Some stormwater governance issues

Port Phillip Bay, Melbourne–endpoint for stormwater discharges.

Bayside beach litter control, Melbourne

Litter source control, Los Angeles region

Los Angeles River outflow, Long Beach –stormwater discharge

Stormwater harvesting policies – Melbourne

- **Innovations adopted during millennium drought include –**
  - **Local government *development consents* to encourage rainwater tanks connected to roofs that provide for gardens, toilet flushing, clothes washing.**
  - **Above & underground stormwater storage/on-site detention – *incentives* to developers and home owners include *rebates* on water and sewer charges.**

Promoting stormwater re-use

Constructed stormwater treatment wetland

Stormwater harvesting policies – Los Angeles

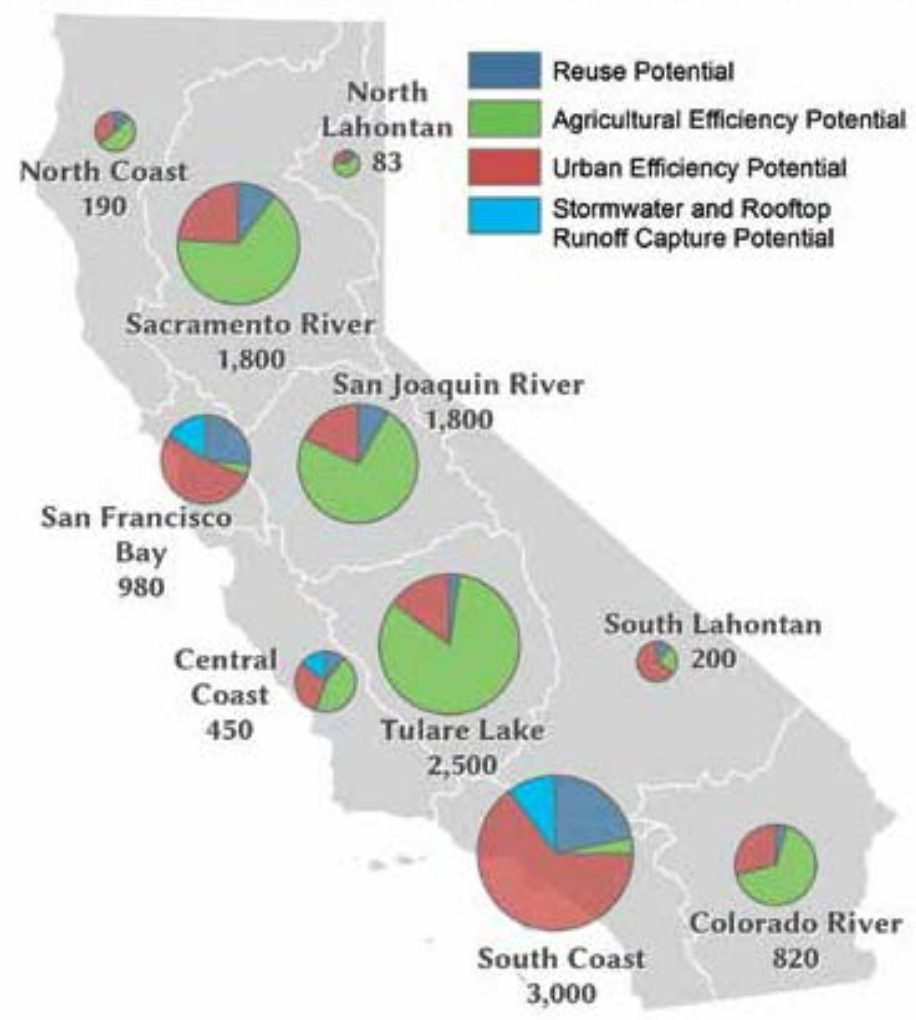
- ***Low Impact Development Ordinance*** **(2011) applies to businesses, most residences. Goal = reduce impervious surface:**
  - **Redevelopment projects capture rainwater at source; utilize rain barrels, permeable pavement, storage tanks, infiltration swales.**
  - **Benefits = conservation, groundwater recharge, green neighborhoods.**
  - **Program designed in collaboration with neighborhoods, building industry, environmental groups – emphasizes *flexible adoption*.**

Rain barrels

Rain garden

SoCal – potential for stormwater capture

- South Coast has highest potential for capturing stormwater.
- Neighborhood-level BMPs, rooftop capture are most efficient methods.
- Water agencies developing biofilters/other innovations based on PIRE experience – land use and regulatory issues make adoption slow.



