

OUR LAND AND WATER SYMPOSIUM

Kia Mauri Ora te Whenua



FUTURE LANDSCAPES

Innovative Agricultural Microbiomes

Sergio E. Morales
University of Otago



FUTURE LANDSCAPES

In the future landscapes contain mosaics of land use that are more resilient, healthy and prosperous than today.

Strategic Area 1

Be able to see what diversity is possible and match land use to what it is suitable for.

Strategic Area 2

Understand and model the management of land and water quality.

Strategic Area 3

Provide the novel production systems that use healthy land and water to generate high-value products.



INCENTIVES FOR CHANGE

New Zealand's primary producers are well-rewarded for producing high-value products in sustainable ways.

Strategic Area 4

Capture and share with the producers more of the value consumers associate with our products.

Strategic Area 5

Increase and share value based on mechanisms that rewards sustainable land use and high-value products.

Strategic Area 6

Enable communities to identify and adopt sustainable land use practices.



CAPACITY FOR TRANSITION

We understand what it will take, and have the tools to help us, transition to resilient, healthy and prosperous futures.

Strategic Area 7

Increase our social capital so that we can have well informed debate about alternative futures.

Strategic Area 8

Act as kaitiaki, being responsible for our actions within enterprises, in a catchment and beyond.

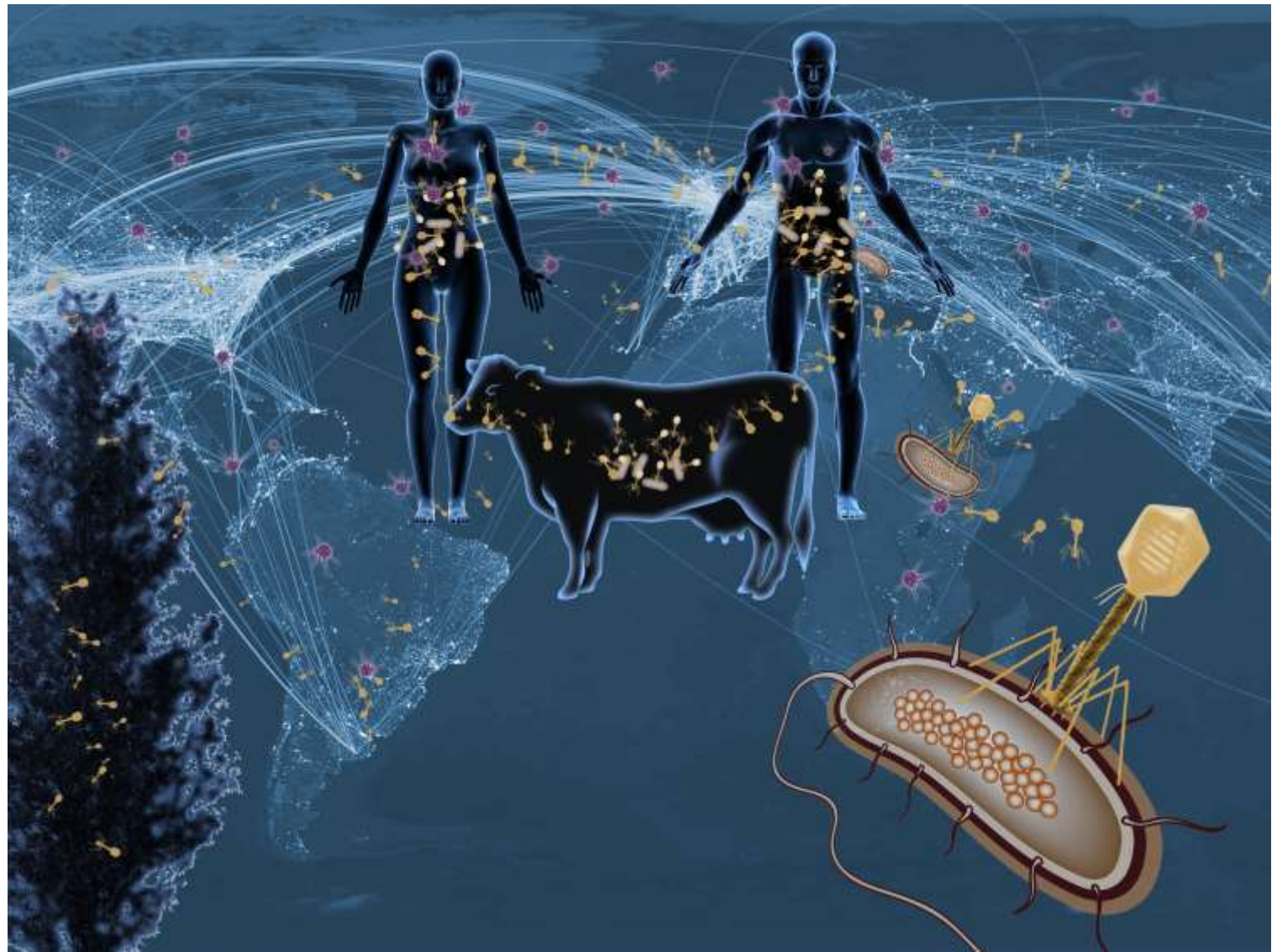
Strategic Area 9

Manage pressures and remove the barriers to a transition.

Problem #1: A lack of knowledge

MICROBIOME

all microorganisms, and their genes, within a particular environment



Problem #2: Repercussions of our activities

Nitrate levels in New Zealand rivers

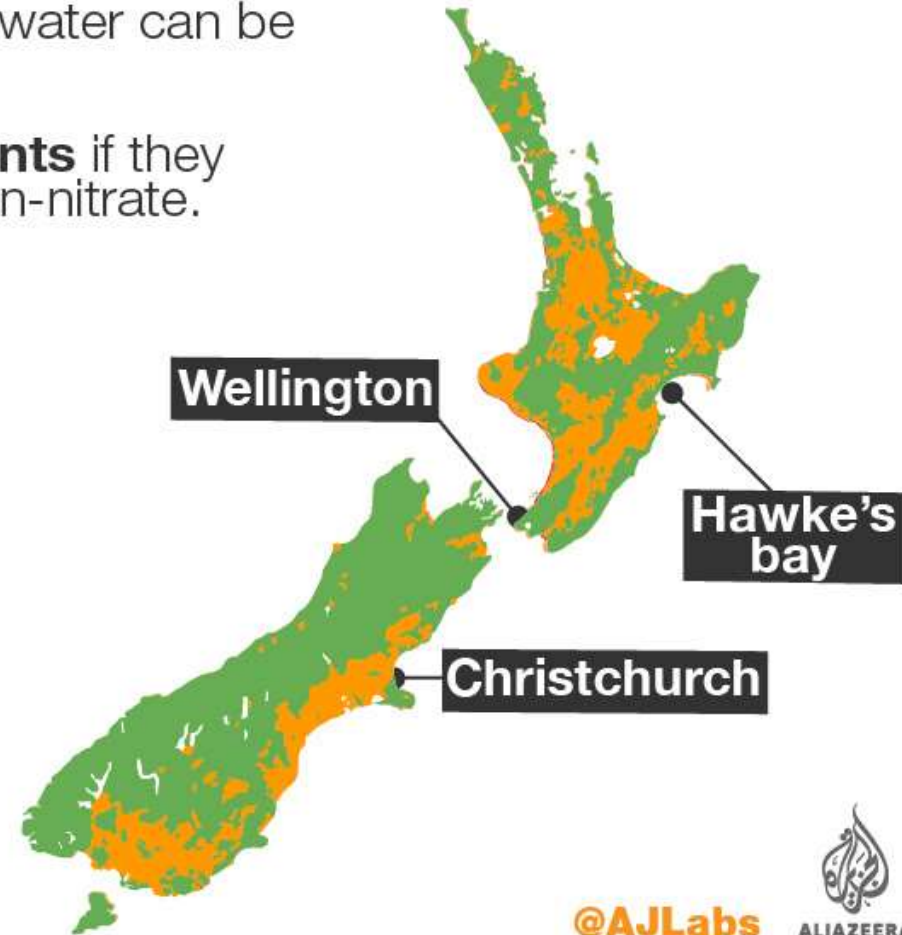
Too much nitrogen-nitrate in river water can be **toxic to aquatic life**.

It can also be **dangerous to infants** if they drink water with too much nitrogen-nitrate.

