# Beneath Our Feet by Deborah Wardle

The quiet under-groundness of aquifers suggests they might lack influence. In actuality their far-reaching cogency is something that awes me. I've learned much about how water moves underground. This beneath the surface place moves me. I wonder at groundwater's metaphoric reach. Finding words to illuminate groundwater's subterranean domains is like shining a feeble torch into a moonless sky. The beam disappears and surfaces darkness expands into infinity. My words are limited to the edge of the torch beam, searching towards the depths of unknown entities. Watery spaces spark my imagination, feed my life both literally and figuratively. I am writing to understand not just but deep underground places. This is a glimpse into what groundwater has come to mean to me. Its jaw-dropping vulnerability and what subterranean aquifers might mean for our terrestrial relationships fuel my explorations. Groundwater has more than entered my skin.

I took a camping trip to Witjira-Dalhousie Springs to see the mound springs. I wanted to taste ancient water flows. Mineralised sediments mounded over millenniums now look like pockmarked pimple scars on aged terrain. The Great Artesian Basin used to discharge naturally into thousands of mound springs west and north of Lake Eyre, from Marree, in an arc roughly following the Oodnadatta Track and up to Witjira-Dalhousie Springs in South Australia and into parts of the Northern Territory. For millions of years the mound springs created small desert oases. Indigenous Australians traced trading routes between the springs. Following these lifelines, cameleers, pastoralists depended on the spring water. Later the Inland Telegraph line and the original route of the Ghan railway between Adelaide and Darwin, followed the springs, joining dots on a map. The springs determined life. Most are now either dry or flows are radically diminished. It is easy to pass them by.

Water soaks through soils and sub-surface sediments to flow incredibly slowly through microscopic pores in sandstones. It seeps within hairline fractures in basalts and it floods dissolved limestone clefts and caves. Aquifers are defined as places where groundwater flows enable extraction. Hydrogeology is, like its subject, convoluted and complex. There is one precept around which there is agreement; groundwater is comprised

of rock, spaces and water — the holy trinity of groundwater. After that debates and disagreements begin. Subterranean waters move. In some places groundwater might follow the sandy, gravelly pathways of ancient rivers, long since buried by tens or hundreds of metres of earth. They're called deep leads. Groundwater's potency and its fragility leads me to conjure images of aquifers that I can't necessarily see. The knowns of science blend with the intangible language of imaginations.

The Great Artesian Basin underlays nearly a quarter of eastern Australia and is one of the largest underground water systems in the world. It holds about 130,000 Sydney Harbours worth of water. Groundwater is now mined from some pockets of the basin. It's called water mining because the water will not be replenished or replaced for at least two thousand years, for that is how long groundwater has taken to find its way from the recharge areas. Rain landing along the inland side of the Great Dividing Range in Queensland and New South Wales, seeps underground slowly towards the channel country in South Australia. Along the way many rivers, forests, towns and farms rely on water from the Great Artesian Basin. Less rain means less recharge of aquifers, less sustenance of the ecosystems they underpin. I naively imagine aquifers as large bladders. People jab forks into them, water spurts momentarily like a soaker hose. The pricked holes are now so many that the water table drops and less pressure reduces artesian flows. The bladder flattens. The mound springs dry up. Townships risk losing their water supply. River systems lose a secret supply. Fish die. Deeper bores are drilled to reach the receding reserves.

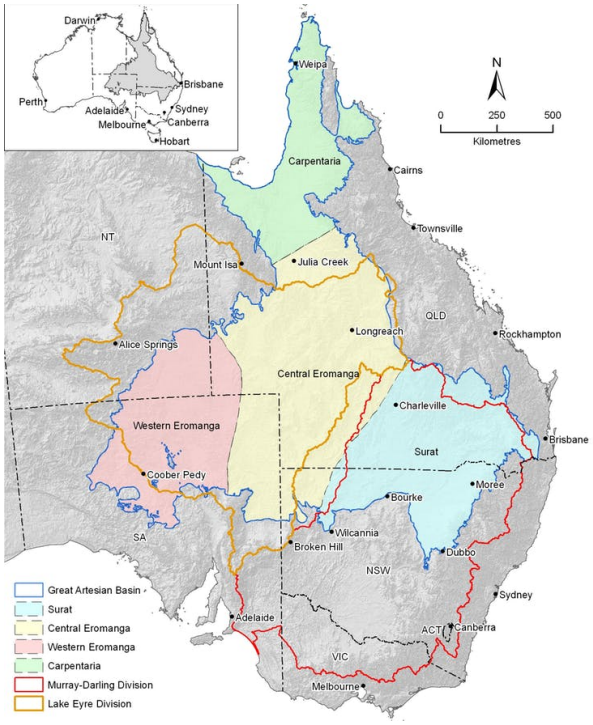


Diagram 1: The Great Artesian Basin Water Resource Region.