Wastewater re-use – Melbourne vs. SoCal

- ***Melbourne: Council of Australian Governments*** **(1995) – developed framework for sustainable policy. Goals = encourage innovations, economies of infrastructure scale, private investment, fair pricing.**

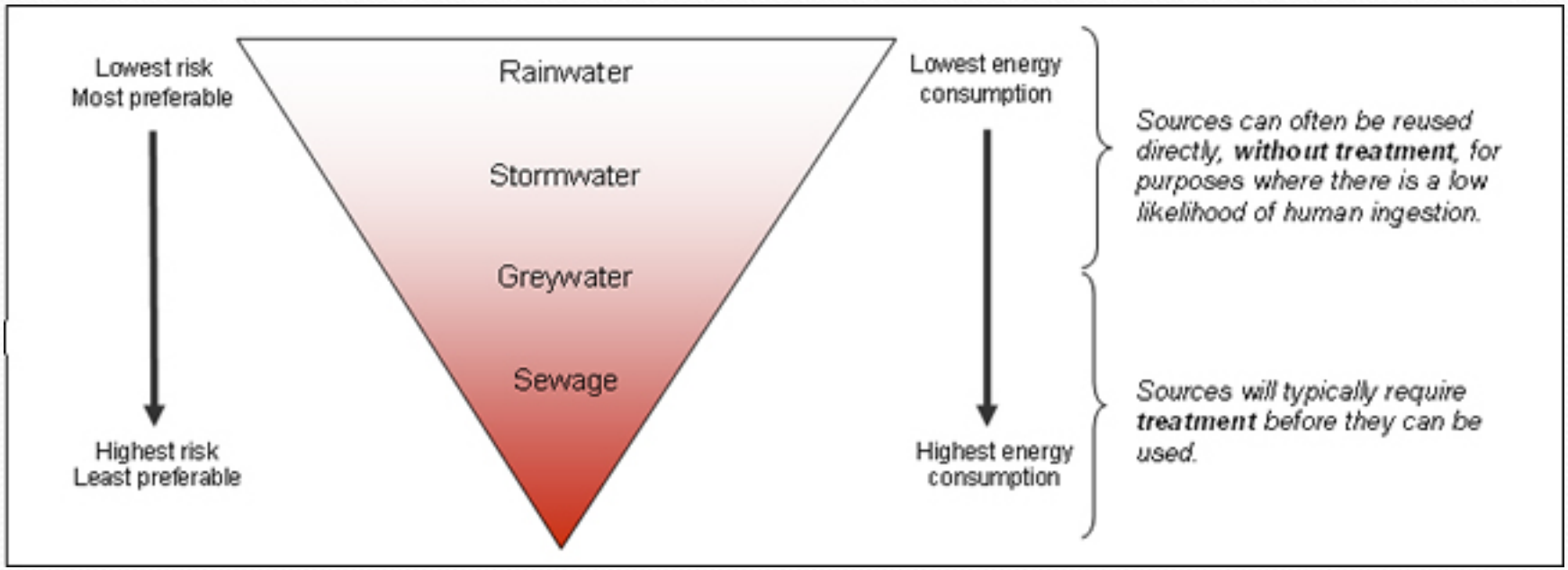
- **Framework sets out requirements for:**

- **Wastewater management/water quality.**
- **Water-related research.**
- **Public consultation & community education.**

- ***California*** **– state water plan encourages options that will compel communities to collaborate, achieve high public-acceptability; have low negative environmental impacts.**

- **Local agencies charged with exploring potable wastewater reuse to improve environment, enhance water supplies.**

Melbourne – principles for wastewater re-use



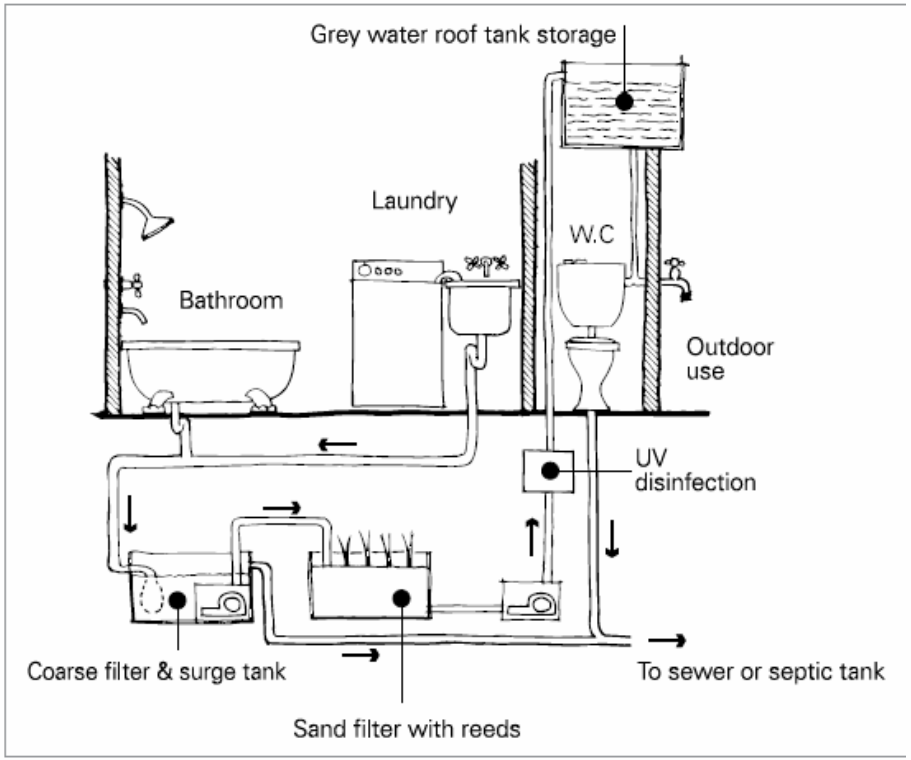
Ranking of risk for alternative water sources (Victoria EPA)

