**WELCOME** Professor Denis O’Carroll, Director
UNSW Water Research Centre (WRC)
Professor Robert Care: UNSW Civil & Environmental Engineering (CVEN)
Associate Professor Lucy Marshall - Associate Dean
UNSW Engineering

**KEYNOTE PRESENTATION**
Professor Hugh Durrant-Whyte: NSW Chief Scientist & Engineer

**PANEL 1 – THE HEALTH OF THE LAND AND WATER**
Dr Jim Bentley, CEO Water, DPIE
Associate Professor Will Glamore, WRC
Kylie Russell, Senior Manager, Aquatic Environment, Coastal Systems - DPI
Professor Cameron Holley, UNSW Law
Stefanie Schulte, Principal Regional Water Strategist, Water Group - DPIE
Erin Cini, Manager, Liveable Communities, WSAA
Adrian Langdon, WATER NSW

**PANEL 1 DISCUSSION QUESTIONS FROM ATTENDEES**

**PANEL 1 AUDIENCE QUESTIONS**

**1PM FEEDBACK FROM DISCUSSION GROUPS**
The Health of the Land and Water

**PANEL 2 – DROUGHT RESILIENCE FOR TOWNS AND CITIES**
Professor Ana Deletic, UNSW WRC
David Reid, Georges Riverkeeper
Professor Ashish Sharma, UNSW WRC
Richard Beecham, DPIE
Nelly Berry, Sydney Water
Professor Stuart Khan, UNSW WRC

**PANEL 2 DISCUSSION QUESTIONS FROM ATTENDEES**

**PANEL 2 AUDIENCE QUESTIONS**

**3.30PM FEEDBACK FROM DISCUSSION GROUPS**
Drought Resilience for Towns and Cities

**FORUM SUMMARY AND CONCLUSIONS**

**APPENDIX A: GROUP DISCUSSIONS**

**NOTES PANEL 1**
The Big Challenges
The State of Our Water
Constituencies
Data and Information

**APPENDIX B: GROUP DISCUSSIONS**

**NOTES PANEL 2**
Government Policies
Innovations
WSUD
Rehydrating the Land
Denis O’Carroll:

• Climate predictions suggest droughts will become more the norm. We need to think about how to develop ways for communities to build resilience around that.

• Today is to be a free-flowing, open discussion about challenges and potential solutions. There will be varying views, let’s be open-minded and come up with solutions.

• The goal is to have tangible outcomes and a path forward at the end of today.

Robert Care:

• Today we are at a confluence of drought, fire and flood. There may be more important issues to address right now such as climate change and the like, but those issues are linked to drought.

• Drought is a wicked problem for Australia. Drought is a natural event but also political, social, cultural, and given the intensity of recent events, particularly over Christmas, it is a deeply psychological event. Our solutions today need to take that into account.

• The result will be a white paper and strategy about how we can be more resilient to the impacts of drought in Australia.

• Today is about listening, sharing, coming together.

Lucy Marshall:

• We need to train the next generation of engineers, scientists and professionals to be able to deal with problems around natural resources where uncertainty is high and where we might have limited data on which we can make decisions.

• It’s exciting to see a blend of different people here today from different areas, this reflects how many different people we need to address this problem, how to turn discussions into practical outcomes.

• Our Keynote speaker is a perfect exemplar of this, he has turned his research into tangible outcomes, delivering the automated container terminals, and the ‘automated Mine of the Future’ for Rio Tinto.
PROFESSOR HUGH DURRANT-WHYTE: NSW CHIEF SCIENTIST & ENGINEER

My role as Chief Scientist covers three main areas, and water plays a huge role in all of these:

- Providing advice in different areas across government on everything from bottled water in Tweed, mining in catchments, decarbonisation etc. A third to a half of the projects we have are based in water policy. We think about water in lots of ways.

- Funding the right research that we think will have an impact in NSW. That includes national critical research infrastructure, funding new centres that might impact what we do in the State, funding lots of things that have an impact across the board. These projects also have a large impact in water, for example, NSSN has a number of projects with Sydney Water, new sensing technology to understand leakage, and other technologies trying to measure data sets around aquifers, and other areas. There is a genuine interest in what new research we could be doing in the water space.

- Working closely with industry and Treasury, to find out what we are going to do in the future, what are the new jobs and industries. There’s not only a problem but an opportunity here; how are we going to approach drought resilience not just for now but for the second half of this century. I’m hoping we’ll address this today, fifty years from now, how we are going to make ourselves resilient to these events that are becoming common.

- I’ve been running an accelerated R&D program with the Premier’s parliamentary secretary, trying to address how NSW Government can do R&D better and how we can engage our university partners, industry, etc. We want to select some big unsolved problems in NSW and try to tackle them.

- I’m so pleased to be here, very grateful that the WRC has organised this fantastic workshop which will resonate through lots of different areas of government. It’s a wonderful initiative. Vital to solve this problem together, using the data we have.
PANEL 1

THE HEALTH OF THE LAND AND WATER
It’s remarkable that we gained over 20% of storage capacity of water into Greater Sydney’s water system over the last three days of rain. Similar gains have been made in some parts of regional NSW, although many remain in severe drought. I’ve already been asked whether that means we don’t need to carry on with the expansion of the desalination plant, can we put the investment back into storage, etc. I obviously didn’t give an absolute answer to that question, but it’s clearly a reminder that we live in a system of feast or famine, which is probably going to get worse not better, so we need to work out how to deal with it.

I agree with Hugh regarding feedback from people across the sector; we need to use what we have more wisely. We’re talking about land and water health here, but given what has happened and my role, it’s probably good to touch on metro as well.

Sydney Water has done a really good job in many areas for a long time. But it’s strange that since the millennium drought, Sydney Water customers have used 25-30% more than customers in Melbourne and we are thinking of doubling the capacity of the desalination plant in Sydney.

Also, Sydney’s leakage rate is the highest of any major city in Australia. This doesn’t mean Sydney Water is not a good utility, but as a sector we haven’t been very good in some areas. We don’t know how to benchmark ourselves. On a world scale our leakage rate is excellent but our situation is quite different to other countries. Most of the world doesn’t live on a big desert island with its population spread around the outside. I want to emphasise: this is not Sydney Water’s fault – systemic problems are to blame.

Across our regulatory and performance systems, our settings are wrong.

We all must stand back and see that it’s not just data not being used well or models not up to date, but we haven’t worked out between us what ‘Good’ could look like. We need to decide what good outcomes would be, not just aim to do better than last year. That’s my brief look at Sydney’s water which I think applies across the State. There are pockets of outstanding performance and then there are not. A lot comes down to what we say good performance and outcomes would look like, in these parts of the State, under these types of conditions.

I think this is the work we need to do now. In government, with our utilities colleagues and other interested players, to lead a piece of work on State water strategy. I want this to say what we want to achieve, what good outcomes look like. This is our goal in NSW – a new State Water Strategy coming out – which aims to articulate what we are trying to do based on new good outcomes benchmarks.

My role is to coordinate this across the whole of the sector – not all of the government owned and run parts of the sector report to me, but the new role I have is to coordinate our strategy and performance across the sector. Not just within government but all players in the sector, so to work with all players, drawing on all our data and models.

I think better understanding, models and use of data is needed, but also investment. We can’t just build big stuff but also, we can’t say investment is not required. The biggest issue influencing the credit rating on Moody’s State report is water security in Sydney.

Water resilience is part of a robust system that also incorporates how people actually use water too. I’m looking for a strategy that gets the right balance between robustness and adaptability or robustness and efficiency.

Key point: As a sector, we don’t know what good looks like because we don’t know how to benchmark ourselves.

Key point: We must use what we have better.

Key point: We must coordinate our effort between all players in the sector.
I'd like to talk about drought and impact on national infrastructure through the lens of the tragedy of the commons. This is where everyone values something, but nobody is responsible for it. As a result, people value the resource but there’s no collective action. In NSW this could be groundwater, stormwater or wastewater but I’m going to talk about 183 coastal rivers where 85% of the population lives, this is my common.

All of us live, work and play here. We love the resources it provides but nobody is responsible for its management, particularly for the natural infrastructure that’s there. It is incredible that there is no one agency accountable for its overall management. It’s particularly worse in drought, there is no collective action. Cumulative impacts of droughts are largely ignored or too hard to manage across the entire system.

Drought in the upper catchments is not connected to the rest of the river management. Diffuse pollutants flow from out of the back door of one, through the front door of the next.

I am incredulous that people are surprised when there is a fish kill or acid plume. The system as it stands is like leaving your dirty dishes out and waiting for someone else to clean the kitchen. It’s death by 1000 cuts, however we seem surprised every time there’s a drought, flood, fire or acid bloom. We are waiting for someone else to clean up the mess.

Collective action is required to address this. We must advocate for the whole system not the component parts.

I propose a total catchment solution, not just for droughts but for all issues we face. Where we advocate for a system not just for the utilities but for the entire river. Someone needs to be responsible for herding the cats. If we can do this, some actions would be:

- A large-scale ecosystem restoration of priority lands in order to build up resilience for droughts, fire and floods.
- A catchment wide long-term plan, so that the forests, nutrient soaked floodplains, and flooded urbanised coastal rivers have –
- A single forward-thinking caretaker who can think 15-20 years ahead.

To close, have a look at this heat-map of usage of our coastal system. This is just four rivers used by us. No other rivers in the world are used like these, they are more valued and used by citizens than anywhere else in the world. There are 183 of these in our community. Think about who is responsible for the management of these rivers? Nobody, but everybody here? It’s a tragedy. The tragedy of the Commons.

**Key point:** We must advocate for the whole system not the component parts.
KYLIE RUSSELL, SENIOR MANAGER,
AQUATIC ENVIRONMENT, COASTAL SYSTEMS - NSW DPI

- The State’s estuaries, coastlines and waters are one of our greatest natural assets. They are highly valued by the community and are the backbone of our economy. Our vision for NSW marine estate is a healthy coast and sea managed for the wellbeing of the community now and in the future.

- NSW Marine Estate Management Strategy is based on comprehensive threat and risk assessment and a considered five-step decision-making process. This process involves investigating and acknowledging pressures on NSW coastal environments and thinking strategically about actions needed to deliver evidence-based management and planning for long-term investment in marine estate.

- Nature-based management actions provide services e.g. healthy wetlands that can supply to waterways even in drought, mitigate floods, improve water quality and increase biodiversity at the same time.

- In comparison to hard engineered structures, nature-based solutions provide social, environmental benefits for communities and nature. These have much lower initial capital investment costs and reduce ongoing operational expenses. For example, building a new dam might cost $300M and have ongoing and increasing maintenance costs over time. That same investment in natural infrastructure could assist the entire NSW coast with better wetland outcomes. That would be increasingly self-sustaining and would adjust to a changing climate.

- My point is to support Will Glamore’s call for catchment-wide action, I would recommend Marine Estate Management program, as it provides a logical decision-making process and a suite of actions that could assist.

- Investments in the $100 million scale – with natural infrastructure we can get significantly more for our money than building a sea wall.