Groundwater's subsurface immensity is deceiving. Only about two and a half percent of all the earth's water is not salty. Of this fresh water, about 69% is frozen in glaciers and icecaps, only about one percent of fresh water occurs at the surface in rivers, streams, lakes and dams. This means that approximately 30% of the world's fresh water is stored in aquifers. Approximations of the volume of aquifers are rubbery; they're measured in either cubic kilometres or sometimes megalitres of water. For ease of comprehension Australian hydrogeologists translate volumes into the number of Olympic pools or Sydney Harbours held underground. They estimate and make mathematical models of sponge-like geologies.

The volume of an aquifer might be seen as like the amount of the water held in a jug. There's all that water available, topped up when it rains, you might think. However, the parlous aspect of an aquifer is what is called the watertable, the upper level to the saturated areas of rock. Where outputs from an aquifer are greater than inputs, the watertable descends, at times beyond the reach of existing bores and wells. Significantly water also becomes unattainable to ecosystems that rely on it, such as the liminal zones along rivers and streambeds, the deep-rooted forests and the rich ecologies of swamps and

springs. Where the watertable drops, the exquisite balance of the global water cycle lurches a little out of shape.

The watertable is the critical thing, not the volume of the aquifer. However, management of groundwater is hotly contested, particularly in drought times when human and non-human demands for groundwater increase in urgency. Ecosystems that rely on groundwater are easily ignored in the commercial stampede to command decreasing and ever lower aquifers. Economic interests have prevailed, with little responsibility for ecological damages. Groundwater dependent ecosystems in pools along creeks and waterways are at risk when water is extracted from a connected aquifer, even miles away. Specific ecological niches are endangered when these isolated pools dry up. Unique and intricate biological ecosystems are harboured in shallow aquifers and beneath ephemeral rivers, including stygofauna, or fish, mites, crustacean and worms that live without light. Studying these creatures contributes new understandings of evolutionary processes. Inland fish, frogs, freshwater turtles, crustaceans and microorganisms breed and remain alive in these sensitive places where many years may pass between rainfalls or water flows. Knowledge and protection of remnant river pools and streams across Australia is still shaky work. Indigenous communities preserved remnant pools, knowing that fish spawned there and re-populated the rivers once flows recommenced. Science has only recently described this eons-old ecological pattern. Where we pump aquifers excessively, complex ecosystems are exposed to the probability of loss, a myriad of connections are ignored. Biodiversity easily takes a blow.

In Australia, the impending crisis from excessive extraction of groundwater means that conflict looms. Increasing demands from competing uses and irremediable pollution of aquifers sit uncomfortably with the gaps and the incalculable in hydrogeology. Tensions between agricultural, industrial and environmental demands, combined with limited supply, pinch at policy makers and scientists.

Examples of over-use and pollution of groundwater abound. On the rich basalts of the Liverpool Plains, NSW, grain crops are irrigated with fossil water, known as such because it is so old it first soaked into the aquifers in past climatic conditions. Networks of black polypipe web the landscape, squirting life into dry soils. Coal mining and

contaminants from coal-seam fracking threaten the web of lens-like aquifers that are mostly interlinked below these fertile regions.

Alice Springs' water comes from various aquifers that comprise the Amadeus Basin, a finite water source dispersed beneath the MacDonnell Ranges. Due to growing population and use of groundwater by industry, the watertable is dropping a metre every year in the mined aquifers. Such examples are among many where unsustainable groundwater usage reflects the dominant but insupportable view that bore water is an endless resource, for the taking. When will we put down the forks?

