IMPACT OF NITROGEN FLOWS FROM AGRICULTURAL PRODUCTION ENVIRONMENTS ON BIODIVERSITY OF NON-AGRICULTURAL ECOSYSTEMS IN THE WAIKATO REGION, NEW ZEALAND

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Intensive agriculture in the Waikato region is characterised by positive nitrogen (N) balances and leaching of nitrate N to shallow groundwater. On a per hectare basis, vegetable growing produces more surplus N than dairy farming, but within any land use option there is substantial variation in surplus N depending on a range of agronomic, edaphic and climatic variables. However, in general, agricultural land uses in areas with the presence of oxic-shallow aquifers have resulted in elevated nitrate N in groundwater in the Waikato region. Since much of the regions surface water drains from shallow groundwater a significant proportion of the N in the regional surface waters originate from the groundwater. The balance of the surface water N is from direct discharges of effluent and farm land surface runoff. Collectively, the point and non-point sources of pollution from the agricultural ecosystems can have distant impacts on a variety of other ecosystems, including rivers and streams, wetlands, lakes, estuarines and coastal waters. The impacts of increased N inputs are most dramatic where N is the growth-limiting nutrient. In this situation any additional N input causes an immediate and often irreversible change in ecosystem function and structure. For example, adventive exotic aquatic weeds may smother the generally low-nutrient indigenous flora and vegetation of aquatic ecosystems. Excessive plant growths can reduce the diversity of the freshwater fauna but can increase the abundance of some species. In extreme circumstances, nuisance algal or plant growths can inhibit the use of water for other purposes.