

River Detectives Story of Change

Victory Christian College, North Central CMA region, 2024



River Detectives is a cross-curricular citizen-science program connecting teachers and young people with their local waterway. Through water-quality testing, macroinvertebrate sampling, and habitat surveys students learn about the importance of catchment health and their role in caring for it.

The program is available to schools and youth groups in five regions across Victoria.

Ro Rimmer is the senior sub-school (Years 9-12) Environmental Science educator at Victory Christian College, a large P-12 school of over 800 students in suburban Bendigo. It is an independent Christian school backing onto the Greater Bendigo National Park.

The school joined the River Detectives program in 2022 when it caught the attention of Ro who had worked as a Park Ranger beforehand. She has found it extremely rewarding to change careers but continue to utilise natural resource management skills, experience and networks through her teaching.

Ro has enjoyed the flexibility of both the environmental science curriculum and the River Detectives program. Add to this Ro's drive to make learning real and practical for students and you have a wonderful example of community-based environmental education that has made the most of natural and human assets in the local area.

Environmental Science students assist members of the Bendigo Field Naturalists Club to monitor next boxes that have been installed in the National Park behind the school, but Ro had dreams for more.

"I joined River Detectives in 2022 as I had to redesign the Environmental Science course for Year 9/10 students. Previously, Environmental Science was just a small unit in the Year 9 Science curriculum but the school had made a commitment to offer it as a VCE pathway subject for Year 9/10 students for the first time. I could see that the upcoming cohort was really into fishing so I modified the course to tailor it to their interests. River Detectives was a way to wrap additional learning around that passion."

The first term of the Year 9/10 Environmental Science course is Healthy Waterways so Ro starts with the 'hook' of taking the class fishing. She builds in a visit to the barramundi farm in Werribee and then uses River Detectives activities to explore water health concepts with water quality testing and macroinvertebrate sampling.



Water quality testing and macroinvertebrate sampling at Kennington Reservoir.



Fishing excursion

The school's adopted site is Kennington Reservoir, a water retention basin two kilometres from the school that was constructed in 1861 to provide a reliable water source for gold mining activities. Today it is a valuable piece of community public space, popular for bushwalking, fishing, picnicking and fitness activities. The surrounding reserve is known for its wildlife, indigenous vegetation and walking tracks.

The River Detectives program also plays a role in the VCE Environmental Science program with Year 11/12.

“One of the units is monitoring change over time so water quality testing has been a perfect fit for that – really practical and engaging. Another part of the course looks at biological indicators, so macroinvertebrate sampling brings that learning to life.”

During 2024, the City of Greater Bendigo commenced dam wall repair work to address structural concerns and ensure the dam remained safe and accessible to the public in future.

While these engineering works required the reservoir to be slowly drained, thanks to funding from the Victorian Fisheries Authority, Council could take advantage of this rare opportunity to also improve environmental and recreational fishing conditions in the reservoir by:

- Deepening parts of the reservoir to create pools and channels
- Using removed timber and root mass to improve fish, frog and turtle habitat
- Planting aquatic vegetation to improve water quality, food and nesting resources
- Restocking the reservoir with a more diverse suite of fish species, including some native baitfish

This project aims to provide better wildlife habitat, better fishing opportunities, fewer algal blooms and improve the look and quality of Kennington Reservoir. Despite being challenged by the disruption initially, Ro seized the opportunity to get involved and use citizen-science activities to measure change throughout the process.

“I invited two City of Greater Bendigo staff; Mark Hall (Senior Biodiversity Officer) and Lu-Wei Spinks (Biodiversity Engagement Officer) to the school to talk to students about the project. They involved our students by asking them to prepare 110 trays packed with native aquatic species to create ‘sods’ that we are now caring for before they are placed in the shallows of the reservoir when works are complete and water is returned.”



Council staff visit the classroom



Students prepare trays of aquatic plants

Ro uses an aquaponics garden in the environmental science course. Students grow plants during the first semester then they compare growth rates to plants grown traditionally in the vegetable garden. Having the aquatic plants to care for has seen the aquaponics garden continue throughout the year with the project extending to the Community Service classes and Duke of Edinburgh classes who are helping to weed and water the trays.