- **Australia encourages "gradations" of water quality for different uses.**
- **Risk and energy consumption increase as needs for treatment- before-use increase.**

Public acceptance – potable re-use in Australia

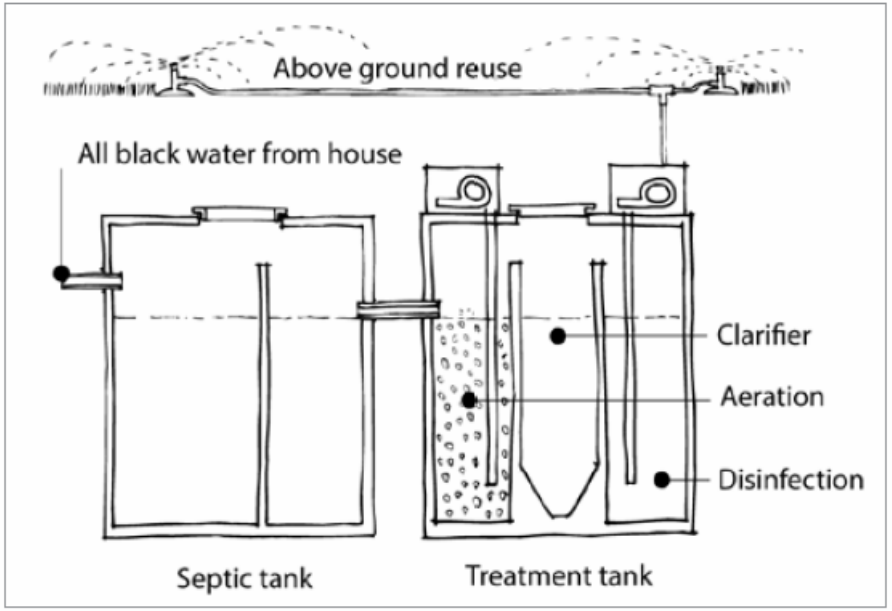
- **Australian social science research has shown that while public recognizes potential of reuse as alternative supply source, reservations remain, e.g.**
  - **Perceptions of health risk closely related to proximity of end use to human contact.**
  - **Public prefers uses that have *limited human contact*, where quality is guaranteed & use is non-potable.**
- **Dual-pipe supply – (e.g., Melbourne) provides potable & recycled water to households/buildings through two networks – one for recycled wastewater; the other for harvested stormwater.**

Melbourne – common non-potable reuse methods



A wastewater reuse system.

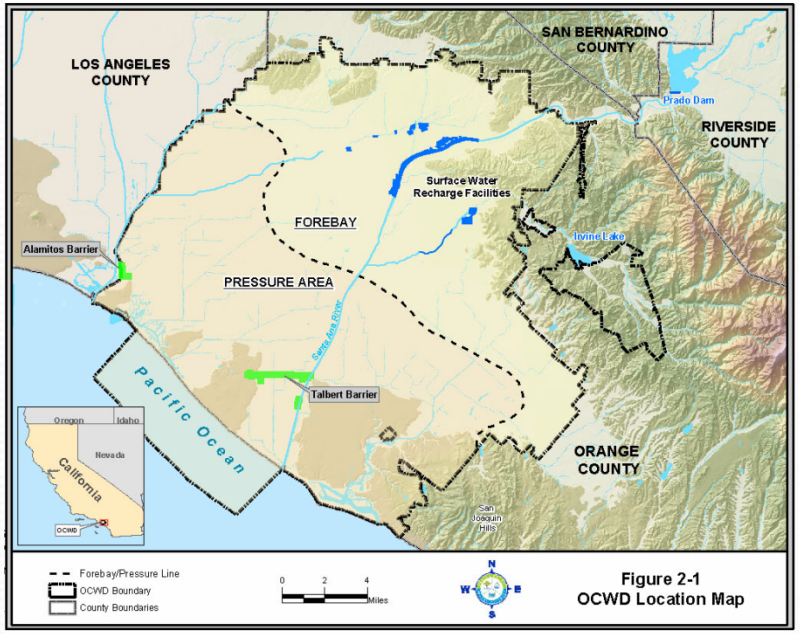
Greywater systems becoming common means to irrigate gardens and landscapes in Australia

