SIMULATION MODELLING TO INVESTIGATE NUTRIENT LOSS MITIGATION PRACTICES

BILL KAYE-BLAKE
Sarah Baillie

Agriculture influences water quality through nitrogen (N) losses from farmland. Several variables affect the extent of losses. The inherent characteristics of the land, such as soil type and slope, affect water and nutrient movement through and across the land. The type of farming is also important, including the type of animal in a pastoral system. There are tactical choices by farmers that affect the impact of animals on nutrient losses. Mitigation activities can change the farming system to produce lower nutrient losses. The farmer as decision-maker is therefore important: the farmer decides what farming practices to employ.

The paper uses the RF-MAS (Rural Futures Multi-Agent Simulation), a system model of New Zealand agricultural industries that incorporates natural resources, land use, policies, prices and farmer behaviour. It models strategic decisions and behaviours of individual farmers in response to changes in the operating environment. RF-MAS examines the production, economic and environmental impacts based on various input data over a 25-year period.

The modelling scenarios are built on differences across farming options and farmer behaviours. They include several levels of on-farm mitigation activities, changes in information available and the willingness of farmers to change practices, and different social parameters. The outputs from the modelling include changes in N losses from farms, changes in total regional agricultural revenue and cost per kilogram of N loss reduction. From the modelling and results, the research considers how farmer behaviours affect N reduction and the adoption of mitigation in the agricultural sector.