January 2013 in our Catchment

We really are having a summer this year: no real rain for weeks; hot days with hotter gusty winds; low humidity even when there is cloud cover; much higher daily evaporation than any rain that does fall. The cool nights have been good … hope they continue! For reasons best put down to the eccentricity of the public service, we were on the road in the Burra Creek and Upper Queanbeyan on Friday. There was still plenty of water about! I hope your waterways are still surviving.

Your Results

Parameter	Where it comes from	How it affects things	Local events
Temperature	Sunlight and flow give a waterbody its temperature	High temperatures allow the water to lose dissolved gases; low temperatures may upset the rhythm of water life	Well, well!
Flow	Rain, springs and tributaries	High flows scour the stream, and increase turbidity but lower EC and pH; low flows provide conditions for poor Oxygen saturation, elevated EC and temperature	The upper Molonglo is slowing down dramatically. The top end of Sullivans Ck has stopped, even below Flemington Pond.
pH	The country rock is largely responsible for water pH; acid over granite or sandstone, alkaline over basalt or limestone	pH helps keep the main minerals dissolved in the stream or pond; too acid, too much sulfur; too alkaline too much phosphorous	North Watson Wetland has an elevated pH, perhaps as a result of the hot conditions.
Electrical Conductivity	The ground water and soil determine the EC	Limey soils are naturally more conductive, more dissolved CO_2; waterlogging also increases mineral content.	The upper Molonglo and Jerrabomberra Ck have joined the usual band of limey creeks and urban streams in having elevated EC
Turbidity	This is how much light can penetrate the water.	Silt and dissolved humus change turbidity	The water in Norgrove Park is muddy.
Oxygen Saturation	Oxygen gets into water through flow, wave action and plants growing.	More than 120% saturation causes embolisms in animals, big or small; below 60% and it is hard for things to breathe.	Even in the upper Queanbeyan the hot weather has driven the amount of oxygen down and the saturation sky high! Eddison Pond and Justice Hope Park wetlands are very high.

Parameter	Where it comes from	How it affects things	Local events
Phosphorus	Phosphorus is found in small amounts in disturbed soil; the other source is fertilizer.	Every cell needs P to carry its Oxygen: excess leads to rapid growth of planktonic algae.	The arm of the top of Sullivans Creek that comes through the new suburb is elevated.
Nitrate (NO_3^-)	Animal droppings and fixation by cyanobacteria and root nodule organisms	With P excess promotes plant growth	
Algal Growth	Most algae, planktonic and benthic, are seasonal; blanket weeds are perennial	Smothering and blooms interfere with biodiversity	The iron bacteria are a runaway success in the upper Molonglo; there is a slick on the water in Royalla; there is blanket weed in Sullivans Creek
Ferals	Introduced fish	Gambusia and European Carp outcompete the locals	There is a problem with Gambusia in the overflow pond in Justice Hope Park

The gutters, the driveways and the drains.

Soil moisture is vital for a healthy ecosystem. In many countries soil moisture levels are watched very carefully and used as part of drought monitoring. In Australia soil moisture levels are used as major components for bushfire alert monitoring.

An open woodland has a patchwork of plant cover and a myriad ways in which the rain can get into and remain in the soil. In that woodland, the canopy of the trees and shrubs collects rain and channels it down to the soil, allowing it to drip from branches and leaves, and trickle down the grooves in bark, providing a slower runoff than direct rain onto soil. The canopy also provides protection from the driving force of the rain in a storm burst. When the rain has passed, the canopy continues to work in conjunction with the soil, shading it and exposing it, often in a dappled fashion, across the day and night. The grasses and the ground cover also do their bit. Tussock grasses act very like mops, collecting water and releasing it slowly. Scrambling plants also slow down across slope flows and later provide shade and wind protection. The soil crust is carefully organised

A soil crust with lichens, mosses and plenty of leaf litter

so that the lichens, the mosses and the encrusting cyanobacteria can all swell up and collect the water, and then help it penetrate the soil. The leaf litter does quite a bit to slow flow, create pools and rivulets and allow the soil to take in the water. Then, when the sun is out again and the wind is up, the same twigs and piles of grass leaves shade the surface soil and break up its profile, slowing evaporation. Soil in a healthy woodland retains most of the rain on site, and then helps whatever is excess to drain off gradually into useful natural cisterns. Soil moisture is important. It slows down soil cracking in summer, and its presence raises the flashpoint for leaf litter and dried grass.

When we build on a piece of land we start off by obliterating this balanced system and all too often we put in its place a mosaic of hard surfaces from which rain has no choice but to run off into gutters and drains, and the soil no longer receives a share!

When we create a living space, we begin by grading the area. We then put in roads, drains and service lines. This clears the area of natural vegetation, disrupts the makeup of the soil, and cuts all the natural drainage lines. We then pave the roads with a cambered water repellent surface. We cement the drains. We direct all this nuisance water into and through cisterns and gross pollution traps and off the site. [Thought: why is stormwater a gross pollutant?]

To put up our structures, we either build by trenching and blocks or by pouring a slab. Trenching and blocks compartmentalises the bare earth and cuts into the subsoil and the country rock. The slab just covers the lot. [No water allowed here.] We put rooves over the top of our structures, put in gutters and return the captured nuisance water to the storm water system with its gross pollution traps. This roofing covers at least 30% and up to 90% of house blocks! Sometimes, especially on the flat expanses of commercial building rooves and the bituminised car parking surfaces round shopping centres runoff is almost 100% of rainfall. What doesn't end up in stormwater drains evaporates off on the breeze. None reaches the now covered soil. Sometimes we collect this runoff…but especially near the coast we funnel it into estuaries and out to sea.

A stormwater drain covered in litter.

We then put in paths and paved areas of water repellent substances, build walls and hahas, and use agricultural drains to take the excess water away. We plant lawn grasses and put down scoria and plant water hungry northern hemisphere trees and… the sum total is we drive the water off.

And here is the real problem. That water we have driven off picks up all manner of things from our water repellent surfaces: dust, heavy metals, petro-chemicals, plastics, litter, vegetable and animal

waste, and packaging. It is carried to the Gross Pollution Traps and turns into a wondrous soup with an unpredictable pH, an elevated electrical conductivity, the turbidity of Turkish coffee, a toxic level of phosphorous, nitrogen and sulfur, and a deadly Biological Oxygen Demand. This we discharge back into our recreation lakes!

Each of us is responsible for a small part of this profligate waste of our most precious resource. The rain on our rooves goes into gutters that join the stormwater system. The concrete paths and driveways round our homes feed out to the drains in the street and so into the stormwater system. Our outdoor living areas are paved and manicured, and the rain ends up in the drain, again! Our lawns are close mown, and hold almost no water, so off it runs into those drains, again. Our trees and garden beds are helpful, but we do tend to keep them very clean and tidy. The soil is exposed and has little cover. The trees and shrubs are organised. So while the soil gets some water, it loses just as much as it heats up! When did you last deliberately encourage a soil crust to develop in your garden?

While the tiny bit from your place and the smidge from mine may not appear important, it is the all too rapid cumulative effect that does the damage.

Calendar

Saturday 2nd February	World Wetland Day	Contact Edwina Robinson at ESDD, ACT Government
16th and 17th February	Waterwatch Monitoring	Your sites

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[1] The operation of the Molonglo Catchment Group and Waterwatch program is assisted by the Australian Government's Caring for our Country and the ACT Government. Some administrative assistance is provided by the Australian Government's GVESHO program.