**Key point:** There is a significant social, environmental and economic opportunity to vastly improve our natural infrastructure with nature-based management.
I’m taking a broad view, focussing on principles and ideas that might inform policy and law and governance responses. There are a range of disaster risk resilience frameworks available from international level to local. Drought might be different but the principles that inform resilience building for law and governance are quite similar regardless of the disaster. We need to think about:

- Integrating agendas. It’s not just about water resilience but drought, climate change and other aspects.
- Operating on multiple scales. Can’t just put all knowledge within one government organisation. Drought will cover multiple areas. Collaboration is necessary through multiple levels of government.
- Good knowledge of risks.
- Self-organisation. Local context needs local people responding. Self-organisation comes into this where local people respond and create more participation through organic networks and innovation.
- Current system is too top down – open this up more. We need to create an environment where people can come up with solutions to the problems their community faces.
- Resilience for what? How do we integrate other agendas in this issue?
- How do we create ongoing learnings e.g. creative drought project in Africa?
I’m part of the regional water strategy team, we are currently developing 12 regional water strategies in NSW. We’re in unprecedented territory at the moment (hotter and drier droughts than we’ve seen). It’s important for us to think about this when developing regional water strategies, better understanding our climate and the duration, frequency and length of drought we’re tackling. This will help us manage these kinds of events going forward.

We also need to be forward looking about understanding changes in communities. We have a lot of different issues and changes happening in regional NSW – including land use planning, inland rail network, special activation precincts. Understanding all of these changes are quite important, and water is the key component. For the first time long-term regional strategies are being developed that will bring together the most up to date information on climate variability and climate change with a range of tools and solutions to plan and manage the water needs in each NSW region over the next decades.

The solutions could include policy, planning, behavioural, regulatory, technology and infrastructure solutions to find ways to improve resilience of water resources in NSW and meet the needs of our communities now and into the future.

Strategies will look over the next forty years to determine how much water communities need, and the challenges and choices involved in meeting those needs. What actions need to be taken to manage risk and water availability.

On engagement, I’ve been out consulting with communities and working with partners to understand their needs and ideas around how to manage water resources in the State better, we stand to gain from listening to each other and working together. The schematics we have, we are working on all regions at the moment recognising the whole State faces different challenges for all communities who have different needs but are all important.

Further information can be found on the department’s website:
ERIN CINI, MANAGER, LIVEABLE COMMUNITIES, WSAA

• Healthy land and water contribute to our health and the liveability of our communities. Water utilities provide safe drinking and wastewater services. Responsibility to protect public health. Water utilities provide life. Water provides broader liveability benefits.

• Last year we quantified the value that investing in water-enabled blue/green infrastructure can deliver to physical and mental health by making communities cooler and more attractive to live, work and play in. Green infrastructure includes natural vegetation, bushland, parks, sporting fields, street trees, back yards and even verges. Blue infrastructure includes beaches, waterways, harbours, lakes, rivers and dams.

• In a study by Frontier Economics for WSAA we found that there are up to $94 of liveability related benefits per person per year attributable to integrated water management and that included benefits from increased physical activity, exposure to green space which reduces mental health issues as well as reduced urban temperatures and improved air quality. There are a number of other quantified benefits in our report.

• Business as usual approaches to urban planning and infrastructure service delivery mean communities are unable to realise full potential of liveability outcomes. When we plan for blue/green infrastructure, while we can unlock the liveability benefits, there’s currently no clear way to deliver and fund those initiatives. There’s also confusion around who is responsible.

• Infrastructure Australia made a recent proposal to fund green/blue infrastructure as social infrastructure, to consider the liveability benefits provided as essential services and fund them in the same way as other infrastructure such as health and education, or even public transport. So, there are possibly other funding options such as subsidisation.

• We should think about how our water supply policies impact health and liveability when they impact on green/blue infrastructure. When water restrictions on outdoor watering are implemented as a drought response, they can restrict the amount and quality of land and water available for recreation and physical activity, expose communities to extreme heat and reduce community connectedness. This in turn exacerbates poor outcomes for community and environment and seems to particularly impact people with lower socio-economic status and where it’s needed most.

• We should consider all options including integrating storm water and recycled water for drinking and non-drinking into urban spaces.

• Think about services that green/blue infrastructure provides, make sure they’re maintained for intrinsic value, but in a way that provides positive outcomes for our health and the health of our communities.

**Key point:** Green infrastructure makes cities cooler, improves air quality, reduces mental health issues, improves house prices, makes people physically healthier and is more aesthetically pleasing.
The intensity of the current drought is not comparable to anything we’ve seen before. If you look at the rainfall over the last three years, we’ve had the driest weather over most of NSW. Temperatures over the last two years are 2-3 degrees above the long-term average. Some of the driest soil moisture in the last 3 years. This impacts storage, agriculture, environment and major centres in regional NSW as well as small ones who haven’t received any rain benefit this weekend. If we look at real data on the last 3 years compared to the previous droughts on record, the droughts we’re seeing now are significantly worse than in the past. From a resilience point of view, this shows the work we need to do to adjust.

Every river west of the divide in the North has run dry in the last year. There has been a major impact on the social aspects of our dams used for recreation, boating and fishing.

Many people in the agricultural industry west of the divide have not grown a crop in three years. Farms and towns are impacted. This has huge impact on the resilience of the community in terms of income, job losses, suicides.

Water is not the issue; the total water cycle is. It is not utilities that are essential but water.

We need to look at accuracy of reporting of information. There is a lot of misreporting over the last three years which has led to more stress. We need to work from accurate data to be able to make the right decisions.
Robert to Will G: Are you picturing catchment management authorities?

Will: Yes, in the simplest way. There are many forms it could take, e.g. Melbourne Water has responsibility for the whole catchment, not above but below, and it works. People integrate data. We tend to just look after pristine forests but everything else is someone else’s problem. Catchment management is currently non-existent in NSW.

Will: If you’re investing in wastewater, there’s only so much you can invest in, you are limited by technology. We need serious investment in our rivers. What point do we decide, if our aim is to have better quality rivers, let’s just treat the river and not create a thousand hurdles along the way. As we make new policy, the Marine Estate Management is a great example, but the boundary there is the tide. Councils in that area are responsible but for the councils above the tide, nobody is responsible.

Kylie: Marine Estate certainly does have boundaries currently. We are constrained, I agree. Maybe refocus how this could work, let’s investigate. One point I’d like to make is please do not waste the work that has already been done as part of the risk assessment. It was an enormous process, nearly seven years in the making involving community consultation, scientific analysis documenting threats and prioritising them. Don’t reinvent that wheel, let’s make the most of what’s already been done.

Will: We seem to pay attention only when there’s a catastrophe like fire or drought. My question is, how do we do this differently if we weren’t in the middle of a catastrophe.

Cameron: The Reef Plan in QLD (for 15 years) was designed to manage rivers and it wasn’t super effective. We need forward thinking, catchment-based approaches. Then, once you set up the institution it needs political commitment and authority to do what it’s there for. This is different from just saying we need a single body/catchment authority. We’ve tried those types of things; they can work but very often don’t.

Robert: So, what are we going to do? There may not be lawyers and politicians here but lots of scientists and technical people, maybe they need to get to the top table.

Cameron: There was the National Water Commission – this is an example of how we create learnings – but don’t necessarily follow it through.

Erin: There were excellent independent reviews and reports about the Millennium Drought. The recommendations from these reports were not implemented. We must keep it on the agenda during and beyond this next flooding period otherwise it will drop off. We must be very clear about the outcomes we want to achieve and having a framework to deliver them.

Robert: Are we clear on the outcome? What does “good” look like? State and beyond?

Adrian: People living in rural communities, managing water utilities, see sustainability differently. How do we get to a common version of sustainability for environmental, agricultural and urban use? Until we can get to this common goal it will keep coming apart.

Robert: Sustainability has always been economic, social, environmental. But whoever’s talking about it will see it through their own lens. We see it in reporting around the use of water at the moment, we don’t have a clear objective of what we’re trying to achieve across different sectors.

Erin: We should ask the people what they want. E.g. communities that value jet skiing on dams. Talk to communities about what they want from the catchment and water and what they’re prepared to accept on cost, value and limitations.

Will: We’re doing wastewater work with Hunter Water, we’re trying to look at where we invest wastewater treatment, to align with values. Let’s invest in what people value, but then it inevitably falls back to cost concerns. We need to have some other way to value that.

Kylie: I second that, even in the last 18 months, government areas are working much better than in the past. One important thing to include with community findings is making people understand the consequences of what they want. So often that’s the gap. They have no idea about consequences and once they’re aware of that they’re not sure they want it anymore. Need to do community education.
**Audience member:** Have we got a picture of sustainability in our heads which is at odds with what the continent can provide? Have people spoken to the first people of Australia and talked to them about what they know about what’s happened over the last 200 years?

**Adrian:** Data in the last three years shows we don’t even have to go back 200 years, in the 1920s we were in a 20-year drought, a similar pattern to recent times. The way we manage water does need to change, this is more of the norm, broader patterns of high floods vs longer droughts. Total water cycle, urban plus regional. Impacting environmental outcomes and social outcomes.

**Audience member:** Are the last 120 years really representative? Our work with Newcastle University was looking at exactly that – longer term records. Then go out to speak to first nations and regional communities, interesting to see how they break down different water uses. There are mutual benefits of aligning different interests/needs of different water users together.

**Audience member:** Do we have the right economic model to solve environmental and social issues?

**Will:** It’s short-term vs long-term. Short-term needs flexibility for example, in a review of bottled water, people were finding it more economical to put water in bottles than use it for farming. This is a pure example of short-term economics. The short-term economics gobbles up our chances of long-term economics travelling in the right direction.

**Audience member:** We don’t have an indigenous representative here. How do we ensure it goes from here up and we’re not just reinventing the wheel? Who is here who can make those decisions? Are we engaging at the right level? do we have the right people here?

**Kylie:** Generally, forums like this bring together good options and answers for higher powers to consider.

**Robert:** We did try very hard to get first nations voices here today but failed, same as political voices, we will try harder on that in future. Discussions here can feed into decisions made upwards. Social media is also very powerful, we all have voices out there and we should be using them.

**Adrian:** Social media can be powerful but inaccurate. Misinformation that is being spread around drought and water management doesn’t help us move forward, we don’t have the facts out there. Improving information in the public arena is the most important way. Social media can be heard, but it needs to be factual information.

**Audience member:** Coming from Western Australia, it is a large dry State, mining industries use up a lot of water. In NSW are there clever partnerships between industries for example, superannuation, with recycling of water, education and awareness? in WA schools teach how to be water wise. My observations from a WA perspective is that there are lots of layers here in NSW before a decision can be made.

**Audience member:** Cooks River in Sydney is a good example of 150 years of policy failure in the water area that is still continuing. Policies don’t connect. What happens on the land? What happens in rivers mirrors what happens on the land. What about water sensitive design around urban area development and how water is integrated in that? How does this fit in?

**Will:** It’s urban, but not just urban. We need to do urban well, but regional issues are also huge in this area. If you look at drought in Taree, Port Stevens, farmers had no water in their paddocks, they were bringing water in to turn into milk. The dairy industry is so sacred that we shan’t have a management protocol over how that influences the river. Same as for homeowners, we are afraid to tell them what to do unless it’s a brand-new house.

**Audience member:** It seems Sydney Water collects lots of data but only uses a fraction of it. To connect all the data available, if that is done, why not make it available to other organisations and agencies that can add value to that data.
1. BIG CHALLENGES
FACILITATOR IAN TURNER

What are the current water challenges facing the land, towns and cities?

- Quantity, quality and storage.
- Planning and Management strategies, learning from failures and planning for the future when the future has uncertainty.
- Current practices need to adapt to increasing population.
- Bureaucracy is too complicated. The political cycle means we go around in a circle while drought/fire is happening.
- Projects are not well sequenced, we may be repeating ourselves and doing things simultaneously.
- Engineering and landscape challenges.
- Let’s think of stormwater, sewerage, water supply all as one.
- Uncertainty around full knowledge of water system.

List Priorities - what is to be done?