New demands for groundwater are highest in peri-urban areas, places where populations are booming as housing estates sprawl or people settle on small-acreage hobby farms. Bore water is pumped for golf courses, commercial car washes, public gardens, sporting ovals, and a myriad of small industries. A large cemetery on the edge of straggling metropolitan suburbs wants to keep lawns green and to fill a pond that is part of a new garden for reflection after cremations and funeral services. They apply to the regional groundwater authority for a licence to drill a bore. It is perceived as cheaper than mains system water. A hydrogeologist is employed to work through the regulations. The rules and limitations are clearly stipulated. How deep will they drill? How much water can they take? How much will be lost to evaporation, to transpiration from the trees, gardens and grasses once it is at the surface? The calculations whirr, the report flies through bureaucratic hoops of fire. The garden blossoms. We expect greenery.

A dispute at Stanley, Victoria, represents what will soon be a common battleground. Tim Carey, from Stanley Pastoral, obtained licences to extract nineteen megalitres per year of groundwater, (that's about nineteen Olympic-sized swimming pools each year) and sell it for bottling and distribution worldwide as mineral water. Through the effects of drawdown, a cone-like lowering of the watertable, the local farming community faces potential loss of access to groundwater for agriculture due to Carey's deeper bore. *Stanley Water for Stanley* is the community catch cry. The arguments were fierce and were heard in the Supreme Court of Victoria in December 2016. Through a convoluted interpretation of Australian water law, Carey's licence to take the groundwater was upheld. Members of the *Stanley Water for Stanley* group were devastated, none more than the organic fruit-growing neighbours who now have water trucks carrying the groundwater

away along the dirt roads past their front gates. Caught adrift between competing hydrogeologists' reports and ambiguous laws Stanley residents and farmers wonder how long their bores will operate, how the local waterways will be affected. Water wars are predicted to become more prevalent.

I know several families who have installed bores to keep large dams filled. They drill fifty to sixty metres on their bush blocks to access groundwater, too salty for gardens, but great to swim in. It was the aesthetic they wanted in front of their homes, not water they needed. Wealthy enough to create their own water views in a dry inland environment at the tail end of the millennium drought, they trivialise about evaporative losses. There are no limits on extraction from private stock and domestic bores. The risk to neighbouring bore holders of losing their supply due to drawdown is sometimes contested. Risks to district-wide groundwater dependent ecosystems are not easily counted when many unregulated bores pump undisclosed quantities of water. The simmering silence of underground and ephemeral ecosystems that are reliant on groundwater haunts me.

I am struck by the potency of groundwater's so-called silence. In her short story 'Teaching a Stone to Talk', Annie Dillard says, 'Nature's silence is its one remark, and every flake of world is a chip off that old mute and immutable block… The silence is all there is.' (Dillard 1982, 69, 76). I might recognise the trickles and gurgles of streams, the rumbles and cracks of stones falling from cliffs, the thump of waves on a beach. Annie Dillard suggests I witness the noises, and search the hums of silence. Listening for the voices of groundwater I imagine growing dissonance. Underground ecotones may be imaginary, even speculative. I listen for stories of sustainable sub-surface water bodies. I hear discord and unrest.

Contests are rife worldwide around perceptions of groundwater's abundance, its uses, and its essential roles in the ecology of more-than-human cycles. 'Water is life' is a well-known phrase from the United Nations 2010 resolution, which recognised access to clean and safe drinking water as a human right. However, as Maude Barlow says in her book, *Blue Future*, (2014) it is not just the reducing quantity of available groundwater that is at stake, it's the decisions about its distribution that are critical. She argues that the competing narratives about fresh water supplies and usage involve two sides — the powerful and

wealthy decision makers who see water as a commodity, a resource for human exploitation, as opposed to grassroots communities, predominantly people living in poverty, who view water as a human right, to be managed for public good. I would add several other voices to the chorus; the groundwater itself and the ecosystems that rely on ancient underground flows. Bruno Latour calls them "Terrestrial" voices. How capable are we of listening to the wider needs, to groundwater itself?

We have easily thought that there is plenty of groundwater for the taking. This idea fuelled the 'silent revolution' of the 1970s, which saw rapid development in pumping technologies, more efficient drill bits, longer bore casing, more powerful pumps. Agricultural irrigation systems pump more water from bores than any other usage. I hear *pht pht pht* and sibilant *hiss* as enormous fields of grains, vegetables and flowers are watered. Groundwater is pumped for domestic supplies to whole townships, for expanding industrial use, and for bottling into plastic containers. As drought periods increase, more often we turn to groundwater to see us through. We seem to forget, perhaps through its invisibility, that groundwater is not an endless resource. Groundwater extraction is entering dangerous territory.

