

THE HIDDEN KILLER

How synthetic nitrogen fertiliser is fuelling intensive dairying, polluting our rivers and climate.



#TooManyCows

GREENPEACE



THE DIRTY FUEL FOR INDUSTRIAL DAIRYING:

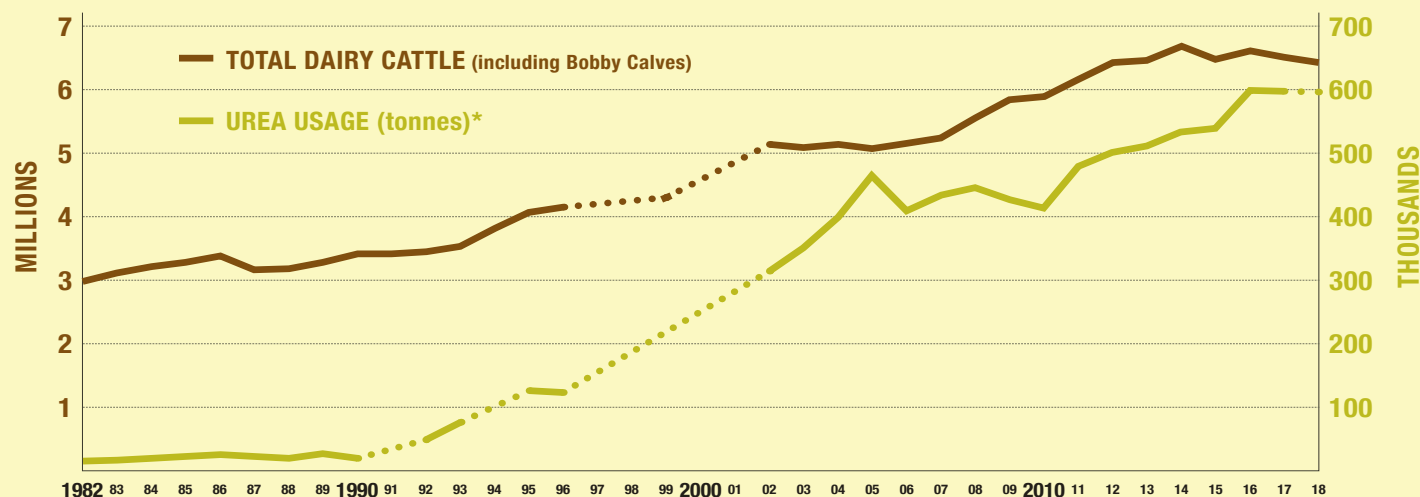
Synthetic nitrogen fertiliser has fuelled the expansion and industrialisation of dairy farming in New Zealand. Since 1990, dairy cow numbers have more than doubled¹ and the use of synthetic nitrogen fertiliser increased seven-fold.²

According to the OECD, NZ has had the highest percentage increase in synthetic nitrogen fertiliser use out of all of the OECD countries since 1990.³

Synthetic nitrogen fertiliser is most often sold as 'urea' but it's also mixed up with other fertiliser products and sold under various brand names. In New Zealand it is sold by two companies; Ravensdown and Ballance, who sell 98% of all the fertilisers used in NZ.

Industrial dairying is the biggest user by far, using 70% of all the urea in NZ.⁴

GROWTH IN UREA USE AND COW NUMBERS



*The NZ government only measures urea and not use of all synthetic nitrogen fertilisers so this graph does not represent all the synthetic nitrogen fertiliser used in NZ.
Source: Statistics NZ, Infoshare LookUp tables.
<http://archive.stats.govt.nz/infoshare/ViewTable.aspx?pxID=e4b2f308-e80b-4157-931a-810effedd3a0>
<http://archive.stats.govt.nz/infoshare/ViewTable.aspx?pxID=224b056c-850a-43af-9d40-2a36d6a84957>

Farmers spread it onto farmland in vast quantities because in the short term it is an easy way to make grass and other crops grow fast.

