"Gestión integrada de cuencas: la experiencia de Australia y su aplicación en el contexto nacional".

Dr Edmundo Claro
Santiago, 10 de noviembre de 2014
Contenidos

• ¿Qué es CSIRO?

• La experiencia de Australia en la gestión integridad de cuencas: el caso Murray-Darling

• Proyecto para la Cuenca de Copiapó
¿Qué es CSIRO?
What we do

Our Vision
Our science is used to make a profound and positive impact for the future of Australia and humanity.

Our Mission
We deliver innovative solutions for industry, society and the environment through great science.
People 6500
Flagships 9
Locations 58
Budget $1B+

Top 1% of global research institutions in 14 of 22 research fields
Top 0.1% in 4 research fields

62% of our people hold university degrees
2000 doctorates
500 masters

With our university partners, we develop 650 postgraduate research students
Our Science Programs (Flagships)

AGRICULTURE

ENERGY

MANUFACTURING

BIOSECURITY

FOOD & NUTRITION

MINERAL RESOURCES

DIGITAL PRODUCTIVITY

LAND & WATER

OCEANS & ATMOSPHERE
Our track record: top inventions

1. Fast WLAN
   Wireless Local Area Network

2. POLYMER BANKNOTES

3. RELENZA FLU VACCINE

4. EXTENDED WEAR CONTACTS

5. AEROGARD

6. TOTAL WELLBEING DIET

7. RAFT POLYMERISATION

8. BARLEYMAX

9. SELF TWISTING YARN

10. SOFTLY WASHING LIQUID
Global connections

We work with partners in over 80 countries

- Foreign governments
- Small to large companies
- Multi-nationals
- International foundations
- Leading scientific institutions
- Over 700 research activities
Global Contacts: impact of partnerships

80+ countries

China Australia Alliance for New Energy Vehicle Innovation
Water management – a global challenge

- Climate change complexities
  - Acceleration of the global water cycle
  - Redistribution of a limited resource
- Population growth
  - Additional 2.5 billion globally by 2050
- Urbanisation & industrialisation
  - Increasing demand for water, energy, resources, land and food
  - Increasing waste streams – sewage & industrial
- Global food security
  - Increasing demand for high protein diet
  - Increasing energy intensity for food production
- Environmental consequences
  - Changes in river and groundwater hydrology
  - Changes in water quality
  - Changes to biodiversity and ecosystem services
La experiencia de Australia en la gestión integrada de cuencas: el caso Murray-Darling
Australia – the driest inhabited continent – with the highest per capita water use

- Australia
- Africa
- Europe
- Asia
- North America
- South America

**Annual streamflow per km²**

- Australia: 12,000 ML
- Africa: 4,000 ML
- Europe: 8,000 ML
- Asia: 16,000 ML
- North America: 6,000 ML
- South America: 6,000 ML

**Daily water consumption per capita (including irrigation)**

- Australia: 1,000 L
- Africa: 200 L
- Europe: 600 L
- Asia: 800 L
- North America: 1,000 L
- South America: 900 L
Rainfall distribution has changed since 1950

- Wetter
- Drier
Crisis in Australia forced the integrated water management process

- Science – evidence and decision support
- Trust – put down the guns
- Sharing of power – institutional reform; laws, policies & programs
- Time – 20 years
- Mandate – is the time right
- Resources – commensurate with the problem

*Ongoing capacity building, consultation & communication*
National Water Initiative –
a transformational policy response

• Return all water systems to sustainable levels of extraction
• Provide secure water entitlements for irrigators and the environment
• Improve security and management of urban water supplies
• Improve water data collection and accounting
• Invest in knowledge and build capacity
The Murray-Darling Basin

- 14% of Australia (size of Spain & France)
- Directly supports 3 million people
- Feeds approximately 20 million people
- Significant environmental values
- Australia’s three longest rivers
- 40% Australia’s farmers
- Home to 34 major Indigenous groups
• There are six governments with responsibilities in the MDB:
  • Australian government,
  • the Australian Capital Territory,
  • New South Wales,
  • Queensland,
  • Victoria, and
  • South Australia.
Consumptive water use

- Agriculture: 7,000 GL
- Water supply industry: 1,000 GL
- Other industries: 0 GL
- Households: 0 GL
- Manufacturing: 0 GL
- Mining: 0 GL
The need for water reform

• Concerns about the state of the environment
  • water overuse,
  • salinity
  • nutrient pollution
• Plus a decade-long drought in the southern part of the basin that ended in 2010
• Resulted in major water reform and changes to governance structures over the past 15 years.
The need for water reform

- Return extraction of water to a more sustainable level
- Support ecological health of the Basin
- Build a more certain future for communities
- Sustain economic output over long term
- Manage water resources for future generations
- What’s the right balance?: Trade-offs: optimise economic, social and environmental outcomes
- Measuring the benefits and the costs
- Set environmental thresholds
Major elements of the reform