Prescient perhaps, perceptive definitely, in 1896 Banjo Paterson captured the wild determination to reach deep, underground water in his poem, 'Song of the Artesian Water'. Drilling bores into the Great Artesian Basin meant creeping victory for inland pastoralists. Patterson puts us bore-side in drought conditions, desperation to reach artesian waters is hammered out. The poem tells of a shattering bore drill, 1,000, 3,000, 4,000 feet below, with dramatic descriptions of seeking water 'from the devil', 'deeper down'. Paterson expressed the conundrums and symbolism inherent in groundwater. In his words:

> 'Sinking down, deeper down,
> Oh, we're going deeper down:
> And it's time they heard us knocking on the roof of Satan's dwellin';
> But we'll get artesian water if we cave the roof of hell in --
> Oh! we'll get artesian water deeper down.'

A combative approach to groundwater extraction has prevailed in Australia.

A morass of mistakes and omissions litter Australian groundwater stories. We are yet to face their immeasurable consequences. Allowing artesian bores to run uncapped for

decades. Enabling coal miners to take unlicensed quantities of water from the Great Artesian Basin. Failing to remediate polluted aquifers. Contamination around RAAF airbases and many Australian airports from fire-retardant chemical compounds used in fire-fighting exercises has poisoned lakes and waterways, fishing areas and oyster farms. Property prices have plummeted for residents in these areas because their bores are no longer potable, no longer useable. Pollution control after petrol or industrial or agricultural chemical spillage, after seepage from landfills, after leakage from coal-seam fracking, is limited if not impossible. Failure to monitor and preserve complex groundwater dependent ecosystems in remnant waterways leaves a void of knowledge. The fish are still dying.

It's mostly the work of government hydrogeologists to articulate solutions to groundwater problems. They make their way through complexities and gaps in the science as if wading through quicksand. Water lawyers interpret the raft of State and Federal water laws and water policies. Each state has different regulations. Wrangles abound between long-term and short-term thinking, between immediate economic benefit and future sustainability. Finding, drilling and moving groundwater from place to place is a large industry. Groundwater provides life and livelihood to countless millions. How will we answer when the aquifers run dry?

Human use of groundwater goes back a long way, we have long-time dependencies on groundwater flows. Indigenous Australians had and have a remarkable ability to read landscapes to find groundwater. They followed bird routes and ant trails, tracked dingos to find their water sources. They dug sumps in the bellies of sand dune country. Connections between surface water and its underground sources are sacred and protected. Stories handed from generation to generation describe locations of springs and hidden water soaks, how they were formed in the dreaming, how to look after them and avoid contamination. Stories tell how springs are formed from tears of grief. Water holes are made in fights between spirit beings, river valleys are forged from mythic pursuits of serpents, emus and frogs. Understanding Country and Water through story is inherently held through Indigenous storytelling. In some stories the rainbow serpent writhes through yawning caverns, bringing life to the water holes where she emerges. Around Uluru, Tjukurpa is kept alive among the Anangu people through dreaming serpent stories. Tjukurpa describes

the complex principles and beings behind lore, morals and ancient stories. Tjukurpa establishes relationships between land and water. For First Australians connections to Cultural Waters include respecting and preserving the deep reservoirs that traverse vast territories beneath Country, enabling communities to survive through dry times. The threats to water supply that we now face ignore the wisdoms of Tjukurpa. The stories are muted under the weight of invasion, colonising, theft and genocide.

Groundwater reminds me of that little-known uncle who occasionally springs into our lives, the ageless relative who unexpectedly turns up for Christmas lunch bearing gifts, and then disappears, perhaps for centuries. We recognise his sulphurous, earthy smell. His few words are potent, full of story, full of other places. Sometimes I perceive aquifers as an even closer relative, more like a parent. I expect them to always be there, underlying bedrock to children's security. They leave a gaping hole, a craving when they go absent. Groundwater speaks with authority, its wisdoms, its dark, underground stories take us beyond a materialist world. I encounter a relational way of being.

