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LakesWater Quality Society had its origins in 1961 to consider the control of newly spreading introduced lake weeds. It was founded by a small group of local and concerned citizens.

During the late 1990s the Society expanded its focus to include water quality and the deteriorating state of the Rotorua Lakes. In 2000 the Society changed its name to LakesWater Quality Society.

Drivers for concern were:

- DSIR break up and redirection of research away from Lakes and to rivers and oceans
- Closure of the Water Quality Centre in Taupo in 1992
- Our Society was told further research on Lakes was unnecessary; what was necessary to know was already known; no lakes that had deteriorated had been restored.
- The Regional and District councils could not agree on what actions were needed – they were in denial.
- Answers to our questions on what was causing water quality problems in our Lakes were inadequate, of concern, and certainly not scientifically based.

Out of frustration from not getting answers or action from the authorities LWQS decided to hold, together with the Royal Society of New Zealand (Rotorua Branch), a Symposium about research needs for the lakes. This forum brought together scientists, local and regional authorities, politicians and local residents. It confirmed the level of research on our Lakes was woefully inadequate and proved to be a 'wake up' call for all of us. It became the catalyst to the first major step forward to saving our Lakes.

In September 2001 Environment Bay of Plenty established the Chair of Lakes Management and Restoration at Waikato University. This proved to be an outstanding decision.

With the appointment of David Hamilton and the associated research group the issues and debate on the Lakes took on a new level of understanding.

LWQS continued with the four more Symposia as we believed it to be the best format to gain an understanding of the Lakes' issues. The Symposia were:-

- "Rotorua Lakes 2001 - Research needs for the Rotorua Lakes"
- "Rotorua Lakes 2002 - Lakeside Communities and Sewerage"
- "Rotorua Lakes 2003 - Practical Management for Good Lake Water Quality"
- "Rotorua Lakes 2004 - Nutrient Targets and Cyanobacteria"
- "Rotorua Lakes 2006 – Wonderful Lakes, What Value, Who Pays?"

Perhaps the greatest catalyst and impact for action was brought about by the Lakes themselves. In late 2002 and early 2003 Lakes Rotorua and Rotoiti produced the highest levels of Cyanobacteria on record, forcing their closure and highlighting the health and safety risks.

The last 3 to 4 years have seen outstanding commitment from EBOP and RDC together with Te Arawa Maori Trust Board, resulting in the marshalling of resources and the full engagement of the Lakes' communities in programmes of restoration and protection of our Lakes.

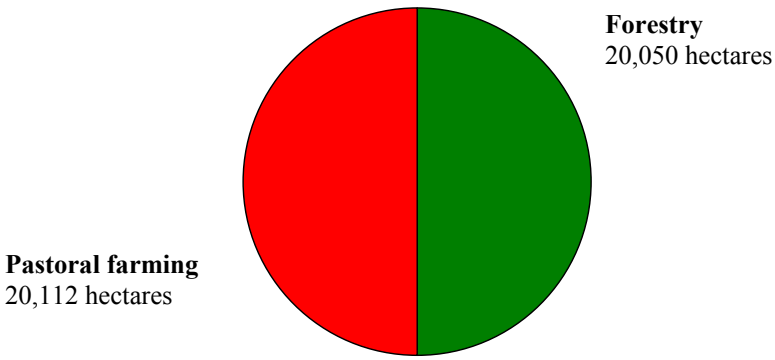
We are now coming to the HARD YARDS, where actions required will cost large sums of money, have huge impact on land use and require some of us to make difficult personal choices. LWQS believes that Science, Public Policy and incentives are critical for successful Lakes protection and restoration plans.

