

# The New Zealand Sheep & Beef Sector's Contribution to Biodiversity & Carbon Sequestration

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NEW ZEALAND'S  
BIOLOGICAL  
HERITAGE

Ngā Koiora  
Tuku Iho

National  
**SCIENCE**  
Challenges



**AUT**

**UC**  
UNIVERSITY OF  
CANTERBURY  
*Te Whare Wānanga o Waitaha*  
CHRISTCHURCH NEW ZEALAND



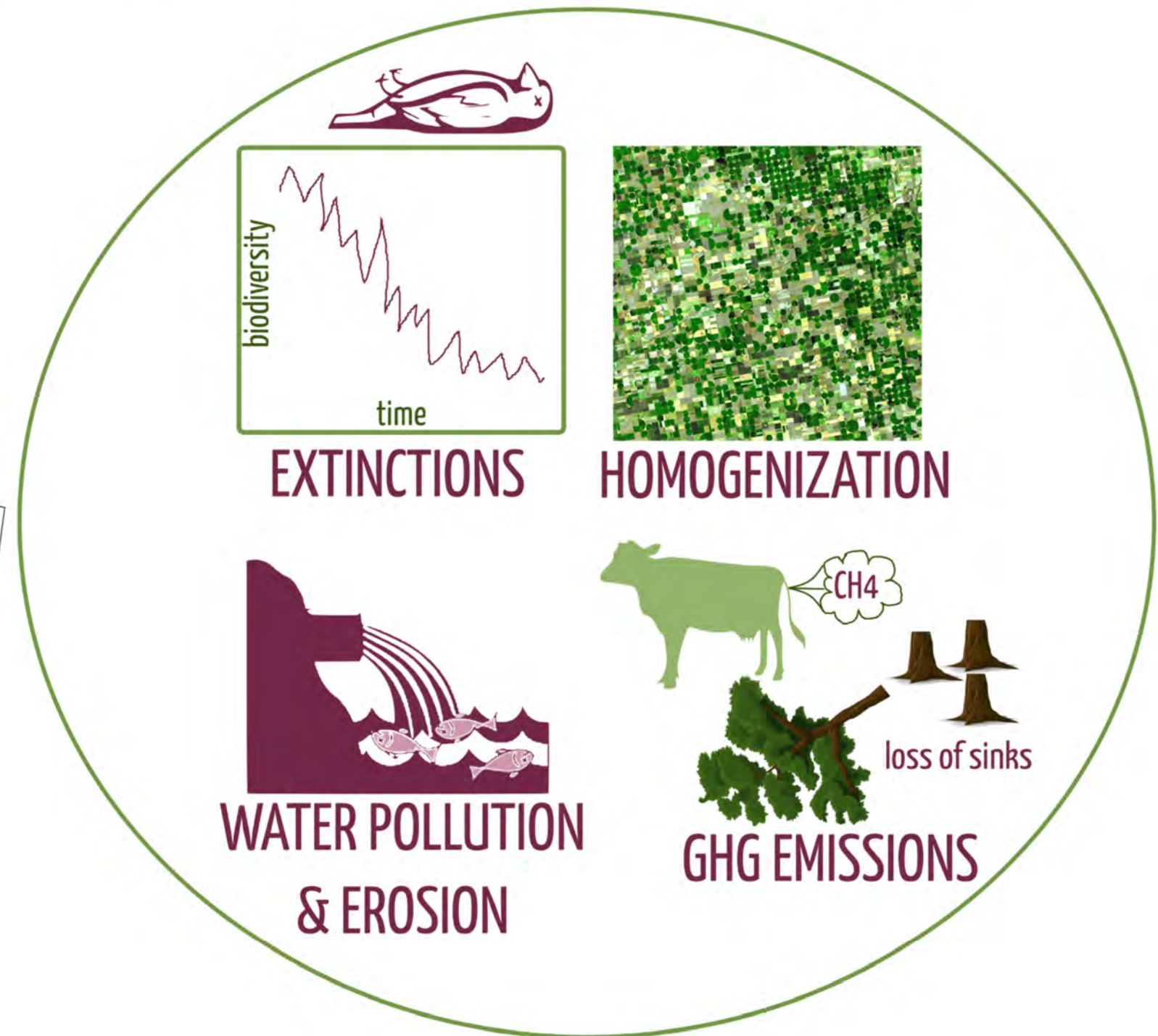
# Links between food production & ecosystem health



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DEGRADED ECOSYSTEMS



# Ecosystem health affects human health

- Loss of pollinators & nutrient cycling → yield reduction, famine





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- Nutrient runoff → e. coli, bowel cancer, algal blooms

The image shows two overlapping news article screenshots. The top article is from 'Bees' and is titled 'Widespread losses of pollinating insects revealed across Britain'. Below it is an article from 'RNZ' titled 'Nitrate in our water linked to bowel cancer'. The RNZ article includes a sub-headline 'Europe set to suffer as climate change brings mosquito threat' and a sub-headline 'Millions more people could be exposed to mosquito-borne disease in coming years amid global warming, experts'. The RNZ article also features a 'Listen 14:28' button and a 'Download' button. The text of the RNZ article states: 'New Zealand has one of the highest rates of bowel cancer in the world and a recent study has found there's a link between nitrate in water and the risk of developing this cancer. In some areas around the country, nitrate levels in the water are higher than what is recommended in the study. So the obvious question is, could drinking it be contributing to our high bowel cancer numbers? That's what Victoria University's Mike Joy and Otago University's Michael Baker have been looking'.



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- Loss of pollinators & nutrient cycling → yield reduction, famine
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- Nutrient runoff → e. coli, bowel cancer, algal blooms
- Loss of species & landscapes → cultural heritage, kaitiakitanga, mental health

The collage features several news articles:

- Bees:** "Widespread losses of pollinating insects revealed across Britain" by Damian Carrington, Environment editor. Published Tue 26 Mar 2019 16:00 GMT.
- NEWS / HEALTH:** "Europe set to suffer as climate change brings mosquito threat". Subtext: "Millions more people could be exposed to mosquito-borne disease in coming years amid global warming, experts".
- RNZ:** "Nitrate in our water linked to bowel cancer". From "Afternoons with Jesse Mulligan". Published 1:14 pm on 28 January 2019.
- PLANT POWER:** "STUDY: GROWING UP AROUND GREEN SPACE HALVES MENTAL HEALTH RISK".

The "Growing Up Green" article text includes:

**Growing Up Green**

We already knew that a city's green space — its parks, sports fields, and other "green" areas — played an important role in the physical and mental health of its citizens.

Now, researchers from Denmark's Aarhus University have found that the amount of green space surrounding a person while they're growing up might impact their mental health as an adult — an important revelation in a rapidly urbanizing world.

**Risk Factors**

In a study published Monday in the journal *PNAS*, the researchers detail how they used satellite data collected between 1985 to 2013 to



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Trees can help!



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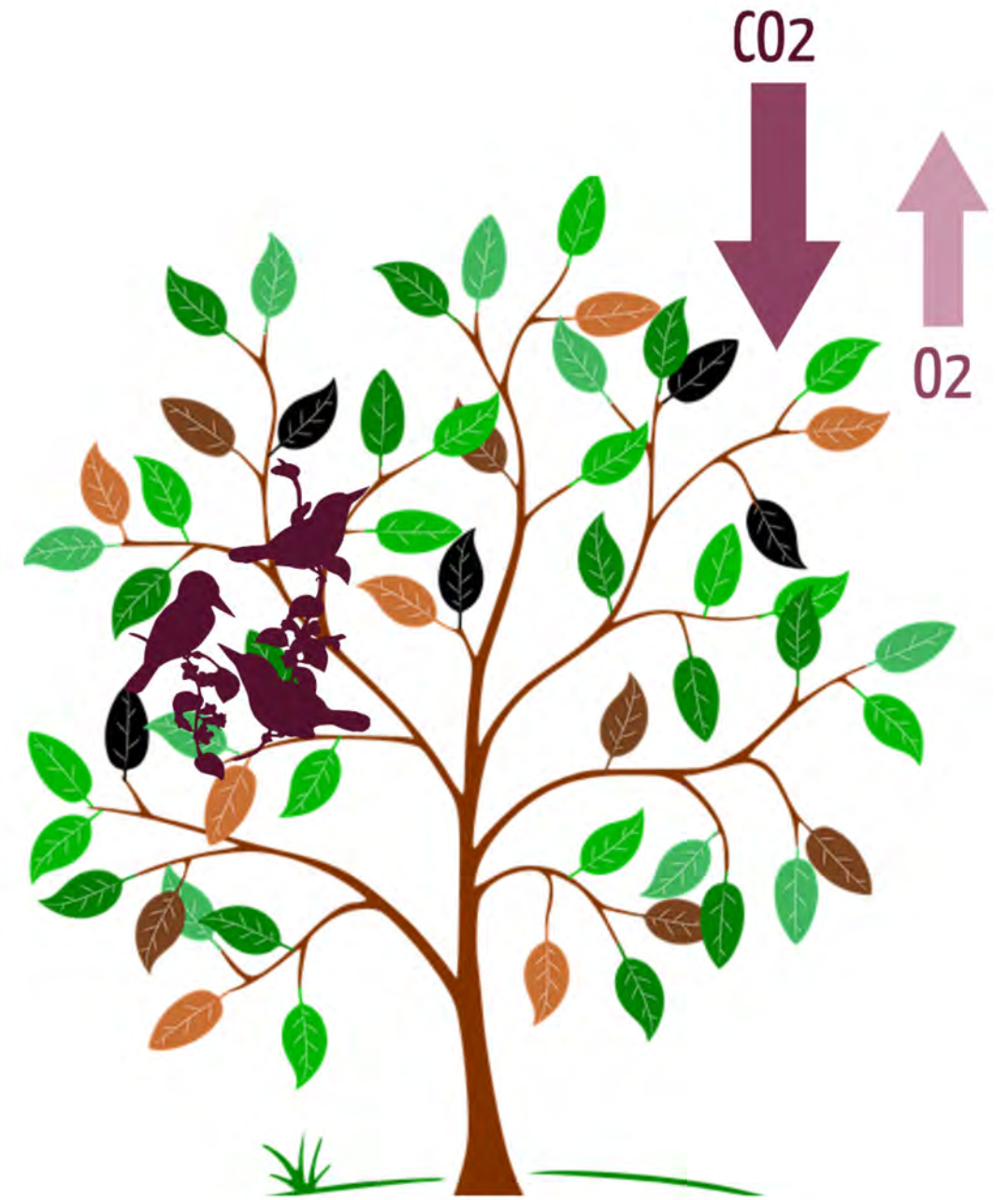
# Trees can help!