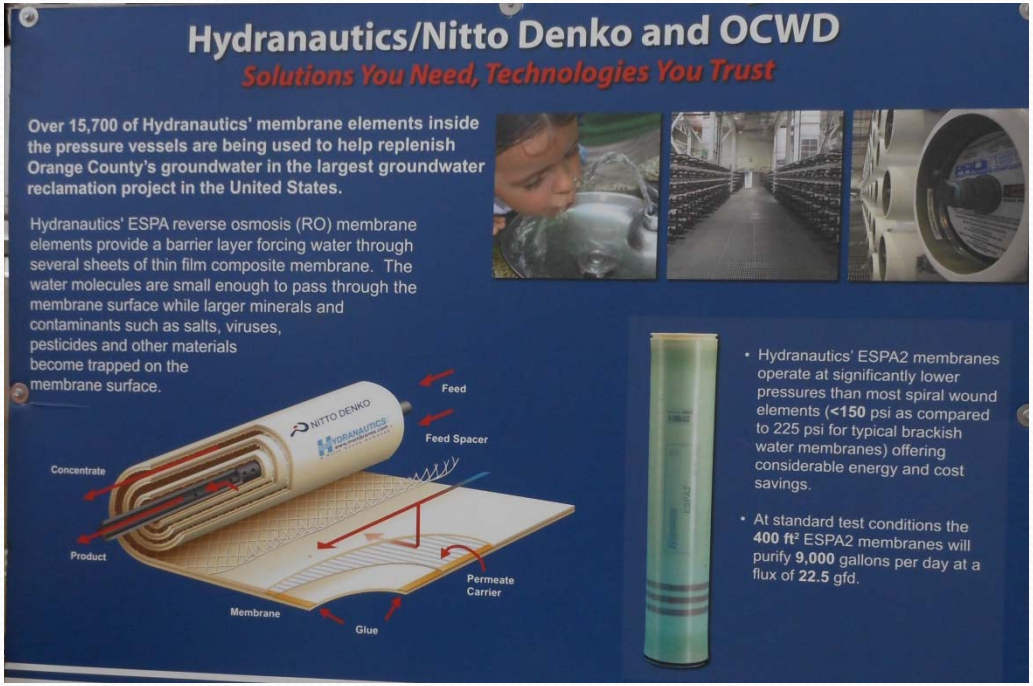


There are many commercial models of aerated wastewater treatment systems available in Australia.

Aerated wastewater treatment – most common reuse system in Australia

Wastewater re-use in SoCal





Orange County Water District Groundwater Replenishment system –

- **Provides indirect potable reuse, recharges aquifer/provides seawater barrier.**
- **Reduces needs for imported freshwater.**
- **Reduces wastewater-pollution.**
- **Employs concerted *public outreach*: tailored talks, visitations emphasizing operations, safety, benefits, comparative advantages to other methods.**

…and Los Angeles?

GRCETTI'S AMBITIOUS GOAL FOR L.A.'s WATER SUPPLY, *Los Angeles Times* October 15, 2014

Spurred by the drought, but planning for long-term sustainability, Mayor Eric Garcetti has set an ambitious and important goal for Los Angeles: to reduce the amount of water it purchases by 50% in 10 years. That's a decade sooner than water managers had anticipated, and it's a big change for a city that currently buys nearly 80% of its supply. (If) it's achieved — this would remake Los Angeles' water management, requiring major strides in conservation, water recycling and groundwater cleanup.

The Department of Water and Power has long had plans on the books that could significantly increase the city's local water supply. But over the years, for whatever reason — lack of funding or political will or some combination of the two — the projects have been delayed. They include expanding catch basins and other systems to capture stormwater and replenish aquifers, developing the infrastructure to safely treat and reuse wastewater, encouraging more residents and businesses to install drought-tolerant landscaping and finally building a treatment plant to clean up contaminated San Fernando Valley groundwater.

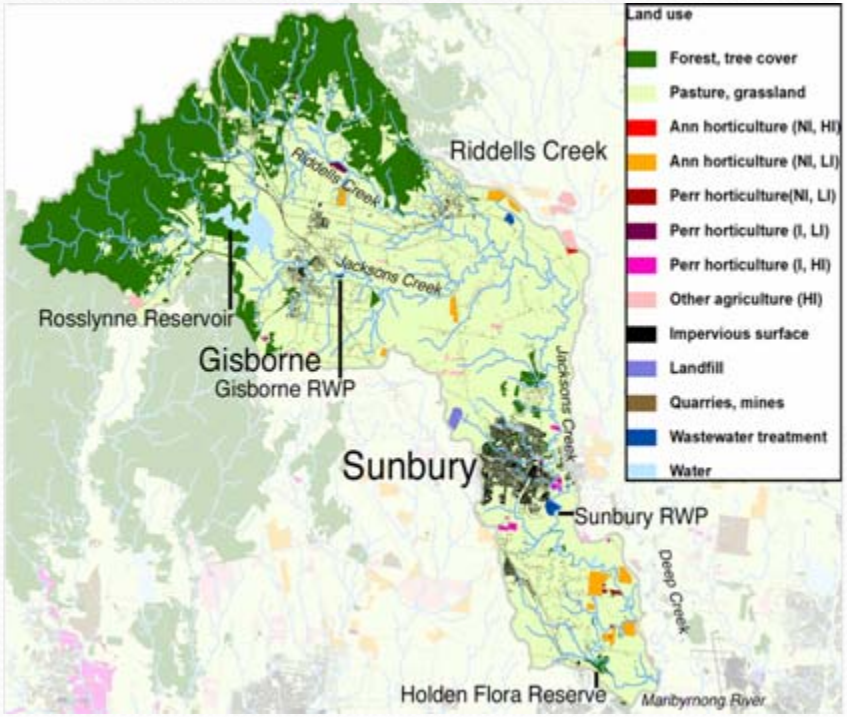
Los Angeles' effort to recycle and reuse wastewater . . . was shelved more than a decade ago after opponents derided it as "toilet to tap." Now it is back in the planning stage after Orange County and others embraced it.