There are certain areas I wish to comment on:

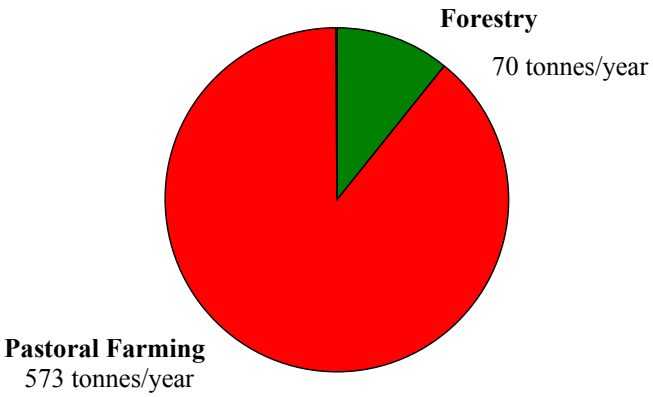
Forestry

Exotic forests are being cut down across our country. For the nation, when carbon credits count, does this make sense? Native and exotic forests are critical to our environment and especially our Lakes' catchments.

Forestry and Pastoral Farming Footprint in the Rotorua Catchment



Forestry and Pastoral Farming Nitrogen Load in the Rotorua Catchment



Forests currently represent approximately 45.3% of the total land area in the Rotorua Lake catchment and yet are responsible for less than 10% of the N footprint.

It is arguable that the forestry sector has been severally damaged by Rule 11 by capping their N and P loads and reducing their land use options.

Government has until 2008 to comply with the Kyoto Accord but to date has not come out with policies granting carbon rights to forestry owners. Indeed indications have been to deny forest owners the carbon rights.

Forestry must come under threat in the present environment. Our lakes need forests but forestry needs to be financially viable. Policies on forestry must provide incentives to be a sustainable land use alternative to pastoral farming.

The current environment is exactly the opposite for forestry.

Leaching of N

Leaching of Nitrogen occurs in the soil below the grass roots' system. Depending on the proximity to the lake and location of each property, leached nutrients can take up to fifty years to reach the Lakes.

Once the Nitrogen goes below the root system it becomes a **legacy problem** for society as a whole.

Nitrogen fertiliser costs $1.30 per kg to apply to land and at least $20.0 per kg to strip from the Lakes depending on what action is taken.

For Example: Ohau Diversion

Cost ratio $1.3 : $20.0 = 15.4 times

Table 1: – N Loss Coefficient (kg/ha/yr)

Beef	30
Sheep	20
Sheep and Beef	25
Deer	15
Deer/Sheep /Beef	20
Dairy	40
Grassland	12
Forestry	4

Source: Lakes Rotorua and Rotoiti Action Plan.

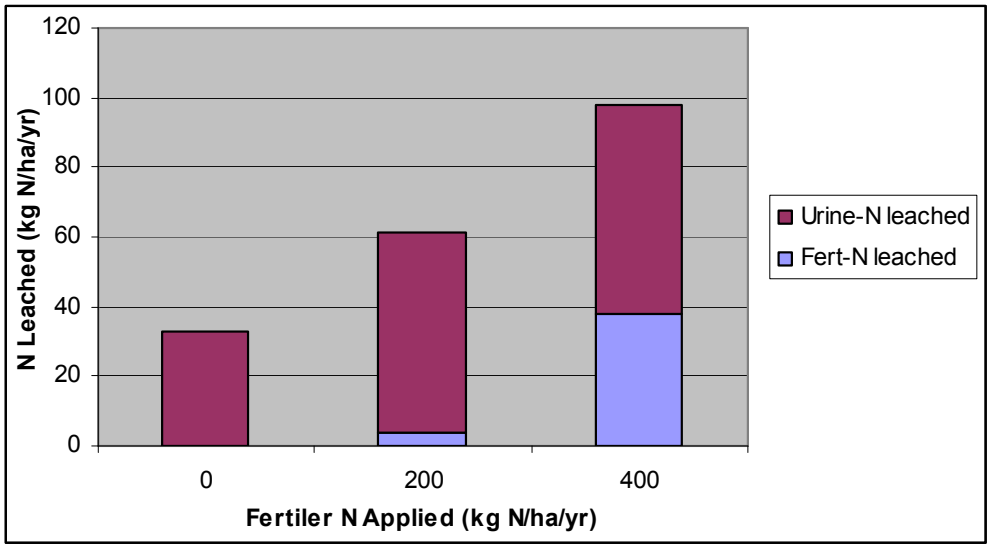
How accurate are these N loss coefficients – could they be higher or lower? Few leaching studies have been carried out on our Rotorua type

soils which are very porous and dominated by yellow/brown pumice. Inaccurate loss coefficients could have significant implications on the nutrient load budgets.

