

UNIVERSITY OF SOUTHERN QUEENSLAND

Exploring Changes in Nitrate Contamination in the Coastal and Hautere Zone Aquifers, Wellington, New Zealand

A Dissertation Submitted by

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Abstract

Fifteen years of groundwater quality monitoring in the Kapiti Coast by the local authority in Wellington, New Zealand, has identified an area of elevated nitrate concentrations in the Te Horo area, with some monitoring bores testing for concentrations above 5 mg/L. However, recent analysis seems to indicate that contaminant levels have decreased from what was previously recorded, although still remaining elevated.

The purpose of this study was to investigate if changes in nitrate concentrations over time were significant and, if so, determine which factors have contributed to these changes.

Initial temporal trend analysis indicated that nitrate concentrations since 1993 have decreased in the majority of monitoring bores. Tobit regression analysis was subsequently undertaken using several land use, land cover, soil type, climate and chemical explanatory variables. Results indicated that beef cattle farming, fruit growing, settlements and lifestyle blocks were associated with increased nitrate concentrations. Groundwaters higher in dissolved oxygen which underlie fine sandy loam soils (which are highly permeable soils) were also identified as been susceptible to higher nitrate concentrations.

Analysis of nitrate plume migration also indicated that, although concentrations appeared to have reduced during the fifteen year monitoring period, the plume could be spreading laterally in an east-west direction.

It was ultimately determined that the temporal decrease in concentrations is best explained by improved land use practices as physical characteristics and land cover overlying groundwater had not changed substantially and thereby explaining the decreasing trend in nitrate concentrations.

Certification of Dissertation

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

Deepthi Jayatha Dias-Wanigasekera

Endorsement

Dr John M. Worden

Dr Gregory De Costa

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