- Perhaps we need an overarching legislation framework that bans unreasonable use of water, like in California.
- Improve our predictive capability (modelling).
- Simplified and decentralised access to secondary water (recycled, stormwater).
- Financial, societal and environmental value of water to be better represented in economic modelling.
- Start small grassroots solutions (similar to solar) rather than waiting for decisions from above.

2. THE STATE OF OUR WATER
FACILITATOR MARTIN ANDERSEN

Report back

- Water Supply: We often (but not always or everywhere) have a fair idea of what water stocks we have now (except for groundwater), but not such a good idea of what we will have in the future (climate variability and climate change). Local councils don’t have the staff to do long-term and big picture on their own. Lack of staff resources and ability to tap into state or national resources. We need to strengthen high level strategy, coordination of tools and provide ways of using that information on the local level.
- How to better allocate water? The Murray Darling economic benefit model does not work during times of drought. We need to look at the outcomes we want. Incorporate triple bottom line to ensure good social and environmental outcomes.
- Consider alternative crops to produce similar outcomes in terms of food, nutrition, fibres etc, with less water consumption. As an example, the Dairy industry uses a lot of water to produce milk, are there other ways to get that nutrition to people using a smaller amount of water?

List Priorities - what is to be done?

- Framework on State or national level to provide resources to local authorities/councils. Some of that work is already happening but there is still an issue with communication and good ways of sharing that work. This comes back to lack of staff resources, capacity to tap into information and knowledge.
- Strengthen national/State coordination of tools and provide ways of using information on local level in a systematic and consistent way.
3. CONSTITUENCIES
FACILITATOR IAN MCINTYRE

Who and what constituencies should be brought to the table for this discussion?

- Water industry doesn’t talk to non-members. So, the people who should be here are people not in the water industry including:
  - Economists. Decision making is driven on economic and financial grounds that don’t address the objectives we are talking about today
  - IPART
  - Levels of government, Treasury, Premier and Cabinet.
  - End user voices. Lots of agencies gather that data but it disappears and isn’t spread. Needs to be a louder voice.
  - Education providers
- Better Media relations. There is a role for water industry to use the media to educate and develop the water literacy and understanding of the population.

4. DATA AND INFORMATION
FACILITATOR EDWARD COURIEL

Report back

- Lots of data out there although perhaps we don’t collect everything we need.
- Data improvements needed in some cases – such as mining. Discoverability a major issue.
- There is always a risk of misuse and misinterpretation of data, however there is no point in collecting and hiding it.
- We need good metadata, and greater transparency and discoverability of water use.

List priorities – What is to be done?

- Education of the community, reflect the need for different levels of expertise
- Data coordination – open data shared across all sources (industry, gov, etc.)
- Define what is the reliable data or sources of data currently available – need to identify source of data as some datasets has no ownership. (BOM is a good example of publicly available and publicly trusted information).
- Characterise the levels of reliability of the data; plus, levels of uncertainty. Map what data is available. What level of uncertainty does that data have?
- Clear response/policy implementation, need for policy to be put in place to assign responsibilities
- Migration/integration of data
- Make connection between data and decision making, create channels (and have the right data in the right place) to incorporate data in decision making
- Realise role for citizen science
- Combine land and water management
PROFESSOR ANA DELETIC, UNSW WRC

• Use stormwater – if we can capture more stormwater we can reuse it. Not doing enough currently.

• Water sensitive urban design (WSUD) is key: wetlands, swales, green walls, rain gardens.

• Property values go up with these types of designs nearby.

• Quality of water also improves.

• Parafield Stormwater harvesting in Adelaide produces 1.3GL per year.

• WSUD systems are great for water supply and flood protection. WSUD systems provide multifunctional environmental benefits including decreased pollution, better air quality, improved biodiversity, improved economics (at least for some people), and serves to cool our cities down.
Dr David Reid, Aquatic Ecologist, Georges Riverkeeper

- Georges Riverkeeper is a small catchment management organisation that is dependent on partnerships. This type of forum is very useful for establishing such partnerships. Rural drought hits home hard, owing to images of dying livestock, dry paddocks and with landholders livelihoods so intimately connected to local water supplies. As the lives and livelihoods of urban communities are not as dependent on local water supplies, urban drought is more of a slow burn.

- But, droughts don’t understand boundaries and affect urban communities, as well as rural communities.

- We’re not doing the best we can at the moment to utilise the resources we have. Every time it rains on urban areas, the majority of that rain is deliberately directed down drains. We do not use this valuable resource and actually turn it into a problem. Stormwater carries pollutants and high flows damage receiving waterways. Ecology and human uses of waterways are diminished by stormwater.

- Georges Riverkeeper is funded by councils and our key partnership is with councils. Urban councils can do a range of things in response to drought. Council offices and council buildings such as libraries etc to implement water saving policies or create infrastructure, for example, stormwater harvesting. Councils can also develop regulations with water saving and/or onsite stormwater retention measures such as local environment plans, they can provide incentives to households for things like rainwater tanks. They can also produce educational materials. Cost-benefit analysis needs to include a full range of factors, such as increased property values after installation of raingardens.

- The wastage of stormwater in urban environments is a real challenge, but also an opportunity. Water sensitive urban design offers the opportunity to use stormwater as a resource, with environmental and social benefits.

- Let’s get research, policy and management people talking to each other.
Last week a paper was published using data from 220 dams across Australia. RRV analysis is the basis for all water supply decision making in Australia and the world. Calculating reliability, how likely can we supply water. All dams are going to be less reliable by 2090. The question is what do we do about this?

Although rainfall is increasing, floods are decreasing (the ones that fill our dams)

Soils are getting drier and need more water.

Reservoir reliability is not as good.

All the dams in the state are going to be less reliable by the year 2090.

Solutions might include incentivising water tanks for householders

Either improve amount of water going in or reduce demand.

Supply that is increasable is through engineering infrastructure (such as dams). Demand decrease through incentives, rainwater tanks, reuse etc.

Key point: We need to either reduce demand or increase the amount going in.
RICHARD BEECHAM, DPIE

- Climate Risk > DPIE Water models > strategies
- We have been developing analytical tools (complex water management models) management and biophysical components that interact. We develop metrics that describe water security for people, environment, agriculture and industry.
- We traditionally used historical climate to do water planning (which has its own variability) but increasingly realised that doesn’t fully represent national variability and future change. We’re only really getting a partial representation of water security. We want to actually look at long term.
- We’ve engaged in an extensive program of work to develop climate risk data sets, that capture the full extent of variability and change that we can imagine. This work is being done in consultation with and getting feedback from climate scientists and water management experts.
- Using palpeostochastic information. Variability and change 400+ years, dynamic downscale climate models (NARCLim), consistency confidence communication.
- Moving from a partial picture to a fuller picture.
- We’re getting a more comprehensive understanding of potential for water security failure. This is fairly new work, there are similar things happening across other water management agencies, this depends on community trust, we need consistency of approaches and to be able to communicate the outcomes of your work in a way that’s meaningful.
NELLY BERRY, PLANNING MANAGER, SYDNEY WATER

At Sydney Water a challenge we have is planning for a population in 2056 that’s estimated will be at 8 million people. We have competing objectives (increase in growth but we want to improve resilience of our system and sustainability). For us there’s a real challenge in balancing these.

• How do we meet long-term objectives when we need to make mid-term decisions? And those decisions themselves have long-term consequences. How do we do this in an increasingly unpredictable world?

• ‘Embraced pathways’ approach for strategy. This means to specify the next action we need to take immediately, while keeping an eye open on the longer-term pathway.

• Traditional ‘one use’, recycled water ‘purple pipe’ and resilient city ‘one water’ – closed cycle approach – one water.

• Can stay on one pathway before returning to another one.
PROFESSOR STUART KHAN, UNSW WRC

- Recycled water is an opportunity. Waste water from treatment plants, we have a waste disposal problem, invest in addressing the problem. We could be looking at it as a resource/opportunity. There are examples where we are, but we could be doing more.

- Coming through drought, towns and city are looking for alternative water resources and these could be a great opportunity to tap into. The economics are often favourable compared to traditional water sources. It has a multiplier effect in the economy; inject money, it gets used again and goes around. Same thing can apply to a sewage water system. Whether it’s potable or non-potable but then the portion that goes into the sewer ends back up in the treatment and goes back in. If we think about being able to recover water, if you can recover 50% then you have a multiplier of two.

- Need to re-examine our water assumptions and ‘no-brainers’ – i.e. potable water flushed down the toilet is not necessarily lost – it can be treated and used again.

- Another big opportunity is that there is now a political openminded attitude, whereas there has not been in the past. Ministers previously not open are now interested in moving the agenda forward in both NSW and QLD

- Australians have short memories: It rains, and we forget about the drought. During droughts we make more progress with water management. Then we forget them.

- National Water Commissions, Centre of Excellence, CSIRO – get funding during droughts but it dries up when the rains come. Lots of government funded research opportunities have been reduced since the millennium drought ended.

- We could have taken the ten years to continue working on it but now we are again looking at the potential of water recycling as an ‘emergency solution’. People are talking about two-year time frames to come up with solutions, because we have failed to plan. Now that it has rained that will buy us a little bit of time to make proper plans and use these opportunities.

- Lots of places are looking at water recycling. In California for example, ten years of discussions brought about those changes. Now is the time and opportunity to make major changes and improvements for water reliability in our cities.

Key point: The ducks are lined up this time: political openness, we have enough time, the community is open to the idea – the time is ripe to make some major changes.
Stuart: Community needs understanding of the realities of the way we manage water and the hydrological cycle. People don’t understand where water goes when they flush their toilet. We need water literacy, getting people to think through the situation and therefore identify opportunities.

Ana: There must be a diversity of solutions. Not one or the other. It should be a portfolio option to make sure the future is less uncertain. If we play on one card we will lose, but if we split our opportunities we can make sure we will survive. New areas mandated as urban design water sensitive design. In Sydney not much, in Melbourne more. Does it cost more? If you add all benefits, it costs less to do this design.

David: Opportunities is a good way of talking about it. Capture and communicate benefits.

Ashish: The biggest problem is the farms. Farmers are really suffering because of the drought. Cities are having nuisance floods; we can live with that. It’s the farmers who have the real problem. Solutions are around demand/supply. Cities are a smaller part of the problem. Cities have a lot of population and they have the power of speech.

Richard: How you make your catchments more resilient is by the condition of the soil. Need to do regenerative agriculture. Start holding more water in soils. This impacts hydrology.

Nelly: One challenge we have is in funding alternative options when the benefits aren’t realised by our wider customer base. Under current arrangements we’re funded for ‘efficient and prudent solutions’ which means the least cost with acceptable risk. If we were to provide recycled water to farmers for use, unless the beneficiary is willing to pay we don’t have the funding to do that.

Robert: How do we solve this? People who aren’t seeing the benefit need to pay, for example, the way we have train travel and seniors’ subsidies. How do we create subsidies for water that are different to the system we currently have?

Stuart: We must capture and communicate the broader benefits for the whole community of these projects. We need to think about the externalities associated with some of these water management systems as well. For example, if we provide recycled water to a user, that user isn’t drawing water from the dam.

Robert: Why are politicians now open to water recycling?

Stuart: We’re having a drought! I think in the past some politicians have been closed to it because it was a difficult political sell. For example, in Toowoomba, opportunities are always there to talk about ‘this government is making you drink recycled sewage’.
PANEL 2

AUDIENCE QUESTIONS

**Audience member:** What about water offsets, can we create an offset system for business?

**Nelly:** Currently it's only in the water they are not charged for.

**Audience member:** Politicians need to make tough decisions, what would you say to politicians?

**Ashish:** We need to start the conversation. There's no one solution. Collective mixture of solutions that are different for different reasons. This is not a new problem. The status quo has been inaction. If politicians invest in identifying solutions, that would be a good starting point.

