

Sustainable Soil and Nutrient Management

Mike Hedley

Fertilizer and Lime Research Centre



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Sustaining the productive capacity of our soils.



Hastings Soils



Source: Soils in the New Zealand Landscape - the Living Mantle, 2nd Edition", by Les Molloy

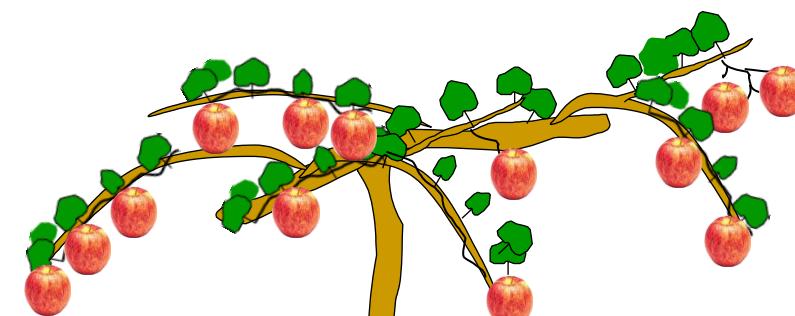


Takapau Soils

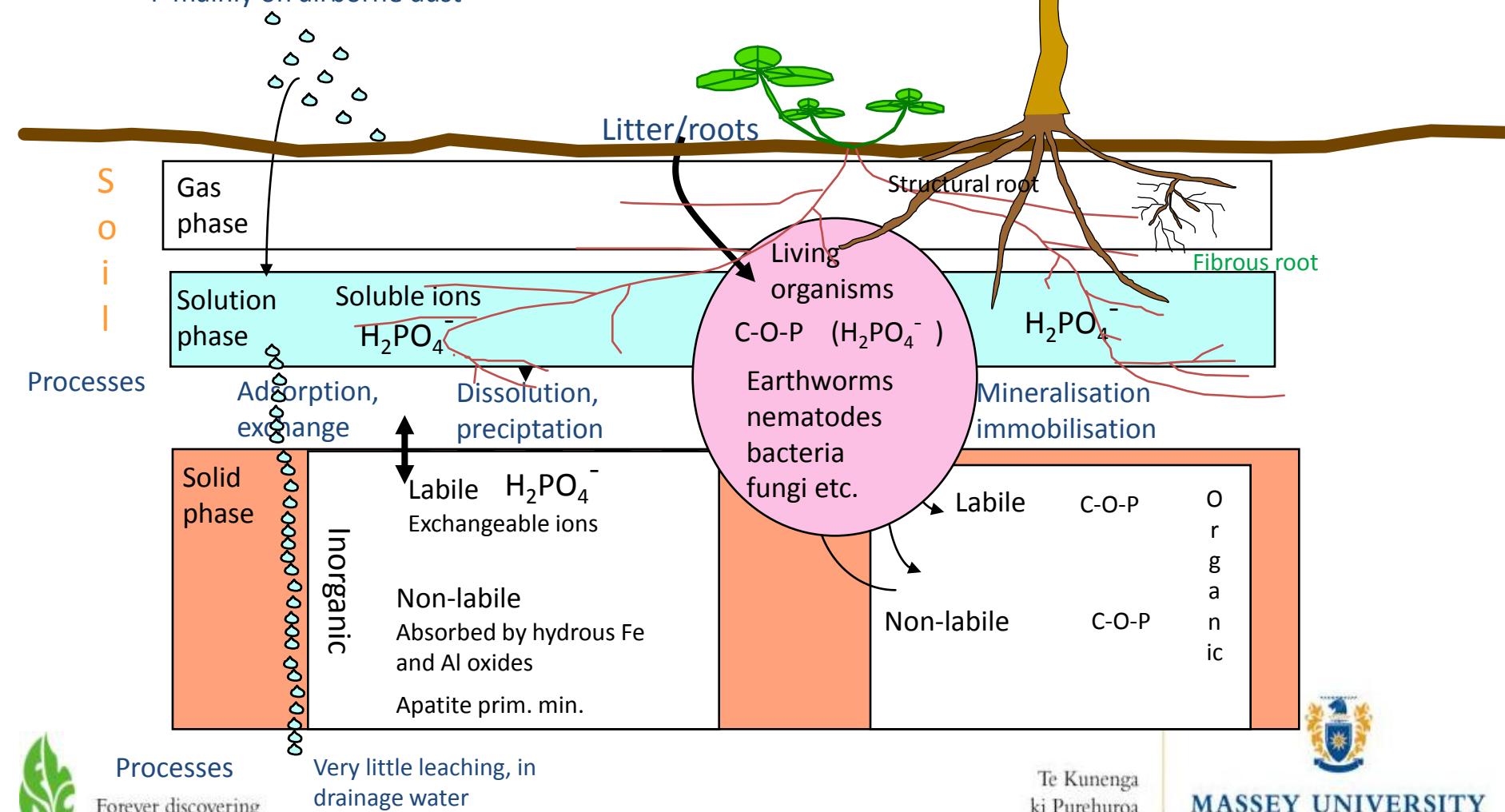


Matapiro Soils

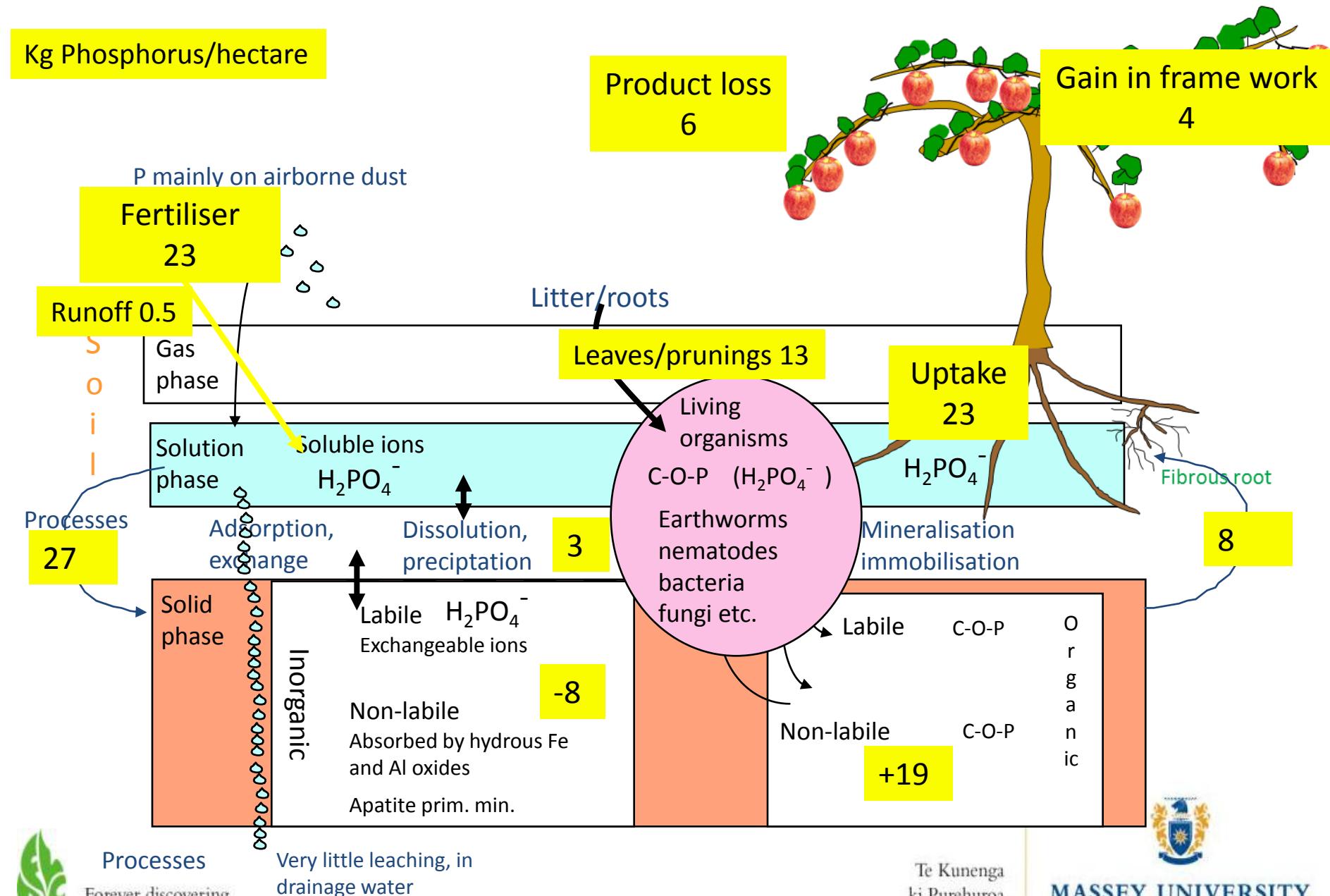
Essential Components of Soils and phosphorus nutrition



