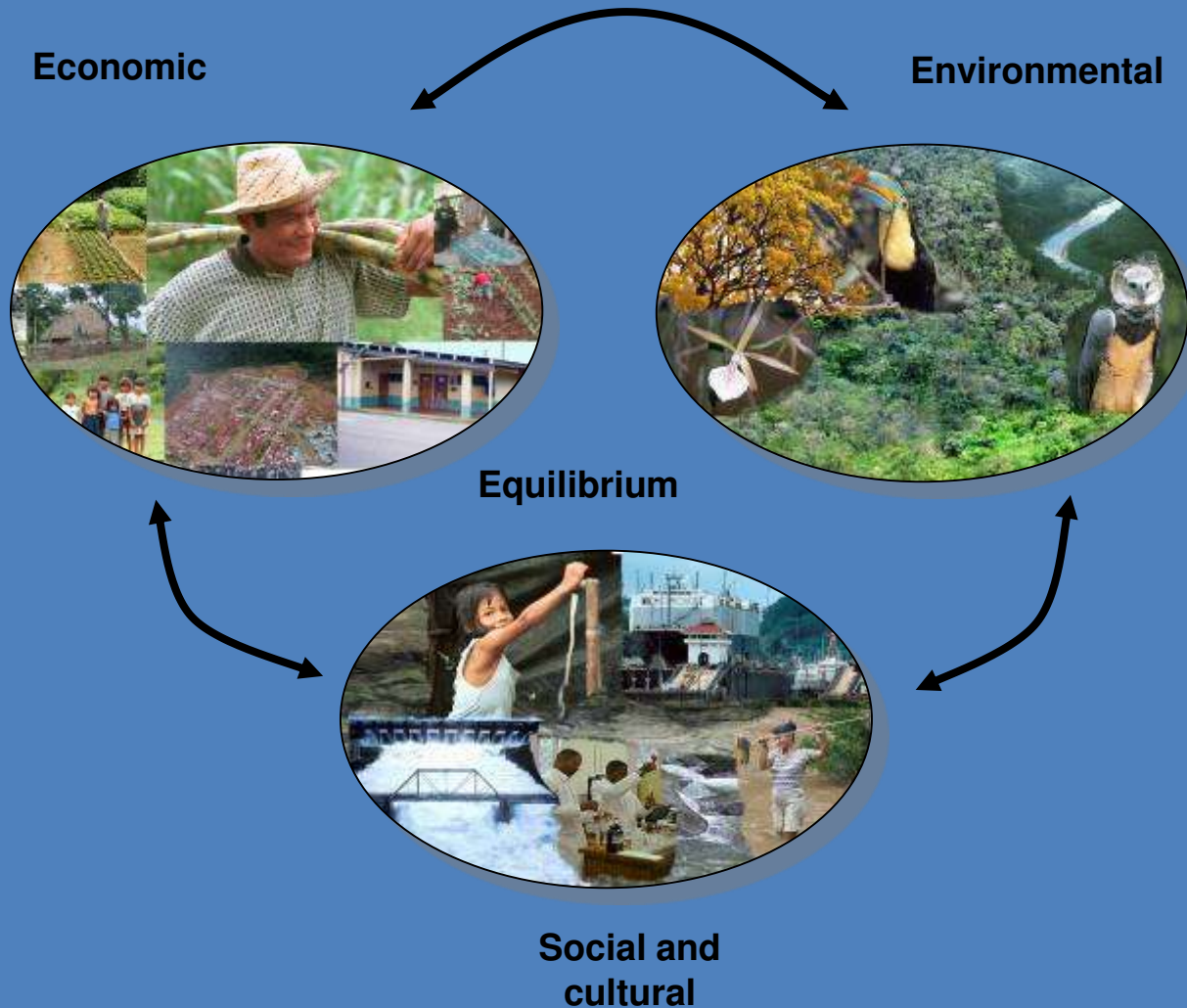
# Why do we need the IWRM Plan?