- Habitat for native & beneficial species



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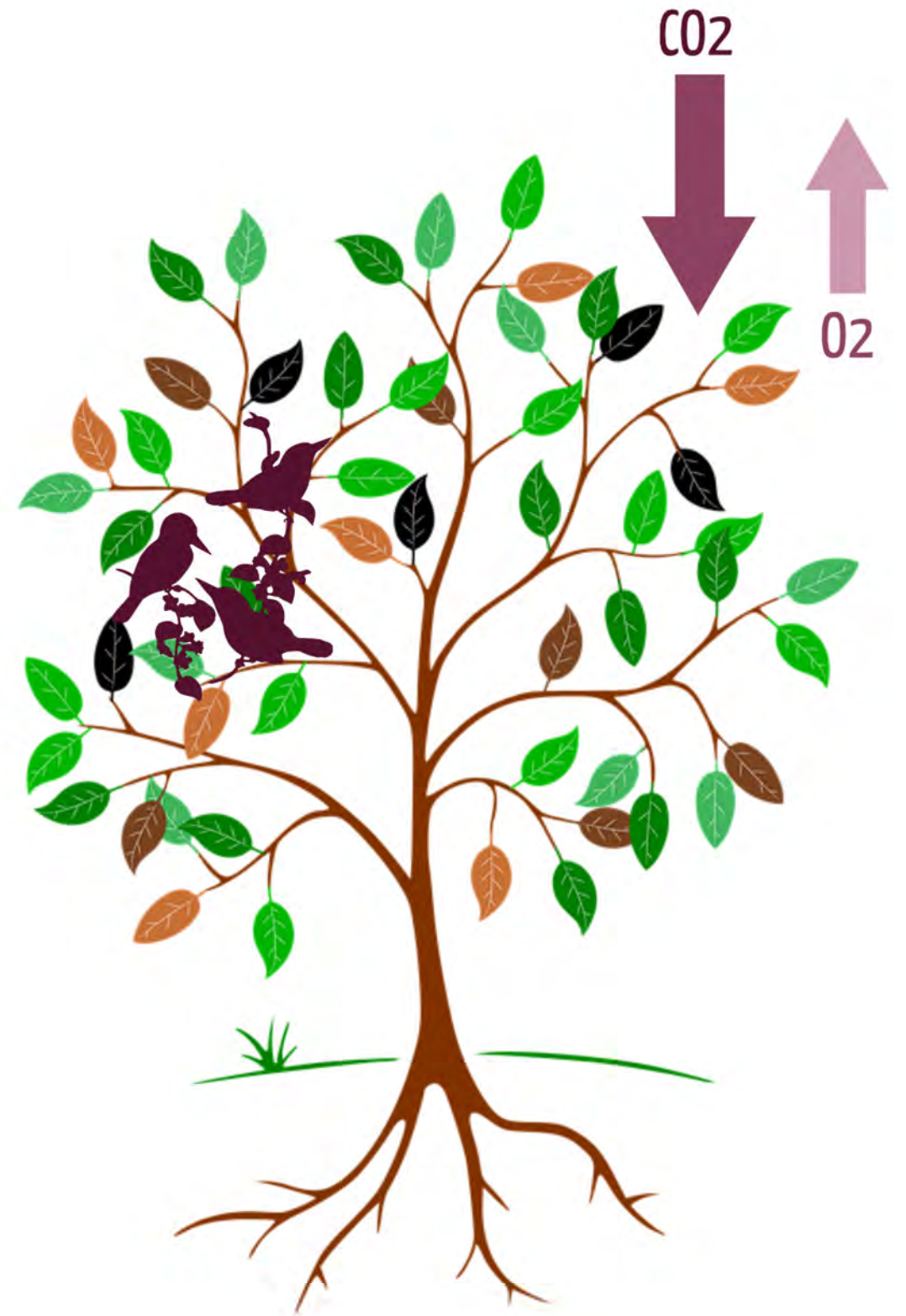
- Habitat for native & beneficial species
- Carbon uptake





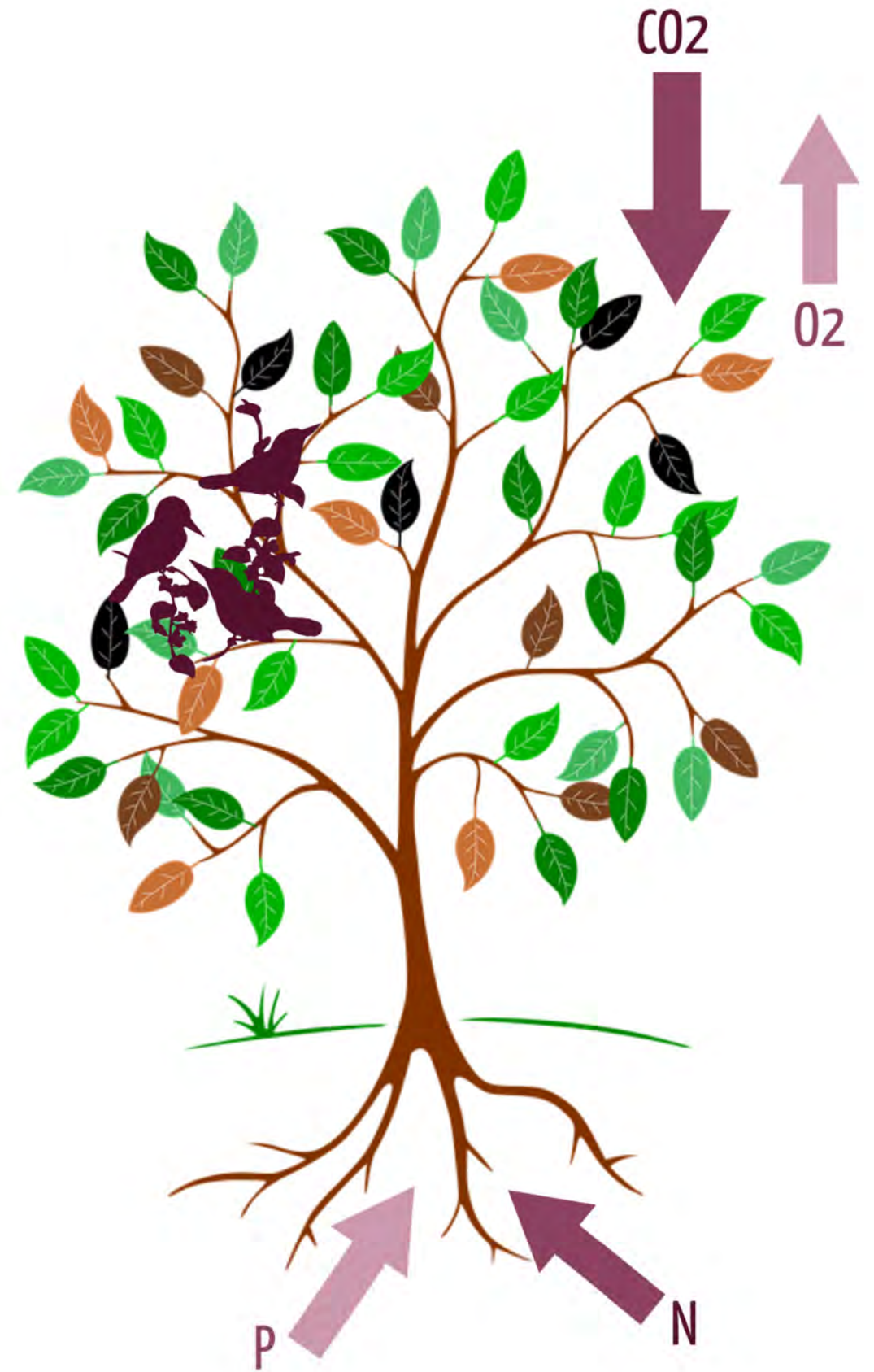
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- Stabilize soil, reduce runoff, improve water use efficiency



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- Habitat for native & beneficial species
- Carbon uptake
- Stabilize soil, reduce runoff, improve water use efficiency
- Phosphorous and nitrogen uptake (species dependent)
- Cultural & mental health benefits