Nitrate-nitrogen river water
(mg/m³)



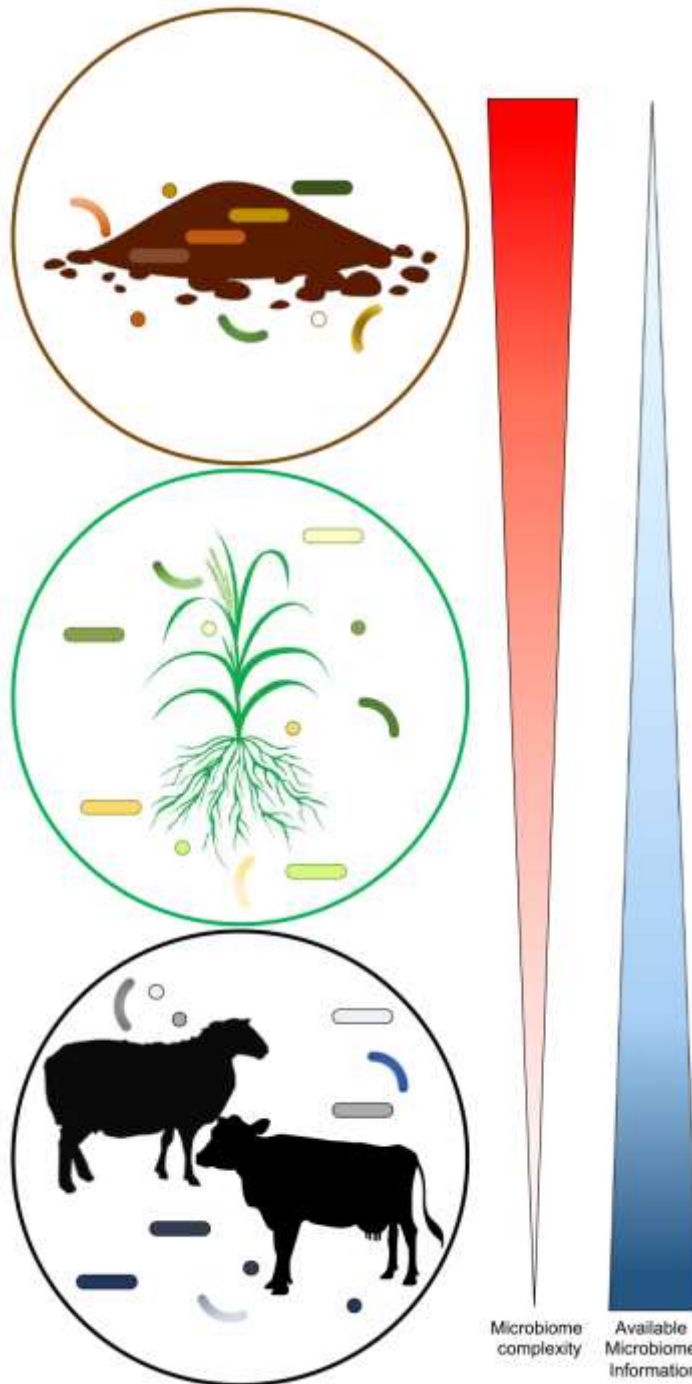
Nitrate-nitrogen limits



SOURCE
New Zealand Ministry for the Environment

@AJLabs ALJAZEERA

What is the solution?



Within the microbiome, identify:

- Who are they?
- What are they doing?
- What CAN they do?
- How can we manage/manipulate them for our benefit?



FUTURE
LANDSCAPES



Who is using the research to make a difference?