## Drivers that led to the Basin Plan:

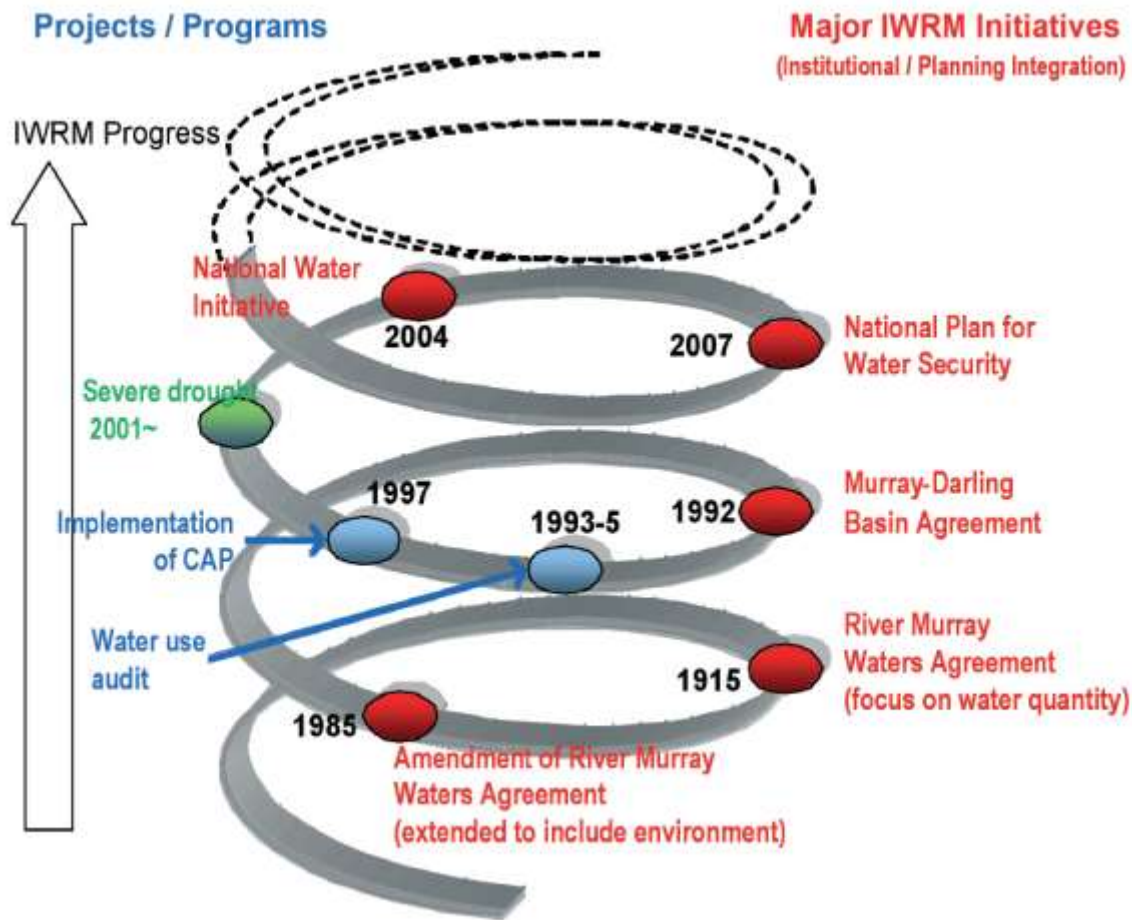
- Overuse of water resources;
- The Millennium Drought
- Signs of climate change;
- Management arrangements not coping.