Synthetic nitrogen fertiliser is a product that is created in factories out of 'natural' (fossil fuel) gas. Using this gas and a chemical process these factories take nitrogen out of the atmosphere and convert it into the form plants can use.⁵

In NZ, 265,000 tonnes of it is made at Ballance's Kapuni factory in Taranaki, every year. The rest is imported mostly from Saudi Arabia, Malaysia and China.⁶

Synthetic nitrogen fertiliser and the swollen dairy herd it has created is degrading the health of our climate, our rivers, and ultimately, the health of our people. Greenpeace is calling on the Government to ban synthetic nitrogen fertiliser, reduce cow numbers and invest in regenerative farming.

CLIMATE BREAKDOWN

Extreme weather events, intense wildfires, drought, flooding, sea level rise and resource conflicts are already taking lives and causing major instability in our global society.

Without swift and deep cuts in greenhouse gas emissions scientists predict we have only 12 years left to escape the worst consequences of climate change and prevent the world from heating by more than 1.5 degrees.⁷

Synthetic nitrogen fertiliser has industrialised agriculture, which is now one of the world's biggest climate polluters.

In NZ, agriculture is the country's worst climate offender, causing 49% of all our emissions.⁸

Synthetic nitrogen fertiliser is a triple whammy for the climate:

1. Its use increases the numbers of cows which increases methane emissions from burps.
2. More cows also means more nitrous oxide emissions from manure and urine.
3. Synthetic fertiliser also directly causes nitrous oxide emissions when it's applied.

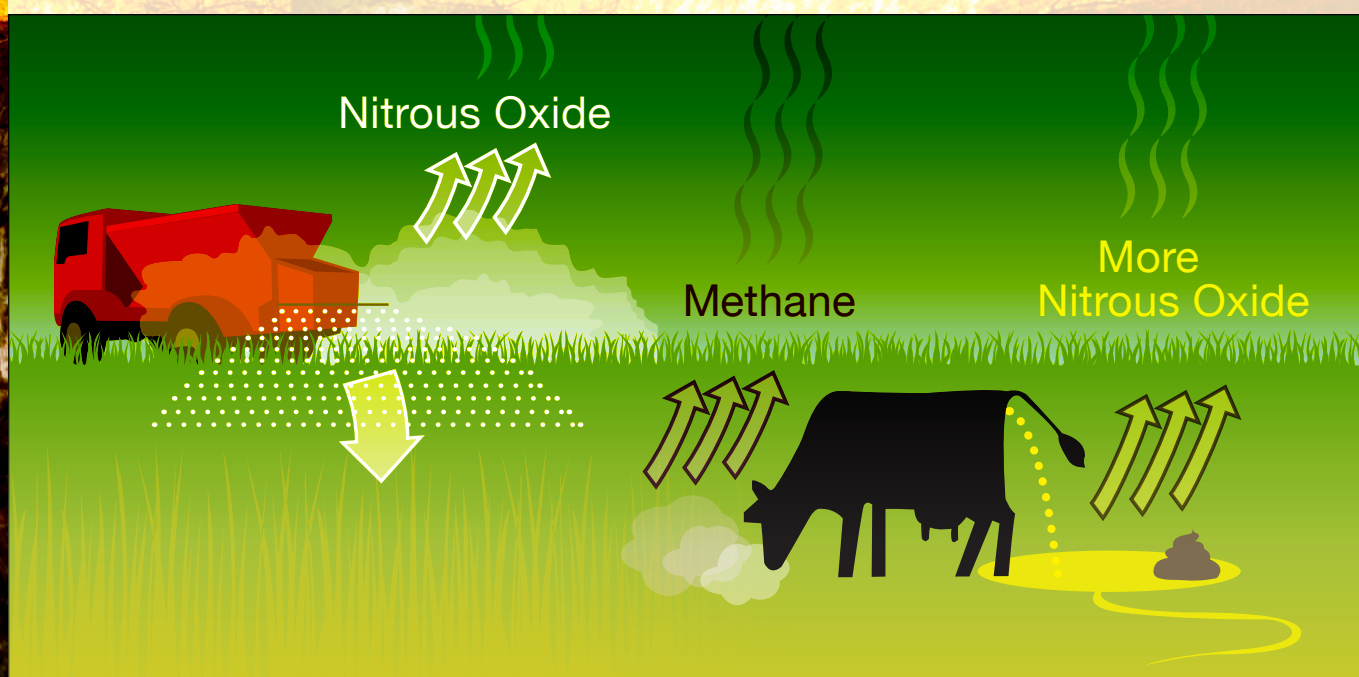
Nitrous oxide is one of the most dangerous greenhouse gases. It is 265 times more effective at trapping heat in the atmosphere than carbon dioxide.⁹