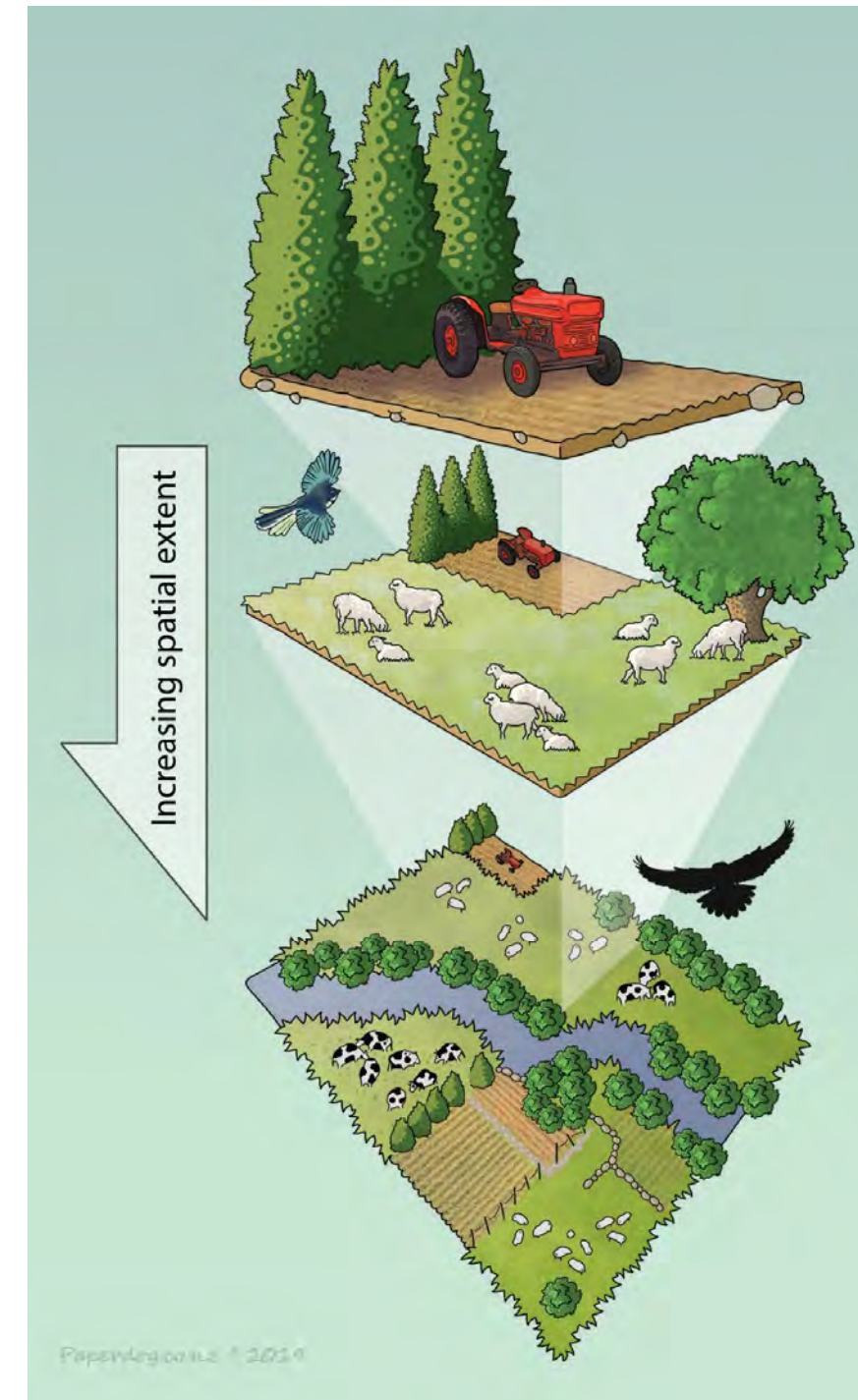






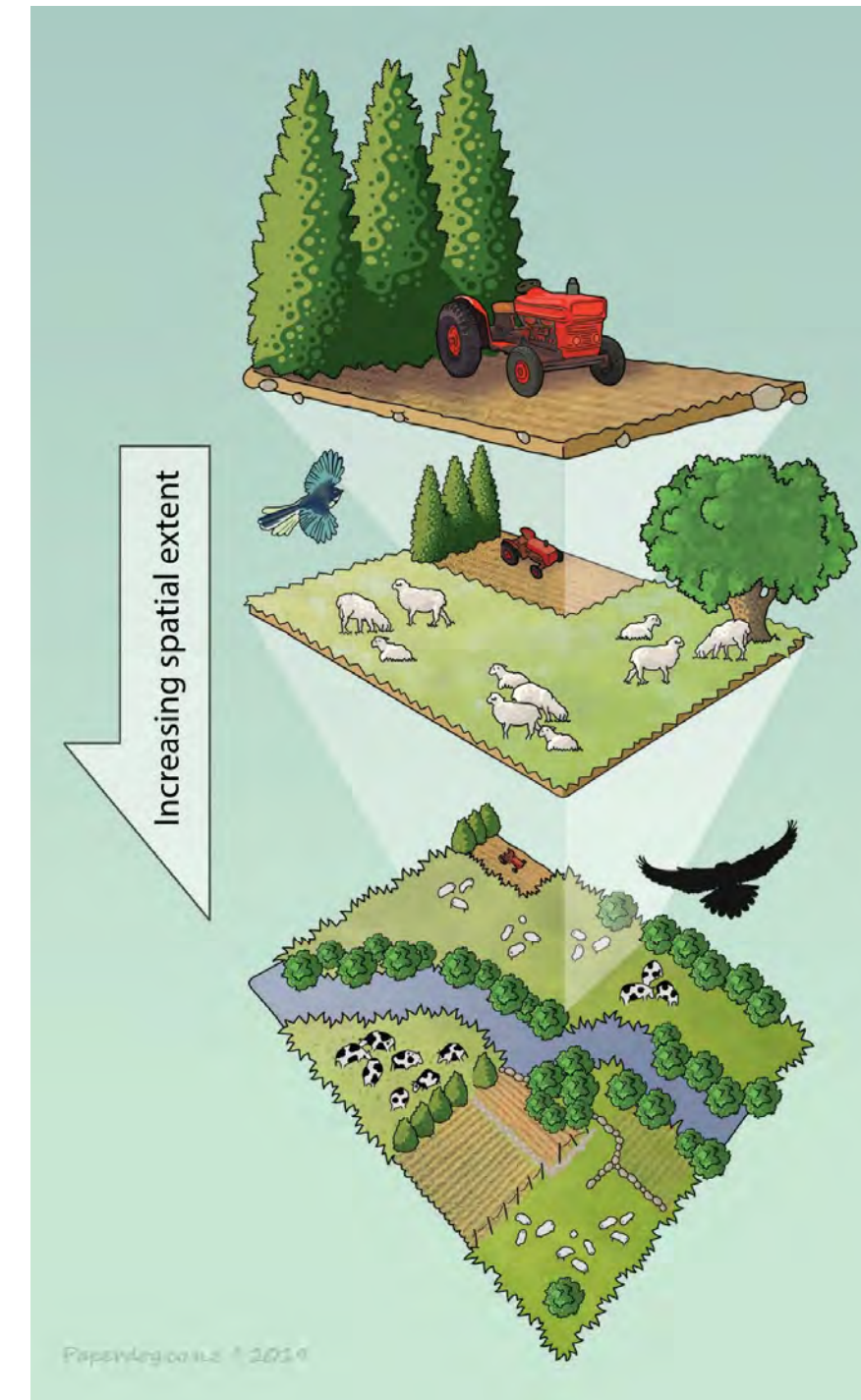
# One (part of) solution: multifunctional landscapes

- Land needed for food production
- Balance restoration and healthy ecosystems



# One (part of) solution: multifunctional landscapes

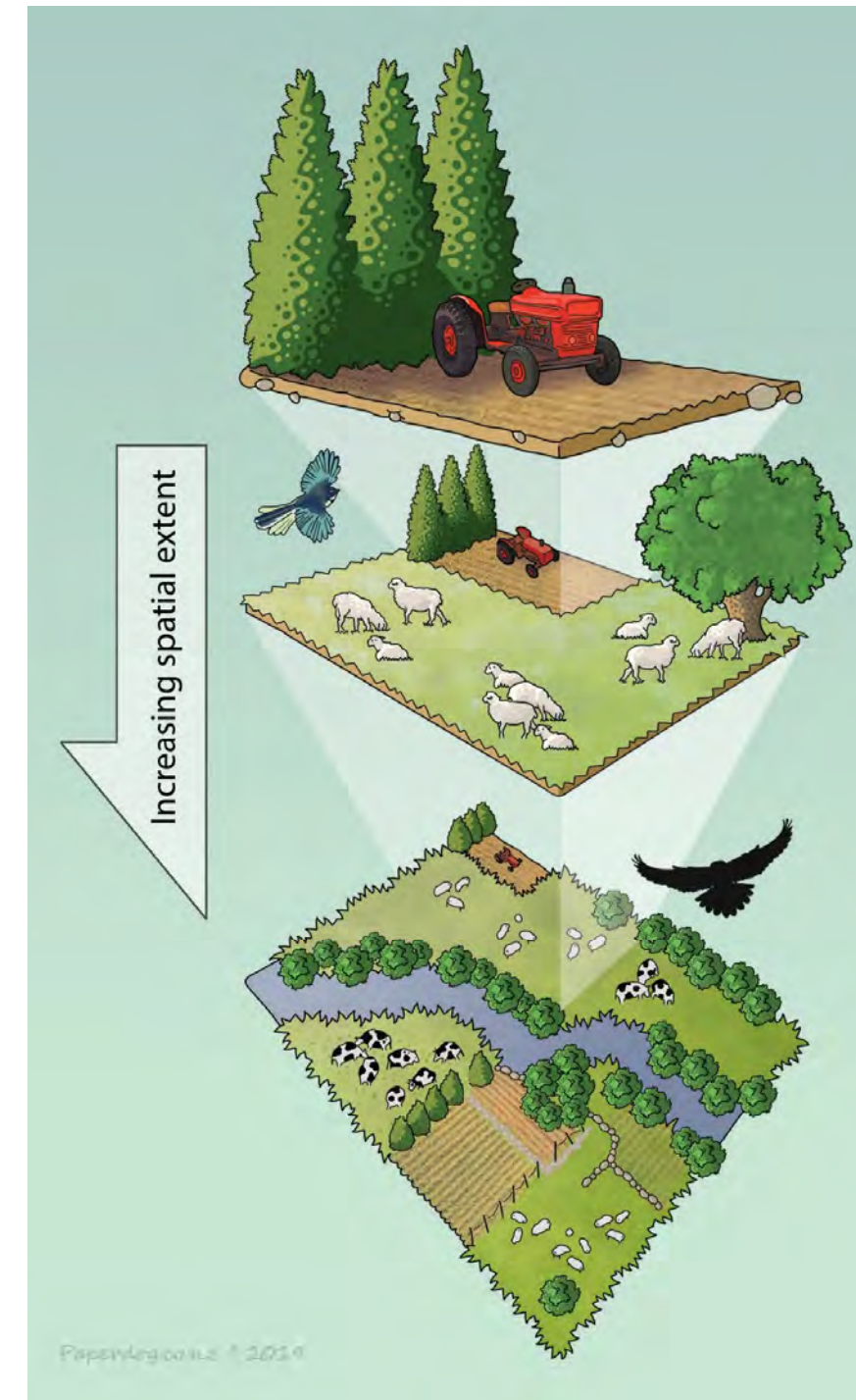
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- Many farms contain woody vegetation, e.g. small patches of native forest





# One (part of) solution: multifunctional landscapes

- Land needed for food production
- Balance restoration and healthy ecosystems
- Many farms contain woody vegetation, e.g. small patches of native forest
- Retain, restore, grow – while maintaining production.



# Native vegetation in NZ sheep & beef farms

- Topography, extensive grazing & history = some forest retained





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# Native vegetation in NZ sheep & beef farms

- Topography, extensive grazing & history = some forest retained
- We don't know how much vegetation is there
- Doesn't count towards carbon credits = little incentive to retain it