Groundwater reminds me that all life is connected. It points to an opportunity for a new and essential respect to be shown for the unfathomable uncle, for the struggling parent, for our stoic loss of soulfulness. We could learn from Tjukurpa, we could take a long-term view of land and water, rather than be ruled by the lure of the dollar. We could hear groundwater's eloquence, its groans, its calls for balance, for moderation. Listening, listening. The deep tone drones are continuous, binding.

Worldwide many cultures have profound knowledge and appreciation of the significance of groundwater. Ingenious ways to pump, drain and move groundwater have occupied civilisations across millenniums. Mesopotamians and Persians built qanats, gently sloping underground tunnels, that tapped into the water table. The tunnels are linked by vertical access shafts and look in profile like subterranean organ pipes. Aztecs, Chinese, Greeks, and Romans also devised ways to access groundwater, which they channelled for miles for domestic and agricultural use. Ancient step wells in India are interweaving stairways into enormous open excavations that reach down to the water table. Step wells are now drying up as modern irrigation lowers the water table. People have traditionally met at the well, the source of water, source of life. The wells are disappearing.

Civilisations are judged by how they treat their vulnerable. Groundwater's fragility, its peeking and seeping links to the surface, joins the long, long list of vulnerabilities of the Anthropocene. Whole ecosystems, land and waters, animals and plants with whom we share the planet, are susceptible to anthropogenic abuses. Groundwater's invisibility, until it leaks or flows to the surface, or is dragged from its covers through pumps and pipes, means perceptions of this subterranean realm might at first be limited. I am learning to listen for and perceive groundwater's potent influences and its fragility. The consequences of not hearing its lamentations are perilous.

Textbooks show groundwater's amorphous presence in cartoon-like line drawings, cross-sections of landscapes with bright blue patches for aquifers, and arrows pointing in various directions between layers of cross-hatched browns to illustrate water's movements through pervious rock and containment by impervious layers of bedrock. It's as if the lines make the aquifer's boundaries real and that the scale is true. Computer modelling of aquifers in two or three-dimensional images maintain the notion of aquifers' boundaries. Thinking about how groundwater moves reminds me of inkblots on blotting paper, fluid and uncontrollable. Diagrams help, but much about the extent, flows and impermanence of aquifers remains imponderable.

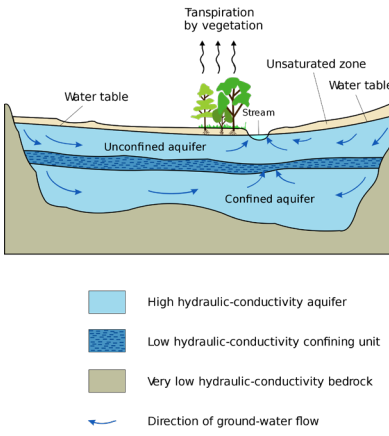


Diagram 2. Line drawing of an aquifer Source:
https://commons.wikimedia.org/wiki/File:Aquifer_en.svg

Peter Dahlhaus is a hydrogeologist and academic with kind, watery eyes and a fleeting smile. When we first met, he had a small fresh scar on his forehead, from a fall at the International Association of Hydrogeologists' conference in Montpellier, France. Salmonella had flattened him. It wasn't from contaminated well water, which kills people in many countries, but dodgy hotel food. It meant he couldn't give his paper about international standards for data exchange. Understanding and sharing information about worldwide groundwater patterns is relatively new and vitally important. Aquifers pay no heed to international boundaries. We still need a common language in the conflict resolution processes. Peter is an Associate Professor at Federation University Australia, at Ballarat, and is responsible for bringing to fruition the Visualising Victorian Groundwater (VVG) project, a publicly accessible website that unites previously inaccessible groundwater data from several government departments for more than 300,000 bores across the state. Exploring the VVG site I imagine myself plunking individual random notes on a piano. I know that when Peter reads the site, he's hearing a symphony.

In response to the millennium drought, which ended in the floods of 2010, the Melbourne Bureau of Meteorology (BOM) was given responsibility for amalgamating national groundwater data into an accessible form. More people needed to understand what water was beneath the surface. The BOM site reveals levels of Australia's groundwater basins, salinity concentrations and a raft of information about sustainable management of bores and aquifers. To represent Australian groundwater systems digitally is a gargantuan task. Working with slippery, difficult to aggregate data from each State, a national picture is formed, perhaps blurry, but indicative of trends. It adds the strings and brass sections to my hearing.