**Audience member:** Resilience. If we're looking to achieve that, do we need to quantify it, how will we know when we reach a level of resilience that is acceptable? Do we have a framework to identify resilience?

**Ashish:** In Australia and worldwide there are metrics for water supply systems, Reliability Resilience Vulnerability (RRV). These metrics do exist, and these are standards that are maintained across Australia.

**Audience member:** I want to point out that there is funding in the drought resilience space from the federal government. There is a $100M/year drought resilience fund, we're in consultation over the last six months about delivering the funds. Land-holders and councils had input in that consultation to see how they wanted it spent. There is also a billion-dollar national land care fund. Does government need to change those terms of reference?

**Nelly:** We're funded for all of our infrastructure by our customers, so we need to be prudent. If we want to choose options that have a better economic outcome rather than just financial then we need to look at our current regulatory framework.

**Ana:** Urban water governance should be done nationally for all Australians not locally by Sydney water, who cannot afford to subsidise developers. Governments need to come into play and focus on solutions for all citizens rather than focusing on sectors. We have to think how to solve that problem.

**Robert:** Which do we start with, stormwater going out to sea or...?

**Nelly:** For us it's choosing the first pathway step.

**Audience member:** Operating models of water suppliers are that they must break even or make money from water supply. So, is the circulating model that you're talking about, does it allow for use of recycled water in a way that maintains the economic basis or operating model of those water suppliers or does government need to change those terms of reference?

**Nelly:** We're funded for all of our infrastructure by our customers, so we need to be prudent. If we want to choose options that have a better economic outcome rather than just financial then we need to look at our current regulatory framework.

**Ana:** Urban water governance should be done nationally for all Australians not locally by Sydney water, who cannot afford to subsidise developers. Governments need to come into play and focus on solutions for all citizens rather than focusing on sectors. We have to think how to solve that problem.

**Audience member:** Can I ask about the increased rainfalls and decreased flooding?

**Ashish:** Basically, soil stores a lot of water and they dry out faster; this doesn't hold for cities, but it does in the countryside. Soil is getting drier, so farmers need more water, demand is increasing, there is a 20% drop in reliability of reservoirs.

**Audience member:** Increases of CO2 in the atmosphere?

**Ashish:** We have observations of rainfall and flooding, rainfall extremes are increasing, and flooding is reducing, so the most likely scenario is the soils. We don't have observations of this, but it seems likely. The soil gets drier quicker than it did 50 years ago.

**Ana:** There's an increase of flooding because of rainfall being more extreme, we have more extreme floods in cities, where we build expensive, impervious infrastructure. Cities are becoming denser, when you have the same rainfall you have more flooding.

**Will:** The biggest elephant in the room for me is population growth. Worst case scenario is we'll have 9 more Sydneys needed by 2100 but we're not talking about that. So, then what do we do? We're barely surviving now and it's getting worse, where does that fit in the discussion?

**Nelly:** We need to diversify what we're doing and be more innovative. For example, Western Sydney has too much water in planning estimates; when we look at wastewater generation and stormwater as we put more impervious surfaces out there. We have a ‘too much water’ problem that we need to solve.

**Robert:** Which do we start with, stormwater going out to sea or...?

**Nelly:** For us it’s choosing the first pathway step.

**Audience member:** Operating models of water suppliers are that they must break even or make money from water supply. So, is the circulating model that you’re talking about, does it allow for use of recycled water in a way that maintains the economic basis or operating model of those water suppliers or does government need to change those terms of reference?

**Nelly:** We're funded for all of our infrastructure by our customers, so we need to be prudent. If we want to choose options that have a better economic outcome rather than just financial then we need to look at our current regulatory framework.

**Ana:** Urban water governance should be done nationally for all Australians not locally by Sydney water, who cannot afford to subsidise developers. Governments need to come into play and focus on solutions for all citizens rather than focusing on sectors. We have to think how to solve that problem.

**Robert:** People need to transition, but not over six months. From where we are now to where we need to be, over 20 years this is plausible. What are the transitions that we need to make? Government departments, private sectors, cities, farmers – we will all have to go through some transition.

**Audience member:** Increases of CO2 in the atmosphere?

**Ashish:** We have observations of rainfall and flooding, rainfall extremes are increasing, and flooding is reducing, so the most likely scenario is the soils. We don’t have observations of this, but it seems likely. The soil gets drier quicker than it did 50 years ago.

**Ana:** There's an increase of flooding because of rainfall being more extreme, we have more extreme floods in cities, where we build expensive, impervious infrastructure. Cities are becoming denser, when you have the same rainfall you have more flooding.

**Will:** The biggest elephant in the room for me is population growth. Worst case scenario is we’ll have 9 more Sydneys needed by 2100 but we’re not talking about that. So, then...
3.30PM FEEDBACK FROM DISCUSSION GROUPS
DROUGHT RESILIENCE FOR TOWNS & CITIES
(FULL GROUP DISCUSSION DETAIL IS APPENDIX B)

1. GOVERNMENT POLICIES
FACILITATOR MARTIN ANDERSEN

Issues

- A lot of fractured, piecemeal parts of government are dealing with for instance stormwater only so they can’t integrate other parts of the water cycle to generate a more holistic way of solving problems. There are lots of silos still out there, working with different aspects of the water cycle. Need integrated approach across the state.

- Education. Increase awareness and knowledge around water use and recycling and change behaviours in terms of water savings. We take water for granted in cities. It’s seen as a human right. Must educate people about water. Ongoing theme from government and utilities point of view: they need to keep engaging with the public around this.

- Should we have a higher price of water? There are practical and equity aspects to consider, how do you do it per household, how many people per household? We’d need to increase prices quite a lot so maybe that’s not the best way to go.

- We need to define the end goals in order to drive policy settings. What outcomes do we want?

- Who should be driving it? We need strategies across the country and an integrated approach. We can’t look at water in isolation, we need to include land use, water quality, and ecological outcomes.

List of priorities- what is to be done?

- Much more integrative approach across the State.

- Investigate changes to water pricing to drive behaviour (consider concerns about social equity).

- Renewed National Water Initiative V2. Now that we have a new appetite for reusing water, build that in.

- Areas for transition into recycled water use, investigate barriers.

- Whole system approach across different institutions.

- More focus on education.

- Look at the financial tools/drivers we need to get at the outcomes we’re trying to achieve.

2. INNOVATIONS
FACILITATOR EDWARD COURIEL

- There’s a lot of technology already out there but what is the most appropriate?

- Solar hydropanels, out there already but not in big use, production rates aren’t enough yet to make them attractive to our economy.

- Emerging technologies using nano, these aren’t getting industry interest yet.

- Aquifer recharge, sewer mining – there are some very successful examples.

- GM crops – making yields more efficient and fit for landscape.

- Sustainable farming look at practices that work with the land rather than destroy it.

- Driverless cars, in urban areas there is a lack of storage space, storing water to use during flood periods, carparks would provide that space.

- Realising true and total value of water. Are markets accounting for it correctly?

- Integrated water, cycle management, most people in US drink wastewater multiple times. Educate Australians on providing security around what real risks are.

- Good governance is around capacity building, allowing people and technologies to come together and be able to tap into the innovations that are already here.

- Growth; if we were to visualise an innovative future cities and plan for them now, if we let the market decide then the market would probably decide something that would be redundant by the time we get it in.

- How do we make longer ranging decisions for the future? Maybe have longer ranging visionary approaches with standard planning assumptions across all areas.
3. WATER SENSITIVE URBAN DESIGN
FACILITATOR NANCY GLENN

Report back

- Need a holistic approach. Retrofitting within cities. Incentivised. Looking at big picture. Overall water cycle and bringing all players into the discussion.
- We have many innovative tool boxes - need to pair them with a policy change.
- Yes, design our cities differently from the get-go and retrofitting

Developers may not be getting rewards for improvements.

One-time monies for build but longer-term funding solutions needed for maintenance. Operational budgets are key to this.

- Retrofit currently very/too expensive. Redevelopment when opportunity exists.

Priorities:

Get it right for greenfield sites
Identify case studies and low hanging fruit especially for maintenance
Get creative – thinking for incentives and incentivising
Legislative reform

4. REHYDRATING THE LAND
FACILITATOR IAN MCINTYRE

FOCUSSED ON RURAL AREAS

How do we revive our land?

- Do case studies on people who have been doing it for 25 years. Mulloon community landscape rehydration project near Bungendore created a lot of interest. Managing land on several properties in a way that slows down the passage of water through those properties, thereby promoting recharging of the groundwater and retaining water in streams. It has been quite successful.
- Another example is the Bathurst super corridors Project, they got cooperation with landholders (and non-cooperation of others) they fenced off corridors either side of streams, allowing native vegetation to grow. This minimised rate of loss of water out of the system. There were some useful tests there (Some willows were removed which turned out to be a disaster). Because some landholders didn’t participate they were able to compare results.
- Both of these projects [Mulloon rehydration & Bathurst super corridors] ran into regulatory barriers. Another example of where the regulatory system isn’t looking at whole system.
- Difference between crops that have an annual demand for water and those which have a permanent need for water. Annual crops vs farming activities where you need constant water to keep trees alive. These reduce the ability to adjust the process to match the season you’re experiencing.
- There’s a need for continuing with water conservation measures after drought. Retention of water in soil helps reduce effect of high temperatures towards next drought.
- Possible use of cost incentives to encourage water conservation behaviour. Urban and rural context applicable. Set a benchmark, if people use less than the benchmark, they pay less.
- Need to take into account full benefits of taking actions. For example, the idea of recycling water onto playing fields keeps kids active for longer which is good socially and also saves public health system costs later on. Another example is to enable retirees to continue gardening, this reduces cost of retirees on the system.
FORUM SUMMARY AND CONCLUSIONS

Denis: summarising a very information packed day.

• Adrian showed how we have been through unprecedented drought, and unprecedented precipitation over the last three days. Many regional towns however remain in drought (Forbes, Parkes, Dubbo, Tamworth).

• Are we using the right climate averages for planning? Are we using right data for planning purposes going forward?

• We need to value our natural amenities; they have important socio-economic benefits that sometimes go unrecognised in our models. The drought has negatively impacted socio economics.

• We need long-term reduction in our water use, we seem to get into same issues in the recurring drought cycle.

• There’s misinformation out there and misuse of data.

WHAT ARE SOME OF OUR SOLUTIONS?

Innovations

• Water reuse, educating the public about reasonable concerns around this.

• WSUD strong option.

• Aquifer recharge.

• Better models, these should include an economic component. We rightly value all important components.

Education & Knowledge

• It’s important that we continue revisiting topics and do long-term planning, regardless of whether or not we’re currently in a drought. We should also look at case studies from other countries with similar climatic conditions such as Israel, South Africa, California.

• We need to share data.

Policy:

• Economic incentive for better use of water,

• More awareness of water footprint of our daily lives (the real cost of our food, cotton, energy usage, water usage).

• Global optimisation looks at associated problems.

• Integrated government approach,

• Should we price water higher?

Lucy Marshall: Thank you to panel speakers and facilitators, great to see the different viewpoints. Lots of energy in all our discussion groups. Valued perspectives from all the panellists.

