



## Introduction

Welcome to winter—a good time for planting! This quote gives us the reason for getting our classes involved in riparian (stream bank) planting. Well planted banks act to filter out pollutants as run-off seeps into streams.

- Healthy banks
  - Healthy streams
  - Healthy river
  - Healthy harbour
- ... the chain starts with us

*The Whau—our streams, our river, our backyard*  
—Waitakere City Council, 2001

Winter soil temperature is nearly always higher than air temperature; trees planted stream-side will develop good rooting systems and flourish as soon as the weather warms up.

Stephen Moore's article outlines how vegetation on the banks of streams affects the quality of the stream environment, and the case study on Plateau School gives some good ideas of how such a stream restoration programme could develop. An article on the "What's new" page of our website <http://nwp.rsnz.org/> by our Northland facilitator Ira Seitzer, about inanga spawning, includes ideas for enhancing habitats and lists suitable species for a planting programme to do this.

If you want to begin a stream restoration programme with your class, start by carrying out an audit of your stream and its environment—look for signs of litter, erosion, and weeds, but also for indicators of a healthy stream, e.g., insects, small fish etc. Next, get your students to set goals for removing rubbish and weeds, planting the banks, and identifying and preventing pollution. They may also need to consider producing compost, gathering and growing seeds, or sourcing of plants locally.

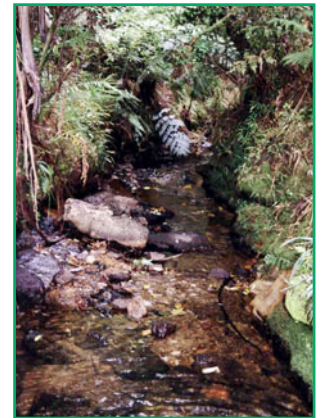
"Stream restoration: some further links" lists some resource areas that could help with your planning.

## How do terrestrial plants affect animals under the water?

Riparian (or bank-side) vegetation strongly affects the quality of New Zealand stream environments. Plant root systems stabilise soils, reducing sediment loss into streams. Vegetation traps and absorbs contaminants before they run off the land into streams. Decomposing plant matter provides food for invertebrates, and releases organic compounds that chemically bind contaminants, reducing their toxicity.

Shade from overhanging vegetation lowers stream water temperatures, and cool water contains higher levels of dissolved oxygen. The larvae of many aquatic insects can only survive in cool, shady streams.

Woody debris dropping into streams provides habitat and cover for aquatic invertebrates and fish, and the leaf litter beside stream margins provides spawning habitats for some native galaxiid fish.

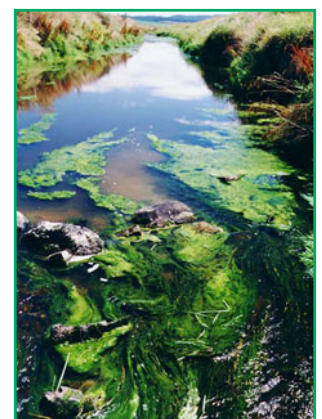


Native riparian vegetation usually teems with insects, spiders and other invertebrates. The last mistake made by many of these invertebrates is to fall onto the surface of a stream. Within seconds these clumsy critters are likely to be eaten by native fish such as inanga (above left) or banded kokopu. Thus native fish biomass can be quite high despite a shortage of aquatic invertebrate food sources.

Riparian planting programmes should be designed for specific stream rehabilitation needs.


- Shade-producing plant species should be a priority if algal blooms (below) and high water temperatures are problems.
- Some plant species have greater erosion control properties than others.
- Grassy vegetation may be more appropriate along the upper tidal reaches of streams where inanga (whitebait) spawning sites are likely.
- Grasses and flaxes are also well suited to flood-plains where frequent flooding occurs.


Locally sourced native plant species should be used and expert advice should be sought regarding soil, climate and site suitability for particular species. Such advice may be available from regional council or Department of Conservation offices.