# Sustainable Development and Integrated Water Resources Management Plan



# IWRM spiral of Murray-Darling Basin

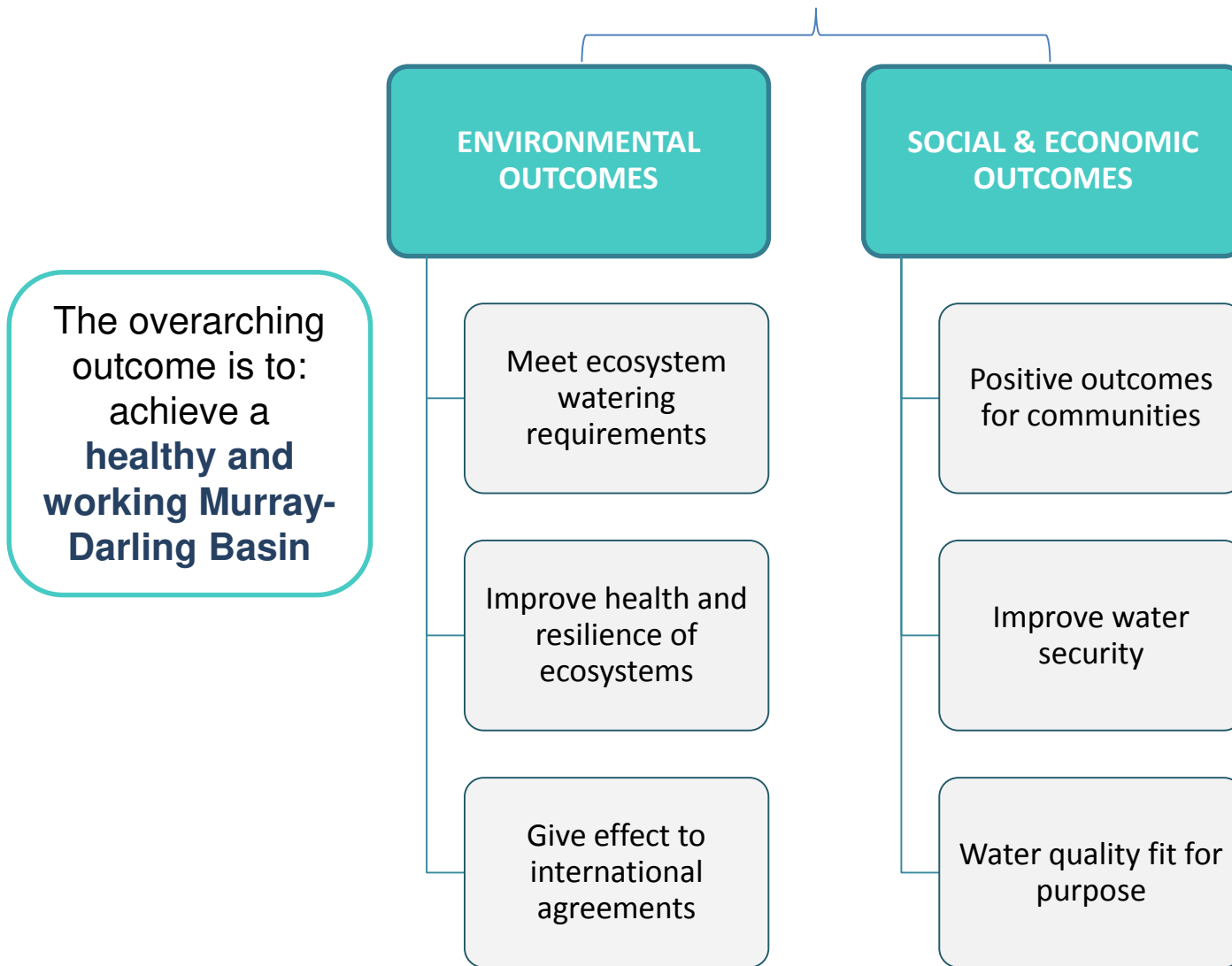




# Federal Water Act 2007

- Fed auth (MDBA)
- Basin Plan (ESLT with best av. science)
  - Sust. Div Limits (SDL) - GW and SW
  - Env. watering plan
  - Water quality and salinity management plan
  - Water trading rules
- Adopted by fed minis on adv from MDBA
- Legally binding on states

# Basin Plan Objectives



# MDB River Modelling

# BASIN PLAN

# RUN 404

**Proposed Basin Plan SDLs**  
**Mean annual volumes (GL)**  
**(1895-2009 historical climate)**  
**[All values to nearest 1 GL]**

- Numbers in **red** are from CSIRO SY modelling for the period 1895-2006 (Avoca & EMLR).
- Numbers in **green** are un-modelled (Kiewa).