P mainly on airborne dust



Phosphorus transformations – maintaining P supply, replacing losses Gala apple block



Potassium (K) uptake and removals from a Gala apple block

Kg Potassium/hectare

Potassium sulphate
229

Product loss
83

Gain in frame work
13

K in rainfall increases near coast

3

Gas phase

Solution phase

K+ Soluble ions

Uptake
178

Leaves/prunings 82

Litter

Processes

58

Solid phase

Inorganic

Labile

Exchangeable K+ ions

Non-labile

Feldspars, mica , illite

Living organisms

K+

Earthworms
nematodes
bacteria
fungi etc.

11

15

Leaching,
drainage

ki Purehura

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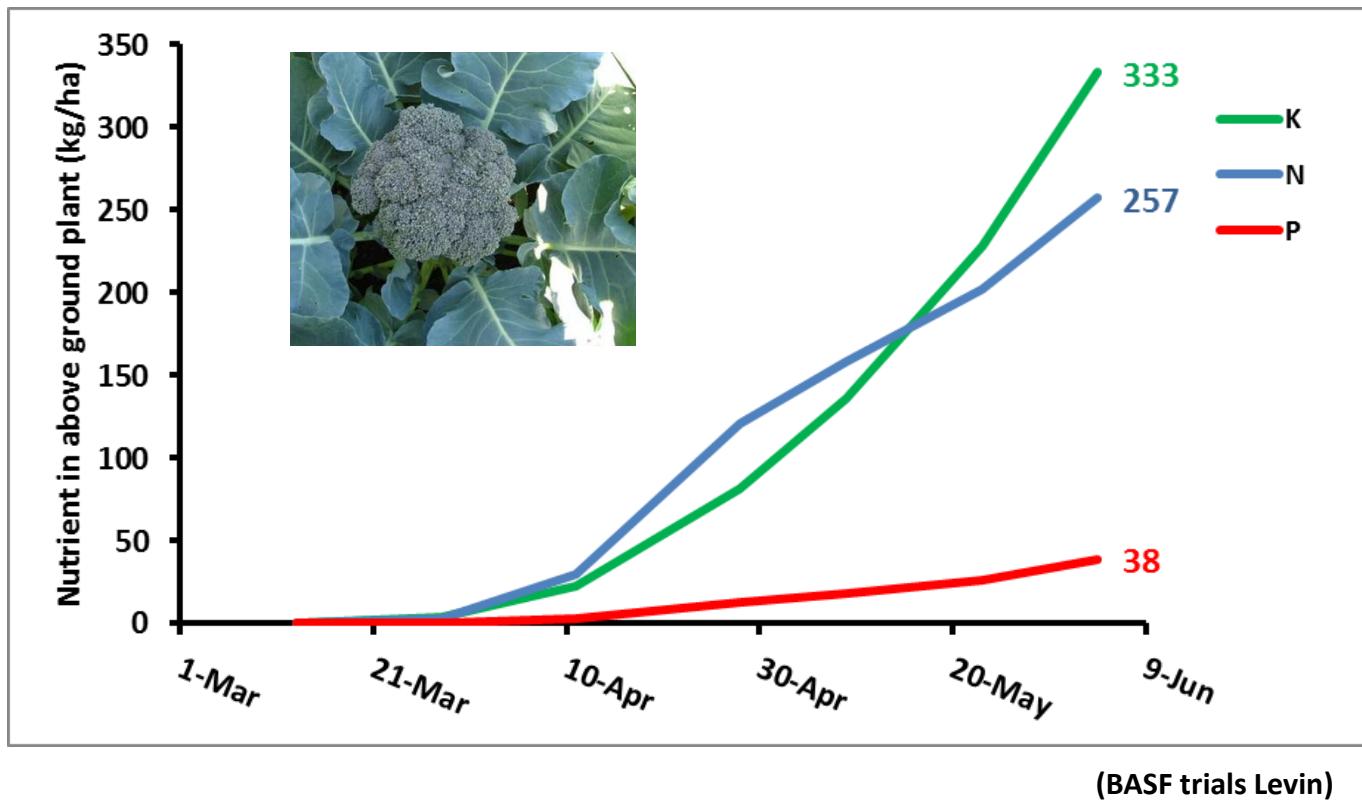


Processes

Never discount the power of processes

Field crops – take up and export large amounts of potassium and phosphate .