“ Between 1990 and 2016, emissions from the agriculture sector increased by 12 per cent. This is primarily due to the national dairy herd nearly doubling in size since 1990 and an increase of over 600 per cent in the application of nitrogen-containing fertiliser during the same period

Ministry for the Environment¹⁰

NZ's Parliamentary Commissioner for the Environment reviewed available science on reducing agricultural emissions and found there were no quick technological fixes available to make the far-reaching and deep cuts required to reduce emissions from industrial livestock farming.¹¹

An urgent transition away from industrial livestock farming is required. That starts with a ban on synthetic fertiliser, and a nationwide shift to regenerative farming.



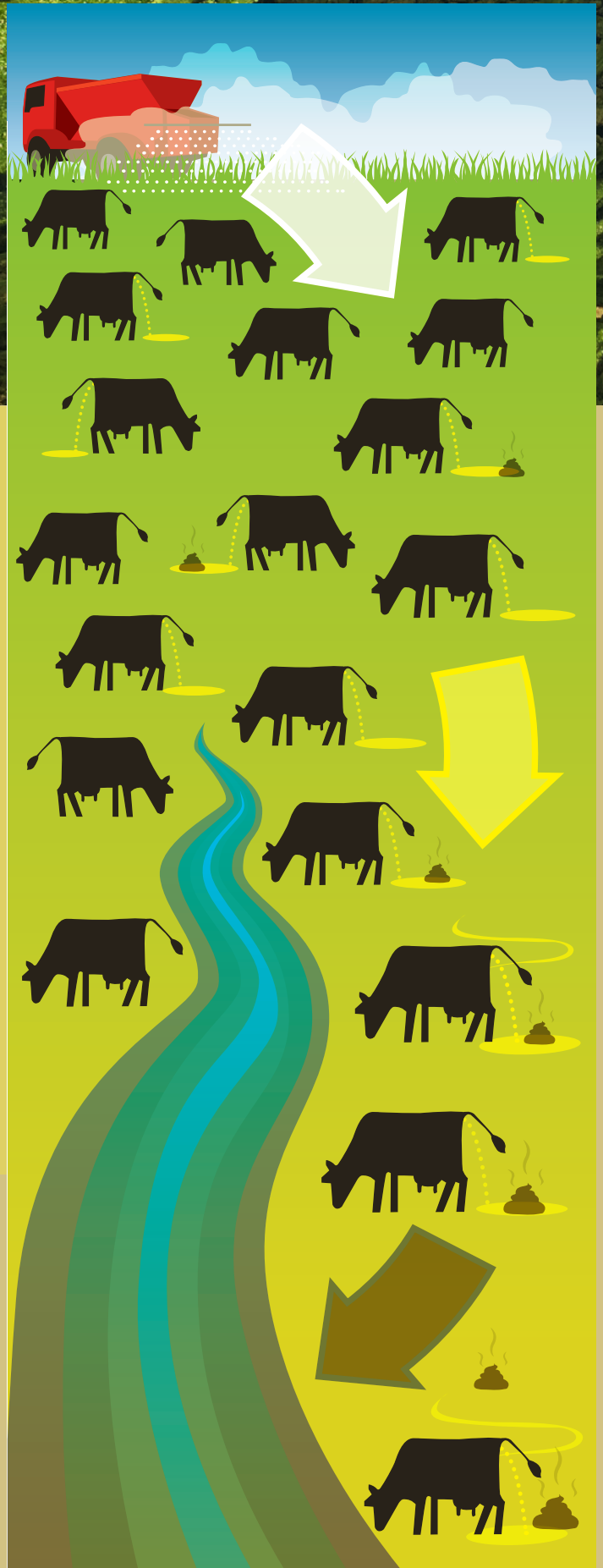
DIRTY RIVERS AND CONTAMINATED WATER

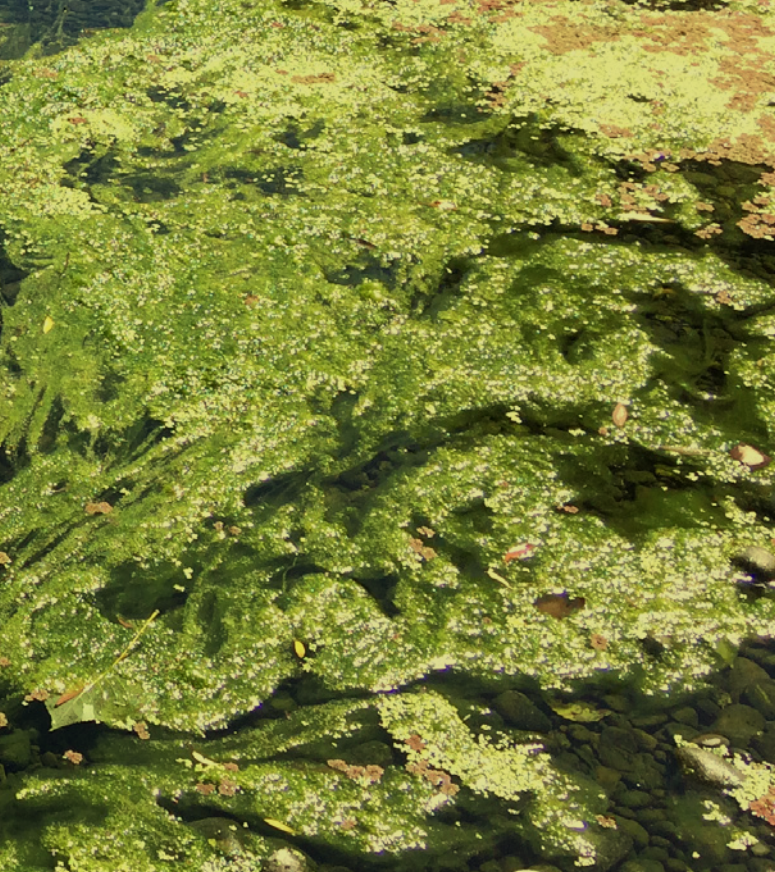
New Zealand's freshwater crisis

- More than two thirds of monitored rivers are unswimmable.¹²
- Nitrate pollution is getting worse in over half of NZ's monitored rivers.¹³
- 72% of native freshwater fish are threatened with extinction.¹⁴
- 44% of monitored lakes are in heavily polluted (eutrophic) states.¹⁵

New Zealand's once clean rivers and lakes are increasingly polluted. Our once-safe drinking water is becoming contaminated. Entire freshwater ecosystems are being pushed past breaking point. We are on the brink of losing native freshwater species forever.

One of the worst freshwater pollutants is nitrogen. When it gets into rivers and lakes it can cause algal blooms which can suck all the oxygen out of the water, suffocating fish and other species.¹⁶





OUR PLANET ON THE EDGE

Scientists have identified the 9 'safe planetary boundaries' as the set of ecological limits within which we must stay for the planet to continue sustaining human life. They include things like climate change, freshwater use and ocean acidification.

One of these planetary boundaries is the nitrogen cycle. It is one of only two of the boundaries that have been breached.²¹

Synthetic nitrogen fertiliser is the single largest cause of this breach.²²

Increasing the number of cows through synthetic fertiliser increases the amount of nitrogen pollution that leaches into rivers from cow urine. On top of that, the nitrogen from the fertiliser itself can directly runoff into waterways. Nitrogen usually leaches and runs off in its highly soluble chemical form, nitrate.