Ravensdown Chief Executive recently said "we know that the leaching is coming not from the nitrogen fertiliser, but from the stock urine".
(*NZ Farmers Weekly,* November 13 2006)[1]

This statement is not supported by science.

Table 2: Sources of nitrate leaching at different rates of fertiliser application on dairy pasture at 3.3 cows per hectare.



From: Blennerhassett, Dr J. 2005. *Nitrogen nutrient budgets for pasture,* Autumn, FertScience, Summit Quinphos, Auckland.

This graph is taken from *FertScience, (*Autumn 2005)[2] in an article by Dr Jamie Blennerhassett. It illustrates the impact of fertiliser N on leaching on a dairy farm. He says that "a key point that is often missed is that even though there is very little loss directly from fertiliser at 200 kg/ha/year rate, **the total loss is twice that of No fertiliser.**

Blennerhasset states that "it is important to recognize the fact that the extra N in the urine has originated from the extra fertiliser N in the first place."

"A simple rule to apply is that more N, either from clover or fertiliser, will equal more production, which will equal more leaching."

If the Chief Executive of Ravensdown can explain away that all leaching of N is via urine and **not** acknowledge N fertiliser as being a major contributor to the N in urine, then **we need to get the facts clearly out in the open.**

How about this formula?

More N FERT = More DRY MATTER + More IMPORTED DRY MATTER
= More CONSUMPTION
= More URINE + DUNG PRODUCED
= More N + P AVAILABLE TO LEACH INTO GROUND WATERS.

SCIENCE NEEDS TO ESTABLISH WHAT "MORE" EQUALS.

The recent article in the *New Zealand Herald (*7 November 2006)[3] quotes Charlie Pederson, President of Federated Farmers, stating that the farmers need to have a "10 in 10" campaign to prevent Nitrate run-off into waterways, i.e. a 10% reduction over ten years, **1% per year!**. LWQS would say "well done, farmers, you are beginning to get the idea, but the Rotorua Lakes need at least a "50 in 10" to survive." i.e. a 50% reduction over ten years.

Rule 11 caps on Nutrient loads must be amended to take account of N fertiliser plus stock urine plus bought-in feed.

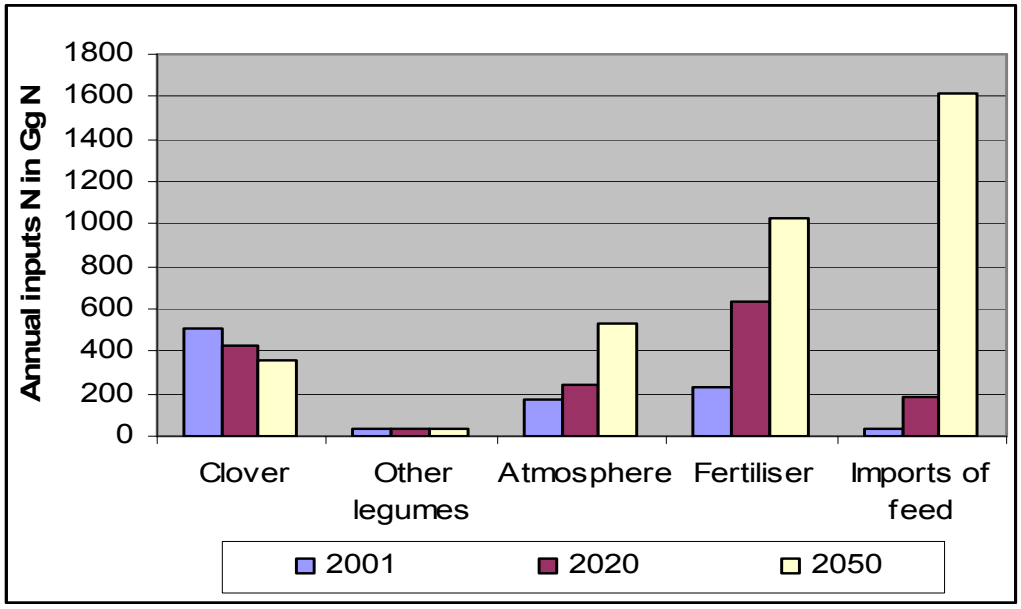
There is a critical need to have independent farm advisors with specialists' skills to properly and fully educate farmers on nutrient budgeting and management of N leaching in the Lake catchments.