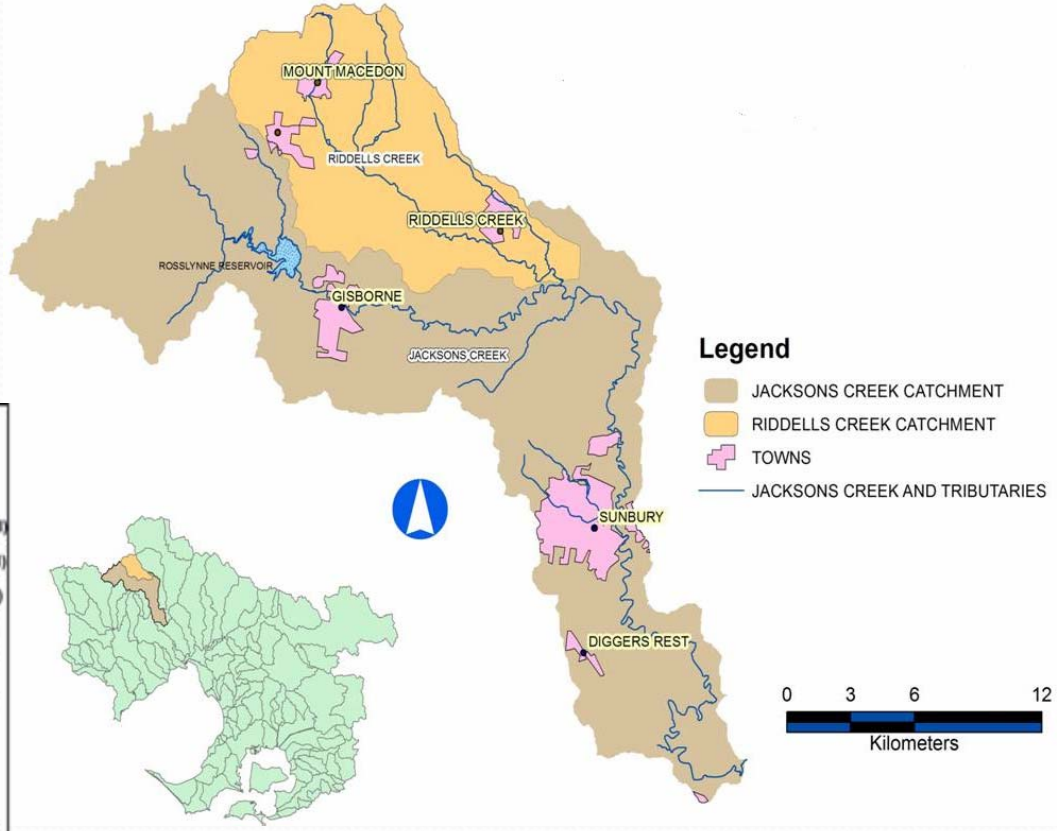
Public acceptance – "toilet to tap" issue

- In California, social research shows that in less affluent areas, those with EJ issues (e.g., abandoned waste sites, contaminated groundwater) *reuse* arouses *mistrust.*
- May be viewed as incentive for additional residential & commercial growth.
- Public needs to be given information on all available options and allowed to evaluate and compare their benefits and long-term consequences.

Offsets for water quality management

- Can offset schemes that trade diverse pollutants/flows be developed to better manage water quality?
- What stakeholder roles are needed to make schemes successful?





Why the need for an “offset”?

- Jackson Creek (NW Melbourne) area ranges from agriculture to suburban.
- Over next 20 years, area is expected to experience a doubling in population, more residential development, agricultural intensification.
- Population growth will degrade surface water quality – necessitating expensive water treatment plant upgrades.
- Local utility (Western Water) has an “over capacity” to produce Class B (non-potable) recycled water – and has a goal of “100% beneficial use.”
- Can this reused wastewater be used to:
  - Enhance in-stream flow in local creek?
  - Meet water quality standards without expensive plant upgrades?

Preliminary findings

- **Scheme can improve water quality, generate other benefits – key is incorporating public in offset design, development of valuation criteria.**
- **Applicability of scheme to point source discharges, runoff pollution, sewerage overspills needs to be established.**
- **PIRE working with partner agencies to introduce similar approach in SoCal watersheds.**

MIDLAND EXPRESS

NEWS

Groups from PIRE, CAPIM, and the Southern California Water Coastal Research Project were able to see the study in action last Thursday when they visited Jacksons Creek.

Creek study flows to US

A river health management study underway at Jacksons Creek could be replicated in the United States, scientists say.

Academics and students from the US and Melbourne converged on Gisborne last week to observe the Water Quality Offsets Framework study, led by Western Water.

"The study is testing the creek for contaminants, and identifying the primary pollutants," said Western Water's managing director, Neil Brennan.

"The plan then is to look at possible measures to reduce those pollutants, such as building wetlands, revegetating creek banks and collecting stormwater before it can run into the creek."