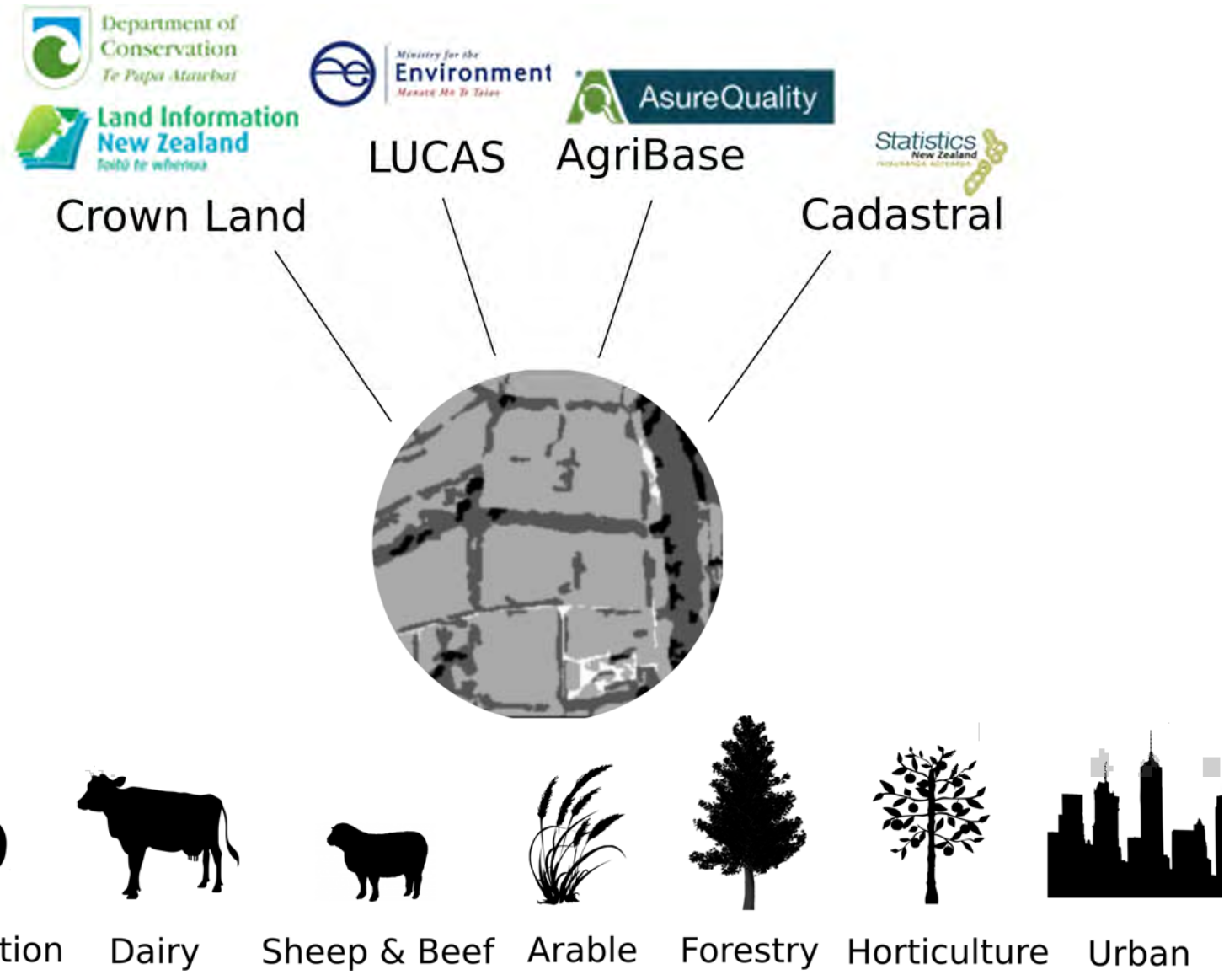




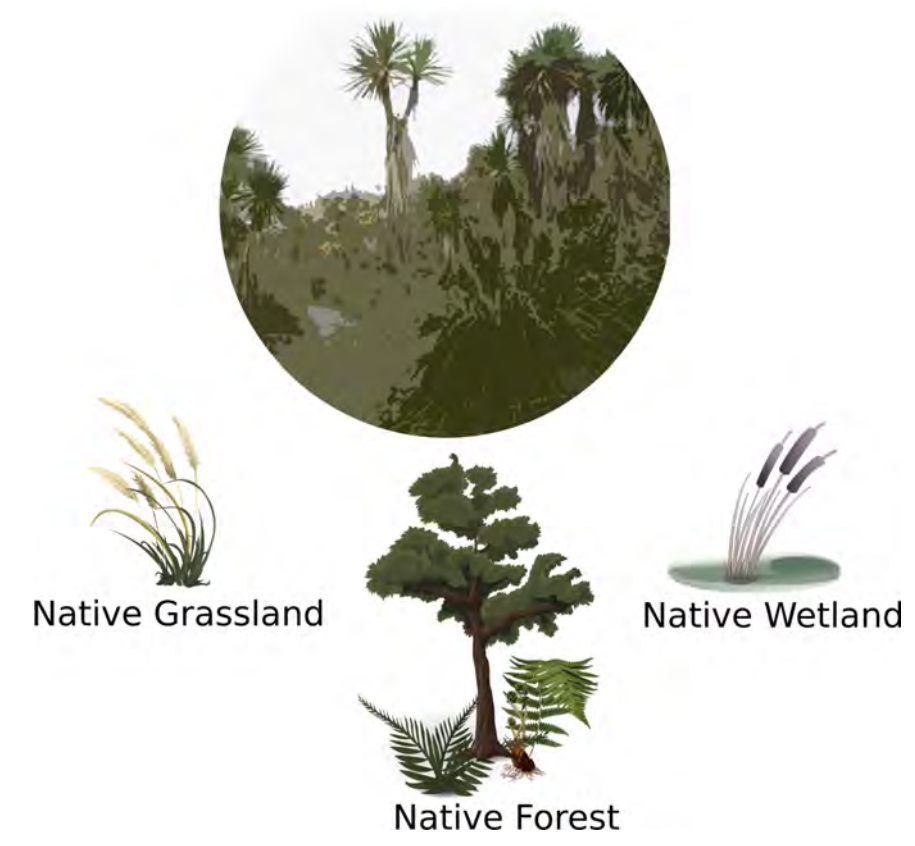
# What's the area of native vegetation by land use?

Define Land use:

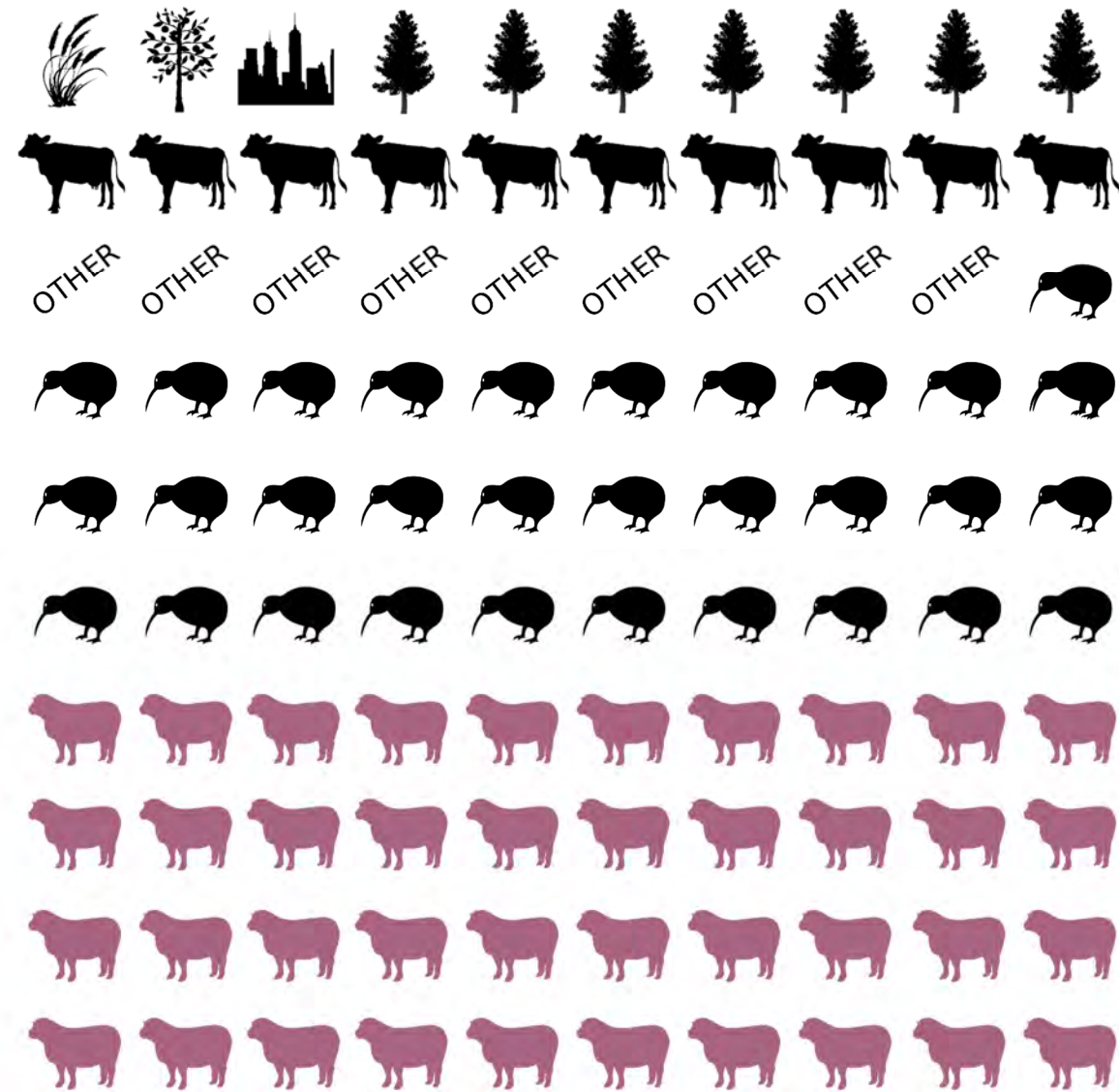
Define vegetation:



LANDCARE RESEARCH  
MANAAKI WHENUA  
Land Cover Database



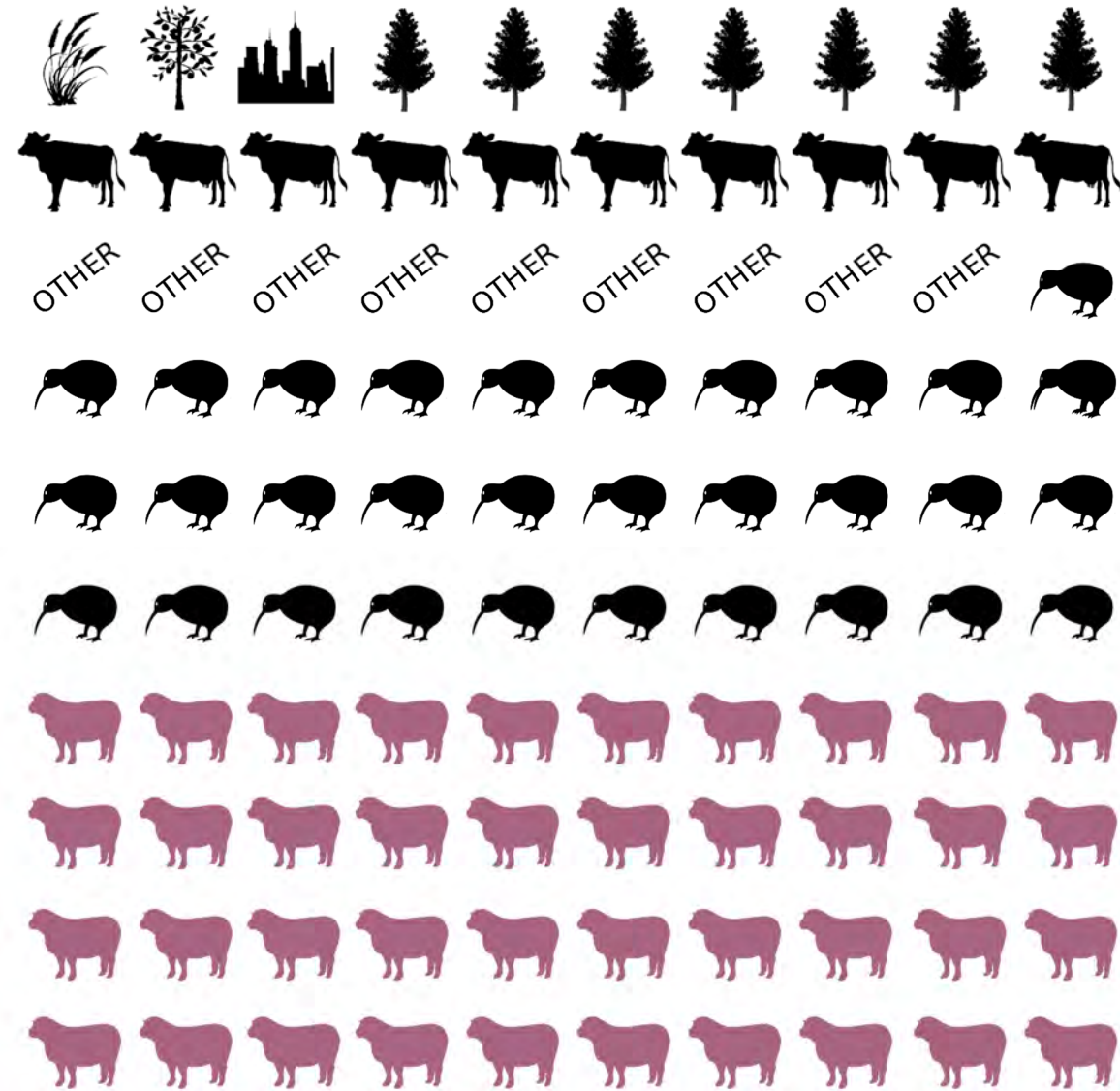
# 40% of NZ is sheep & beef farming



←  
31% Conservation  
10% Dairy  
7% Forestry



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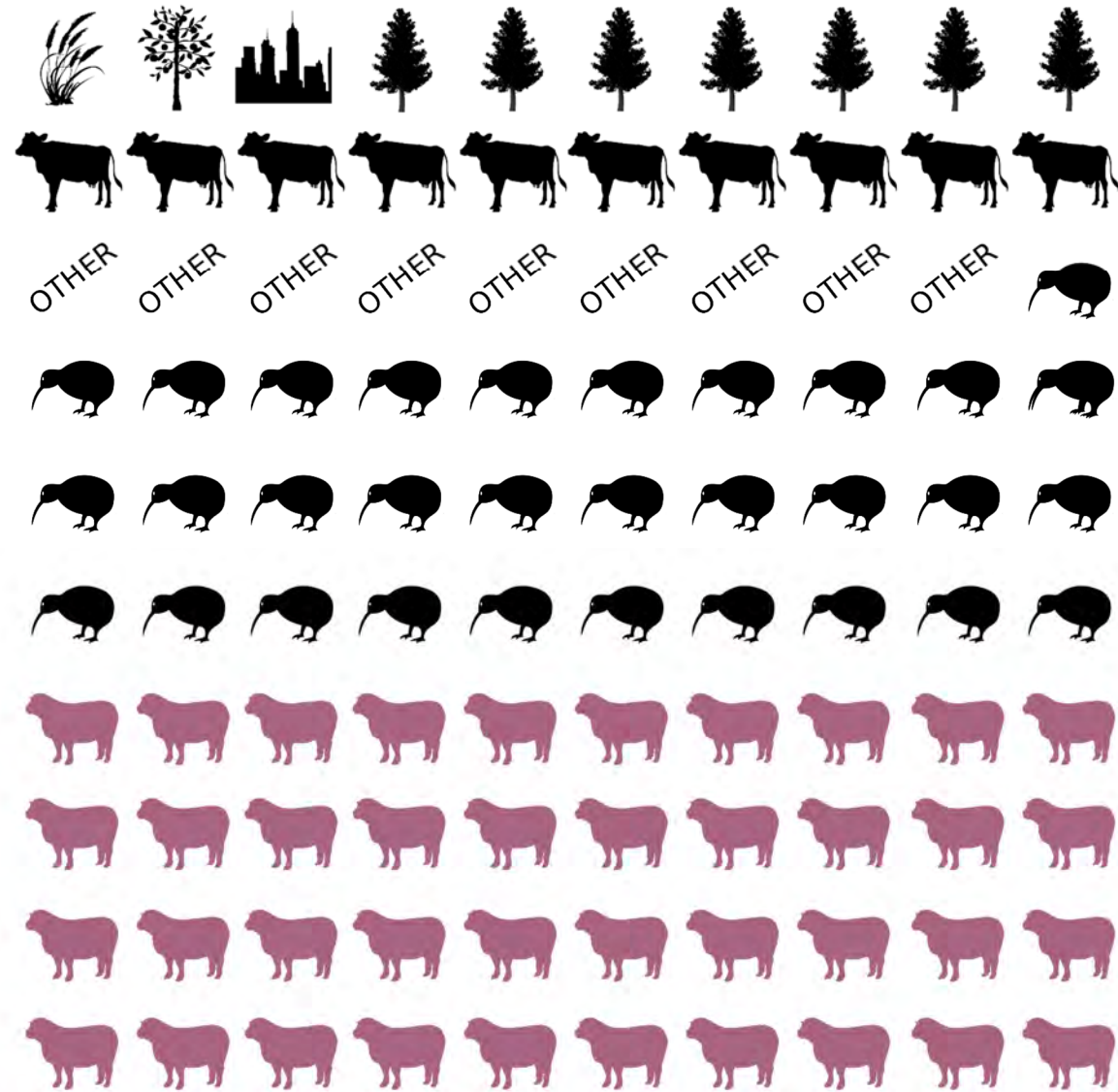
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Nationwide,  
the area covered by  
native vegetation equals  
**11 million** ha



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- That's 43% of NZ (over 13 million rugby fields)

- 71% is forest

- 24% is grassland

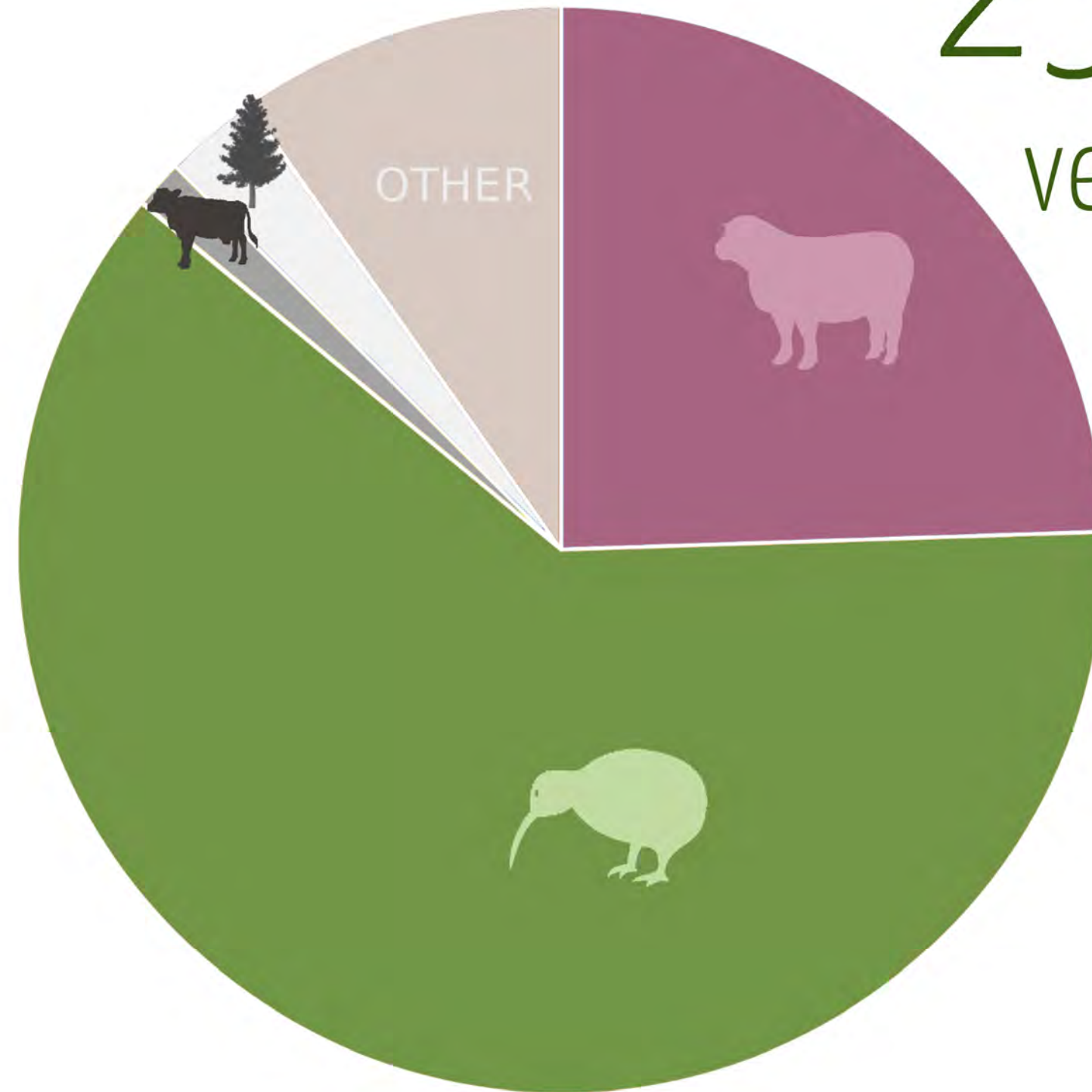
- 5% is wetland



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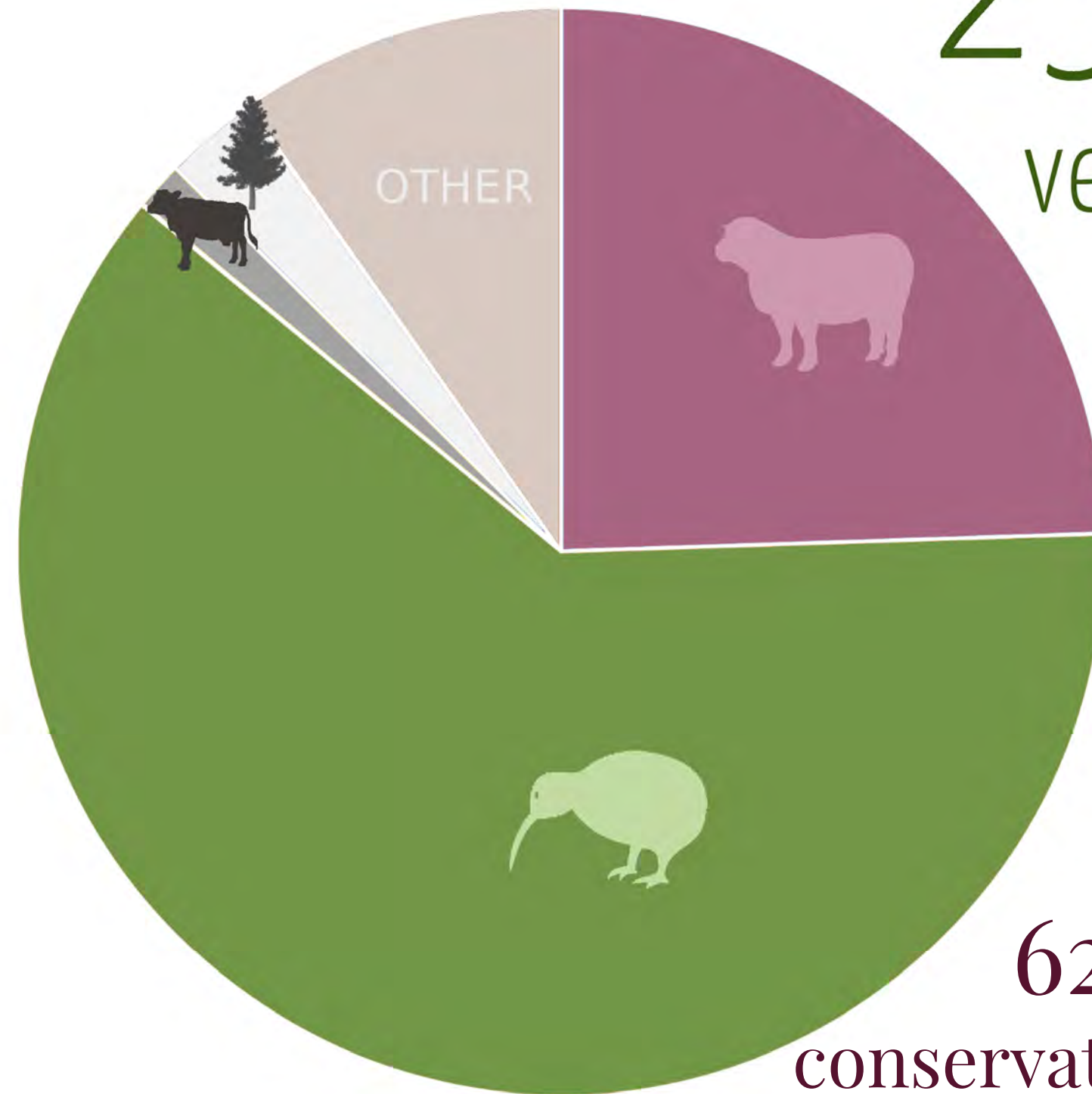