Future Pastoral Production and Land Use

The pastoral industries have set a sustainable growth target in New Zealand of at least 3% per annum. How sustainable is this target?

Project *The National N Budget in 2020 and 2050 after 3% Production Growth, with Implications for Sustainability*[4] highlights some significant trends and changes which will occur over the next 44 years in the pastoral farming sector if such growth targets are to be achieved.

Table 3: Annual inputs of N for New Zealand in Gg N (1 Gg = 1000 tonnes)



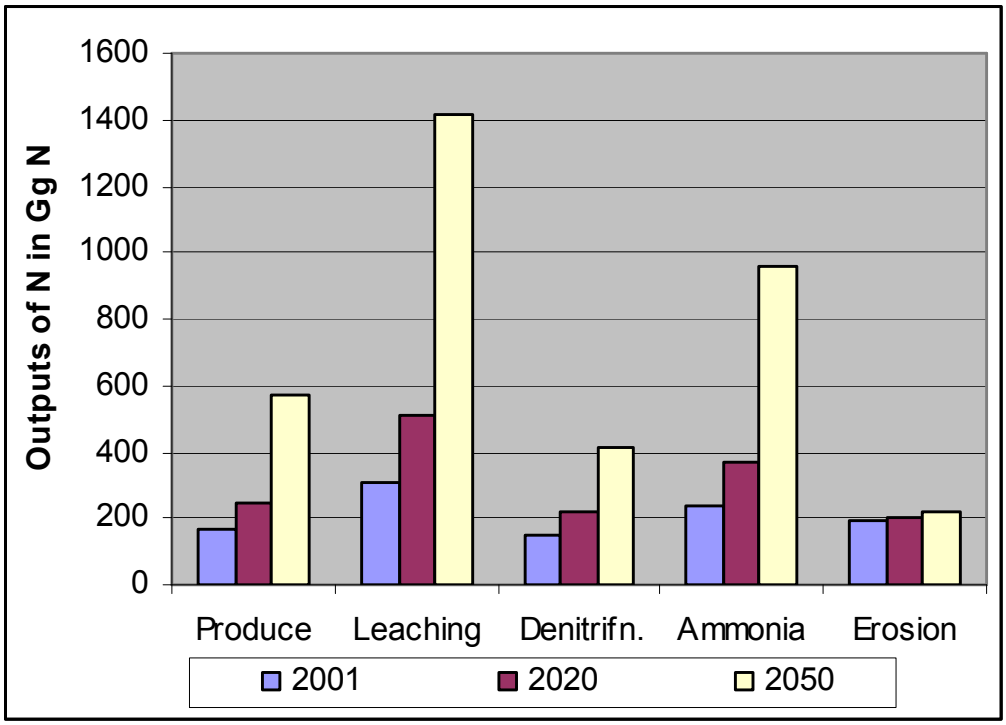
From: W Troy Baisden, Roger L Parfitt, Alec D Mackay and Louis A Schipper. 2006. *The National N Budget in 2020 and 2050 after 3% Annual Production Growth, with Implications for Sustainability, pp 109109-117,* Occasional Report No. 19, ISSN 0112-9902, Massey University, Palmerston North.

This graph suggests that inputs of N into New Zealand will be dominated by fertiliser and clover in 2020 and then by imported feed and fertiliser in 2050. In 2001 clover dominated.