Another spinoff has been the delivery of 160 native fish fingerlings for the school to raise in their aquaponics tank. The fish are fed and tanks maintained by students and the fish will be stocked in Kennington Reservoir when dam wall works are complete.

“Monitoring had to cease during works as low water levels saw students getting well and truly bogged in the sticky mud but this River Detectives-related project has enabled students to monitor the health of this valued local waterway, take an important role in raising native plants and animals that will be returned to the enhanced reservoir, then continue to monitor change into the future.”

Dam enhancement works provided another interesting opportunity for inquiry-based learning that Ro initiated. When water levels were dropped, she asked council if salvaged fish species could be provided to the school. Tench, Redfin and Carp species were secured and frozen immediately at Victory Christian College.

In fourth term, as Year 11 students studied Pollution and Food Security units, they investigated ‘how scientific endeavours contribute to minimizing human impacts on Earth’s systems’. North Central CMA River Detectives coordinator, Nicole Howie, delivered an incursion about micro-plastics; what they are, how they can enter streams through the urban stormwater system, their impacts on waterways, aquatic life and even humans and then looking at some innovative strategies to reduce impacts.



River Detectives staff explore concepts with a giant stormwater floor puzzle.

The following week, students dissected the frozen fish, analysing their stomach and digestive tracts for microplastics.

“Even with very simple technology, microplastics were found in one third of the fish. However, they were only found in the Tench species, with half of those dissected having microplastics present. We would love to conduct more dissections on the remaining fish as we hypothesise that it may be the bottom-feeding fish species (Tench and Carp) that will be more likely to contain microplastics.”



Year 11 students dissect fish salvaged from Kennington Reservoir to search for microplastics.

As these students proceed into Year 12 Environmental Science studies in 2025, they will continue to be involved in the Kennington Reservoir project. They will produce a scientific poster to show their learnings and it is hoped they will see the fish restocked and be involved in planting out the sods of aquatic plants.

River Detectives has provided opportunities for outdoor learning which is vital when engaging students that choose Environmental Science who are naturally more 'outdoorsy'.

"Being able to teach the scientific skills whilst in the field and make it relevant to their learning has helped learning outcomes. If talking about turbidity for example, students can see the difference between a turbid and less turbid sample in the turbidity tube. This starts to make sense to them as they connect the relationship with aquatic plants that will have trouble photosynthesizing in turbid water."

Projects such as ours at Kennington Reservoir mean that concepts are not just theoretical. They are practical, important and useful to others beyond themselves. It's nice for students to feel as though they are giving back to the scientific community through their studies."

Ro concedes crowded curriculums and time constraints can make it difficult to get out and about but when the effort is made it is well worth it. Adding practical opportunities and experiences to course work and using real world applications has added so much value to the students' engagement, learning and passion to continue studying Environmental Science.

"Sometimes students come to class feeling frazzled or overwhelmed but then we go out on an excursion and they're smiling. I love the 'aha' moments that can occur in the field. I may have been trying to relay a concept in class or with a text book but then you take students out in the field and they get it. And then I hear the language I've been using coming through in student conversations."

The River Detectives program really lends itself to secondary science. In the past there has been a low uptake of Environmental Science at VCE level at many schools. This is often because the subject is not offered to Year 9 and 10's and they are unable to get a taste of the subject. River Detectives, along with other like-minded programs, makes Environmental Science at year 9/10 level doable and practical.



Outdoor learning at Kennington Reservoir in action.

2025 will be the first year that Environmental Science is offered right through from year 9-12 at Victory Christian College. This is an important change for the school and is directly related to the pathway program that introduced Environmental Science to Year 9 students back in 2022.

Always thinking, Ro has big plans for the future. She'd like to:

- Involve year 9/10 students in stormwater pit stencilling to raise community awareness.
- Have media students join excursions to document learnings at Kennington Reservoir.
- Grow awareness of the River Detectives program across the school to embed it in other areas.
- Develop an augmented reality sandbox with a model of the local catchment so students can see how water moves across the landscape from Victory Christian College.

For more information about River Detectives:

Email riverdetectives@nccma.vic.gov.au or visit www.riverdetectives.net.au