



Sarah Mika and Darren Ryder in a damp Bunnor wetland, hosting a healthy water couch meadow, December 2014. Credit - UNE

When wetlands boom

by Dr Sarah Mika

One of the key concepts of Australian freshwater science is the “boom and bust” nature of Australian inland wetlands. Fledgling scientists are taught that the wetlands cycle through wet and dry states. During the dry states, there is no surface water. The aquatic vegetation that need to be submerged in water or at least have damp roots, dies back and is replaced by more terrestrial vegetation. If the wetland area is dry for long enough, the terrestrial vegetation also dies out and the wetland location is marked by large patches of bare earth.

By then aquatic animals have mostly gone: fish and waterbirds have left or died. Invertebrates and amphibians have died or hibernated in the soil. Turtles have spread out looking for water or a shelter to wait out the dry. All the nutrients that were in the water column or bound up in plants and animals are stored in the soil or have left the wetland as part of the emigrating animals.

Eventually, it rains; sometimes locally and sometimes a long way upstream. The soils rewet and the wetland fills. Micro-organisms (bacteria, fungi, viruses) start reproducing. Plants and algae grow.

Invertebrates hatch out of the soil and start recolonising fresh aquatic habitats. Fish and waterbirds arrive. Predators arrive. Within a short time, the bare patch of earth is teeming with life.

Coastie goes west

I grew up in Brisbane. After university, I studied and played in the coastal rivers of NSW and these are my first and great love. Coastal rivers, with their more regular rainfall, don't experience the same boom and bust cycles as Australia's inland rivers. Their beauty and wonder are based on topography and continuity: waterfalls, cascades, pools and riffles (shallow fast bits) and the very high number of plants and animals they support.

I started working in the Gwydir wetlands in 2014. My first field trip to the wetlands of the lower Gwydir and Gingham watercourses was in spring during a dry spell. I stood on dry dirt and did not appreciate where I was (Figure 1). I went back two months after that and the wetland was damp: I stood in a water couch meadow (top of page). I went back the third time and the reeds were over my head (Figure 2).



Figure 1. A very dry Bunnor wetland in October 2014. Credit - UNE

Words cannot justly describe the explosion of life as wetlands “boom”. With each step of ours, waterbugs, fish, spiders, tadpoles, frogs and the odd black snake scrambled to safety. With each step. Clouds of aquatic insects swirled above us and above them, the waterbirds. Eagles hunted above them.

The vitality and energy in the wetlands was awe-inspiring and humbling, and I realised that I had absorbed the theory without understanding what it meant in the greater landscape. Most of us never get to experience the wetlands when they are booming as access is tricky.

These are truly special places whose contribution to our environment far exceeds the small space they consume. As an aquatic ecologist, I focus on the wet part: the processes, plants and animals that exist in the water column when it is present in the wetland. These are important components, especially within the context of measuring the benefits of water for the environment. However, the more I think about it, the more I feel that we are missing a key aspect to how we measure these benefits. When these wetlands boom, the nutrient and energy pulse is felt across the landscape, not just in the wet bits. The wetlands subsidise the surrounding terrestrial ecosystems both in the production of concentrated and abundant food for terrestrial animals including invertebrates, reptiles, birds and mammals; and in the dissipation of nutrients and energy across the landscape as animals move from a drying wetland.

We count the waterbirds but not the woodland birds feasting on the insects swirling around the wetland. We count the waterbugs and frogs, but not the lizards and snakes that gorge on them. We measure the density of water couch but not the kangaroos or cows that eat it.



Figure 2. Bunnor wetland in full boom with birds nests visible in the background, February 2015. Credit - UNE

Like many places, the Gwydir wetlands were very dry last year. Like many people, I found the stock and crop losses, and ecosystem loss from drought and bushfire to be soul-destroying. We built protective walls around our hearts for survival, but they crumbled in the dust and smoke, and we were left wounded.

After recent rainfall, the Gwydir wetlands are now filling. In a few weeks, I'll head back to measure the wet: the processes, the plants and the animals. This is not the country of my childhood and I don't think that it will be the country of my old age. However, I'm really looking forward to going back there and seeing life boom. I'm excited to spend time in a landscape where vitality, energy and life pulse with every step. I love what I do and that it takes me to the special places.

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Managing water for the environment is a collective and collaborative effort, working in partnership with communities, private landholders, scientists and government agencies - these contributions are gratefully acknowledged.

We acknowledge the Traditional Owners of the land which we discuss here. We also pay our respects to Elders past, present and emerging.