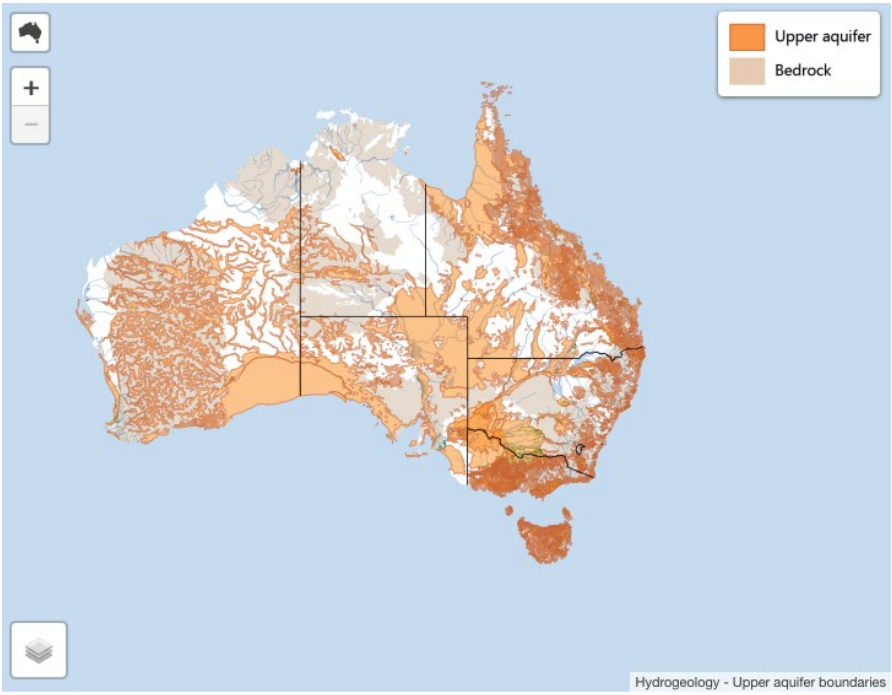


Diagram 3: Upper aquifer boundaries: http://www.bom.gov.au/water/groundwater/insight/#/hydrogeology/aquifer/upper

In my conversations with hydrogeologists I am struck by fluctuations between certainty and uncertainty. Perceived accuracy of hydrological data is deemed sacrosanct. Textbooks brim with extraordinary mathematical formulae, which help explain the occurrence and movement of groundwater. For example, following the formula derived from Darcy's Law enables flow rates of underground water to be quantified. Q=KIA. Flow, or discharge (Q) equals the hydraulic conductivity or permeability of the rock (K), times the gradient or steepness of the fall of the water (I), times the cross-sectional area through which the water flows (A). Accuracy of numbers can't be argued. Yet in the same breath my newfound science heroes were quick to qualify their statements. As much as scientists know, there remain many gaps in hydrogeological knowledge, the modelling of aquifers remains incomplete. Groundwater's unknowability is tantalising.

The effects of climate change on groundwater are particularly indeterminate. Volumes and movements of groundwater are expected to increase in some places, such as coastal aquifers, decrease in others where recharge diminishes. 'It all depends' is a

common refrain. Scientists are wisely cautious of singularly definitive statements. With groundwater there are too many variables. The inscrutable aspects of subterranean water mean the research is based on any number of assumptions and often has an acknowledged level of conjecture. The mathematics may be definitive, the modelling processes exhaustive, but aquifers remain at another level imaginary, always out of sight.

A good example is what's called the hyporheic zone. That's the murky area underneath creeks and rivers, where they leak and gain groundwater in an exchange with aquifers far beneath their rocky, pebbly streambeds. Understanding how surface water connects with groundwater is an emerging field of research. Topography, seasonal rainfall variations, and the deep geology of the landscape all determine how water flows through plume-like hyporheic zones. It's a mixing of waters - the new and the old. It's a transitional place where water chemistry and biology is in flux. No one really knows where surface water ends and aquifers begin. The hyporheic zone is like a choir where harmonies meld and separate according to the range of voices at the practice session that night. Sometimes the baritones outnumber the tenors, other times, perhaps after rain, the sopranos are on top. As I take a swim in a tea-coloured river pool, thinking about the amorphous hyporheic zone below me, I imagine the blues-like tones of groundwater coming closer. Deep, melodious, a minor key.

