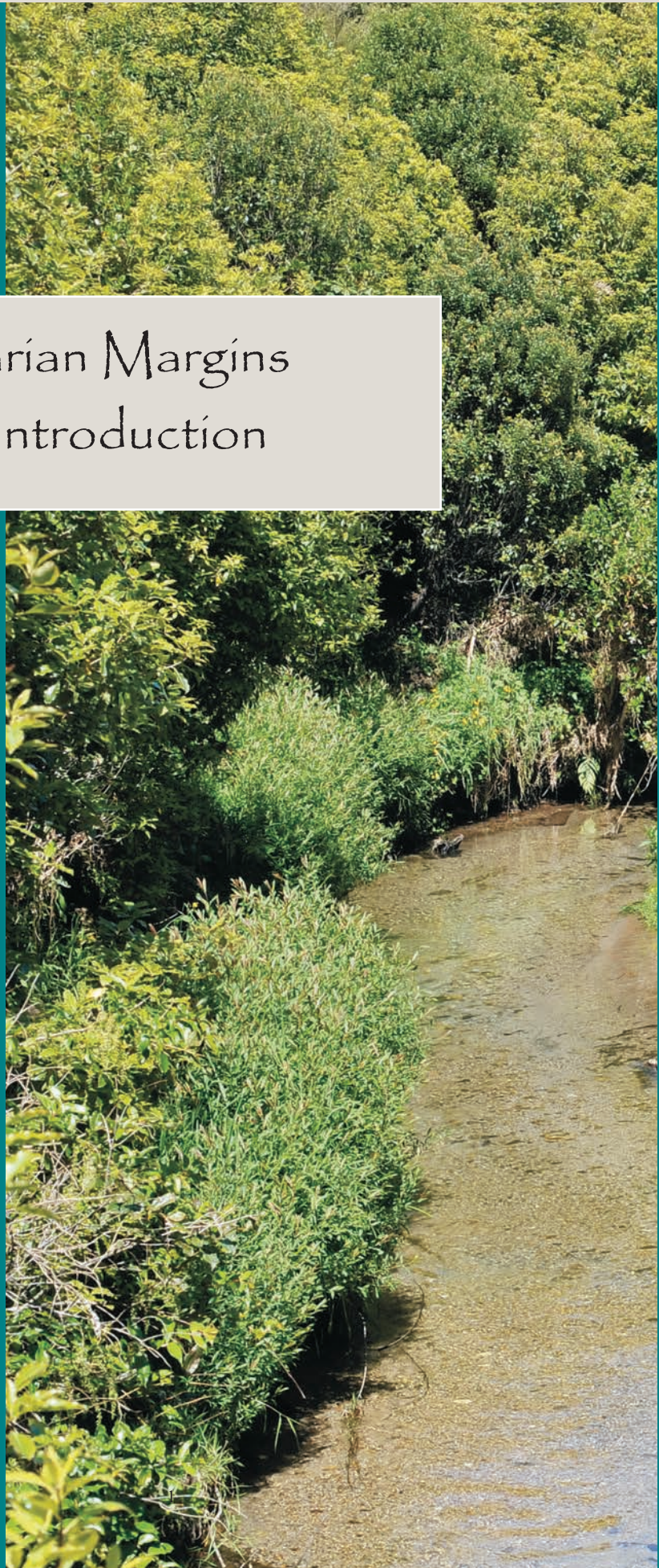




Riparian Margins - an Introduction

In natural systems the margins of streams, rivers, lakes and wetlands - riparian margins - serve as an important interface, or buffer, between terrestrial and aquatic ecosystems. They are commonly areas with varied soil and vegetation types and so can provide a diverse habitat for terrestrial and semi-aquatic plants, birds, amphibians, and insects (Parkyn 2004). In New Zealand, riparian margins were often where the biggest native trees grew because the soils were more fertile, water supply was reliable, and stream margins were often sheltered from harsh weather conditions. For these very reasons river valleys and floodplains were amongst the first areas cleared for agriculture.





RIPARIAN MARGIN FUNCTIONS

Today, the revegetation and fencing of riparian margins is strongly advocated as an environmental management tool to help reduce the impacts of land use activities on our fresh water resources. With appropriate restoration and management, riparian areas can perform many functions (Parkyn 2004).

