Water Bar Speech, 11 February, 2016 - at the Paddington Reservoir

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According to NASA, we are 70% water in weight and perhaps coincidentally we live on a planet that is 71% covered in water. This water all erupted from volcanoes during the early degassing of the planet earth – perhaps around 4 billion years ago.

Now, the great majority (96.54%) of water lies in the oceans and contains the products of chemical breakdown of rocks due to weathering.

Only 3.46% of water is fresh – but of that 3.46%; 1.76% is tied up in permanent ice – leaving only a tiny percentage of 1.70% to account for all other occurrences of water.

Perhaps surprisingly 1.69% of that balance is groundwater. BUT, 0.93% of that groundwater is saline leaving only 0.76% of all the water on the planet that is fresh water capable of sustaining our lives.

Note that rivers and dams do not even get a look in yet! Rivers contain 0.0002% and the atmosphere 0.001%. We possibly get the research/monitoring budget slightly wrong when we compare what we spend on river gauging and checking the levels in our dams – as compared to groundwater investigation and monitoring.

Maybe that is only natural – we can see water in rivers and dams! You can't see groundwater – so it remains for the most part a large mystery – and largely forgotten about until the surface water runs out and the streams dry up.

There is another major difference between surface water and groundwater and that is the speed at which it moves. We are all familiar with the speed and impact of floods. However, groundwater moves very slowly. So slowly that impacts due to contamination or over-abstraction can take 100's or 1000's of years to become apparent. Therein lies a major political and policy problem. As an example from the unconfined Botany Aquifer in Sydney, it took only 10 or 20 years to add the chlorinated hydrocarbons to the groundwater – it will be at the very least 300 years before the majority is washed into the ocean – or pumped out and treated.

So, we have a very small part of the total water on the planet that actively takes part in the hydrological cycle – that great machine that evaporates water from the surface of the ocean and transfers the water vapour to fall as rain or snow on the ground surface. Eliminating rainfall would not significantly impact the distribution of water on the planet – but it would soon make the News Headlines!

What about springs? Marketing folk get very enthusiastic about water that is associated with springs. There is a long and fascinating story to tell of human evolution and the importance of springs – but not tonight! Although I must pause and give credit to the Early Australians who understood enough about groundwater and springs that they were able to survive and flourish through the last ice age – about 10,000 years of well below average rainfall when the sea level fell by 130m and most surface sources of water were dried out!

Springs are simply where the groundwater system overflows to the surface. All spring water is groundwater. If you pump groundwater from an aquifer that normally discharges as spring flow, the spring will dry up. You only get one bite at the cherry!

Groundwater also normally discharges as base flow to rivers. If a river continues to flow during a drought, or in a desert, it can only be because groundwater is the main source of water. If you pump water from the aquifer before it gets to discharge to the river, the river will dry up.

The relationship between groundwater, springs and surface water is very delicate and very easy to disrupt. Little is actually known about this relationship and for a long time surface water was considered to be a different resource to the underlying groundwater. We formed the Connected Waters Initiative Research Centre at UNSW 10 years ago to focus on this neglected research area. Fortunately, a prominent local business man (Gary Johnston of Jaycar) shared our concerns and made a significant contribution to help establish the research facility. Such generosity is priceless and we owe an enduring debt to Gary!

Before I close, how about some more specific comments about the waters available for tasting tonight. Sydney Water has made a number available from surface storages. Due to incredible foresight by our forebears, a distribution system has been laid down throughout the city and we can all now sample this water. It costs about 0.2 cents a litre!

We are standing in one of the early storage tanks for this distribution system. It was constructed in 1866 and was part of the third water supply option for Sydney: the first being the Tank Stream and the second Busby's Bore that allowed groundwater to drain from Centennial Park to Hyde Park. As Busby's Bore became fully utilised, a big pump station was established at Engine Pond as a part of the Botany swamps water scheme. All the groundwater from the Botany Aquifer used to discharge into this pond and the water was collected and piped back up the hill to the Paddington Reservoir. This room was filled with groundwater!

As I mentioned earlier, all spring water is groundwater. The difference in chemical quality of the water is related to the rock type that the original rainwater has been stored in. Some of us get excited about 12, 18 or 24-year storage for another fluid and the type of barrel used for storage. Our groundwater has in some cases been stored for 10's of thousands of years – at a very closely controlled temperature and in complete darkness! The flavour of the water is a function of the rock type – with the less salts from weathering the better – but some salts are in fact very beneficial, as the labels on the bottles suggest. We would in fact become ill very quickly if we just drank distilled water.

The chemical quality of water used for drinking has always excited interest. I was nurtured on water from a well sunk into Jurassic Sands in Sussex. That formed my basis to compare waters with. The public supply close by came from wells sunk into chalk which had high levels of calcium carbonate. So high in fact that the chalk precipitated out in the kettle. I considered our supply much superior! However, those who knew only the chalk water considered that a cup of tea brewed from this was much superior to that brewed from a granite spring in Cornwall for example. People moving between districts actually developed stomach problems as they switched between water supplies.

Early water supplies were often contaminated – often by sewage. Folk became ill and were moved to spar towns to partake of the spring waters. They recovered their health – not so much as a result of the efficacious nature of the spring water – but because the spring water was pure and natural!

I am now going to hand you over to Janet Laurence the artist who has put this concept together…

Enjoy.