Thanks to Mary O’Connell and Tamara Rouse for organising this excellent event. Thanks to Robert for keeping things moving and to Denis for inspiring the forum.
APPENDIX 1

RECORDER NOTES FROM THE DISCUSSION GROUPS – MORNING

THE HEALTH OF THE LAND AND WATER
1. BIG CHALLENGES
FACILITATOR IAN TURNER

Current water challenges facing land, towns and cities

- Quantity, quality, storage – do we have enough of those things?
- Quantity not sufficient – not meeting level of water required
- Water planning not being done the right way?
- Dynamic population increasing in density, reducing living spaces, higher pressure on public open space. No water to make those spaces perform at a higher level. Can’t make water supply work hard enough to provide desired performance. Can’t keep doing more of the same cuts – restrict ourselves into clay paddocks.
- Managing changing expectations
- A lot of our assumptions around water management are based on a short period, some might not be valid particularly in the space of climate change. Data from the past not sufficient for managing into the future.
- Bureaucracy stopping anything from happening, inhibiting at different levels. By the time processes are complete, cycle has changed, and priorities are no longer the same. 3-4-year political cycle, both parties need to be involved.
- Urban water governance is very fragmented – current system is not enabling necessary interventions. Change and improvement being prevented.
- A lot of programs initiated but aren’t well sequenced – all happening concurrently, would be better to coordinate.
- Landscape challenge – more frequent and extended droughts has phenomenal effects on soil quality, ability to support population through agriculture. Not only an engineering issue.
- Stormwater not integrated with sewerage and water supply. Should be managed as one system.
- Need to hold water in the catchment, not rain to drain.
- Groundwater – don’t understand the system we’re trying to manage, don’t understand recharge under normal circumstances. Considerable remaining uncertainties around what the resource is and its sustainability / connectivity.
- Reports get written about problems, put in file, no action, someone writes another one. Problems not addressed.

List of priorities – what is to be done?

- Plan by thinking about failure, thinking back from there – various trigger points, what would you do if there was a failure…?
- California state constitution says all water will be used to maximise benefit, unreasonable use is not permitted.
  E.g. can’t use potable water to water golf courses if recycled water is available.
- Predictive modelling is very important – looking at downscaling of climate models and connecting that to predicting water quantity and quality. This should be more integrated.
- To have a simplified process of being able to extract secondary uses of water that could be easily accessed for use in the community. Invest in making e.g. stormwater accessible, decentralised.
- Costing in the value of water, quantify. Look at value of liveability aspects. However, not MDBA style monetary system where unreasonable use (e.g. someone buying water to put in bottles) is allowed.
- Planning for failure, how do we sustain the community?
- Natural capital accounting, putting a value on natural resources and using them must justify cost.
- Restoring natural landscape function.
- State Agencies should be consulting widely, keeping up.
- Work from the bottom up, get in at grass roots level, individuals picking it up and things can just evolve without needing political action (complicated by politics, lobbying etc)

SECOND RECORDER NOTES:
What are the current water challenges facing the land, towns and cities? What will be the impacts of population increase/climate change/ bushfires/other extreme events on our water resources and infrastructure?

- Quantity, quality and storage – Do we have enough? How do we plan for it? Other jurisdictions look at the failure of groundwater, surface water. They work backwards to work out management strategies at various trigger points.
- Are we planning water supplies in the right way?
- Learning from past failures
- Management strategies
What happens if there is a failure of water supply?

- Not all about engineering solutions, must change current practice.
- Manage and change expectations
- Our assumptions are actually framed upon a very small amount of climate history. We just can’t use the past to predict, plan and manage resources into the future.
- A community group perspective: too bureaucratic, too complicated, too many inhibitors, challenges and layers that stop anything happening
- The political cycle/too short – 3-4-year cycle is not ever going to work in the water space
- Fragmented urban water management design. Water governance needs reform
- Lots going on but projects not sequenced/coordinated/integrated/lack of awareness/prioritised – what should come first??
- Effect on the landscape – our landscape is changing and its ability to support our population/food production is evolving
- Sewerage, supply, stormwater – should we be regarding them more closely as one? Water is water is water.
- Present system – rain to drain – how to hold water in the catchments?
- Groundwater is fundamental challenge – we don’t actually fully understand the system we’re trying to manage. We don’t even understand recharge under normal circumstances.
- Academics types – How many reports get written on problems? How many never get traction?

List Priorities- what is to be done?

- In California - All state water resources put to maximum benefit and unreasonable use of potable water not permitted. There is an overarching legislative framework – i.e. no potable water goes into golf courses and parks. Every decision goes through this. Enormous power.
  – Create improved predictive capability of integrated water resources including future change
  – Have a simplified process of being able to extract second source water (storm and sewer) that can be processed easily, decentralised, accessed, storm, sewer, through a household
- Review the cost/value of water. It’s basically free at the moment. But must avoid the Murray Darling debacle – not the $ value - ensure that unreasonable use is not permitted.
- Plan ahead for water failure in a community
- Natural capital accounting – valuing water, vegetation and animals it supports
- Restore natural landscape hydrological function – rehydration of soils.
- Bring fisheries into the debate
- Political gravitas – getting this.
- Follow the lead of other industries i.e. the solar industry which caught the politicians off guard. Works on microlevel. Can we get it at grassroots– people adopting solutions. Small public solutions.

2: THE STATE OF OUR WATER
FACILITATOR MARTIN ANDERSEN

It was agreed that this discussion was to be focussed on urban water use.

The question posed was how much water we have:

1. Temporally – how much water can we expect to have in the future around which to plan activities and build resilience?
2. Spatially – what is the level of connectivity between supply and demand? Where is the water located in the landscape?

Rather than concerns over water supply or infrastructure, we want to discuss what to do with the water/how we use it.

To this end, it is critical to establish how much water there is – what is the demand vs supply – spatial and temporal.

In regional areas, local water utilities don’t have a good handle on how much water they have. The yield/demand curves are not well established and there are questions over forward planning. While some water audits have been undertaken – in general, regional areas don’t have the expertise or the resources to undertake forward planning and are not getting assistance in this regard.

This can be attributed to a lack of critical mass vs the scale of resourcing required – i.e. regional offices are too small and do not have the expertise, nor are there funds available to hire an external consultant.

APPENDIX 1

UNSW SYDNEY - WATER RESEARCH CENTRE DROUGHT RESILIENCE FORUM

32
DPIE noted that they have a regional water team facilitating the Safe and Secure Water Program. This has funding to assist the development of 30-year strategies and has been accessed by 47 of 92 state councils.

Tweed SC acknowledged there is currently assistance with safe and secure funding but questioned the long-term commitment to the scheme.

Some regional areas don’t even know to apply for assistance under the program.

The question was raised, if there are 92 regional water utilities, is there scope to merge some of these and be able to provide more or better resources?

There have been attempts at local government reform, with regional (local) governments linked to utilities, but these are politically difficult.

Water NSW has control of dams and regulated systems. They are responsible for notifying Councils of the state of their water supply, but indications are that the information is not being passed on by Council.

Is it a communication problem?

It was suggested that a consistent method of communication needs to be established throughout the state to manage the issues associated with having multiple different entities.

State water resources are potentially overallocated. This issue has become focussed during the drought. There are allocations associated with water management policies and licences for mining and irrigation. The demand for water bites harder during a drought and the over-allocations become apparent. The example of a huge water allocation being recently granted to a new mine licence was raised as it is expected to have ramifications on community water supply in the future.

The allocation and cost of water means that a number of farmers find it more economical to sell water than to grow crops in dry years

There are concerns that when we get through the current drought we will return to treating water as an endless resource, subjecting the resource to death by 1000 cuts. The drought focusses attention on where those cuts make a difference, highlighting where shortages are.

How do we get the allocation right long term?

How do we de-politicise it?

Who is having a conversation with or in senior government to address water demands.

A number of industries have significant water use—e.g. dairy. The elephant in the room is that we need to ask if this is really sustainable.

Much water use goes to areas with the highest economic output, but in many cases, this is counterproductive to long term viability (in terms of flood and drought) and social and environmental outcomes. We are only addressing the single (economic) bottom-line.

It was noted in defence that Australian irrigators have very efficient practices. If it was not economically viable, they wouldn’t do it. Irrigators have not received their full allocations over the last few years, and yet are still getting the blame for water shortages. There is considerable misinformation in the public arena. Even in the absence of agriculture, the drought means there is not enough water and regardless of irrigators there will be negative environmental consequences.

In summary, important points to note are that we need to:

- Share resources for planning
- Improve (formalise) lines of communication and the distribution of information
- Provide suitable tools that are readily accessible to everyone
- Develop a state led, coordinated approach provide consistent outcomes (it was further noted that this should be managed at a national, not just state, level)
- Plan for demand usage
- Encourage an attitudinal shift – water needs to be respected and treated as a finite resource, not a bottomless bucket
- Identify and manage clashes of interest over the resource due to competing demands

Two sides to management of the water resource were identified; supply is one side, demand the other. On the demand side there is a need to allocate with consideration to all demands and not just from an economic perspective.

Tools going into decision making for permits need to account for inputs and outputs to avoid failure—e.g. the Murray Darling Basin Plan (MDBP) is not working.

Is that because we don’t have the right understanding of the water budget or are we mismanaging it?

The concern is that we are not outcomes focussed. We need to develop economic decision-making tools that capture the full value of the resource.

There is too much “silo” decision making. We need to
transfer knowledge, have more flexible tools and broader analysis to provide triple bottom line accounting – reflecting economic, social and environment values.

The Mulloon Institute has been looking at projects that tick multiple boxes. Projects have been run with a catchment scale approach, aiming for both catchment repair and secure agriculture supply. For example, by holding water in the landscape they are able to manage flooding during peak flows and improve land management. This has been achieved at a small scale (managing a local water cycle) but has potential for landscape scale functional repair and agricultural management – ticking multiple boxes.

Government needs to be more outcomes focussed and make more water sensitive decisions. Get public to be better informed. E.g. we are asked to take shorter showers, but why are we not being told the production of 500g of meat requires 5kL water? Look at sizes of houses. Need government to encourage and inform more sustainable practices.

Discussion comes back to how much water do we have – for now, yes, we have a good idea, but for tomorrow – we have trouble predicting. Lots of local level water utilities/councils don’t have the resources to make these predictions.

A useful outcome would be developing a framework at a national level where we can provide these resources to support local councils.

Some of this is already happening – e.g. DPIE Safe and Secure Water Program, but it is not being communicated. Communication/dispersal of information needs to be improved so others know the resources are there. It was suggested that a national framework and standards be established which are then communicated to local planners.

How we allocate water – for example in the MDB where we try to convert water to provide the highest economic benefit – doesn’t work. We need to incorporate a triple bottom line – go back to basics – what outcomes do we want – e.g. milk – high water use for relatively little yield.

The system to allocate water to different users needs to be fixed.

SECOND RECORD OF THE STATE OF OUR WATER
How much water do we have? Where is it? Do we know the breakdown of water consumption in our communities (e.g., agricultural, domestic, industry, recharge aquifers)? Where are opportunities to save water? List Priorities- what is to be done?

It’s not a static question. How about future, and also about connectivity? Where is the connection in the landscape?

A problem mentioned in the morning session: there is this assumption that there is sufficient water supply, but the problem is the way we manage it. In other words, it is not about water amount but about management of water. But in some areas water quantity is also a problem. Groundwater is running out for example. This was probably a misunderstanding of the morning talk.

Local water utilities in most regional areas do not know exactly how much water they have. They don’t have the resources or expertise required for planning for water supply and droughts. There are many factors to this problem, including data, modelling tools, lack of resources, but no help is provided from state government. Some councils have inhouse expertise, but this is not the case for most councils. Too few expertise exists and not enough money to pay external consultants.