N Fertiliser needs to double in application per hectare, between 2020 and 2050 to reduce the reliance on imported feed.

So what are these growth implications for the land and the environment?

Table 4. Annual outputs of N for New Zealand in Gn N (1 Gg = 1000 tonnes)



From: W Troy Baisden, Roger L Parfitt, Alec D Mackay and Louis A Schipper. 2006. *The National N Budget in 2020 and 2050 after 3% Annual Production Growth, with Implications for Sustainability, pp 109109-117,* Occasional Report No. 19, ISSN 0112-9902, Massey University, Palmerston North.[5]

This graph shows that if farming growth continues at 3% over the next 44 years, growth will largely be dependent on N fertiliser and increasingly on imported feed supplies with **N Leaching increasing by at least 4.6 fold!**

LWQS seriously questions the ability of farmers to achieve N leaching targets in the face of such pastoral industry growth targets.

Imported feed allows for increased production. The obvious conclusion from this is that as stock numbers increase so does the nutrient load on the catchments. While Rule 11 currently caps nutrient losses, it does **not** appear to cap increases in stock numbers.

The setting of on-farm sustainable nutrient budgets in the Lakes catchments and the process for independently measuring and monitoring farm practices will be critical. What regime for penalties will there be for non-compliance?

This is where the hard yards are. The Draft Lakes Rotorua and Rotoiti Action Plan calls for an N reduction target of 200 tonnes per year for Lake Rotorua. This is equivalent to over 6,400 hectares, i.e. 31% of the total pastoral land being retired from intensive farming right now in the Rotorua Catchment.

Can, and will, leaching technologies and improved farming practices enable farmers to meet these targets without retiring the land?

Future pressure must come on the economic viability of pastoral farming in its current form in the Rotorua Catchments.

The current District plans need amendment to allow for greater flexibility in land use to occur, and to create an environment for innovation allowing land owners/users to find the best possible options going forward.

To this end LWQS favours an incentive system of tradeable property rights which will allow for the retirement of 10 hectares of Rural A land into forestry or other low N impact uses in exchange for the right to subdivide 1 hectare for residential purposes.

The key point is to provide financial incentives to farmers to reduce their nutrient loads on the Lakes catchments. LWQS are in the process of making submissions to Local and Regional Councils on this subject.

It is essential we raise the public debate on the District Plan to allow for greater flexibility in land use and incentives to retire pastoral land.

In conclusion intensity of livestock farming is what causes high N outflows, through stock urine, and it does not matter much whether the N comes out of a bag, imported feed, or the atmosphere. But increased use of N fertilizer and imported feed is lifting the intensity of farming, and the amount of total outflow of N from urine, to unprecedented levels.

Rotorua lake catchments can only stand low intensity farming, unless major progress is made in technology reducing nitrogen outflows from intensive farming.

Science has a pivotal role to play in the future of farming within our Lakes' catchments and our Lakes. Much work needs to be done on leaching of N. Farmers must have the tools to optimize their operations

yet significantly reduce their N footprint on the land. Ultimately it will be science and cleaver innovation which will determine the sustainability of farming in sensitive eco-systems like ours.

On behalf of our Lakes we encourage you to be innovative, resourceful and successful in your future endeavours.

Thank you.

REFERENCE

[1] Rennie, Richard, *Prime Minister sparks fury with fertiliser plunge pick,* New Zealand Farmers Weekly, November 13, 2006

[2] Blennerhassett, Dr J. 2005. *Nitrogen nutrient budgets for pasture,* Autumn, FertScience, Summit Quinphos, Auckland.

[3] Ward, Stephen. *Farmers to tackle nitrogen run-off into waterways,* The New Zealand Herald*,* 7 November 2006.

[4] Baisden, W. Troy, Parfitt, Roger L., Mackay, Alex D., and A Schipper, Louis A. 2006. *The National N Budget in 2020 and 2050 after 3% Annual Production Growth, with Implications for Sustainability, pp 109109-117,* Occasional Report No. 19, ISSN 0112-9902, Massey University, Palmerston North.

[5] Baisden, et al.