Biodiversity:

- Shade to keep stream water cool in summer, below critical higher temperatures that can be lethal to indigenous fish and invertebrates;
- Shade to reduce light levels and so restrict the amount of instream plant growth that can choke unshaded, high nutrient streams;



- Provision of a constant supply of leaf material and woody debris to streams that provides habitat diversity and food for invertebrates and fish;
- Riparian margin vegetation provides important habitat for the terrestrial adult stages of several stream insects;
- Tree roots, overhanging branches and woody debris provide important habitat for a variety of native fish species and freshwater crayfish; and
- Riparian zones can sustain diverse plant and animal communities, and as such can serve as important links for plant and animal dispersal between isolated pockets of native vegetation.





Sediment and nutrient management:

- The root systems of trees and shrubs stabilise streambanks against collapse and erosion;
- Grassy vegetation and organic litter reduce the velocity of overland water flow (runoff) reducing its erosive power and causing suspended sediment to settle out before reaching the waterway;
- The prevention of livestock access to stream beds reduces stream bank erosion and the direct deposition of pathogens, nutrients and organic matter into the waterway;
- Well developed riparian vegetation can slow down the speed of flooding and the height of flood peaks downstream by slowing down the speed of water and providing temporary storage for the flood waters;
- Roots of riparian plants can intercept shallow ground water and utilise some of the nutrients before they reach the waterway; and
- Denitrifying bacteria can remove substantial quantities of nitrate from emerging groundwater that flows through well formed and vegetated wetlands, releasing the nitrogen to the atmosphere as nitrogen gases.

With some thought and careful planning, riparian areas can also fulfil some useful land management and economic functions:

- Riparian trees can provide good livestock shelter;
- Well positioned fences can improve livestock movement; and
- Trees (both native and exotic) can be successfully grown and managed in the riparian zone for timber as well as performing important biological functions.

Fenced and planted riparian margins can also generate undesirable environmental effects:

- Poorly managed riparian areas can become favoured habitat for weeds; and
- The provision of food and shelter along stream margins provides an important dispersal corridor and habitat for animal pests.



RESTORING RIPARIAN MARGINS

While well restored riparian margins can perform many functions, any initiative or action may not automatically produce a riparian zone that can perform all of the functions listed above, and in some cases management to improve one function can lead to a decline in others. For example, in some circumstances planting for biodiversity can lead, for a period, to an increase in sediment load in the stream because stream bank sedges and grasses are shaded out leaving the accumulated sediment vulnerable to erosion.



The standardised prescription for riparian management – fencing and planting in native trees and shrubs – does not always provide the environmental solutions desired.

Research (Rutherford et al. 2009) has shown that the many kilometres of subsidised riparian fencing and planting that occurred in the Lake Rotorua catchment in the 1980s and 1990s, while significantly reducing sediment and phosphorous loads in the Ngongotaha River (and therefore reaching the lake), did not reduce nitrogen levels. In fact, nitrogen levels have continued to rise. The planting and management approach to reduce nitrogen contamination of waterways is quite different from that for sediment and phosphorus, especially on porous volcanic soils.

Consequently, where there are one or more important land management objectives to be met by planting native trees, shrubs and grasses in the vicinity of rivers, streams, wetlands, spring seeps and lakes, careful thought must be given to the suite of actions needed to achieve those objectives. The sections that follow discuss options for planting and management of native trees and shrubs for nutrient, sediment, pathogen, biodiversity and timber production in riparian areas.

FENCING

Irrespective of the width of the riparian margin or the species of native tree, shrub or grass planted the riparian zone should be permanently fenced to exclude all farm livestock. This is because:

1. Farm livestock, especially cattle, with access to streams and wetlands are a major cause of bacterial, nutrient and sediment contamination of waterways. They should be excluded wherever possible.
2. Livestock will cause considerable damage to planted native trees and shrubs if given access to them for even short periods.
3. Rank, ungrazed grass alone can serve as a very effective filter to contaminants contained in surface runoff.

Because of the meandering nature of streams and wetland margins fencing can be expensive to install, especially if the literal path of the waterway is followed. In some situations fencing costs can be reduced by fencing along more direct routes so that sections of land between stream meanders and steep faces on the inside of a stream bend are included inside the fence. These larger fenced off areas provide ideal opportunities for indigenous forest species to be established for sustainable timber production (refer Technical Article No. 9.4 in this Handbook).



The construction of effective, preferably permanent, fencing around wetlands and along riparian margins prior to planting is an essential first step.

Many Regional Councils and organisations such as the Queen Elizabeth II National Trust can provide funding to assist with the cost of establishment of new fencing around retired riparian margins and areas of native bush.

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Tāne's Tree Trust promotes the successful planting and sustainable management of New Zealand native trees and shrubs for multiple uses.