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This paper focuses on the occurrence, transport and fate of nitrate and pesticides in the groundwater systems. The nitrogen cycle and natural levels of nitrate in groundwater are discussed and the various manmade sources of nitrogen are detailed, together with nitrate loading and leaching rates from various land uses. The historical information on nitrates in New Zealand groundwater systems is provided and current trends are discussed, followed by a look at modelling nitrate transport and fate in groundwater and various options for treating high concentrations of nitrate. The type and usage of pesticides and the factors controlling the entry of pesticides through the soil and into and through the groundwater systems are discussed, followed by a critical review of New Zealand studies which have examined pesticide fate and transport in a range of New Zealand soils and groundwater systems. The monitoring and occurrence of pesticides in New Zealand groundwater systems is described, and a discussion of temporal variability, point sources and remediation of contaminated sites is presented. A few examples of interactions of contaminated groundwater with surface water are given and the relationship between nitrate and pesticides in groundwater is discussed.

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