25% of native  
vegetation found  
on S&B farms  
(that's 2.8 million ha)



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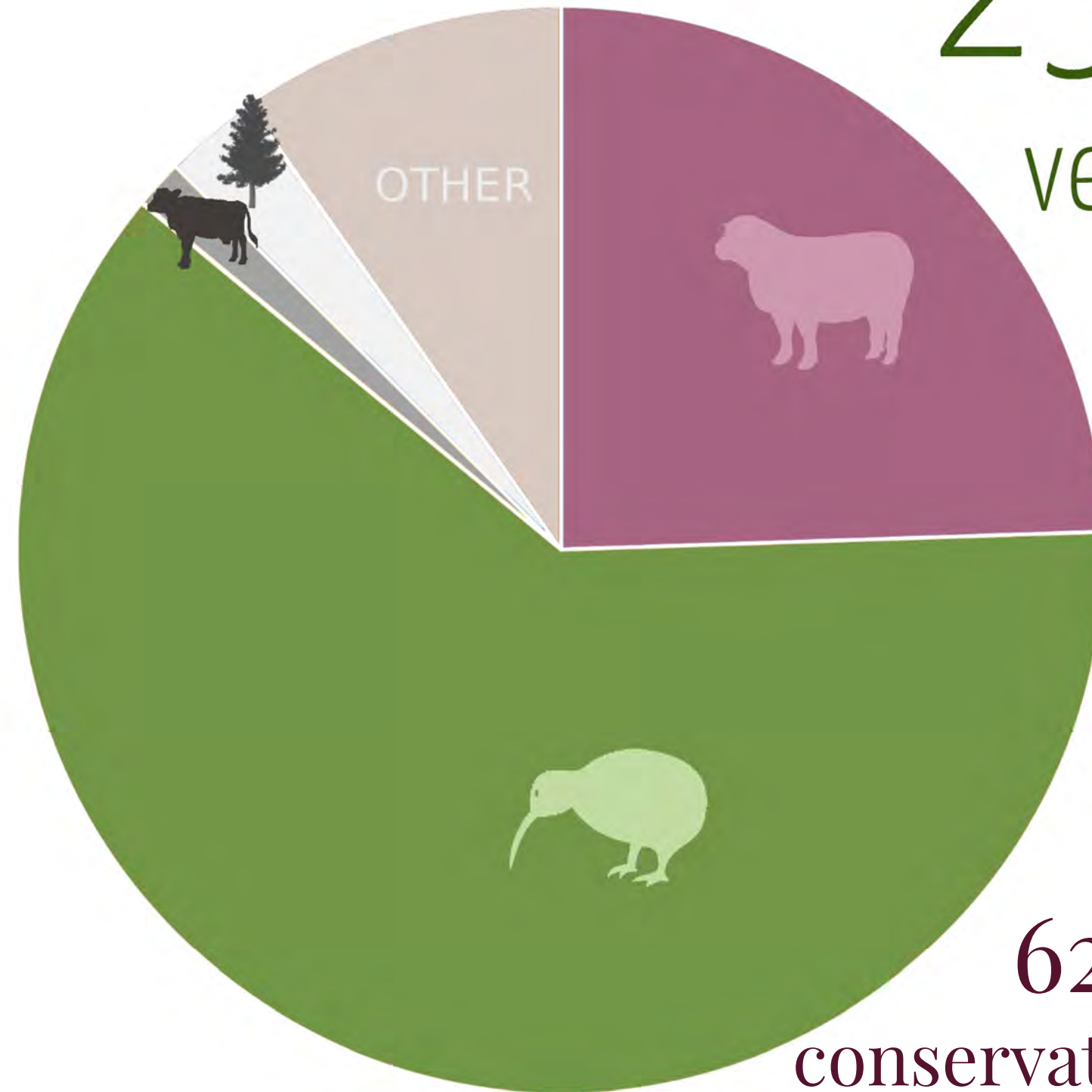
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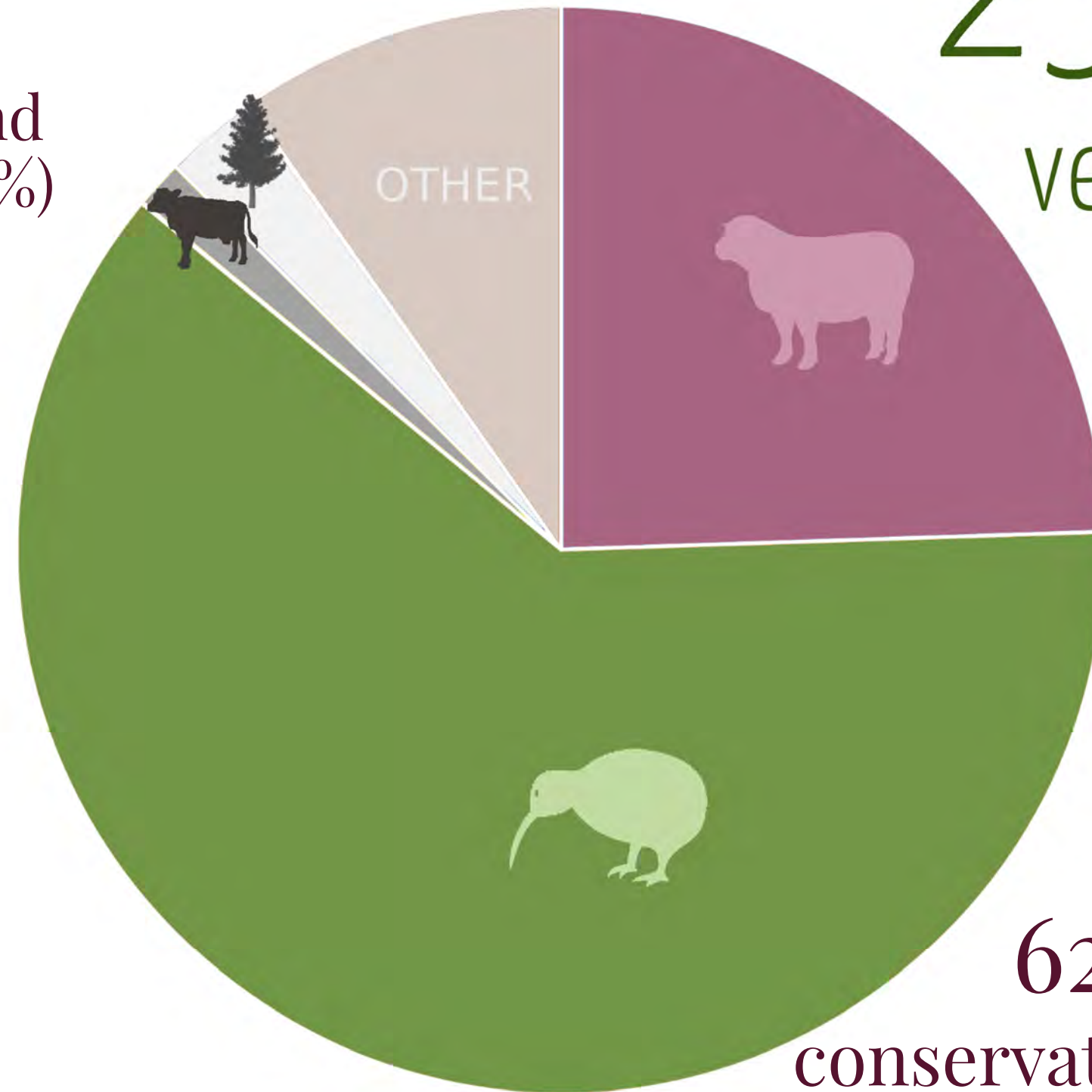


62% is on  
conservation land



Other makes up 10%  
(lifestyle blocks, non-crown reserves)

A little is found  
on forestry (3%)  
& dairy (1%)



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62% is on  
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An aerial photograph of a lush green landscape. In the foreground, a grassy hillside slopes down from the left. A wooden fence runs across the middle ground, with three people standing near it. To the right, a valley contains a cluster of trees, some with bare branches and others with green foliage. In the background, more rolling green hills are visible under a clear sky, with a power line tower on the far left.

