



CAREX Key Steps

Get the right tools in the right place

Handouts

1. CAREX Key Steps
2. Aquatic weeds
3. Sediments
4. Nutrients
5. *E. coli*
6. Rebattering

What is CAREX? The Canterbury Waterway Rehabilitation Experiment (CAREX) is focused on finding tools and solutions to improve agricultural waterway health. We work with farmers, councils, and the community to co-develop and trial tools and actively communicate our research findings. We have also created demonstration sites on working farms to share knowledge and showcase successful tools.

Agricultural waterways often face a number of issues, including nutrients, sediment and aquatic weeds. We have found that a combination of tools is likely needed to improve waterways, with a focus on getting the right tool in the right place.

The CAREX toolbox approach has been developed to help guide farmers, landowners, and stakeholders to address these issues and rehabilitate agricultural waterways. The toolbox, underpinned by science, is based on three key steps:

1. Start at the top - Management and protection efforts are most effective in small waterways and become ineffective if issues remain above. So it is best to target restoration efforts and tools in small waterways or as close to top of the catchment as possible.

2. Identify issues & treat hotspots - Identify the main issues in your waterway and find any hotspots (also called critical source areas). Hotspots are where sediments, nutrients and bacteria enter a waterway and are a source of pollution. Broken fences, rills, slumps or tile drains can be hotspots.

3. Apply restoration tools - It is important to get the right tools in the right place. Different practical tools designed to effectively control aquatic weeds, reduce and remove sediments, reduce nutrient levels, and improve biodiversity in agricultural waterways. A combination of tools will likely to be needed to overcome issues in any waterway.



This is the first in a series of handouts designed to provide practical information on restoration tools and how to use them to improve the health of your waterway.

Step by step: A combination of tools is needed to improve waterways

Right tools in the right place to address key issues and improve water quality, habitat and health.





1. Think about your waterway - Identify issues and your overall goals for the waterway. Consider how tool will work with on-farm operations (e.g., irrigators).

2. Talk with others - Chat with your neighbours, local council staff, and contractors to find out what can you do and if consents are required or funding is available to support your project.

3. Design & plan - A combination of tools will likely be needed over time. Identify your priorities and constraints. Consider costs and labour for initial and maintenance activities for different tools.

Key to success: Check in regularly on your waterway and take necessary steps to maintain any tools that have been applied.

Scientifically-tested practical tools to improve waterway health

Problem	Tool choices	How it works
 Aquatic weeds Fill waterways, impede drainage and increase sediment deposition.	Riparian planting Weed mat Chemical spray	Provide shade and compete with weeds that grow from the bank (e.g. monkey musk) for space to reduce weed growth. 
 Fine sediments Clog stream beds, reduce habitat and enable aquatic weed growth	Sediment trap Rebatting banks Fencing Hedge removal Two-stage channel	Capture and remove sediments from the waterway and prevent smothering of habitats downstream. 
 Nutrients Degrade water quality, increase algal blooms and aquatic weed growth	Bioreactor Riparian planting Organic matter additions Two-stage channel	Intercept nitrate in drainage, enhance the activity of microbes that covert nitrate in the water to nitrogen gas, and reduce nutrient levels flowing intow waterway. 
 Biodiversity Lack of important habitat for freshwater fish and invertebrates	Habitat addition Riparian planting Fencing	Create new habitat and valuable cover with the addition of boulders and logs. 

For more details and steps to get you started, please check out our other handouts.