Each measure will be assessed to see which would be the most cost-effective and have the most benefits for the creek and the community.

The $430,000 study is funded by the State Government's Smart Water Fund, the University of Melbourne's Carlton Connect Fund, Western Water and other regional water authorities.

It is being carried out in consultation with the Environmental Protection Authority (EPA), Department of Environment and Primary Industry (DEPI), Melbourne Water and the wider Victorian water industry.

The University of Melbourne's Centre for Aquatic Pollution and Management (CAPIM) is working on an aquatic ecosystem assessment as part of the study.

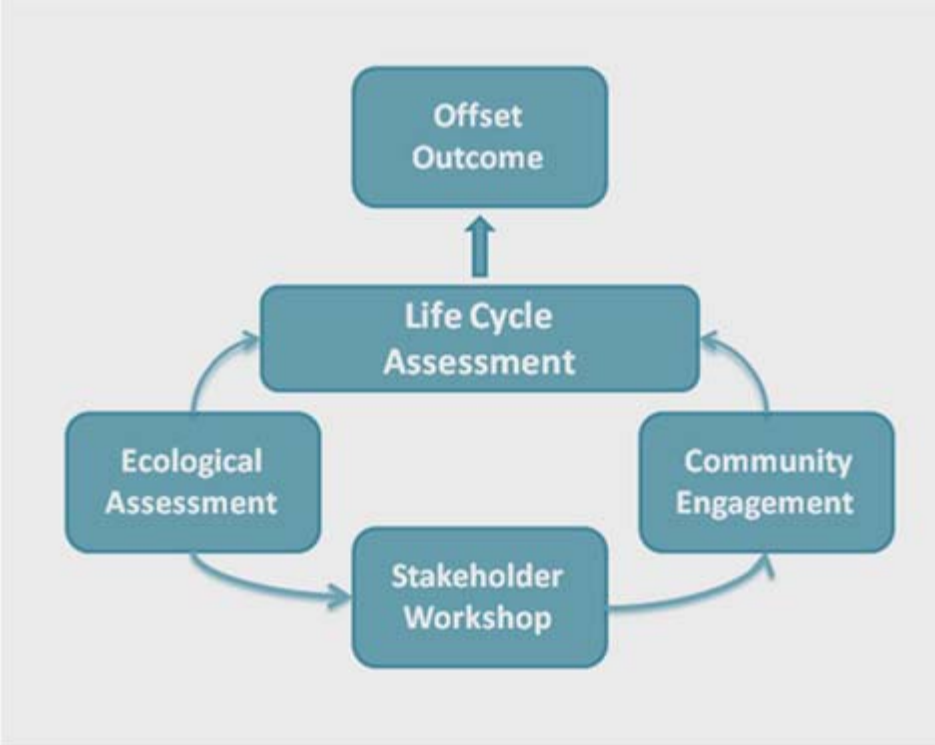
"Scientists from multiple disciplines are applying new technologies to assess the health of the creek," said CAPIM's chief executive officer, Associate Professor Vincent Pettigrove.

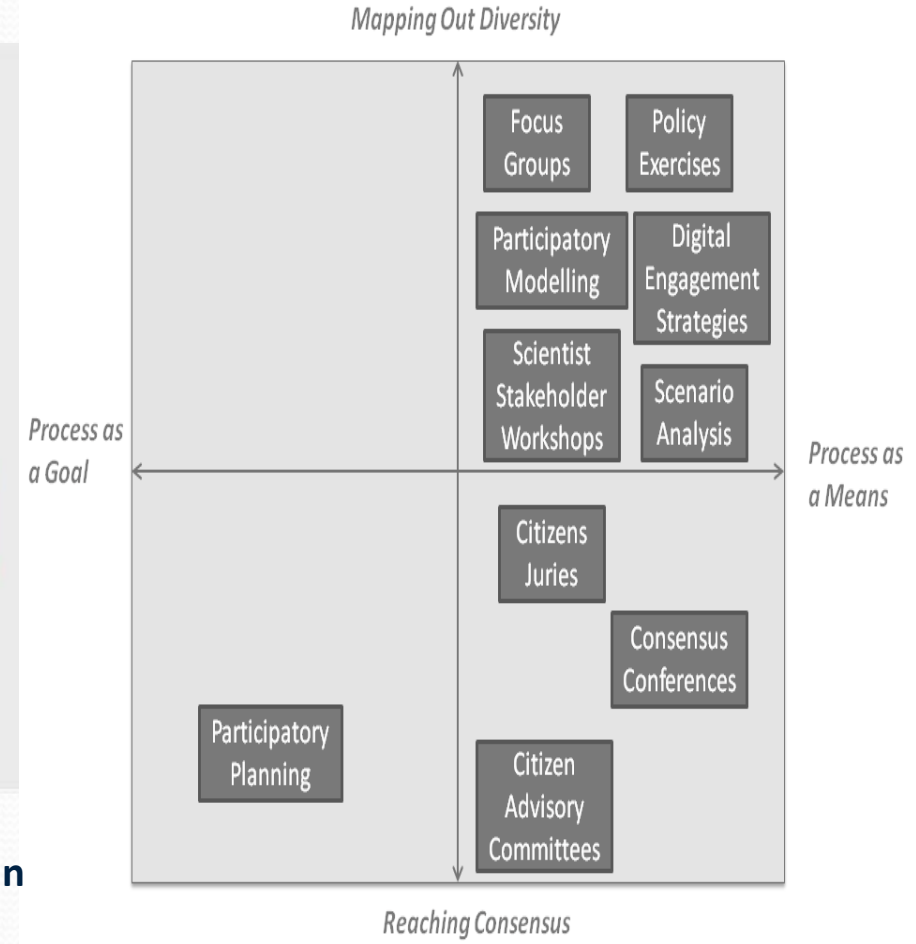
"By identifying priority pollution issues in the catchment, we are able to assist management agencies to develop effective and efficient environmental outcomes."