“Between 1990-2012, the estimated amount of nitrogen that leached into soil from agriculture increased 29%. This was mainly due to increases in dairy cattle numbers (& therefore urine which contains nitrogen) & nitrogen fertiliser use”

Ministry for the Environment¹⁷

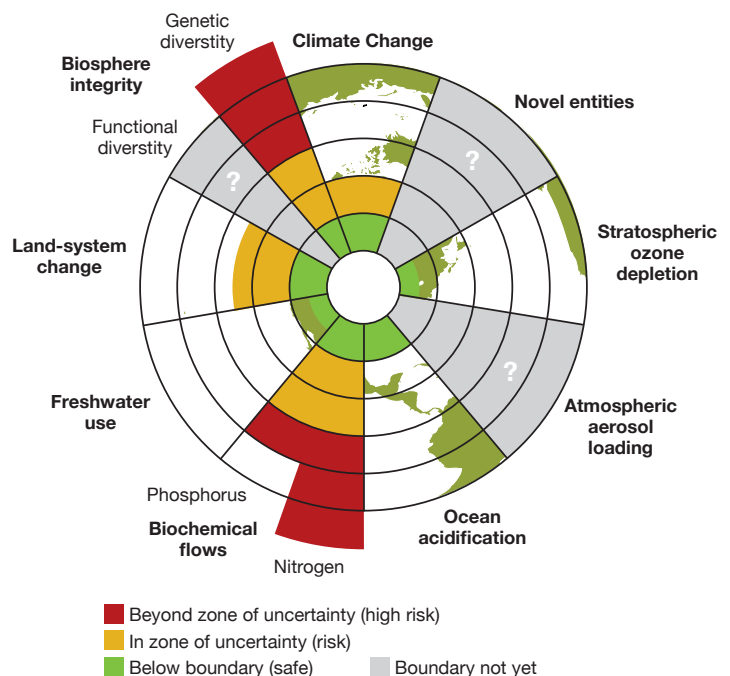
Dairy cows are now the biggest nitrogen polluter into NZ's waterways with direct synthetic nitrogen fertiliser pollution coming in as the third biggest.¹⁸

In high concentrations, nitrate also renders water unsafe for drinking. Over half (53%) of NZ's drinking water comes from groundwater.¹⁹ There are already monitored groundwater sites (not currently used for drinking water) where nitrate concentrations breach human health standards, in many regions of NZ.²⁰

“The nitrogen cycle has been altered more than any other basic element cycle”

Professor John Aber.²³

SAFE PLANETARY BOUNDARIES²⁴



The impacts of the nitrogen cycle breach are many and are already being seen around the world. They include; the rapid growth in nitrous oxide emissions, freshwater pollution, ozone depletion, acid rain, oceanic dead zones, loss of potable drinking water and human illnesses.²⁵

Scientists say it is critical that we urgently reduce the amount of nitrogen in the environment.

REGENERATIVE FARMING - THE WAY FORWARD

There are a growing number of studies proving that it's possible to farm without synthetic nitrogen, still turn a profit and grow enough food to feed the world.

- A ten year study by DairyNZ compared a farm with no synthetic nitrogen application and a farm using 181/kg/ha/yr of urea. The study **“confirmed that profitable milk production systems can be achieved without N fertiliser applications”**.²⁶

Regenerative farming is a way of growing food that works with nature. Not against it.

Industrial agriculture treats a farm like a factory. It uses huge amounts of ‘inputs’ - which are the ingredients, brought onto the farm and used to grow both food and pollution. Synthetic nitrogen is the most widely used input. Pesticides, livestock feed and irrigation are a few of the others.