17% of native forest is on S&B farms

- Also 45% of native grassland (habitat for invertebrates, reptiles, some birds)
- Half the native vegetation on S&B farms is woody

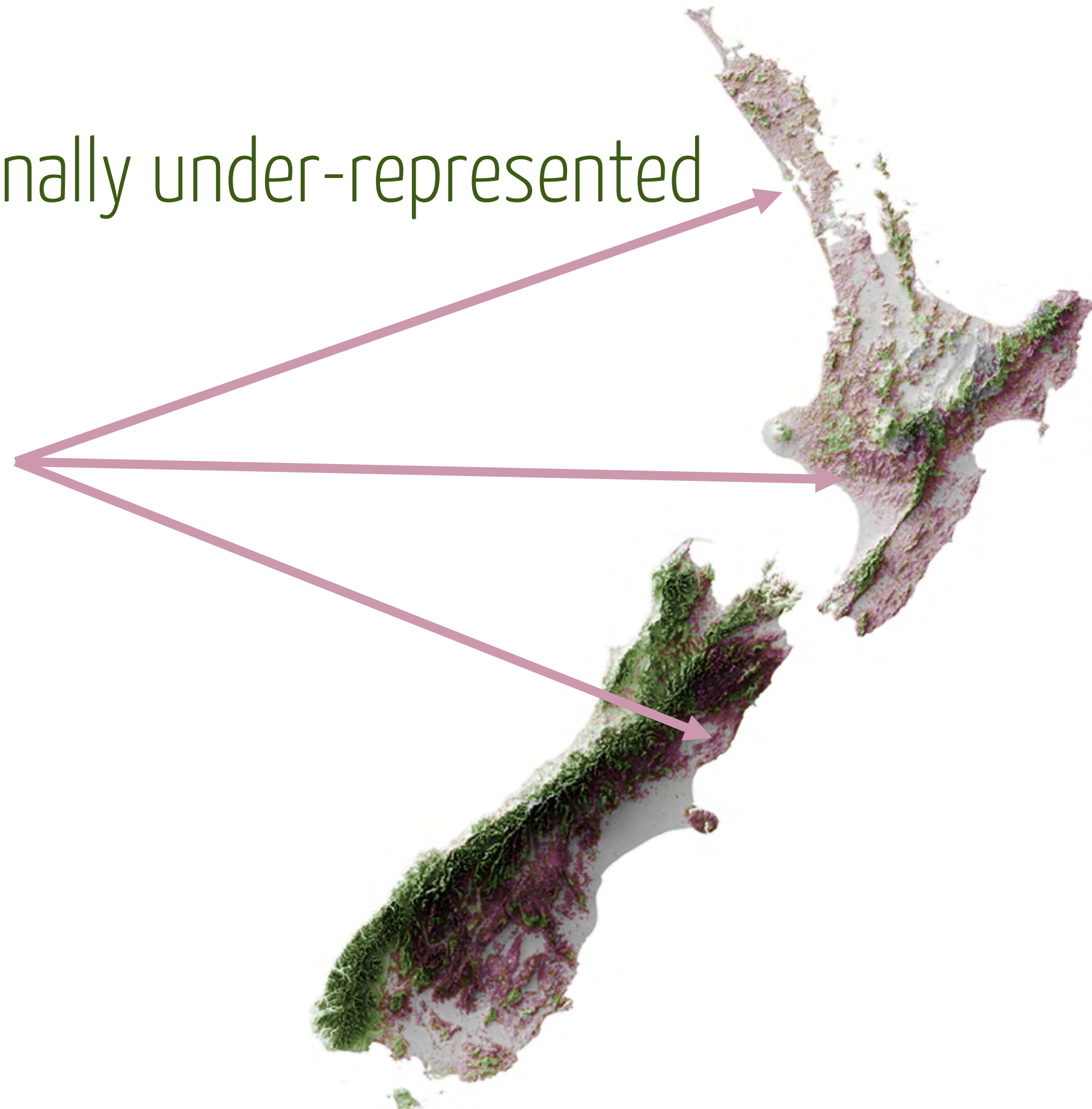


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# Forests on S&B are nationally under-represented

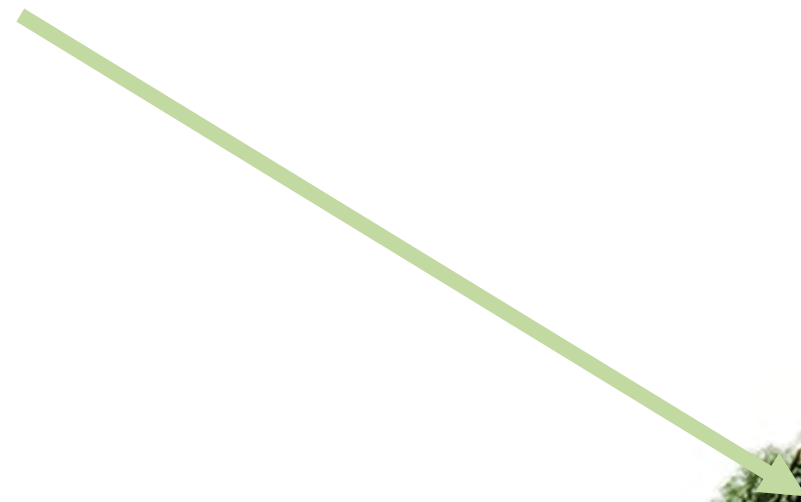
In heavily deforested areas  
e.g. lowlands the little forest  
that remains is on S&B farms





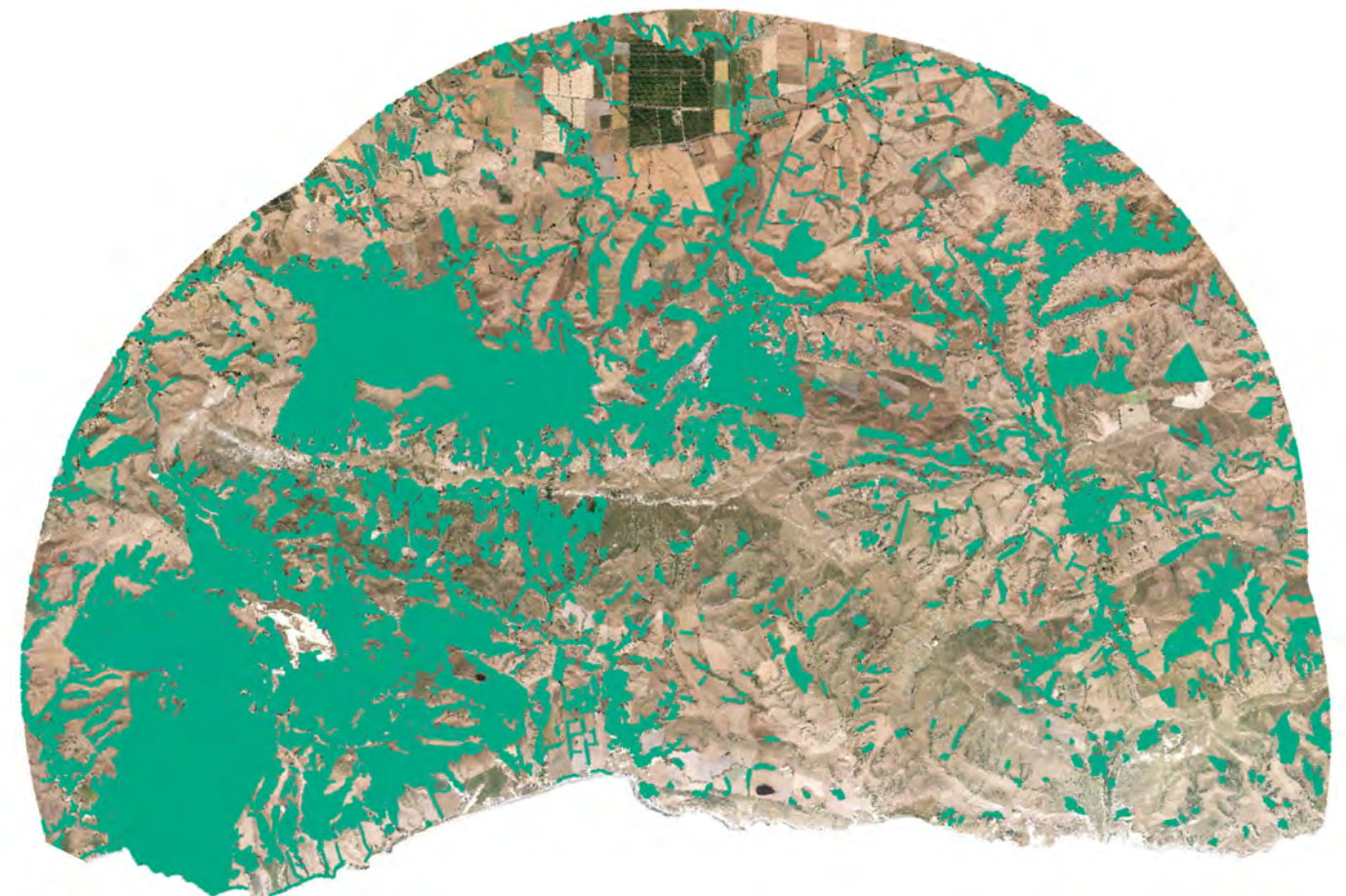
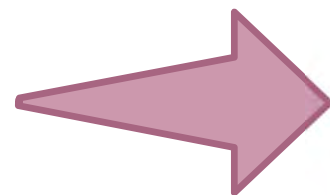
# Forests on S&B are nationally under-represented

Forest in conservation land is steep, high elevation, large forest areas and nothing else



# S&B farms could help conserve healthy ecosystems

- Conserve more ecosystem types than just reserves

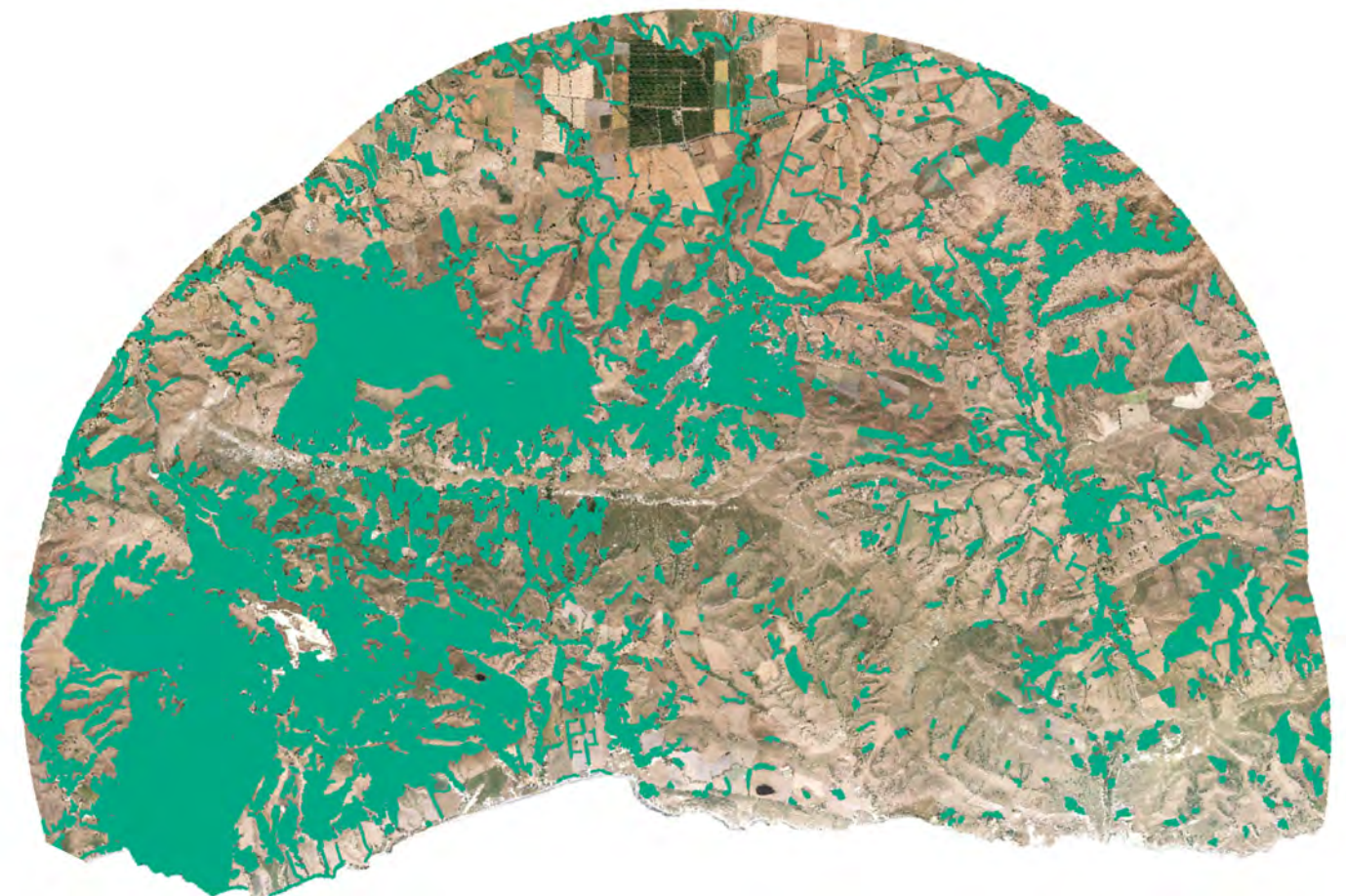
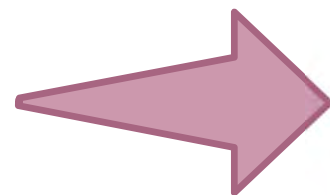