There is program in DPI - “water program safe and secure” which provides funding for integrated water recycle management supports funding for such programs. There is already some government attention to this problem to secure funding. However, it seems that this support has not been communicated with councils.

Comment: Sometime the problem is that there is a lack of communication about these helping programs. And we need to have them in the long term, not just when there is drought.

Connectivity is key here …

There are political barriers for water utilities

WaterNSW controls and regulate dams. They do projects with consulting companies, but this information doesn’t flow downwards to councils.

Martin: So, there is communication problem.

Potential solution: State water resources are all allocated especially during the drought. But we do allocations randomly. Some farmers are not growing crops, as it is more economical to sell the water than grow crops. We take water as it is an endless resource. During droughts, our focus is just on how cutting some water demand would make some impact. But we need to find out how to get the allocation right.

When and whether the conversation will start between government and water users e.g. agriculture sector or certain industry uses about their amount of water usage.
the current system water is allocated to demands with the highest economic outcome but it clashes with long-term ecological or environmental goals.

When you have drought even in the absence of agriculture, the environment suffers. But when drought happens people point to different demands such as the agriculture sector. There is mis-information in the industry.

But there are some impacts from agriculture we need to consider e.g. lagged impacts.

An example of projects: There is a landscape rehabilitation project that help water cycle in the catchment by moderating flow to save water, mitigate flood, and to hold water to help landscapes function and repair. The project is not just improving water quality and quantity but also ecology.

Government can be more outcome focused. Looking at community to make water sensitive cities. We are told about shorter showers but not about how much water it takes to produce 300 grams of meat.

Outcomes:
• Sharing resources, tools to do planning and predictions;
• Need to take state or national-led consistent approach for planning and also communications
• There are issues with the current way of allocations to demands which assumes there is an infinite resource. On the demand side, we need to factor and categorise different demands and allocate water based on that. Decision making about permits should be based on available amount of resources and not just on the economic benefits.
• We need a better economic decision-making tool for allocation of water for different uses. There is silo decision making and we need more flexible tools and information for full integrated economic-environmental approach not just financial.

We have a fairly good idea of how much water we have now although groundwater is a bit challenging to measure, but the big questions is how much water we will have tomorrow?

Local councils don’t have tools or resources to do planning for water. A National planning approach is needed. Some work has been done in DPIE but there seems to be a lack of communication to pass this information. We need a National framework or standard for how to plan for water, and more resources and tools for smaller places to implement them.

How to allocate water is also challenging. Economic benefit based is not working e.g. in MDB

3: CONSTITUENCIES
FACILITATOR IAN MCINTYRE
Who is not here?
• AMA, health sector
• Community education
• Primary Schools
• Economic regulator - IPART - finance drives the decisions, Water utilities use IPART as an excuse
• Systems thinking
  Economists
• Treasury
  Premier and Cabinet
• Part of issue is lack of clear outcomes - needs to be backed by Premier and Cabinet
• Dept of Agriculture - Fed. Government
• Indigenous communities
• The water industry like to talk to themselves but End users need to be in the room. How do you get end users voice in the room?
  • If you want action on drought - you need action on the whole the system
  • Diversity of problems
  • There is a need for leadership
  • Community education -
    • knowledgeable journalists
  • Resolve conflicts:

Think about future generations
Water industry speaks to each other - however is very fragmented and not well organised.

• Need to articulate the wider economic benefits
• Outcomes for pricing
• Voice of customer
SECOND RECORDER DISCUSSION
Attendees:
Georges River Catchment representative
Erin Cini – Water Services Association
Warren Smith and Partners
Sue Burton – Cooks River Alliance
Jacqui McLeod
Tamara Martin – UNSW Innovation Manager
Grantley Smith – principal engineer at Manly WRL
Will Glamore – WRL
Penny Joseph – Sydney Water
Question: Who’s not here who should be
- Water industry likes to talk to itself, non-water industry should be present
- AMA and other health organisations – opportunity to prevent issues related to low water flow
- Community education sector, especially primary education
- Economic regulator – IPART
- NSW uses IPART as an excuse
- Sydney Water prices are reducing but liveability doesn’t increase
- IPART is only relevant if the outcomes are clear

Economists
Treasury and Premier and Cabinet are needed behind any DPIE strategy
Dep. Agriculture water team from Federal Government
Indigenous communities
End users
Water utilities do hold forums with community asking large questions, moving toward citizens juries etc
This data needs to be brought from these forums into the room

Media – need knowledgeable journalists that can educate community

Need for leadership
How can we resolve conflicting objectives?
- Focus on future generations – what should we do now so that future generations inherit what we want them to inherit
- For organisations to be effective, need to be integrated – panel discussion talked a lot about different initiatives happening separately

4 DATA AND INFORMATION
FACILITATOR ED COURIEL
What data or information is required? Do we have enough data or information to decide on a path forward?
- GIS spatial information – essential for planning, bring data and mapping together (also, decisions and policies are per location). Helps understand the distribution of demand and availability (also, if sources are public and private); incorporates different scales. Focus on the targeted area/town. Spatial view and comparison. Data needs to be appropriate for the type of planning in which it will be used (e.g. what depth of data?)
- Public or private water availability – what is the water availability in private properties?
- Water extraction and usage – licenses could be used to monitor usage. How much water is used by industry; make sure that extraction license obligations reflects the actual use and can be tracked. Process of having a license could support the requirement for actual monitoring/water metering. However, challenges exist in terms of privacy.
- How do we monitor the quality alongside quantity used? There is a need for data about water quality and, again, how to characterise the contribution (or not) of industries to water quality. Also, not much real time water quality data is currently available.
- Assets and types of assets. Measuring tools and instruments. E.g. Gross pollutant traps
- Include local/council assets available and aggregated as part of the NSW general mapping.
- Social data/stress level from communities are also important to consider: feeling by community; asset usage and engagement; community surveys. This can be integrated with other social/health indicators related to the social response impact from water issues (suicide, use of assets, changes in behaviour, etc.)
• How do we understand, manage and communicate uncertainty not only in the data points, but also in use of data for communication, modelling, decision making etc.

• For currently used models (or developing models), need to determine what types of data are needed

• Translate data information and context back to the community. Also, how the community deal with the data that becomes available (and uncertainty) and how to avoid misinterpretation.

• Data demand according to time and technology available. Data that is resilient to be used in future. Understand how the availability and demand for data change in time, might be a need to review the type of data we collect ➔ are they still relevant to move for the future? E.g. translatable

What else do we need?

• Central data sets ➔ helps curate, map and also publicise the data. However, these need to be supported and maintained – ownership is challenging

• Data quality and define the levels of quality ➔ for which intended uses the data is enough: different levels of quality vs. potential uses.

• How to deal with and communicate uncertainty; how to treat uncertainty in the decision-making process? How to unify the “language” to discuss uncertainty. Having clear modelling assumptions which are commonly used.

• Education around data, so people are able to properly understand what the data are actually about and the limitations. Creating water data information as user-friendly such as rainfall information to community

List priorities – What is to be done?

• Education, reflect the need for different levels of expertise

• Data coordination – open data shared across all sources (industry, gov, etc.)

• Define what is the reliable data or sources of data currently available – need to identify source of data as some datasets has no ownership.

• Characterise the levels of reliability of the data; plus, levels of uncertainty. Map what data is available. What level of uncertainty that data have?

• Clear response/policy implementation need for policy to be put in place to assign responsibilities

• Migration/integration of data

• Make connection between data and decision making, create channels (and have the right data in the right place) to incorporate data in decision making

• Realise role for citizen science

• Combine land and water management

SECOND RECORDER OF DATA SESSION

What data or information is required?

• Mapping, spatial information. Spatial information is essential for planning. If you’re able to bring data sets and mapping together it gives a more complex view of the challenges areas are facing. Information varies by location, and decisions and policies do too.

• Demand compared to where water is coming from.

• Public vs private water availability, knowing where water is available on private properties.

• Spatial view gives you a comparison, helicopter view. Spatial also gives opportunity to zoom in and out – details vs overall view.

• The number of devices that have been installed – assets, and types of assets.

• Demand side – what people consider as minimum needs vs discretionary. This might vary with space.

• Time? Demands might vary in different times of year. Data demands might be different. Sometimes for modelling before 2018 might be different before and after because types of modelling change.

• Historical parameters might not be relevant to information we want to collect for the future.

• Level of stress in the community, hard to measure. Modelling could help measure that. Social media, community surveys, knowing how a community feels about opportunities and investments that are affecting them. This will vary between LGAs. Asset usage, how happy are communities with use of assets.

• What does the data mean? It would be helpful to communicate this to communities with context.

• Misinterpretation of data - how do we stop this happening? Fact checking in media, getting them on side.
• There is a view that information/data should be open and available to everyone, but some people might make mistakes with it, others will turn it into something new, along that journey we do get those mistakes. How do we move to an open data world while making it less dangerous?

• Better engagement with State governments as far as providing data? Better understanding how communities value water, from an all use perspective. What do people value. Get information around how we can value water as a commodity. Challenge around benefits being segregated to certain groups, if you’re trying to maximise value, how do you do that for the whole area when funding is only coming down one stream. Perhaps the right data can assist with this.

• Stormwater and wastewater.

• Industry usage of water e.g. mining, lack of transparency, how much they use? There are licenses and regulations around the industry but how accessible is that information to other decision makers? There’s a need to protect privacy but if you can de-identify that data would that be of benefit to decision makers? There are lots of licenses out there, but usages can vary dramatically. The challenge is, what is being extracted and for what purpose, and can you adjust that during drought?

The licenses themselves are a useful starting point, tracking the freshwater resource, how do we do that better and manage quantity and quality of water. Lots of data taken around that but it’s hard to get hold of. There’s nervousness around making it public (quality control, business secrets?)

• Common assumptions within the industry around population growth, there are other datasets which are external to this but would figure in modelling. Are those bigger datasets we have big enough to help?

• Decision makers always have to make decisions in uncertain times. How do we do this, how do we understand, define, communicate uncertainty? There’s variation within groups of experts’ thinking about that too. Enormous work needs to be done within government and communities about how we think, understand and manage in that context.

• Social impact data. Costs that impact socially, mental health data, suicide data, education wellbeing, financial data from insurance. What would be impact of lack of response potentially to financial impact to community e.g. water release policy.

Do we have enough data or information to decide on a path forward?

• Data dissemination. No point collecting it if not going to educate community, industry. For example, everyone accepts BOM website data, maybe we need to look to create something similar with water, where people trust and rely upon that data.

• Aboriginal information, different communities having different needs, different knowledge and different history.

• How do you measure resilience of a community, need data to do that?

List priorities- what is to be done?

• Education of what data is available and what is the certainty of that data.

• Data coordination, between industries, across all sources, sharing, metadata, open data. Make it discoverable. Data integration. Marrying information from local level to State government level, how those two talk to each other and create a data resource.

• We need a map of what data is out there and who is responsible for it. Sometimes you can’t even track the source.

• We need to have a clear response and action from government agency once we’ve confirmed validity of data. Have someone responsible for actioning it, have a policy in place which enhances it.

• Decision-making. Data decision, fit for purpose, source, quality, communication. Is there a line of sight between data and decisions? This is not always clear.

• Best practices.

• Land and water management combined (first nations) bushfire management and how much better it can be done with experience of the land.