Nutrient uptake by Broccoli

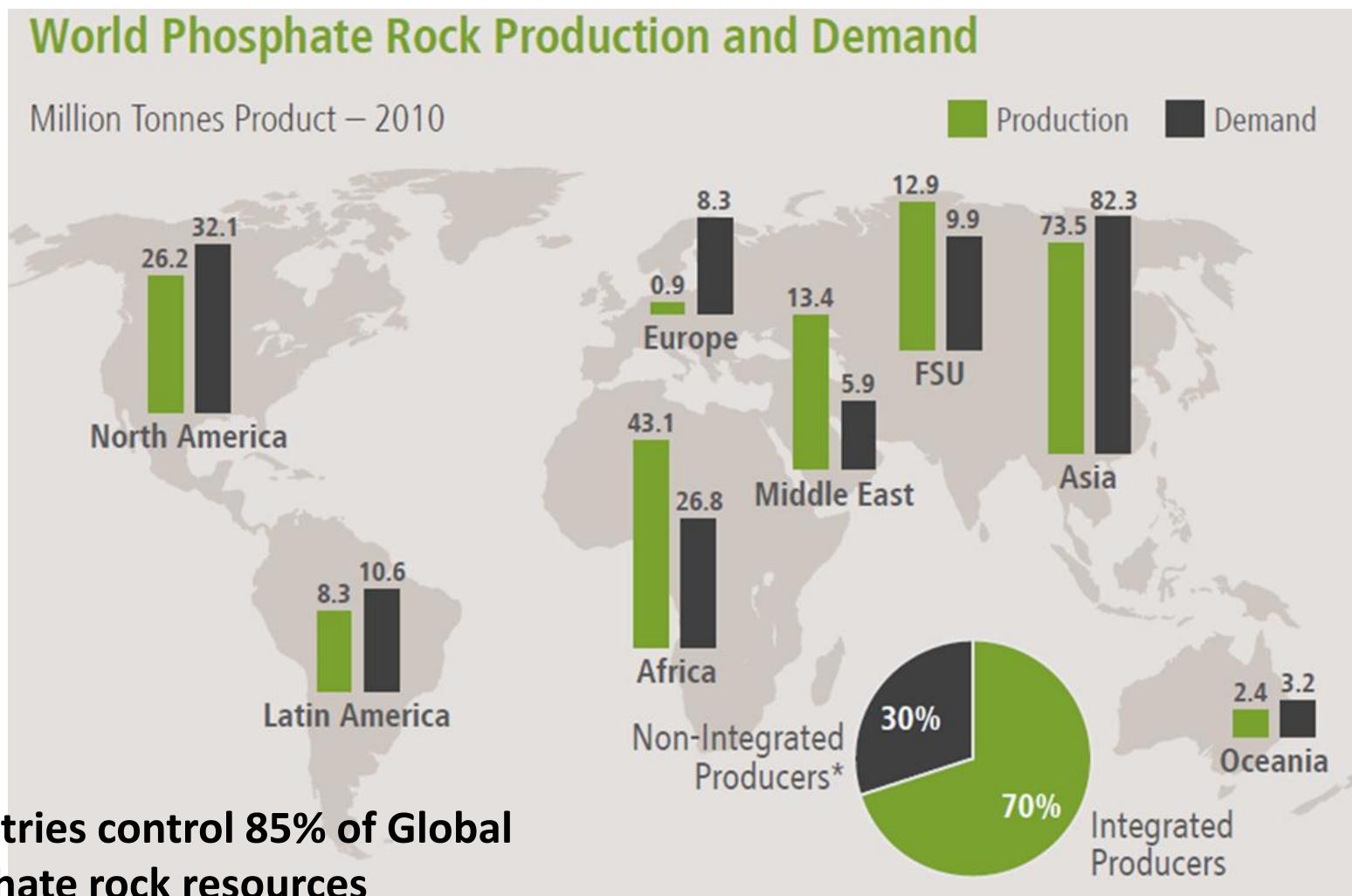


Summary :

NZ primary industries depend upon significant inputs of :
Non-renewable Phosphate and Potassium



Where will our replacement P come from ?