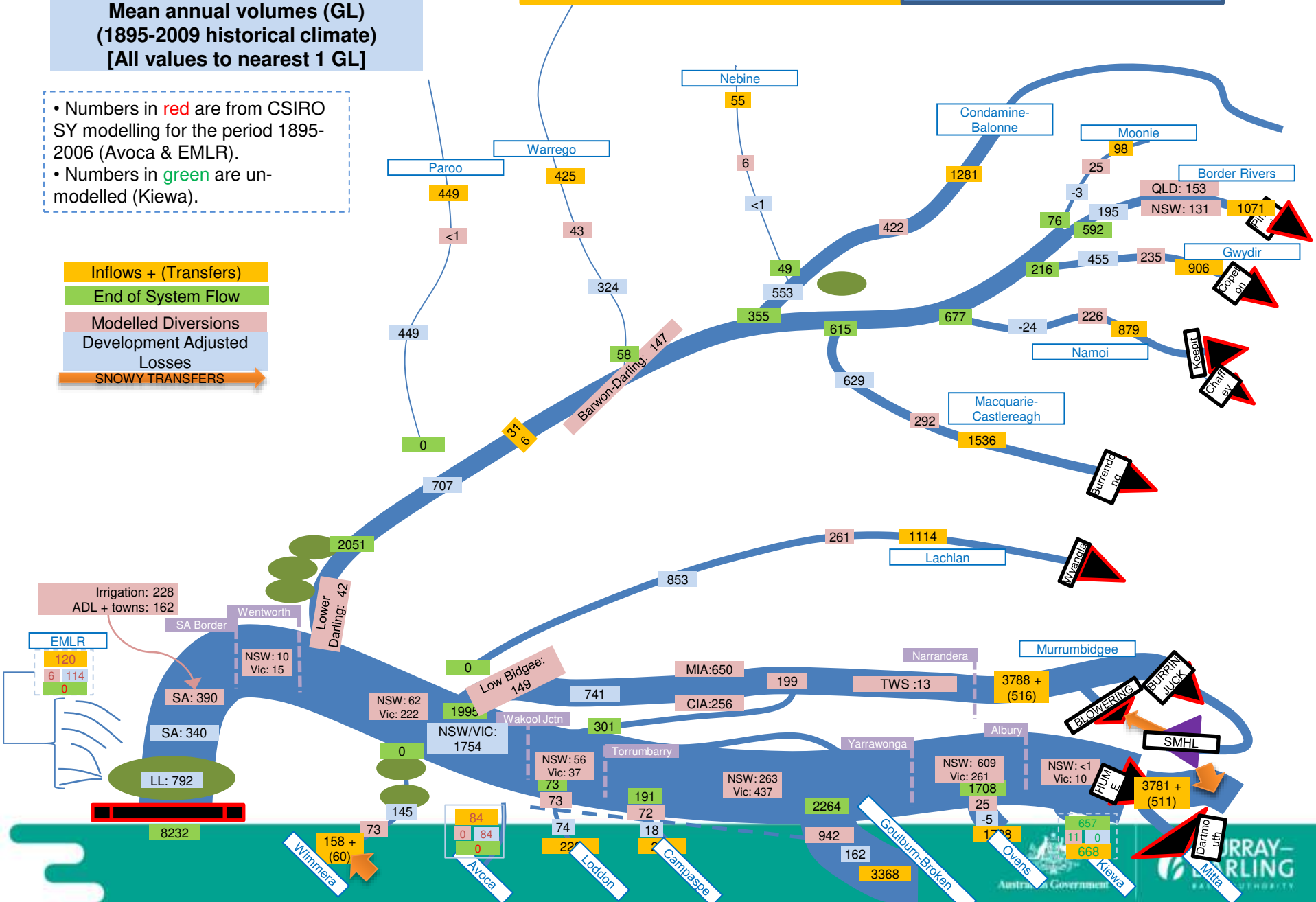
**Inflows + (Transfers)**

**End of System Flow**

**Modelled Diversions**

**Development Adjusted Losses**

**SNOWY TRANSFERS**



# Community Engagement

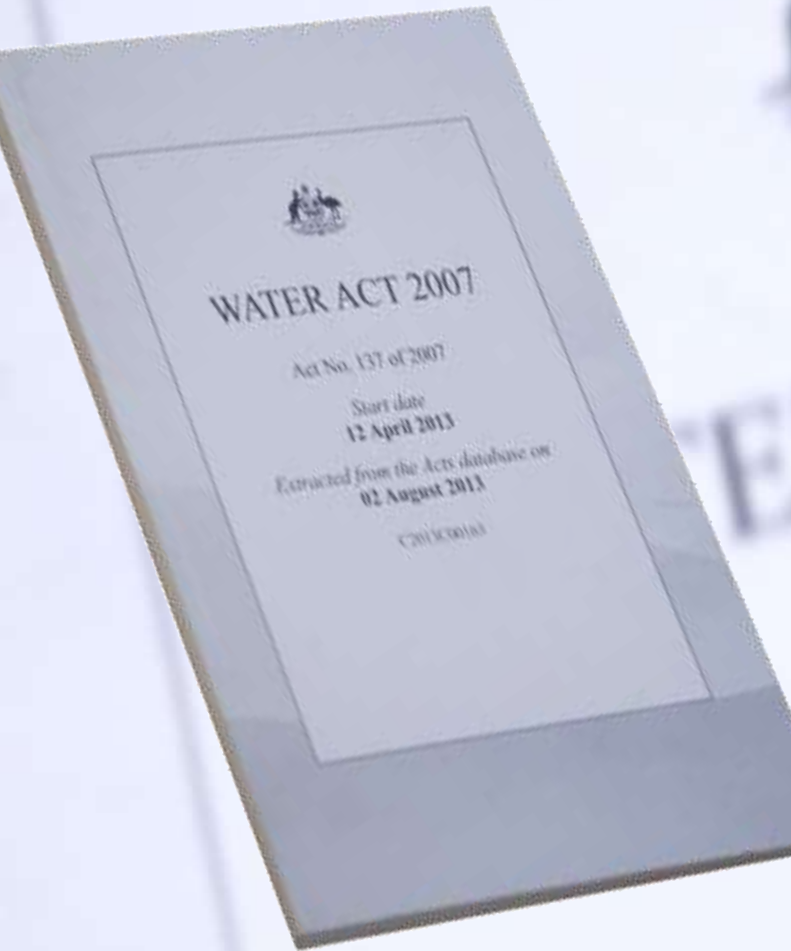
**20 week consultation: 170 meetings**

**>12,000 written submissions on the proposed basin plan**

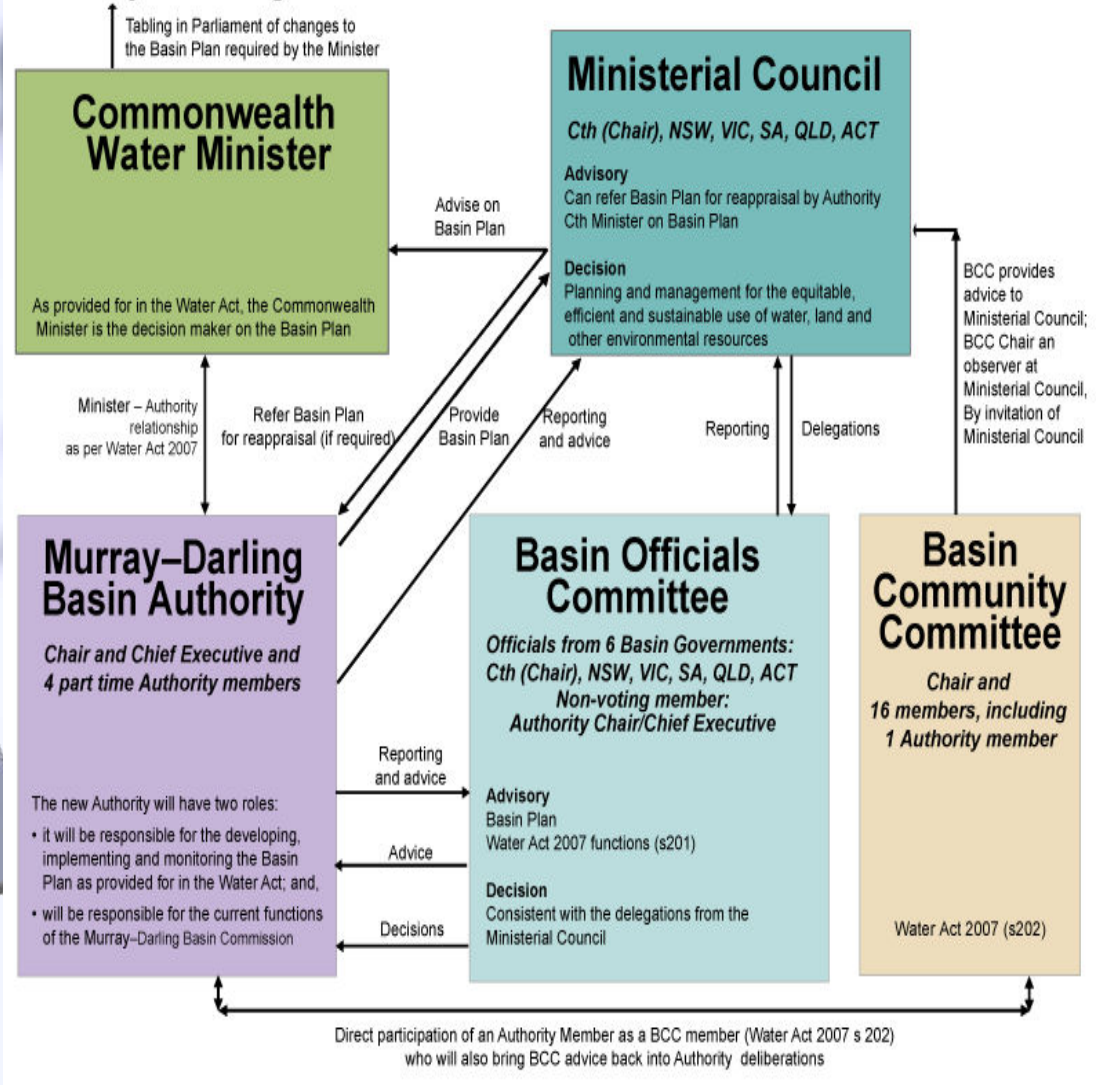


# Water Resource Plans

- Setting limits on take is only part of the story
- Need to monitor impacts (levels/pressure, subsidence, salinity, stream flows, vegetation, springs, living things)
- Possibly use rules and resource condition limits as part of water resource plans



# Murray–Darling Basin Institutional Structure and Governance



# Discovering information

## Information



## MDBA Use

POLICY

REPORTING

EVALUATION

ENGAGEMENT

COMPLIANCE

# Ultimately this is what we want to achieve



Communities  
with sufficient  
and reliable  
water  
supplies



Healthy and  
resilient  
ecosystems



Productive  
and resilient  
water  
dependent  
industries



# What is the evaluation going to do?

1



Is implementation  
on track?

2



What impacts and  
benefits are we  
seeing so far?

3



How can we  
improve  
implementation?

