Riparian Protection – Benefits to the Rotorua lakes

In the Rotorua district, riparian protection buffers are very important to reduce the amount of nutrients (especially phosphorus) entering the lakes from the surrounding land uses.

Riparian protection is the management of the banks of water bodies (like lakes and streams) to protect them from environmental degradation. Livestock are kept out of water bodies by fencing. Plantings between the fence and the water body can be used to filter runoff from land, stabilise land-water margins and help to suppress weeds.

Riparian protection helps remove:

- particulate phosphorus and nitrogen, by trapping the particulates.
- organic nutrients, by breaking down and absorbing the nutrients.
- suspended sediment, by slowing runoff and allowing sediment to settle out.
- faecal material and disease-causing microbes, by bacterial action and settling out.

Riparian protection has limited ability to remove:

- **Dissolved inorganic nitrogen.** Most nitrogen entering water bodies around the Rotorua lakes is in nitrate form. The majority of this comes from livestock urine patches. Nitrate easily leaches from the soil into groundwater, where it can travel under riparian plantings directly into water bodies.
- **Dissolved inorganic phosphorus in surface runoff.** Dissolved inorganic phosphorus is generally not trapped or treated by riparian buffer zones. However there may be some plant uptake and soil absorption.
- **Nutrients and sediments during storm flows.** During heavy rain events most water runoff forms rivulets and small streams, and flows straight over riparian buffer zones.

Protection plantings around Lake Rotoehu

Riparian vegetation

In general, the wider the riparian buffer zone the more effective it is; yet even narrow riparian buffers have benefits. The type of plants used will depend on the purpose of the riparian protection. For example, a native tree canopy on stream banks will shade the stream, act as an 'ecological corridor' for native birds and fish, and will promote a healthy instream invertebrate community. However, these trees prevent the growth of smaller plants. Streambank erosion may worsen and nutrient-filtering properties will be small. Trees in riparian areas used for nutrient filtering should be planted with enough space between them to let light through, so ground cover plants can survive. Grasses, rushes and small bushes are the best plants to use to prevent nutrients and sediment entering rivers, streams and lakes. Their thick clumps of stems and roots help to slow runoff, trap sediments, and take up nutrients to grow. Around the organic-rich root zones of wetland plants, bacteria transform inorganic nitrogen into nitrogen gas, releasing it to the atmosphere.

The Rotorua Lakes Problem

- Many of Rotorua's lakes have too many nutrients, caused by activities such as farming and residential settlement.
- These nutrients (nitrogen and phosphorus) feed algal growth, which degrades water quality.
- The Rotorua Lakes Protection and Restoration Action Programme is initially tackling water quality problems in five lakes in the Rotorua district
- Some long-term solutions focus on land management and include new wetlands, restricting nutrients "outflows" from properties, and changes in land use.
- More urgent solutions include sewerage reticulation, structures to divert flows, and the use of mineral products to lock up nutrients.

Riparian management beside a stream

Riparian protection buffers work best next to small watercourses and temporary streams rather than large streams and rivers, as it is the small channels that catch most of the initial surface runoff from land. Riparian protection upstream will often improve stream and lake water quality downstream.

Effects of riparian protection on the Ngongotaha Stream

The Upper Kaituna Catchment Control Scheme was a large riparian protection programme for Lakes Rotorua and Rotoiti and the streams in the catchment. It began in the 1970s and aimed to reduce the impact of land use around these lakes. More than 4000 hectares of pasture was planted in trees, mostly along stream and lake edges and on poor quality soils. About 540 kilometres of protection fencing was constructed.

In the late 1980s the Ngongotaha Stream was studied for three years to determine the benefits from the Upper Kaituna Catchment Control Scheme programme. Comparison with data collected before the riparian protection found that:

- Actively eroding streambanks had decreased from 30% to 4%.
- Sediment entering the stream had decreased by 85%.
- Particulate nitrogen and phosphorus entering the stream decreased by 33%.
- Total phosphorus inputs decreased by 25%, but total nitrogen inputs stayed constant. The reduction in particulate nitrogen was off-set by an increase in groundwater nitrate levels entering the Ngongotaha Stream.

Overall, the study estimated that the riparian protection works resulted in an 8–9% decline in nitrogen and a 15–20% decline in phosphorus input into Lake Rotorua.

Changes over time

It can take time for the benefits of riparian protection to be seen. In some cases it may take years – longer than changes in the riparian vegetation.

A 1995 study indicated that buffer strips are less effective at phosphorus removal over time. On one site studied 20 years after planting, similar amount of phosphorus were being released as were trapped by the riparian plantings. Future improvements in riparian planting and management may help avoid this.

Riparian protection is not a cure-all solution for the Rotorua lakes. However it is a proven tool to reduce sediment and nutrient inputs to water bodies. Because of this, Environment Bay of Plenty is aiming for retirement of all riparian margins in the Rotorua lakes catchments by 2020.

To help reach this goal, Environment Bay of Plenty offers substantial grants for riparian fencing and planting undertaken as part of an Environmental Programme agreement. Free advice to landowners wanting to protect their riparian areas is also available from Environment Bay of Plenty's land management officers. More information on riparian protection can be found in these ***Sustainable Options*** fact sheets, free on request:

- LM01: Environmental Programmes
- LM02: Riparian Protection
- LM03: Protection Fences
- LM04: Stream Crossings
- LM06: Stock Water Supply
- LM07: Plant Selection for Retirement Areas
- LM08: Management of Environmental Protection Areas
- LM12: Native Plants for Revegetation Projects

For further information and advice, contact your local soil conservator at Environment Bay of Plenty:

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This fact sheet was last updated March 2005

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