With whom should
we trade ?

Small Oceania fish
in a large pond ?

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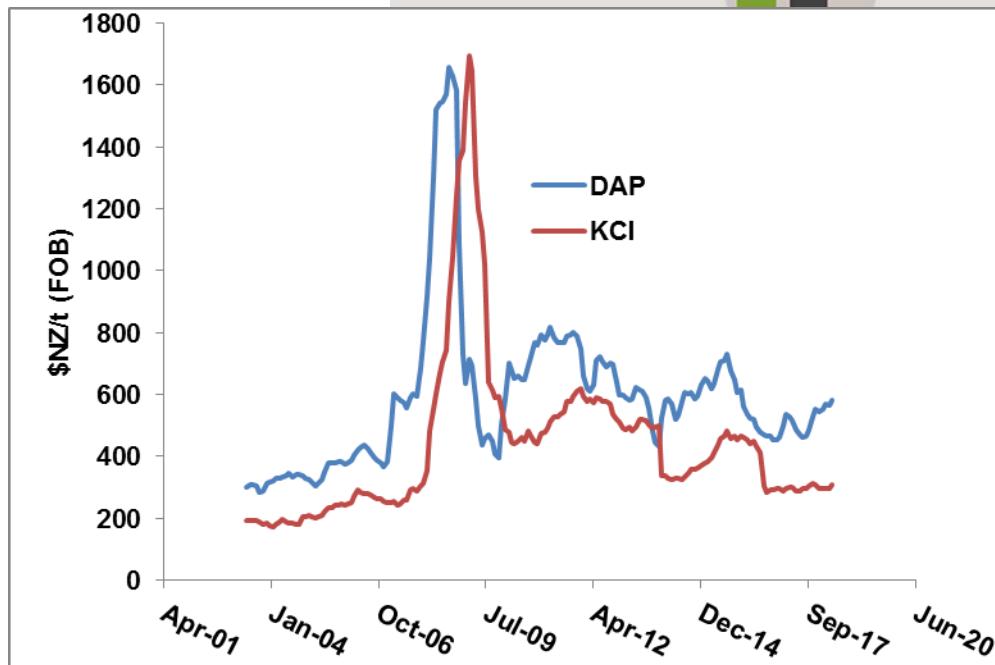
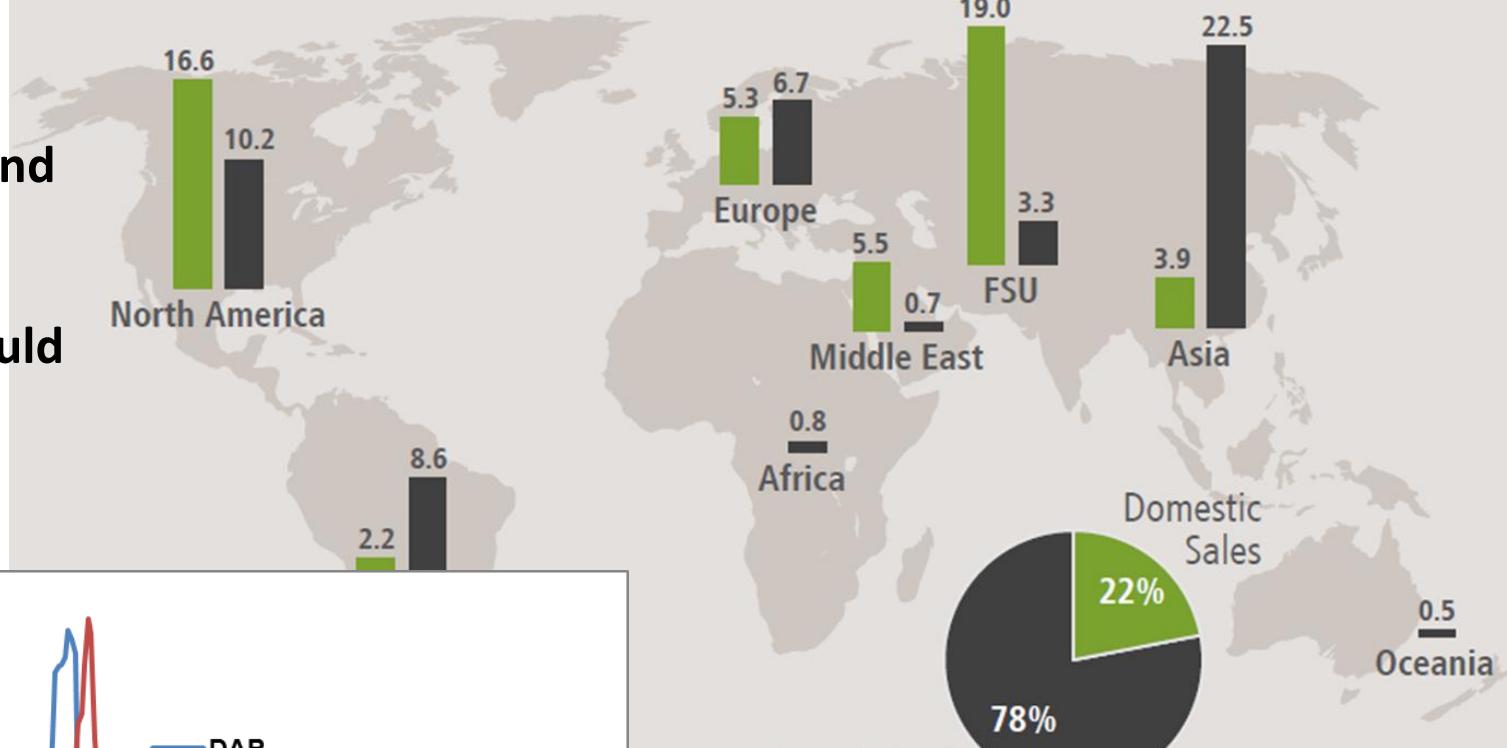
Where will our replacement K come from ?