The global water cycle describes the movements of water vapour from air into clouds, through rain that drenches surfaces and sustains plant life, through earth's porosity into subsoils and aquifers and into root systems. Water transpires across botanic membranes, evaporates from lakes and oceans back to water vapour, into air. Endless movement. We often forget to include water's sojourn to underground places in this gigantic cycle. It's the ballast that keeps the ship afloat.

It is becoming increasingly imperative that we understand the significance of groundwater, not only in day-to-day lives, but also for its deeper metaphoric importance. We understand little in the contemporary Australian psyche of the place of aquifers, of the flows of deep leads in ancestral underground streambeds. Conversations between First Australians and the plethora of newcomers still have a long way to go before a wider, a deeper understanding of human relationships with this continent can emerge. By exploring the

waters beneath my feet, by searching beyond first appearances, I learn about myself. It's more in depth to how I relate to surface landscapes.

I remember groundwater's sulphury smell, its refusal to lather, the way we called it 'hard water'. It is in my cellular fabric. Many Australians drink and wash in groundwater every day. It is pumped from bores, piped into homes, dams, reservoirs. I first think of taps, wells, irrigation spigots, the glasses or bottles of mineral water I hold to my mouth, the lakes I've sailed over or plunged into. Then there's the spring-fed rivers, dammed and fished. I consider the dewy, hydrogenous plants I chew, made mushy by my own liquid saliva. My attention to groundwater soon reaches my cells, the watery membranes and nuclei that make me. Paradoxically, the skin that holds me watertight is itself made of briny cells, from water that once may have been underground. Watery meeting places I call them, water sites. The artificial divide between nature and culture merges. Water dispels the myth of difference between what is human and what is not. Groundwater melds me to earthly depths.

Despite the jeopardy of aquifers, deep leads, and ancient water flows, in Australia public discussions about diminishing and damaged aquifers are lost in political wrangles and ambiguous laws. It's no longer possible to assume that groundwater will always be there. Perhaps it's easier to fight for the health of waterways we can see. Rivers and creeks, swamps, estuaries and coastlines face their own threats. Groundwater's voices slide quietly into billabong-like cul-de-sacs, its murmurings are muffled. We could give aquifers legal rights, with legislative identity, as New Zealanders have given the Whanganui River the rights of personhood. We could make Australian water laws consistent, so that common sense sustainability can prevail. We could recognise groundwater's voices in indigenous narratives and in our national story. Instead, at the same time as droughts bite, long and dry, more people dig deeper to mine ancient water. New bore techniques drill one thousand, five thousand metres below, pumps grow larger, pipelines trail longer. It is as Banjo described.

If we empty the jug of water with clever long straws, we may have temporary relief to our thirst, a few people may become wealthy. The empty jug however means not only parched landscapes, but denuded psyches.

Consciousness of groundwater's meanings and affects enhances my understanding of connections between living and non-living entities, between this land and myself — my watery self, my underground self, my beneath the surface life. Voices of deep, dark places resound in heavy, slow-moving times. I listen to the metaphoric realm. Listening deeply enriches life. We are fools to ignore subterranean voices. The task ahead is to protect this powerful presence, to preserve a space in our imaginations for groundwater's ongoing existence. Knowing a fraction about the entities deep beneath my feet, catching its sonorous discord, my journey into storying with groundwater continues.

Sustainable relationships with groundwater are vital for ethical, multi-species survival. Groundwater reserves are not a resource to be conquered, but an entity to be respected, made sacred. I bravely go to subterranean places to appreciate life on my return. Understanding aqueous underworlds illuminates the imperative to listen for groundwater's earthly and metaphoric tones. The old uncle, the tired parent and Tjukurpa are calling for respect of the present and the future. We neglect the vulnerability of groundwater at our peril. Like a faltering mound spring, my subterranean sojourn eventually reaches the surface. I am nourished by deeper understandings of this continent. It is not surfaces alone that make our world. I seek the rich veins, the lifeblood in deep geologies beneath the surface. Groundwater's chorus reminds me that there is much to be done to protect the aquifers beneath my feet, the aquifers within my cells.

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