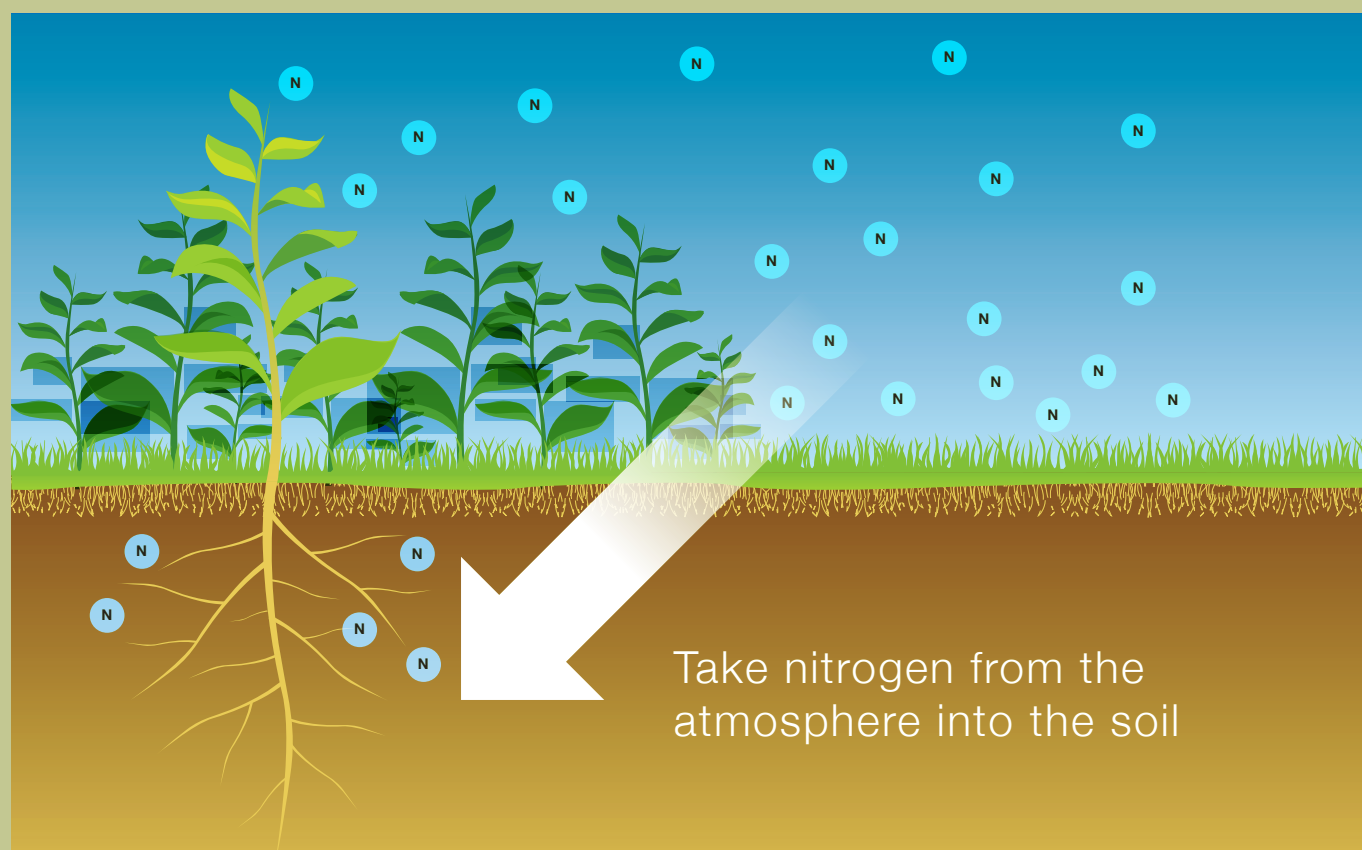
Instead of treating a farm like a factory, regenerative farming treats a farm like an ecosystem. It abandons industrial agriculture's damaging inputs, and replaces them with innovative practices.

Instead of using synthetic nitrogen regenerative farmers use nitrogen fixing plants and put their effort into building healthy soil, naturally. They farm a diverse mix of crop and animal varieties, and use methods like cover cropping, inter-cropping, agro-forestry, no-till and many more.

Regen-farming has been proven to be able to sequester carbon rather than emit it, purify water rather than pollute it, rebuild biodiversity rather than diminish it, and build healthy soil rather than degrade it.

There are some farmers in New Zealand who are already farming regeneratively. These farms and the innovative practices they use offer a genuine solution to the environmental crises we face.

To mainstream this revolutionary way of farming the government needs to hugely increase support, subsidies and investment in regenerative agriculture.



Bacteria convert or “fix” the nitrogen from the atmosphere into a form that certain “nitrogen-fixing” plants can use. Then, when those plants decompose or are eaten and excreted by animals the nitrogen is distributed and used by other plants that can’t fix nitrogen for themselves.



Feeding the world without synthetic nitrogen fertiliser

Studies have proven that regenerative farming methods can replace synthetic nitrogen fertiliser without reducing the amount of food produced.

