

# CLEAN UP OUR WATERWAYS

WORDS AND IMAGES JOANNE TAYLOR

*Canterbury has an abundance of freshwater: rivers, streams and lowland waterways. The quality of the water in this important part of our ecosystem has never been so under threat. Intensive farming, increased urbanisation and industrialisation have all had a part to play in the degradation of these waterways. It is now time to reverse this trend and improve our water quality.*

One of the projects focussed on cleaning up our streams and lowland waterways that has caught my eye is the work undertaken by the Freshwater Ecology Research (FERG) within the School of Biological Sciences at University of Canterbury (UC). This research group has many diverse projects underway, from acid mine drainage to native fish ecology, and it is valuable work which is creating hard data for our councils and regulators to use going forward. One of the major areas of their work is in riparian management. What is riparian management I hear you ask?

Riparian management is much more than just planting a few natives along the edge of a waterway. It also includes stock being fenced off from accessing the waterway, planting but also maintaining that plant cover to exclude weeds from our waterways, preventing erosion of banks of waterways and rivers, and allowing our waterways to carry away flood waters.



ABOVE In Canterbury alone we have approximately 17,000 kilometres of waterways that range from our braided rivers to these lowland waterways. The bioreactor is located to the left of this image and water flows through the bioreactor into this point in the drain.

The Canterbury Waterway Rehabilitation Experiment (CAREX) is a region-wide waterway restoration project carried out by a team of nine scientists, including professors, researchers and students from the FERG group at UC. Acronyms notwithstanding, this is an important body of work that has been undertaken for the last ten years and that is starting to yield some impressive results.

The CAREX team have formed an enduring partnership with the Mackenzie Charitable Trust, which was formed in 1976 by Mid Canterbury farmers Alan and Don Mackenzie. The Mackenzie brothers, via their legacy trust, have funded this research into the effectiveness of riparian management since 2008 and in the last five years the funding has been directed towards finding practical management tools and strategies that farmers and local councils can apply to improve the ecosystem health in our waterways.

“We were tasked to talk to farmers first,” says Dr Catherine Febria, a Director and Scientist with the CAREX team. “Our aim is to find easy-to-implement, cost-effective and practical ways for farmers to reduce the nitrate and sediment load in the waterways.”

When Mid Canterbury farmer Warren Harris heard about the CAREX work he was keen to offer his farm as a pilot site for experimentation with the ideas put forward by the scientists. “I must admit that I did shake my head at first, but working with this team has been marvellous,” says Warren. “These ideas that have been implemented are all small steps which together add up to reduce the nitrates moving from our paddocks and into the waterways.”

Warren and his wife Suzanne, together with their equity partners Harry and Tracey Whitwell are dairy farmers in the Lowcliffe area. They have heavy soils and a number of drains running through their property not far from the coastline. These drains, or lowland waterways, provide necessary drainage for the surrounding land and are spring fed from underground aquifers.



Brandon Goeller is the PhD student working intensively on the Harris farm and has developed a great working relationship with the team. The CAREX proposal was to reduce the nitrate loading into the waterways by building bioreactors at the points in the paddock where the water drains into the waterway. In one paddock the bioreactor has intercepted a tile drain that served the purpose of draining the paddock. In two other places the bioreactors have replaced low lying ground where water naturally pooled.

What is a bioreactor? Well, put simply a bioreactor is a hole in the ground, in this case about two metres by fifteen metres and one and a half metres deep. The hole is placed in the paddock near the edge of the waterway where water would normally drain through to get into the waterway. The hole is usually lined with an impermeable fabric, filled with woodchips, covered over with a permeable geotextile fabric, then covered with soil and can be regressed over the top. This hole or bioreactor is now providing low-oxygen conditions combined with carbon from the woodchips to enable microbes to convert the nitrates in the water that is now flowing through the woodchip-filled hole, into nitrogen gas that then enters the atmosphere and is harmless.

Early results from the bioreactors on the Harris farm have shown an average 10% reduction in waterway nitrate levels from this one bioreactor. The idea is that if bioreactors were

ABOVE LEFT Pictured working together, CAREX's Catherine Febria (blue jacket) and PhD student Brandon Goeller (far right), with the staff on the Harris farm – from left Tracey Whitwell, Ailish, Robert Harris, Harry Whitwell, Warren, Latte and Kyan at the front.

ABOVE RIGHT On Warren and Suzanne Harris's farm the CAREX team have implemented riparian planting and bioreactors to work in combination to reduce the effect of nitrates and sediment on water quality and biodiversity in this drain.

placed all over farms where water moves from the surface into the drains then the nitrate loading into the waterways would be significantly reduced. And this is good news for the biodiversity of these living waterways which are also home to a variety of life such as eels, fish and other invertebrates.

“Using the bioreactor tool in combination with riparian planting reduces the nitrate load but also helps to reduce sediment run-off into the waterway,” says Dr Febria. Native Carex sedges planted along the edge of waterways will out compete weeds which mean less mechanical clearance is needed to maintain these drains. That is what we are working on – a variety of tools from riparian planting, bioreactors, sediment traps plus many more – all of which can be used together, are practical and can be implemented by the farming community at low cost.” ■

For more information and to keep up to date with the CAREX team [www.carex.org.nz](http://www.carex.org.nz)

# GOT WATER, SAVE IT

**WATER STORAGE HAS NEVER BEEN EASIER, RX WATER TANKS MEET THE HIGHEST DESIGN STANDARD AND HAVE A 20 YEAR WARRANTY**

**SIMPLE**  
EASY INSTALLATION.

**STRONG**  
DURABLE ONE-PIECE CONSTRUCTION.

**SAFE**  
FOOD GRADE MATERIAL FOR POTABLE WATER STORAGE.



**VISIT YOUR RURAL MERCHANT TO FIND OUT MORE**



**RX PLASTICS**  
[rxplastics.co.nz](http://rxplastics.co.nz)