*Thanks to Stephen Moore, our expert from Landcare Research, for this article.*


## Stream restoration: some further links


 A good website to look at to gain a better understanding of the processes involved in stream restoration is the Greater Wellington site at <http://www.wrc.govt.nz/TA/water/teachers/booklet/takeaction/restoration.cfm>

 Also worth a look on the same site is Pollution Prevention, and at <http://www.bethedifference.gw.govt.nz/water.stm> is a good article on the steps individuals can take to help reduce stormwater pollutants.


 Environment Bay of Plenty's website has detailed information about land management—line diagrams on how to plant seedlings <http://www.ebop.govt.nz/Land/Management/How-to-Plant.asp> and lists of species suitable for revegetation projects <http://www.ebop.govt.nz/Land/Management/revegetating/Revegetation-Projects.asp>


 At <http://www.converge.org.nz/ntsth/reveg.html> can be found information about plants to use for revegetation projects and how to go about planting and protecting seedlings.


 Remember to look again at the method for making seed balls—an innovative way to recreate native habitats: <http://nwp.rsnz.org/content/TheSeedBallMethod.doc>

 Find out about the “Trees for survival” programme on [http://nwp.rsnz.org/content/projects\\_treesforsurvival.htm](http://nwp.rsnz.org/content/projects_treesforsurvival.htm) Trees for survival aims to ensure that involvement in the programme and support is free to schools.


## Droplets


 Living Things is a series that focuses on animals and plants in a variety of natural communities. “The Stream Community” (first published in 1993) consists of a picture pack containing 23 photographs, a copymaster of a sample stream web, and teacher notes. The pack would be useful if you're studying this area with students from years 5–10. If your school doesn't have a copy contact Learning Media.


 A very useful field guide to help with the identification of Auckland stream invertebrates has been put out by Wai Care <http://www.waicare.org.nz>. The book is written by Stephen Moore and contains pictures and brief notes on 63 invertebrates including each invertebrate's value as a pollution indicator. Each page is laminated. Copies are free to Wai Care groups or for \$40 from: paul.chambers@arc.govt.nz


 Environment Waikato has produced two excellent posters—one on New Zealand's freshwater fish, and the other on New Zealand's freshwater invertebrates (photos again by Stephen Moore). Copies have been sent to all regional councils for distribution to schools—contact your regional council if you would like these posters for your school.

 Remember, SciCon 2004 will be in Christchurch July 4–8. Their latest confirmed keynote speaker is Professor Lord Robert Winston, known in New Zealand for his television documentaries “The Human Body”, “The Superhuman”, and “The Human Mind”. The website contact for SciCon is <http://www.scicon.canterbury.ac.nz>

 The “Gully Restoration Guide” is a booklet put out by the Hamilton City Council. It contains information about the projects already underway in Hamilton but also has a good section “Step by step guide to gully restoration”. The ideas in this section are easily applicable to other restoration projects. The booklet's appendix also contains a good section on native plants for gullies and information on the plants' habitat requirements as well as information on why the plants should be used. The website for Hamilton City Council is <http://www.hcc.govt.nz>

 The Hydrological Society has developed the Water Information Directory—an on-line searchable facility which covers surface and groundwater, water quality, quantity, water levels, flows, rainfall, and ecology from all regions of New Zealand. There is also a ‘Live Link’ which enables users to find real-time data on fresh water from the regions of New Zealand. This site will enable ready access to data for use in the classroom. Go to <http://www.waterinfo.org.nz/>

 The Society, via regional councils, has also sent to secondary schools three posters on “Where is our water”, “Who needs water”, and “The water cycle”. Currently they are developing teacher notes and curriculum links for these. These should be ready for SciCon. Visit the society's webpage at <http://www.hydrologynz.org.nz> for more information.

 Always worth a read is NIWA's Water Resource Update. Included in the latest issue are articles about the Rotorua lakes protection and restoration programme, and water resources data for December 2003–February 2004. You can access an on-line copy of their newsletter at <http://www.niwa.cri.nz/ncwr/wru/2004-06>

## Case study: Plateau School *takes action* to enhance their environment

North of Upper Hutt, Plateau School is nestled amongst the bushy foothills of the Rimutaka Ranges. At the western boundary of the school a stream flows slowly towards the Hutt River. It sounds idyllic—and it will be one day!