- A global meta-analysis found that using nitrogen fixing plants like clover and lucerne can provide enough biologically fixed nitrogen to replace the entire amount of synthetic nitrogen fertiliser currently in use, **without reducing the amount of food produced.**²⁷
- Another study found that a farm can do away with 100 kg of nitrogen fertiliser (per hectare) by simply increasing the varieties of pasture crops used in the field from 1 to 16 species, and **still produce the same amount of food.**

ENDNOTES

- 1 Ministry for the Environment 2017: Environmental Reporting Series; Livestock numbers http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/livestock-numbers.aspx
- 2 Ministry for the Environment 2017: New Zealand's Greenhouse Gas Inventory 1990-2016, Snapshot.
- 3 OECD 2008 Environment Performance of Agriculture in OECD countries.
- 4 Statistics NZ 2017 Agricultural Census Tables <https://www.stats.govt.nz/information-releases/agricultural-production-statistics-june-2017-final-note> The NZ Government does not specifically measure all the use of all synthetic N fertilisers, only Urea.
- 5 Ibid.
- 6 Ballance Agri-Nutrients 2017: Submission on New Zealand Productivity Commissions Low Emissions economy.
- 7 IPCC 2018 Intergovernmental Panel on Climate Change, Special Report.
- 8 Ministry for the Environment 2017: New Zealand's Greenhouse Gas Inventory 1990-2016, Snapshot.
- 9 Intergovernmental Panel on Climate Change 2014 Climate Change Synthesis Report AR5 https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf
- 10 Ibid.
- 11 Parliamentary Commissioner for the Environment 2016: Climate change and agriculture: Understanding the biological greenhouse gases.
- 12 NIWA (2017)) Technical Background for 2017 MfE 'Clean Water' Swimmability Proposals for Rivers.
- 13 Ministry for the Environment & Stats NZ 2017: New Zealand's Environmental Reporting Series: Our fresh water 2017.
- 14 Ibid.
- 15 Schallenberg, M., de Winton, M.D., Verburg, P., Kelly, D.J., Hamill, K.D. and Hamilton, D.P., 2013. Ecosystem services of lakes. Ecosystem services in New Zealand: conditions and trends. Manaaki Whenua Press, Lincoln, pp.203-225.
- 16 Ministry for the Environment & Stats NZ 2015: New Zealand's Environmental reporting series : Environment Aotearoa 2015.
- 17 Ibid.
- 18 Ministry for the Environment & Stats NZ 2017: New Zealand's Environmental reporting series : Freshwater and nitrogen leaching. http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Fresh%20water/nitrogen-leaching-agriculture.aspx
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- 21 Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F.S., Lambin, E., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H.J. and Nykvist, B., 2009. Planetary boundaries: exploring the safe operating space for humanity. Ecology and society, 14(2).
- 22 Ibid.
- 23 Fields, S., 2004. Global nitrogen: cycling out of control. Environmental Health Perspectives, 112(10),
- 24 Planetary boundaries showing changes that are shifting Earth into a 'new state' that is becoming less hospitable to human life, as updated by the newest research published in Science in 2015. Pollution with nitrogen and phosphorus fertilisers, together with Biosphere integrity (Biodiversity) are the two planetary boundaries under the high-risk zone for disruption for life on Earth (Steffen et al., 2015). The 'novel entities' boundary refers to 'new substances, new forms of existing substances, and modified life forms that have the potential for unwanted geophysical and/or biological effects' (eg. microplastics, nanoparticles or genetically engineered organisms) (refs. 68-71, Steffen et al., 2015)
- 25 Ibid.
- 26 Glassey, C.B., Roach, C.G., Lee, J.M. and Clark, D.A., 2013. The impact of farming without nitrogen fertiliser for ten years on pasture yield and composition, milksolids production and profitability; a research farmlet comparison. In Proceedings of the New Zealand Grasslands Association (Vol. 75, pp. 71-78).
- 27 Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M., Avilés-Vázquez, K, Perfecto, I. 2007: Organic agriculture and the global food supply. Renewable Agriculture and Food Systems, 22(2), 86-108.



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