• Look at case studies of cities e.g. Singapore, Hong Kong, how they use their water infrastructure, are we replicating or learning from that?
APPENDIX 2

RECORDER NOTES FROM THE DISCUSSION GROUPS - AFTERNOON

DROUGHT RESILIENCE FOR TOWNS & CITIES
1. GOVERNMENT POLICIES
FACILITATOR MARTIN ANDERSEN

How should governments help with appropriate policies? Are “appropriate” policies palatable to the public? What is sustainable usage of water? How do we consider the food/water/energy nexus? How do we work with nature? How do we reduce our ecological/aquatic footprints? List priorities—what is to be done?

Martin: What are the first things we need to do in terms of governance?

Answers:

Different levels of government have different roles:

- State government is responsible for preventing water misuse
- Local authorities are responsible for water infrastructure and maintenance

However, what is missing here is the engagement with community. There is not much education on how to be water efficient.

Value of water is cheap. But the water price varies from urban areas to rural areas. Some believe both are valued very cheap while others believe it is more expensive in rural areas.

Education is important, but government policies are important too and need to be set right. Water prices are very important. We have a long way to get the demand side right. Business models for water supplies should change. There will be less revenue for the used water. Increasing water prices to reduce demand has its own limitation e.g. rich people won’t care. There are studies that prices need to increase significantly to make a change.

How about a price setting and capping of water use that looks after every economic class? … There are many challenges with that.

Water policy: taking a step back we don’t have a benchmark on how to work and plan for water. There is no national model or initiative on how to define what is the end goal? There is still a lot of silo thinking. A lot of internal talking in different government sections but it is not clear who will be responsible for what. Need to talk across different sectors to get potential benefit and ideas about it.

Government policies are there to facilitate recycling and treating water, with WSUD etc but there is still a lot to do on that to make it a requirement and enforcement to implement. The bigger shift is also financial shift; whoever needs to do it need to have the resources. As an example, stormwater is important, but we need lots of resources to implement.

The government policies say stormwater is local gov issue. There is no government framework, legislation or policies to look at the whole of water cycle or to integrated management. Stormwater is a big challenge and opportunity. A state level government policy is needed to build the capacity and financing to help local government for stormwater management.

There is a need for consistency in messaging with people or policy when it comes to different water uses and sources. For example, during drought we announced many water restrictions, but there has been no messaging about groundwater usage (people who have bore water license have no limitation. Water is water, doesn’t matter if its tap or bore water. This is not the responsibility of councils. There is a gap in terms of messaging the values of water. The community is not getting consistent messaging.

Summary:

Need demand management through Water pricing and education

Need national water initiative and legislation

Need a clear definition of responsibilities for different parties including local and state government

There is a gap between policy and science for implementing new technologies

Land use and water planning should be together. Clear responsibility between local and state government for water.

SECOND RECORDER AFTERNOON DISCUSSION GROUP 1 – GOVERNMENT POLICIES

Different levels of government have different roles – the state government’s role is to regulate and prevent misuse, while local government manages infrastructure and community education.

Lack of community engagement

Community engagement is lacking - Sydney Water has water saving ads, but there is not a lot out there in terms of educating people about water efficiency, and particularly with respect to embodied water.

There is a lot of marketing out there, so we need to think about what we can do to stand out from the crowd and make people take notice of water issues and gain traction in the education arena.

As an example from one group member – the need for waste minimisation didn’t hit home until he actually went to a landfill and saw the impact – whereas water isn’t obvious
It is taken for granted – need to be put in an environment where you can see the value – which is something positive we can do.

**Water is undervalued**

There are concerns that we value water too cheaply and that this presents an impediment to improving efficiencies. There is also an impression that this undervaluation varies and is most pronounced in urban areas. Rural communities appear to have a stronger sense of the value of water, although some also consider it undervalued in rural areas as well.

Education is important, but the policy settings need to be right. There is potential to increase the cost of water. A higher price on usage would increase people’s awareness, but we need to be aware that reducing consumption also reduces revenue and this would need to be managed.

Studies have indicated that the price rise required to have an impact on consumption would have to be very substantial and that the result tends to be inequitable, leading to social issues in cities, while in the country areas, smaller farms get bought out of the market as big companies buy up the water rights.

The question was asked - can we rate water prices on, for example, the size of a house

Sydney Water have already considered this, but again, it would likely be socially inequitable as the size of a house doesn’t necessarily reflect the number of inhabitants.

The next level of water restrictions would include a per person per day allowance, but it would be hard to manage as it is difficult to know how many people are in each house or to accommodate visitors etc.

Rating on the size of a house is not practical – water is a necessity, not a luxury.

**Lack of direction, policy frameworks and leadership**

We need a clear benchmark to define what is good. There is no clear end goal from a policy perspective.

Lots of silo thinking and internal talk, but we need to identify who should be responsible. Who should be driving? We need to talk across different sectors to maximise mutual benefit.

We need to have policies in place to facilitate options for water recycling and WSUD for example. Particularly in urban areas, planning frameworks should not just encourage, but actually require water conservation and water sensitive design.

We also need a financial shift to get whoever needs to do it to actually do it. So much water is lost in the urban setting. Money is required to implement water recycling and WSUD programs, so the programs must be required by policy.

The governance and policy framework in local government is not looking at the whole water cycle and we don’t have the government framework or policy settings to manage it. Stormwater is a prime example - it should be managed at a state government level as local councils don’t have the capacity or financing to manage it.

An audit of frameworks should be undertaken to see who has responsibility for what and whether that is still appropriate. Identify which authority would provide better outcomes.

Stop the piecemeal approach to crises

Science has established the outcomes – we know the solutions, but government policies aren’t aligned with these.

Water use and water planning need to be better integrated.

Clear lines of responsibility are required.

If we accept this is a crisis it demands some level of government intervention. Otherwise we just take the easy route and we will end up in the same place in another 10-15 years.

**Lack of consistency in message to community**

There is a lack of consistency about the message being communicated regarding stormwater, recycled water and drinking water. For example, in Tweed Shire Council, restrictions are placed over the use of town water during the drought, but none are applied to groundwater so there is no consistency of messaging. The message is also disjointed when it comes to stormwater.

Some aspects of water management are governed by Councils and some by DPIE, and there is a gap in the value applied to the resource. All areas of government need to be working together and provide a consistent message with a consistent value for the water resource.

To save water we have to rely on behaviour change in the community, but the community is not getting consistent messages from the different levels of government. For example – town water restrictions are applied by Council, but bore water is under licence from DPIE, so neighbours may have totally different usage allowances.

Water pricing also needs to be consistent.
Miscellaneous

Renewed National Water Commission is required to give direction - NWI version 2 – apply current perspectives

Transition to use of recycled water – avoids policy issues associated with scaled pricing – recycled water can be priced differently.

We also need to look at broader issues and acknowledge changing demands – not just the quantity of water, but also water quality.

We need to consider environmental flows when looking at stormwater harvesting, and floods as programs may have unintentional side effects or outcomes. For example, floods and stormwater runoff can act as environmental triggers that would be missing if we redirect too many flows.

Stormwater may not be the best source to augment water supply, but it is the easiest to capture as we already have the infrastructure in place – and also for wastewater. (note - there was some dissension around this point, but the conversation quickly moved past it)

Consider developer contributions towards water sensitive urban design. Increases in Council charges are limited.

We know how to design and guide water sensitive urban design, but to mandate it we need a cost benefit analysis or alternative water source to incentivise investment.

We need to provide education regarding demand side management.

Summary

• It is difficult but necessary to educate people about water – the level of community engagement is low
• Different levels of government have different roles and they are not necessarily supporting or complementing each other
• Policy settings are needed to better reflect the value of water, with consideration of social equity and sustainability of smaller farms
• No-one is taking responsibility or driving water savings. There is a need to co-ordinate various sectors to maximise mutual benefits
• Need to look at the whole water cycle but we haven’t got the government framework or settings to support this.

Are there other potential alternative ways of thinking that should be considered?

• Hydro-panels (water harvesting from the air) integrated with the solar arrays, are they feasible? Information given: hydro-panel installed in an aquatic centre produces 4-6L/day with heavy infrastructure
• Storage problems in urban environments - driverless cars – fewer cars in the city, meaning possibility of repurposing parking spaces for water storage
• Aquifer recharge integrated with water recycling, example exists in Perth
• Economic Offsets, Schemes that effectively pay the price and make things economical
• Innovative ways of funding - separate a fixed proportion from water pricing to continuously pay for R&D in water innovation
• Create a water footprint market incentive to reduce water footprint similar to what exists for carbon footprint reduction.
• Education to facilitate the uptake of the innovative solutions

Educate community about water recycling

Educate about water usage – smart meters that segregate water usage inside the houses

• Incentivising behaviour change via a whole system (economical, mainly, but integrating information, certification/accreditation, etc.) – Can benefit from smart metering. As a requirement need to have sound data available about behaviour changing: what makes people change behaviour? Which are the limits of each action? Is there a balance between education to reduce water usage and the value given to usage of water? i.e. would urban population be willing to pay the price to keep activities they value, such as gardening.
• Build capacity and collaboration rather than planning in isolation (management of small areas). Innovate in the way planning is done : increasing communication and dialogue, in general, then bringing the players to work together earlier in the process. Innovating in the planning approach itself, looking for bolder, longer-term necessary measures.

APPENDIX 2
Innovations in Agriculture – better crop water need/usage monitoring using sensors, minimizing crop waste, management practices, use of IT, genetically modified crops, membrane-based irrigation/plant demand driven etc. ➔ evolve to sustainable farming. E.g. there have been a shift over the last 5 years – conventional to regenerative in broadacre agriculture

Mobile technologies/solutions that can be moved around to maximise the reach of benefits, e.g. Mobile technologies that could be moved across communities in need, such as desalination modules.

Sewer mining

What is to be done?

Capacity building

Necessary innovations will be of an economic as much as technological nature

Education

3. WATER SENSITIVE URBAN DESIGN
WSUD FACILITATOR PROFESSOR NANCY GLENN, UNSW

Q1. What is the paradigm shift in terms of water and urban environment?

We need to sell it to developers. Getting developers on board and getting them to do it. Maybe through education.

It should be mandated. Policy change. Use Victoria as an example.

Integration needed with urban environment. Where water is needed, for what, why? With other government objectives. It needs to be on a catchment/precinct scale. How it fits in the overall water cycle, stream health, etc.

Retrofitting existing infrastructure. Where do we place in urbanised area?

We need toolboxes of solutions, for different water solutions; pipe systems + WSUD at the same place. Case study of solutions.

WSUD implementation is not a technical issue, it’s more about legislative, and implementation. LGA model is a poor model for WSUD because there is a governance issue, but also monitoring and maintaining.

No industry capacity to build and maintain. Too many mistakes when Australian industry builds them. We need to spend more time to build robust solutions, because these are young solutions; we need both technological and governance advances. We need to grow mature environment for proper use of WSUD. Capacity building, technical aspect, governance need to develop at the same time.

Technical solutions (WSUD) are not proven in reality; everyone can report whatever results; no real control and standard to be followed. Strata cannot monitor and understand. WSUD is built, but not serviced.

In Melbourne, they are adopted by Parks Victoria, they are gardens and they are maintained as such. Zero Additional Maintenance WSUD is implemented in Melbourne, “hiding” WSUD so that they look same as a nature strip, and people mow them as part of normal maintenance.

Q2. How should we design our cities differently?

Developers to contribute money from good projects, community engagement. Get money from developers for community infrastructure solutions. But developers don’t want to do much with water, they want someone else to do it for them. They think customers are not interested in that.

Who earns money from this? Probably developers might not have an interest in this. Community should have bigger voice. Maybe through education?