# IWRM benefits

Closing the Gap



Amenity



Agriculture

Global  
significance



The benefits from  
IWRM are  
extensive and  
wide-ranging



Tourism

Healthy Country



Recreation

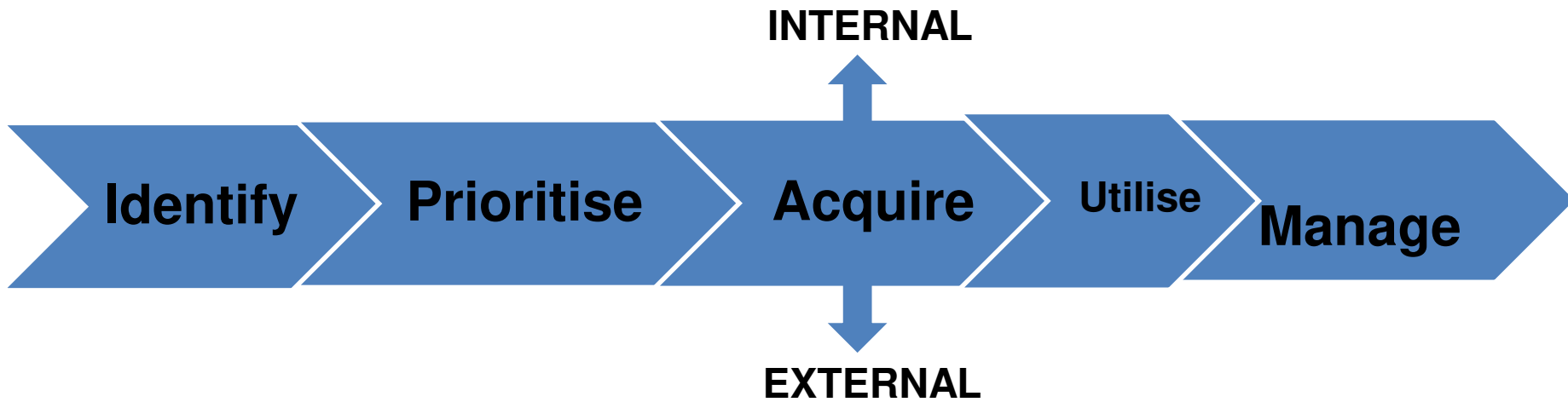
# What we learnt

- Water management strategies require an evidence base informed by: science, community & governance
- A management plan is a social construct informed by science
- Knowledge & information is important
- **MUST** bring the community on the journey
- Community education and awareness is vital
- Compliance and monitoring & evaluation is as important as planning and management.

# Recommendations for applying IWRM in Timor-Leste



# Smart Knowledge Acquisition for IWRM



- Balance between economic, social and environmental
- Other drivers e.g. Market competition
- Provides platform and political will to set sustainable use

- Use climate projections for change in supply in case they occur
- Develop contingency options
- Interaction with other regional plans

- Focus on regional water plans
- Climate and Groundwater
- Capacity building to support regional planning



Interacts with:

- Regional development
- Infrastructure planning
- Urban water sensitive design
- Surface water planning
- Biodiversity planning
- Catchment planning

# Data for education via [www.mdba.gov.au](http://www.mdba.gov.au)







# Resources

Classroom resources



Video conferencing programs



Videos



Robots?



Smart device app(s)



Posters



Theatre?



# DATA

Dam Name	Left Damwall	Left Damwall	MRTA MRTA	MURRUMBidgee	Flow to South	LAND
	Dam Wall	Dam Wall	REGUL	REGULATOR	Australia	ALEXANDER AVERAGE
Measurement	Volume (ML) End of Month		Flow (ML/day)	Gravity Ingestion District Division (ML/month)	Flow (ML/month)	Gauge Height (m)
	Gauge Height (m)	Flow (ML/day)				
Day						
409.08	2102419.9	975.9	177948	234793		
409.12	2043972.4	984.1	124026	219791.8		
409.14	2022279	1079.9	116070	206965.8		
409.16	2016663.8	939.2	67540	243701.1		
409.17	2002786	991.4	761	193761.4		
409.18	2181743.2	949.9	0	187869.3		
409.19	2286249	996.4	9	217028.9		
409.19	2434463.2	972.4	10081	445221.6		



Innovation



Images



Law



Success!



Ongoing media commentary



Oral histories



Opinions

# MDBA and the curriculum

Science



Geography

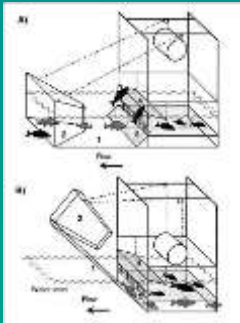


Sustainability

ICT



Technology



Aboriginal and Torres  
Strait Islander  
perspectives



History



# Thank You



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Australian Government