stuff 

business

Bacteria key to reducing greenhouse gas emissions from sheep

Esther Taunton • 14:47, Jul 09 2019



RURAL NEWS

Wednesday, 17 July 2019 08:55

Getting to the gut(s) of methane problem

nzherald.co.nz

Kiwi scientists find ways to cut methane emissions by up to 90 per cent



**PASTORAL GREENHOUSE GAS
RESEARCH CONSORTIUM**

WATCH OUT, METHANE – INHIBITORS ARE COMING



FUTURE
LANDSCAPES

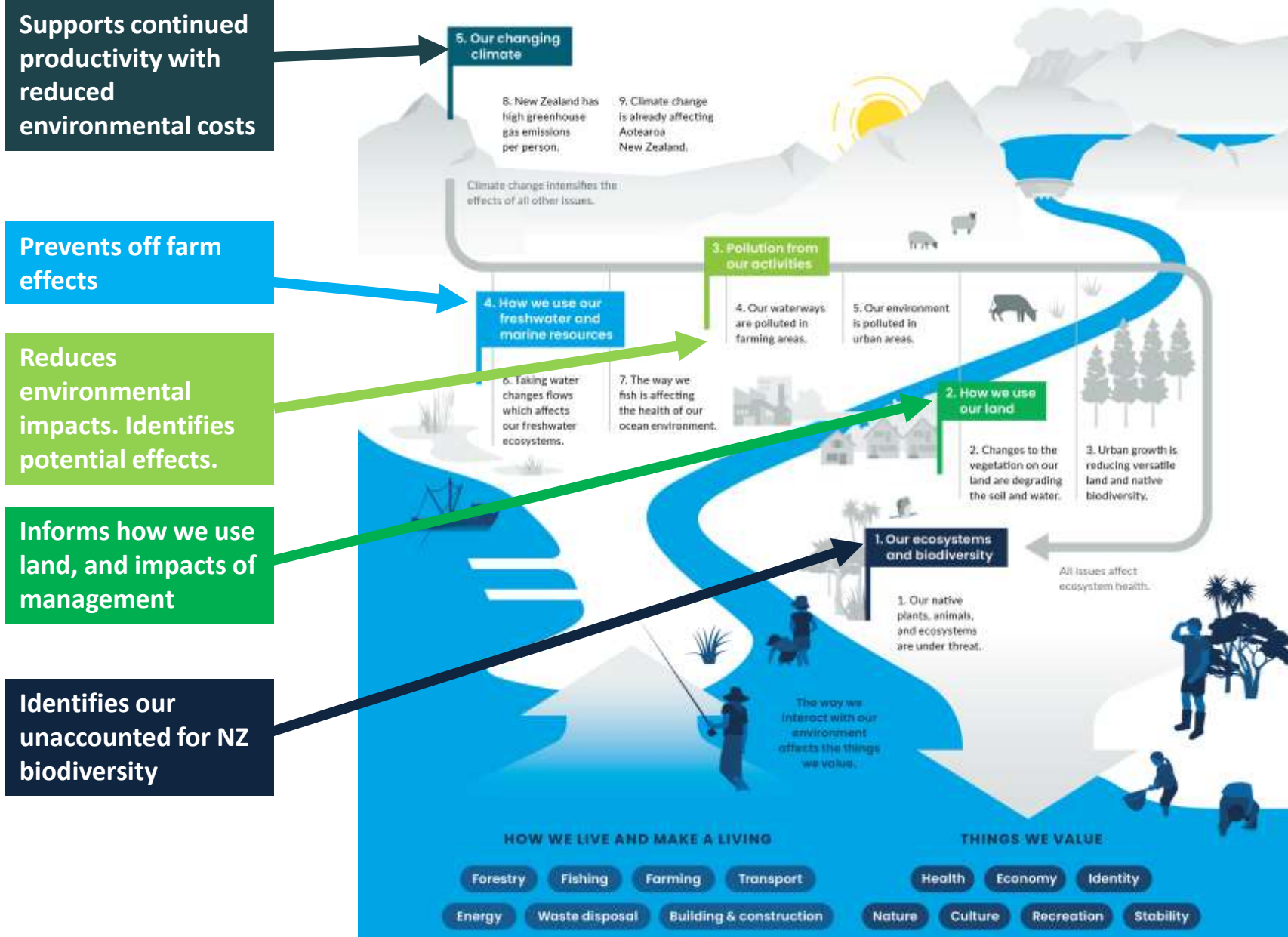


@OurLandandWater
#OLW2019

How is it building towards the Our Land and Water goal?

► Environment Aotearoa 2019 themes and issues

The themes and issues in this report show how the things we value are affected by the way we live and make a living.



Supports continued productivity with reduced environmental costs

Prevents off farm effects

Reduces environmental impacts. Identifies potential effects.

Informs how we use land, and impacts of management

Identifies our unaccounted for NZ biodiversity



FUTURE LANDSCAPES

Collaborators



Farm operation, animal management, plant and milk (production and composition) measurements.

Prof. Pablo Gregorini, Lincoln University

Farm systems modelling. Dr Pierre Beukes, DairyNZ.

Soil microbiome analyses. Dr Gwen Grelet, Landcare Research.

Above ground plant (phylosphere) and internal root microbiome analysis. Dr Linda Johnson, AgResearch Grasslands.

Rumen and faecal microbiome analyses. Dr Graeme Attwood, AgResearch Rumen Microbiology, Grasslands.

Amplicon, metagenome and metatranscriptome sequencing of microbiome samples. Dr Suzanne Rowe, AgResearch Animal Genomics, Invermay.

Comparative microbiome and network analyses. Dr Sergio Morales, Dept. Microbiology, Otago University.