Minute Oceania fish in a large pond ?

With whom should we trade ?

World Potash Production and Demand

Million Tonnes KCl – 2010



6 countries control 85% of Global potassium chloride resources

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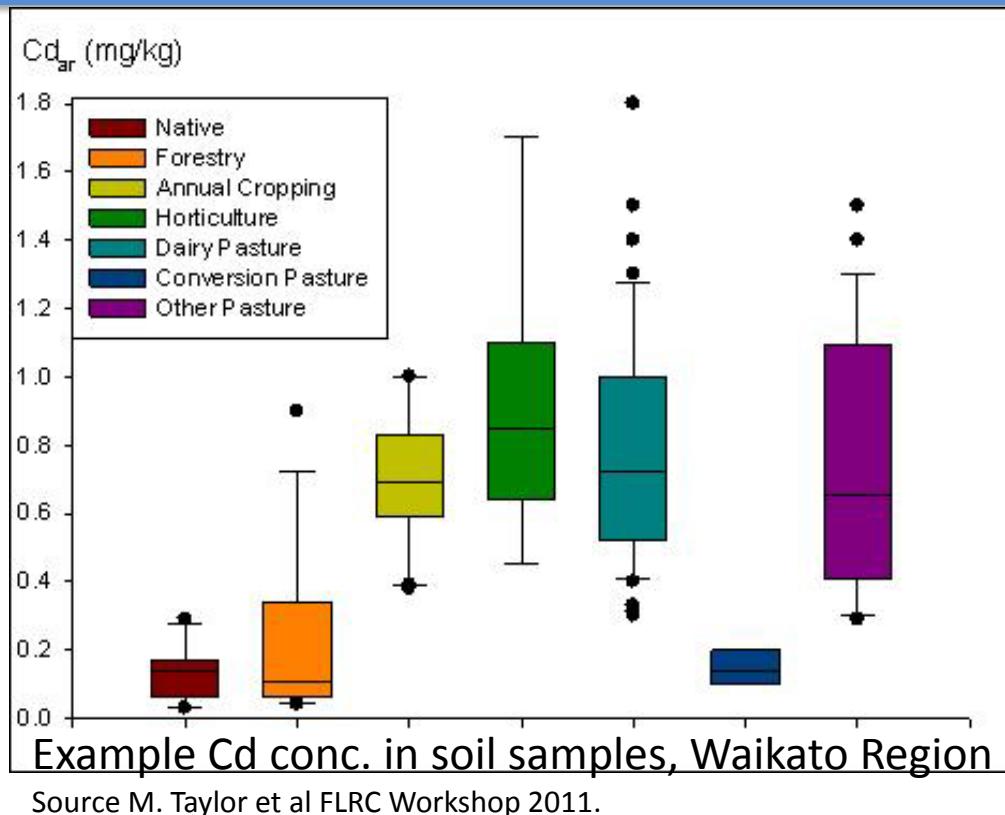
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Managing risks from contaminants - Cadmium derived from P fertiliser