The importance of the environment to Plateau School is reflected in the school's charter and there is a whole school focus on its enhancement. Under the guidance of the Greater Wellington Regional Council, with input from Glennis Sheppard, Plateau School teacher aide and member of the Forest and Bird Society, as well as others in the community, things are swinging into action.

Recycling is underway; a compost bin has been built; and a shade house planned so that the children can care for their bush and stream. Each year Forest and Bird brings the school hundreds of seedlings, and each child pots up at least six into planter bags using potting mix provided by the regional council. Planting out is currently taking place along the bush walk behind the school, on the banks of the stream and, later in the year, at Kaitoke Regional Park.

Last term the *Take Action* team from Greater Wellington took the children to Kaitoke Regional Park where they tested the water in this pristine valley. Back at school, the Pollution Detectives compared the health of their own stream with Kaitoke, and found it



to be badly degraded (not even a snail in sight although there was one eel lurking in the shadows!) and in need of care. Full of rubbish, banks crowded in weeds, this little stream could only boast willows and one pine tree growing on its banks.

A clearing out programme began in earnest and old shoes, car parts and lots of rubbish from the neighbours' back yards were removed. The wandering willie on the banks was sprayed in readiness for replanting. Then the February floods swept through—and they had to begin clearing again!

In spite of this setback, water monitoring and stream bank planting is continuing. The children know that when the plants grow up the roots will stop run-off into the water, and there will be cover to keep the water cool. As the stream gradually recovers, they hope to see a return of water bugs and perhaps some fish as well.

There is never any shortage of enthusiastic workers for this project. It is on-going and succeeds because it is a partnership between the school and local community groups, and most importantly, is backed by a visionary principal and her staff.



*Above: before the flood;  
below: planting after the flood.*

## Parekereke (seedling bed)



This modern-day version is made of corrugated iron with a covering of 50% shade cloth. The bottom third is filled with hay or grass clippings, the next third with compost and the upper layer with sand (to within 15 cm of the top). Seeds are planted (depth = size of seed), watered and covered. As the grass or hay decomposes, the heat generated ensures rapid germination and growth.

In the background of the picture are rows of plants germinated in this way from locally sourced seeds, and grown on in planter bags ready to be planted to enhance the lake and wetland. The parekereke was also used for kumara propagation.

*Walter Wilson waters seedlings in a parekereke  
at the Lake Whakaki Trust nursery.*

## Up the Creek and fully informed about fresh water

An adventurous journey up a waterway sets the scene for a lesson in freshwater conservation, in a new online bilingual resource from the Department of Conservation (DOC).

DOC created the resource as a step to meeting the needs of children who were visiting its websites for information, and as a way of promoting the value of fresh water. It was funded through the New Zealand Biodiversity Strategy.

In the story, Ani, Rick and Dion travel up the creek to discover why they're not catching any whitebait. On the way they explore different freshwater environments and conservation issues.

“Our number one aim was to make Up the Creek as interesting as possible for children, based on the idea that if they're having fun the learning will spring from there”, said Conservation Awareness Manager Nicola Patrick. “We then designed teaching materials to complement the journey.”

“We're hoping teachers will use Up the Creek to hook children's interest at the beginning of a module on freshwater conservation. We're also hoping that Up the Creek is so interesting that teachers who might not otherwise have thought of teaching freshwater conservation will add it to their programmes.”

Almost all of New Zealand's lowland waterways have been seriously modified by humans, whether by channelling, irrigation or pollution. Community and school groups throughout the country are now adopting local waterways and restoring them through groups like QEII National Trust and Landcare Trust.

“Up the Creek” is aimed at intermediate students, though it is hoped that children as young as 10 and as old as 14 will find the story appealing and interesting. It is also bilingual, with English and Maori versions accessible from the homepage.

<http://www.upthecreek.org.nz>



**Need funds for your stream restoration project? One organisation that might be worth approaching for funds is Pub Charity. You apply using an original barcoded Pub Charity application form, available from your local Pub Charity venue or request one from the Pub Charity Head Office, P.O. Box 27-009, Freepost 956, Wellington. Fax 04 384 1630.**

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