

Nitrogen Cycle

The nitrogen cycle starts with nitrogen gas in the air. Bacteria thriving in soil, around plant roots, and in water, convert it to forms useful for other biochemical and biological processes.

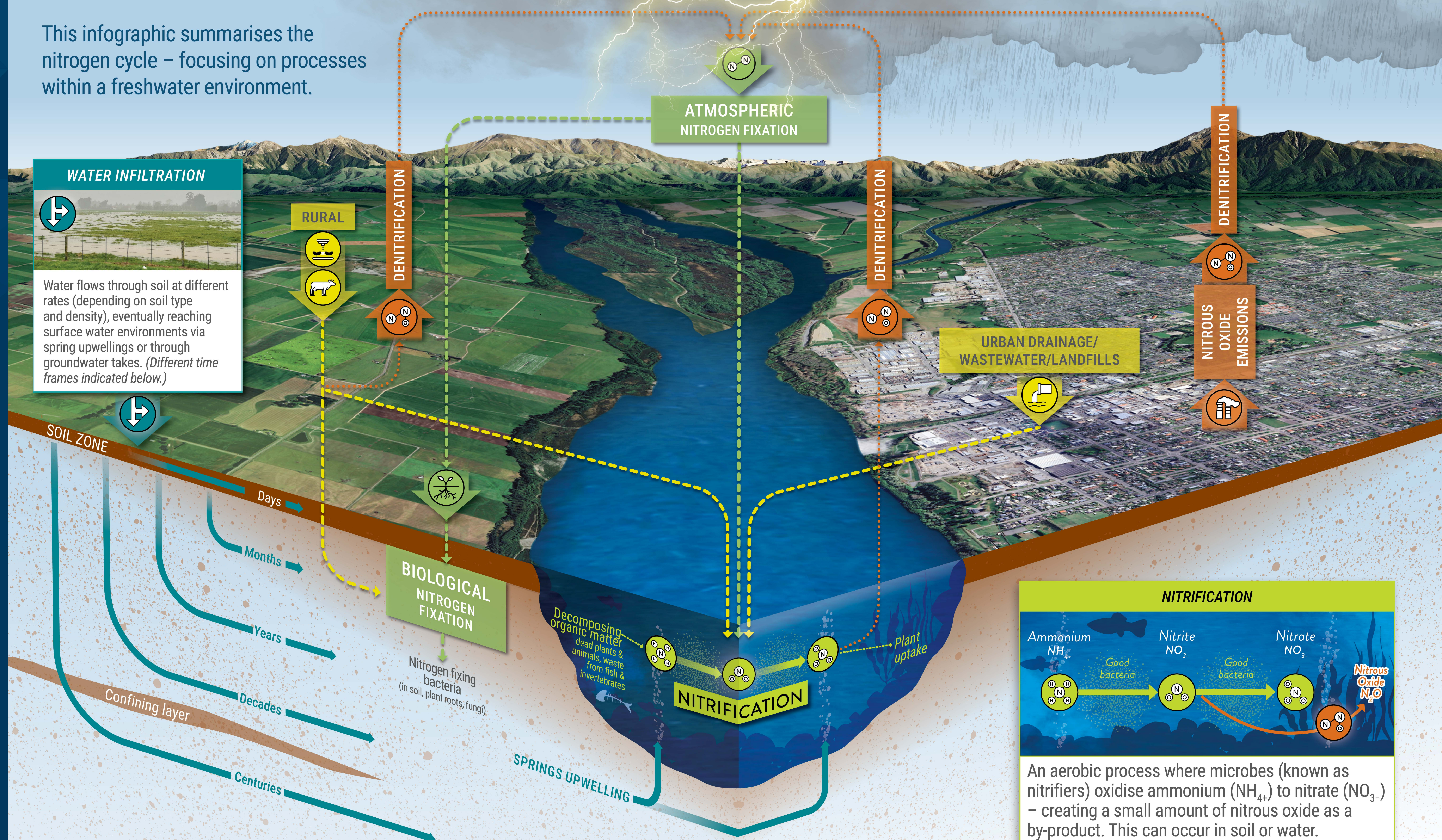
Understanding nitrates and their impact on your catchment's waterways:

Nitrate (NO_3), a compound formed when nitrogen combines with oxygen, poses concerns for waterways when it becomes elevated.

An important nutrient for plant growth, and naturally present in low quantities, elevated nitrate levels indicate contamination from human activities. These include infiltration from fertilised lawns/cropland/pasture, leaky septic systems, runoff from animal manure/urine, and industrial discharges.

The adverse effects of excess nitrates on your catchment's waterways include excessive plant/algae growth. This can smother streambeds, reduce oxygen in the water, and alter water pH – eventually harming fish, macroinvertebrates and their ecosystems. At very high levels, nitrates are toxic to fish, and some aquatic invertebrates.

This infographic summarises the nitrogen cycle – focusing on processes within a freshwater environment.



Nitrogen Inputs		Nitrogen Fixation		Nitrogen Outputs	
RURAL	URBAN DRAINAGE/ WASTEWATER/LANDFILLS	ATMOSPHERIC	BIOLOGICAL	DENITRIFICATION	NITROUS OXIDE EMISSIONS

For rural areas, the main nitrogen inputs come from synthetic fertilisers and urea in animal urine, which rapidly hydrolyses in the soil to ammonium and is then nitrified to nitrate (see nitrification diagram). Nitrate can also enter waterways directly from wastewater, landfills, animal feedlots, septic systems, or urban drainage.

This is where molecular nitrogen (N_2) in the atmosphere is converted into nitrogen compounds useful for other biochemical/biological processes. Fixation can occur through atmospheric (lightning), biological (nitrogen-fixing bacteria), or industrial processes (not shown).

An anaerobic process where microbes known as denitrifiers convert nitrate into nitrogen, with some released into the atmosphere as nitrous oxide. This can occur in soil, water, or air.

Nitrous oxide is emitted during some industrial processes, burning fossil fuels, treating solid wastes, and when naturally occurring microbes act on nitrogen in soils.