

The Limits Of Development Research

Assessing Water Quality Limits and Risks from Intensified Irrigation Development: a New Zealand Case Study

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Abstract

Irrigation development is being promoted by the New Zealand government alongside the need to set catchment limits for water takes and to protect water quality. This paper presents results of an integrated catchment management assessment of the potential water quality consequences from the proposed Waitereia water augmentation project near Nelson, New Zealand.

The assessment comprised four components:

1. Modelling nutrient leaching through the soil profile for six land uses, irrigated and dryland, and four soil groups using the SPASMO model
2. Assessing attenuation of nitrogen carried via three aquifers from the bottom of the soil profile to potentially sensitive receiving waters (springs, river and coast)
3. Recommending water quality limits which protect the values and uses of those receiving waters.
4. Scoping possible Good Management Practices (GMPs) which would reduce the risks of water quality limits being exceeded when increased irrigation is implemented.

Full irrigation is modelled to increase nitrogen concentrations entering groundwaters by 23% and in a hypothetical worst case by up to 50% if the entire plains were converted to irrigated market gardening. These increases, however, are mitigated (diluted) by increased drainage rates to groundwater of 6% and 19% respectively caused by the increased irrigation. Nitrogen is diluted and dispersed within the aquifers with attenuation of around 50% in the unconfined aquifer and 0–40% in the confined aquifers.

In the river, water quality is expected to improve when the water augmentation scheme is operating, because of the dilution offered by the uncontaminated flow releases from the dam. Spring-fed streams fed by upwelling water from the unconfined and Upper Confined aquifers already have high – albeit declining – nitrate concentrations 4.6–14 mg/L, a legacy of past land use. Those springs are identified as 'choke points' for system management because potential nitrate limits based on toxicity to aquatic species may be exceeded.

1. INTRODUCTION

New Zealand is in the midst of an irrigation development phase. Driven by a boom especially in dairy sector returns, irrigation developments are also a priority for encouragement by the current

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