The more upmarket developer goes the lower their financial performance. Stormwater for City of Sydney – we need as an LGA to have comprehensive water plan. Variety of stormwater implementation solutions around Sydney is too great, so LGAs are confused and there is no perfect solution. Operational budget is lacking, but construction budget is high. Problem – no one manages WSUD.

It could be charged as a percentage of council rates. There is a stormwater levy, but it’s not enough. Mostly used for gross pollutant traps -GPTs.

How can we retrofit existing, ageing infrastructure? Make them more cost effective.

Retrofitting is very expensive, and it’s much easier in new developments (or brown-field redevelopment).

No one is taking a lead on these projects. *for example =- 1500mm drain wide that is going into the Salt pan creek; what to do with this water? Do we just dump it? There needs to be solutions.

Pollution is not always the problem, sometimes too much water (flow) kills everything. Trapping it on site can be a solution. How to take the water out? Stormwater harvesting, and on-site retention can solve this.
Rain tanks can reduce flows and redistribute water volumes. Another solution can be aquifer recharge – inject stormwater into aquifers for recharge.

**Q3. What are the top 3 priorities?**

Get it correct for greenfield sites.

Identify low maintenance WSUD devices that can be applied.

How to do maintenance and who pays for it? Funding is challenging issue, and who is going to maintain it?

What does community want to pay for WSUD?

We need to identify low hanging fruit. What are some easy solutions? Positive case studies.

Creative thinking on incentives (financial).

Simplifying the bureaucracy and make things easier to do correctly. Major challenge on which everyone agrees. This is a starting point.

**WSUD - SECOND RECORDERS NOTES:**

What is the paradigm shift we need in terms of water in urban environments?

• We need to have some benefit to existing controls, i.e. getting developers on board and giving them incentives.

• Policy change, mandate, use other States as exemplars (Victoria, South Australia).

• More integrated planting e.g. between tree planting with other initiatives/objectives.

• What do we do in areas where there is already existing infrastructure in place?

• We need to have a bigger perspective on where it fits in with the water cycle, try to be holistic about our approach. We need holistic policies and leaders to initiate and communicate across broader sectors.

• A ‘toolbox’ approach looks at case study solutions. Victoria does it better, not for technical reasons but because of government. Their government has more holistic thinking. We have repetitive problems. Western Sydney LGA has same problems as everyone else, there are solutions out there, you could streamline that and allow it to run across multiple areas. LGA model is a poor model because that’s all about capital expenditure and nothing about operations.

• A rain garden is useless unless you have a budget for it.

• These systems are such ‘young’ systems technologically, if you ask industry to build these systems they will make mistakes. Maintenance is also needed over time. We need to spend more time to robustly develop them and create policy. We need to accept they are a recent development, so we need technological and government advancements. We need to grow and mature the technical and policy together.

• Ana: it used to be just about technical growth but in the last 5 years policy has started advancing. We need systems around confirming that devices work, that they are reducing pollution. It’s a cowboy industry out there at the moment. When Kellyville Ridge in Western Sydney, file a DA to put a rain garden in there, who’s going to service it after ten years? In Melbourne it’s more advanced, they get adopted by Parks Victoria, they are part of your landscape.

**Do we need to design our cities differently?**

Yes.

**How?**

• Developers are currently not getting rewards for improvements.

• Developers should contribute money that is pooled and used to implement one project in a location rather than piecemeal pockets of rain gardens that aren’t serviced properly and don’t have a big catchment area. Bigger infrastructure is easier to manage. Developers can pay for it upfront and then council can maintain it. Developers don’t want to differentiate themselves based on water though, the majority just want to sell land.

• The average house price has gone up in areas around Sydney where developments have WSUD compared to others that don’t. But this money goes to the person that on-sells those properties, not the developers. The more upmarket the developer wants to go with precinct plans, the lower their performance is financially. They don’t get the reward for creating a better community.

• Where do we get the money from? If developers fund the creation, the ongoing costs fall on whoever is managing it, should that be a percentage of rates?

**Can we retrofit ageing cities and infrastructure?**

• Retrofitting is very expensive. How do we make them more efficient, more cost effective? It’s much easier in new developments, much easier in suburbs.

• urban rivers now have too much water (used to be sucked up by plants but now with paving everywhere there’s too much flow). Avoid too much flushing of urban rivers.
• One-time money is available for implementation but then nothing for maintenance. Need long-term funding support for maintenance of these systems.

• Even rain tanks can help with this. Stormwater redistribution.

• Aquifers, they inject back, infiltrate everywhere and replenish groundwater. Needs certain geology though so it’s not possible everywhere.

List priorities- what is to be done?

• Get it right for the greenfield sites, get it right for the new. Prove we can do it well for areas under development.

• Identify (case study) low maintenance technologies that we can apply.

• Plan for funding for operations.

• Understand community interest and willingness to pay.

• Identify the low-hanging fruit i.e. what are the simple, easy to implement solutions that we can do quickly to give a 3-5% fix, that have been proven to work.

• Creatively think about incentives.

• Simplify multi-agency bureaucracy. Legislative paperwork and layers to get integrated water solutions is hard.

4: REHYDRATING THE LAND
FACILITATOR IAN MCMINTYRE

• How many people live west of divide in this discussion group?

  1-2 people

Need people in Sydney to understand what is going on out west

• How do we revive our land?

Catchment scale land re-hydration project.

Mulloon Creek, southern tablelands

Pilot project started in 2006,

Installing leaky weirs, building bed of river up, send water laterally, building bed of stream, ecological connection, stock management, regenerative ag techniques, swales/contours at every stage of landscape holds water

NWI framework - landscape interception of water, how to account for water that has been not returned to the stream?

On a practical level, this is working, policy framework is lagging

Not sure of the water balance - not sure if water is not returning - work is about slowing the water down through the profile not stopping it from re-entering river.

Land Care - 90s and early 2000s Land Care project around Bathurst, Super Corridor project, provided barriers along the creek, a buffer against debris into creek and animals from entering creek - native re-growth was really good

Where they put structure in, created a pond which was an ecology pond

Found that over time the amount of water being taken out was minimal but was in fact storing in river gravels

The corridors where the willows were removed, was a bad idea, those areas that willows remained did better and natives came to those areas

Started in 94 and is still going, some areas good, drought has been hard.

Mulloon Creek - have faced development approval hurdles.

• What is sustainable usage of water?

Rice and cotton - only grow when the water is available, rights to water - permanent cropping - is this the best thing for the Australian landscape?

Our climate is good for nuts - not many places in the world good for nuts. Implications for permanent cropping need to be thought about in the discussion.

Need to think about ways to keep water conservations going outside of times of water restrictions

Incentives for using less water - issues around equity and public health concerns for incentives to lower usage, such as reduced recreation and sport time if playing fields are not available or time for retirees to garden - these have public health implications.
SECOND RECORDER REHYDRATING
How do we revive the land/regenerate soils?

• Huge divide between people in the city and bush
People living west of the Great Dividing Range living the drought
People in Sydney should see what it’s like in rural areas

• Catchment scale rehydration project in Mulloon Creek, near Bungendore:
Good model for rewetting the landscape
Installed leaky weirs and swales to send water laterally into the landscape and reconnect floodplain to stream
Slowing water down, rewetting the soil, improving habitats, and reduced flood peaks
Treats surface and groundwater as one resource
Hand-in-hand with regenerative agriculture such as stock management and grazing management
Works starting across Southern Tablelands with a long list of people trying to get projects funded

• National water initiative framework accounting for what is ‘taken’ from the stream
How to separate surface and groundwater
How to add these measures into water sharing plans
Policy frameworks are lagging

• Landcare and river care practitioner: 1990s Bathurst catchment scheme ‘super corridors project’
Revegetation along different riparian corridors.
Tried to put in leaky weirs, but there was no modelling and Fisheries Dept objected
Largely riverbank recharge but also managed to create some ecological ponds
Insignificant impacts for downstream based on total volumes (1% of 1-year storm).
Protect water from evaporation.
Not all rivers have suitable gravels
Willow removals was a disaster – riverbank collapse and death of native animals.
Some farmers refused to participate

• Significant bureaucratic barriers
Biodiversity conservation act
Regulatory system for development but not for landscape regeneration

What is sustainable water use?

• Lots of discussion about rights for cotton, but cotton and rice are annual crops, only grown when there is water

• Need to re-think about permanent crops (nuts) that need water all the time

What does the future look like?

• Water conservation even when there are no restrictions in place

Could water efficiency rebates improve water efficiency?

• Need to consider financial equity and public health impacts around cost incentives

• Costs for using water for recreation – huge public health cost savings down the line

• Gardening for retirees has important health benefits

THIRD RECORDER – REHYDRATING THE LAND
How do we revive our land? How do we regenerate our soils? How do we feed our populations? What is sustainable usage of water? What does the future look like - Will we see more extreme events with climate change? What happens when we have too much water?

• Huge divide between urban and rural perspectives

• Mulloon landscape rehydration project -slowing water, storing in landscape.
Scepticism, at first, funding now received. Mulloon Creek, Southern Tablelands. Ongoing since 2006. Philanthropic at first. Farmers now knocking down our door. Catchment scale.
Installing leaky weirs
Building creek bed creek up. Sending water laterally into the landscape

Some farmers refused to participate

• Significant bureaucratic barriers

Biodiversity conservation act
Regulatory system for development but not for landscape regeneration

What is sustainable water use?

• Lots of discussion about rights for cotton, but cotton and rice are annual crops, only grown when there is water

• Need to re-think about permanent crops (nuts) that need water all the time

What does the future look like?

• Water conservation even when there are no restrictions in place

Could water efficiency rebates improve water efficiency?

• Need to consider financial equity and public health impacts around cost incentives

• Costs for using water for recreation – huge public health cost savings down the line

• Gardening for retirees has important health benefits
Connecting the floodplain to the stream again

Stock management, managed grazing. Restricting stock access to the stream

Swales, every step and stage in landscape holding water. Landscape scale repair project.

At grassroots level, it is working. Farmers want to undertake this work. Policy framework, however, is lacking/lagging

Monitoring – not taking water out, it is about slowing the water down. River and groundwater are the same system.

Regulatory hurdles – development approval, can trigger avalanche of other hurdles. Current regulatory system is geared around development.

National water initiative framework. Ongoing advocacy.

**Bathurst super corridors project – going since the 80s/90s.**

100m wide strips alongside rivers.

Bio-buffer.

Mulch caught in corridor.

Came up against the authorities, fisheries etc.

Native regrowth was phenomenal and slowed water down without any engineering structures.

Created an ecology pond.

Do downstream users lose water? It was insignificant. Over time the amount of water ‘taken’ was tiny for that whole year. Effectively creating more water. Less evaporation.

Took willows out of some, left in others. The ones they took willows away from, the results were a disaster. The ones left were hugely successful.

Some farmers refused to cooperate, some came on board 10 years later, so can see the differences.

There was a bureaucratic wall.

Difference between crops with an annual demand for water and those with a permanent need for water

Lots of questions around rights.

Need the ability to adjust what you’re doing to the weather you’re experiencing.

Nuts. Why? Spain California and Australia. As soon as you commit to keeping trees alive, there is a baseload commitment – can’t actually fit the rainfall pattern

**• Water saving scheme (similar to energy saving scheme) economic driver – ought to be relatively easy in both urban and rural.**

**• Watering a sports field from a public health point of view is important particularly in low socioeconomic areas. Retirees hobby gardening – keep active. Cost savings of that water use is huge.**

**• Regulatory barriers – regulatory system is not looking at the whole system**

**• Continuing water conservation after the drought.**