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# S&B farms could help conserve healthy ecosystems

- Conserve more ecosystem types than just reserves
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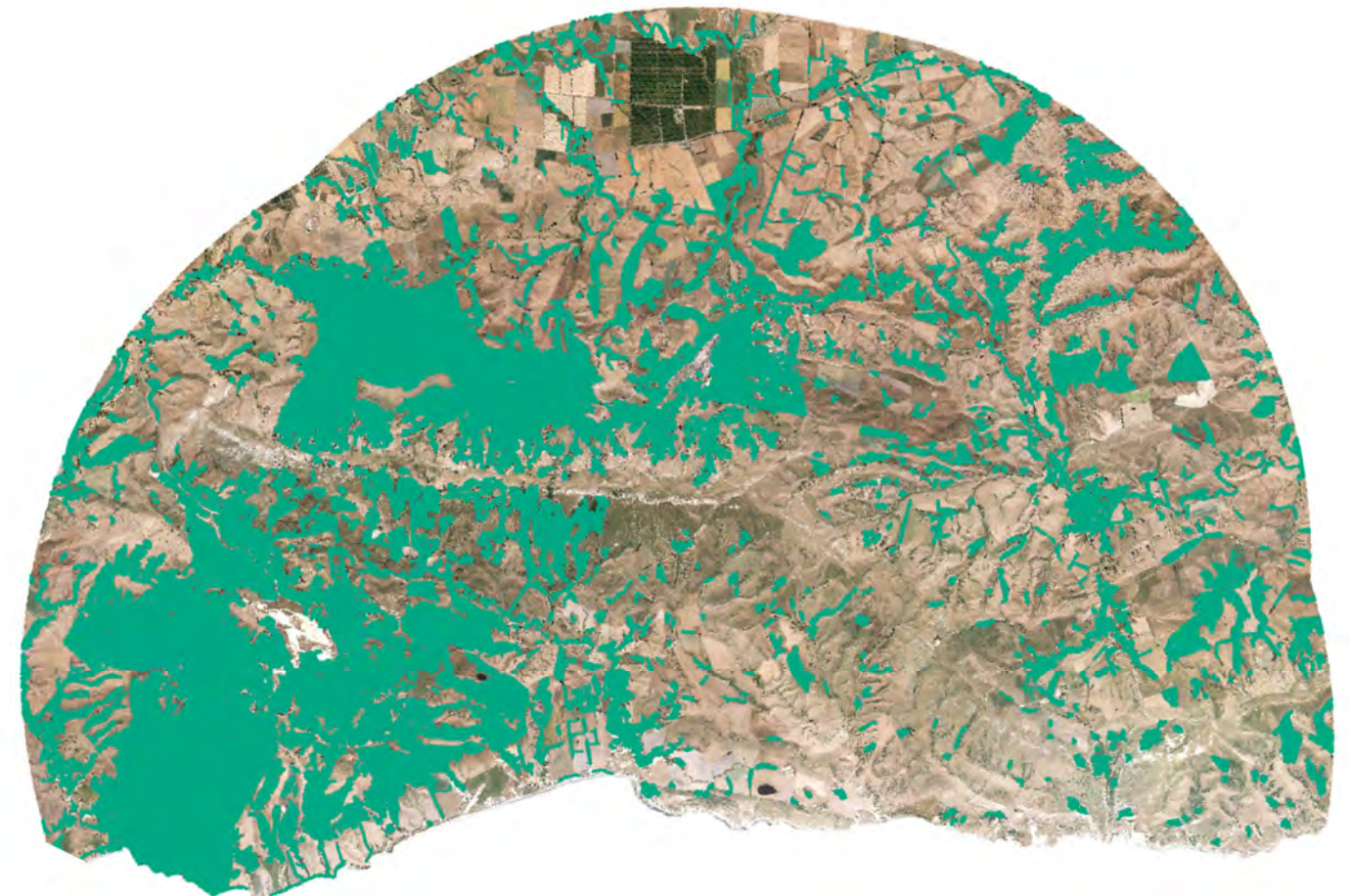
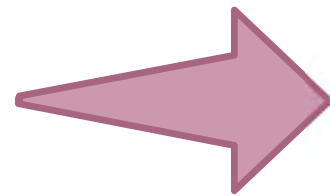


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# S&B farms could help conserve healthy ecosystems

- Conserve more ecosystem types than just reserves
- Benefits carbon, sustainability, human health & wellbeing
- Benefit farmers: control erosion, water use, stock shelter, social license

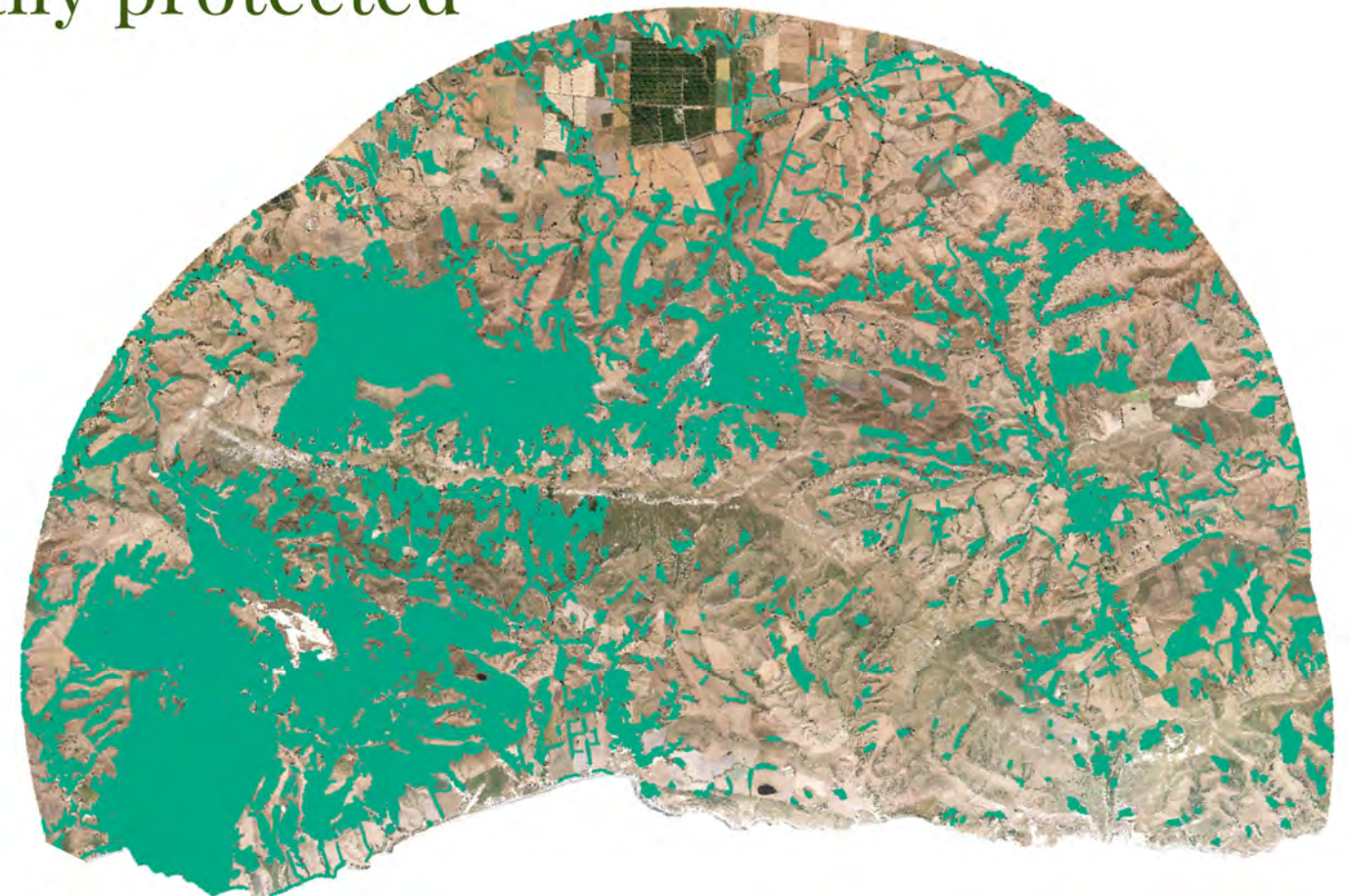
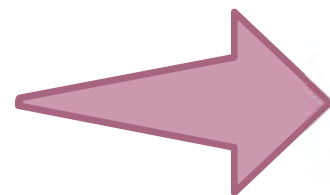


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# S&B farms could help conserve healthy ecosystems

- Conserve more ecosystem types than just reserves
- Benefits carbon, sustainability, human health & wellbeing
- Benefit farmers: control erosion, water use, stock shelter, social license
- But, it's fragmented and little is formally protected



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# Ways forward

- Incentives to retain native vegetation



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- Incentives to retain native vegetation
- Recognize native vegetation when assessing sustainability



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# Ways forward

- Incentives to retain native vegetation
- Recognize native vegetation when assessing sustainability
- Template to design healthy landscapes e.g. connect patches
- Engage with landowners, bottom up & top down solutions



Farming & Nature Conservation  
wider research project



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# Thank you!



## References:

- Norton DA & Pannell JL (2018) Desk-top Assessment of Native Vegetation on New Zealand Sheep and Beef Farms. Report for Beef & Lamb NZ. Available: <http://beeflambnz.com/nortonreport>
- Pannell JL, Buckley HL, Case BS, Norton DA. Native vegetation in agroecosystems is important for biodiversity conservation in New Zealand. In Review Landscape and Urban Planning



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