• Promotes water trading
  • Unbundling of water rights from land ownership in 1994
  • Difference between water “entitlements” and water “allocations” (both can be traded)

• Establishment of a cap on total surface water abstraction:
  • Limits withdrawals
  • Rules out new claims on water resources

• Governments take action to secure flows for the environment:
  • US$ 450 millions in 2004
  • US$ 2,700 millions in 2007

• Establishment of the Murray-Darling Basin Authority in 2007.
Water Rights Reform & unbundling

- Single Title to Land with a Water Licence
- Tradable Right
  - Entitlement: shares of water resource in perpetuity
  - Allocations: Assignments to a particular entitlement in a specific period
  - Use licences with limits & obligations

National Competition Policy 1993/94 Plus Cap

National Water Initiative 2004
The Murray-Darling Basin

70% of Australia’s irrigated agriculture

However...

Serious over-allocation of water between 1960s-1980s

Driving Philosophy:
You can’t manage what you can’t describe and measure

Must move from perceptions to fact
In 2005, >$600M government investment into Water Information, Knowledge and Tools

National technological capability to support basin-scale water resources planning and management under climate change
Integrated modelling – systems nexus
SYSTEM, e.g. WATER

NEXUS WEBS

WELLBEING

ASSETS

WELLBEING

SERVICES

SERVICES

Source: Peter Wallbrink
Conceptual Integration Framework

Risk management

Threats
- Climate
  - Change
  - Variability
- Land use
  - Forest cover
  - Land clearing
- Population Growth
- Over-allocation
  - Surface water
  - Groundwater

Scenarios

Water Quantity
- Cyrosphere / Snow melt models
- Rainfall / Runoff models
- River Flows
- Groundwater
- Storages / Abstractions
- Floodplains

Water Quality
- Sedimentation
- Water Quality

Assets
- Irrigation
- Domestic Supply
- Hydropower / Mining
- Environment

Social Decision Modelling

Socio-economic Modelling

Services
- Food Production
- Potable Water
- Energy production
- Hazard Risk
- Ecosystem Services

Wellbeing
- Food Security
- Water Security
- Energy Security
- Economic Security
- Sense of Security / Place
- Environmental Security

Bio-Physical Modelling

Source: Peter Wallbrink
Proyecto para la Cuenca de Copiapó
DGA (March 2012) estimate of imbalance

Rights issues exceed 19,000 l/s
Storage losses are 2,600 l/s

Most water rights are not used because of:
1) lack of water,
2) high cost of extraction,
3) poor quality
4) need for water supply security,
5) speculation

All demands are increasing
Plan de gestión integrada para la cuenca de Copiapó

• Una Estrategia de desarrollo para la cuenca de Copiapó, establecida de común acuerdo entre los diferentes actores participantes, qué considere los valores de la minería, la agricultura, el medio ambiente y los valores sociales.

• Un marco y una metodología general para una planificación integrada de cuencas, adecuada para aplicarse a nivel nacional, la cual debe estar alineada con la Estrategia Nacional de Recursos Hídricos.
Plan de gestión integrada para la cuenca de Copiapó

• Fase 1
  • Bases del proyecto
  • 6 meses

• Fase 2
  • Implementación del proyecto
  • 2,5 - 3 años
Resumen Fase 1

• Diseño del proyecto
  • Estructura de gobernanza y actores clave

• Aumentando la participación
  • Consultas con actores clave
  • Desarrollo de “Visión Compartida”

• Difusión del proyecto
  • Identificación y reuniones con posibles fuentes de financiamiento
  • Delegación a Australia

• Desarrollo de TdRs para la Fase 2
  • Modular: US$ 2 millones v/s US$ 2+ millones
## Visión Fase 2

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<th>Phase</th>
<th>Stage/timeframe</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4 +</th>
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<td>Establish vision &amp; baseline</td>
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<td>Identify options (1st pass)</td>
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<td>Develop and analyse options</td>
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Potenciales productos de la Fase 2

• Específicos
  • Estado de la cuenca
  • Escenarios futuros acordados (derechos y límites)
  • Plataforma de información sobre recursos hídricos (accesibilidad)
  • Procesos y modelo para fortalecimiento de capacidades

• Generales
  • Plan de gestión integrada para la cuenca de Copiapó
  • Marco general de aplicación a nivel nacional
Pilotos

• Principios
  – Win-win
  – Sin arrepentimiento
  – Arrepentimiento bajo
• Balance público-privado
• Triple bottom line considerations

• Ejemplos
  • Infraestructura (reutilización de aguas urbanas/mineras)
  • Water trading (cap and trade; auction; buy back)
Gracias