Academics at the University of California Irvine's Partnerships for International Research and Education (PIRE) will also be involved in the ecosystem assessment.

The American scientists are visiting Australia as part of a $4.9 million project to foster US/Australian collaborative research on water supply and water quality, funded by the US National Science Foundation.

Incorporating public in offset valuation

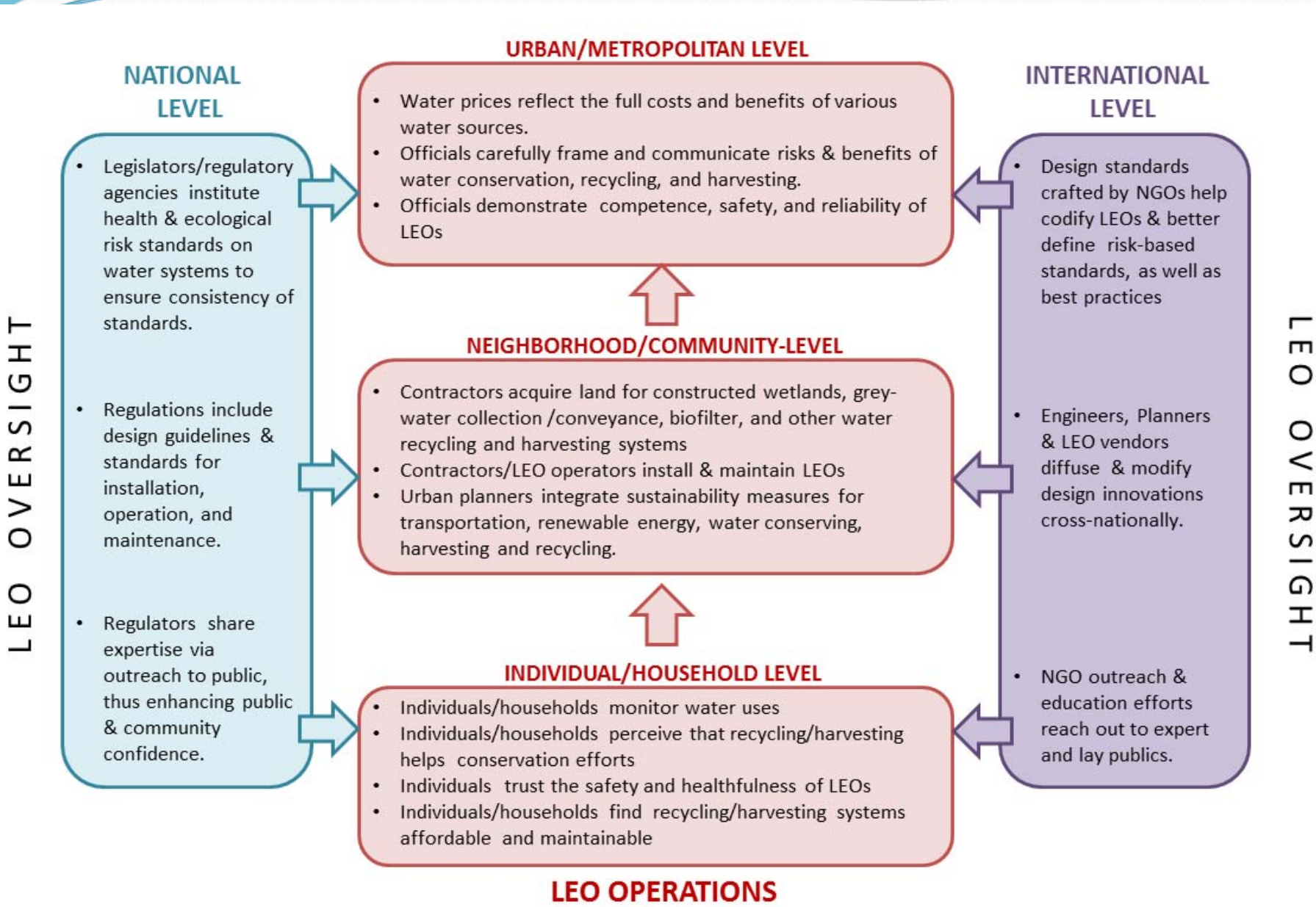




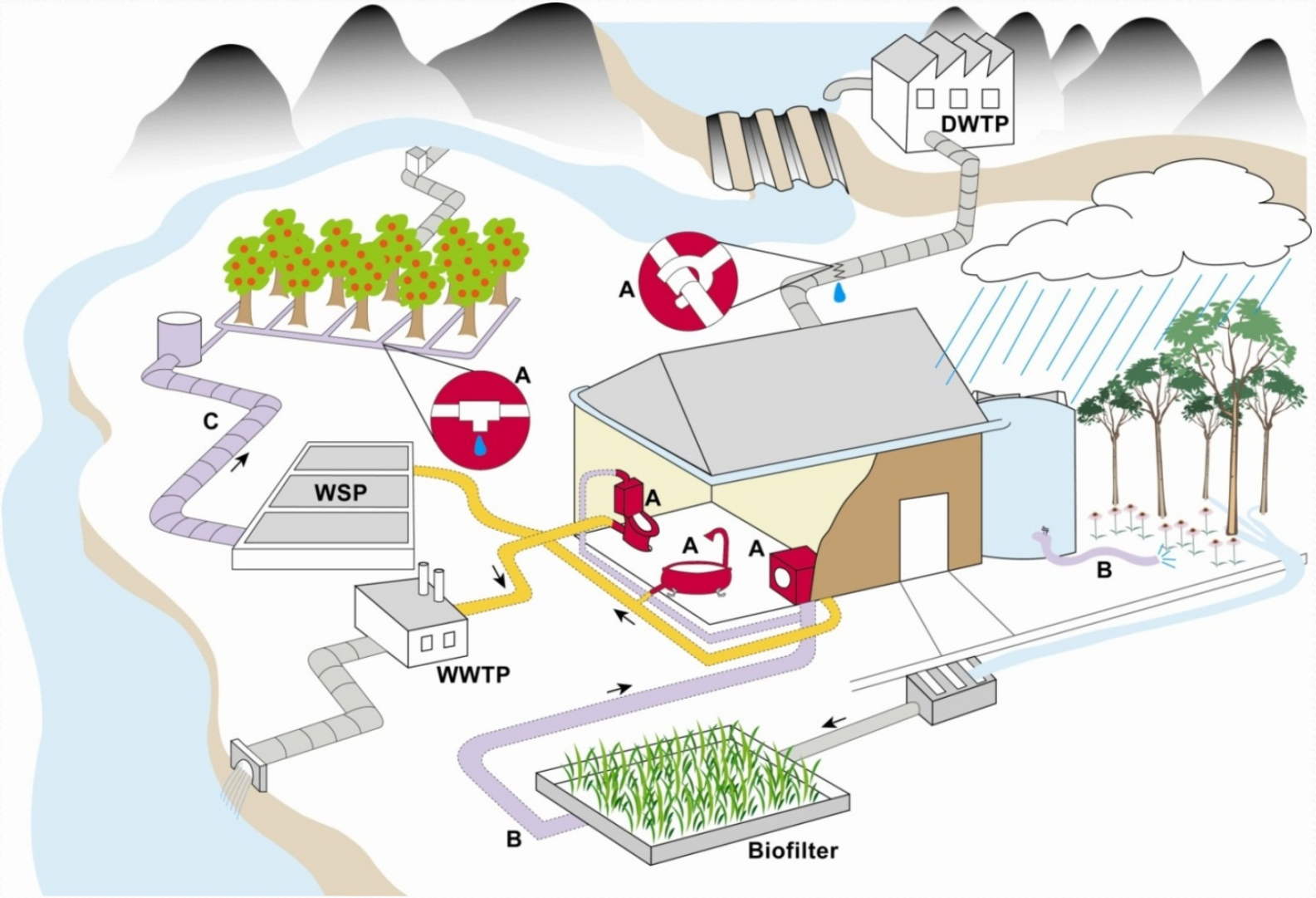
LEFT: proposed framework for engaging public in Melbourne-area offsets program.

RIGHT: possible forms "stakeholder workshops" may take (TBD).

Low energy options – summing up



Toward a water-sensitive urban system



From: S.B. Grant, J.D. Saphores, D.L. Feldman, Taking the "waste" out of "wastewater" for human water security and ecosystem sustainability. *Science, 337*, (2012): 681-686.

KEY: substitution (A), regeneration (B), reduction (C)

Conclusions

- **Melbourne & SoCal encourage innovation – but ability of adaptive governance to exploit windows of opportunity varies.**
- **In *Melbourne* economic, social, environmental outcomes weighed in combination; consumption remains low – but interest in reuse has declined.**
- ***SoCal* displays renewed interest in reuse, stormwater harvesting – other innovations, e.g. offsets, are slow to develop, in part because of gradual adoption of other innovations.**
- **In all cases, gradual/incremental introduction, garnering public support, encouraging local government culture change are keys.**

Gov. Jerry Brown . . . remains reluctant to impose mandatory water restrictions, saying the state's doing "pretty well" conserving water voluntarily as it enters a fourth year of drought. (He) is "reluctant to expand the coercive power of state authority, so wherever we can engage a voluntary citizenship, I'm for that." -

February 6, 2015