NZ Cadmium Management Strategy

Tiered Fertiliser Management System (TFMS)

- 5 yearly screening of farmed soils
- Categorise soils into different Tiers
- Managed by Fertiliser companies

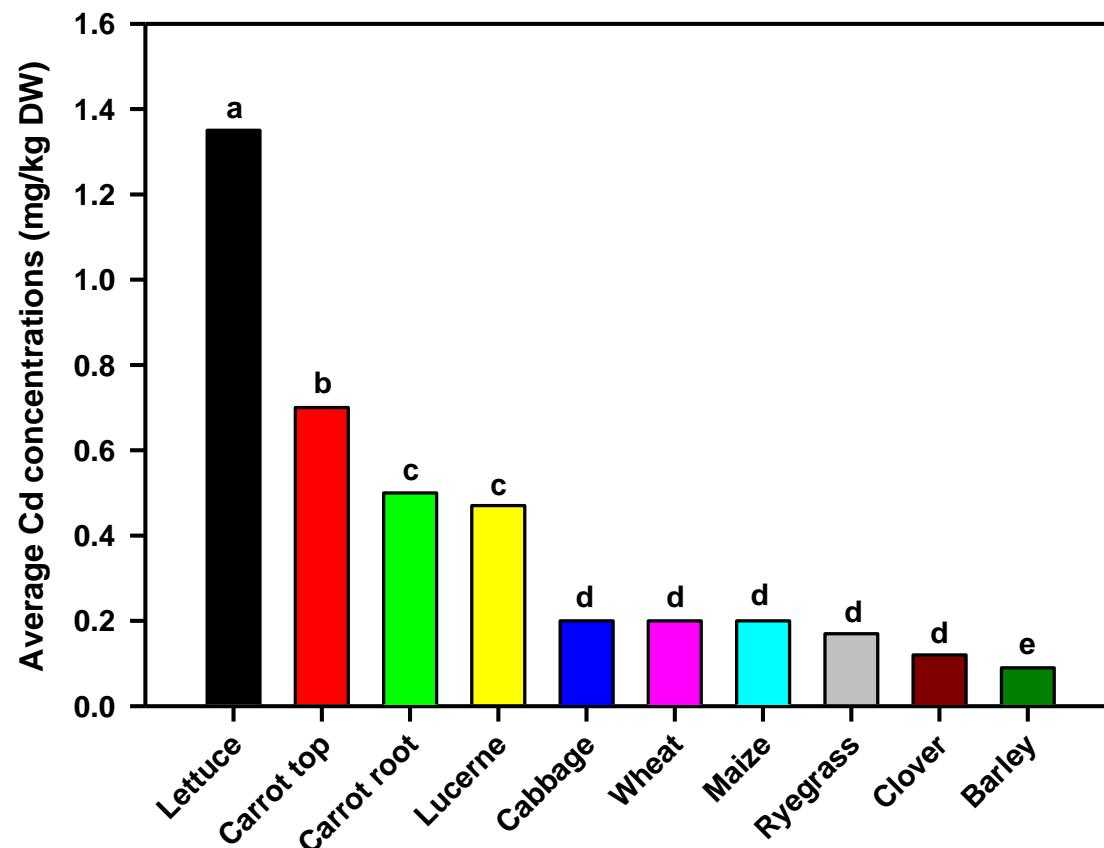


Source M. Taylor et al FLRC Workshop 2011.

Compliance testing for potential contaminants - Soil Cadmium 2017

Tier	mg Cd/kg soil	Restrictions
1	< 0.6	none
2	0.6 < 1	low Cd, P fertilisers, to maintain soil Cd below acceptable threshold for 100 y
3	1 < 1.4	v. Low Cd P fertilisers, to maintain soil Cd below acceptable threshold for 100 y
4	1.4 < 1.8	No application of Cd allowed Cd free fertiliser

Managing risks from contaminants - Cadmium derived from P fertiliser



Mean CD concentration for different plant species. Values accompanied by the same letter are not significantly different ($P > 0.05$) according to LSR analysis (After Gray *et al.*, 1999).



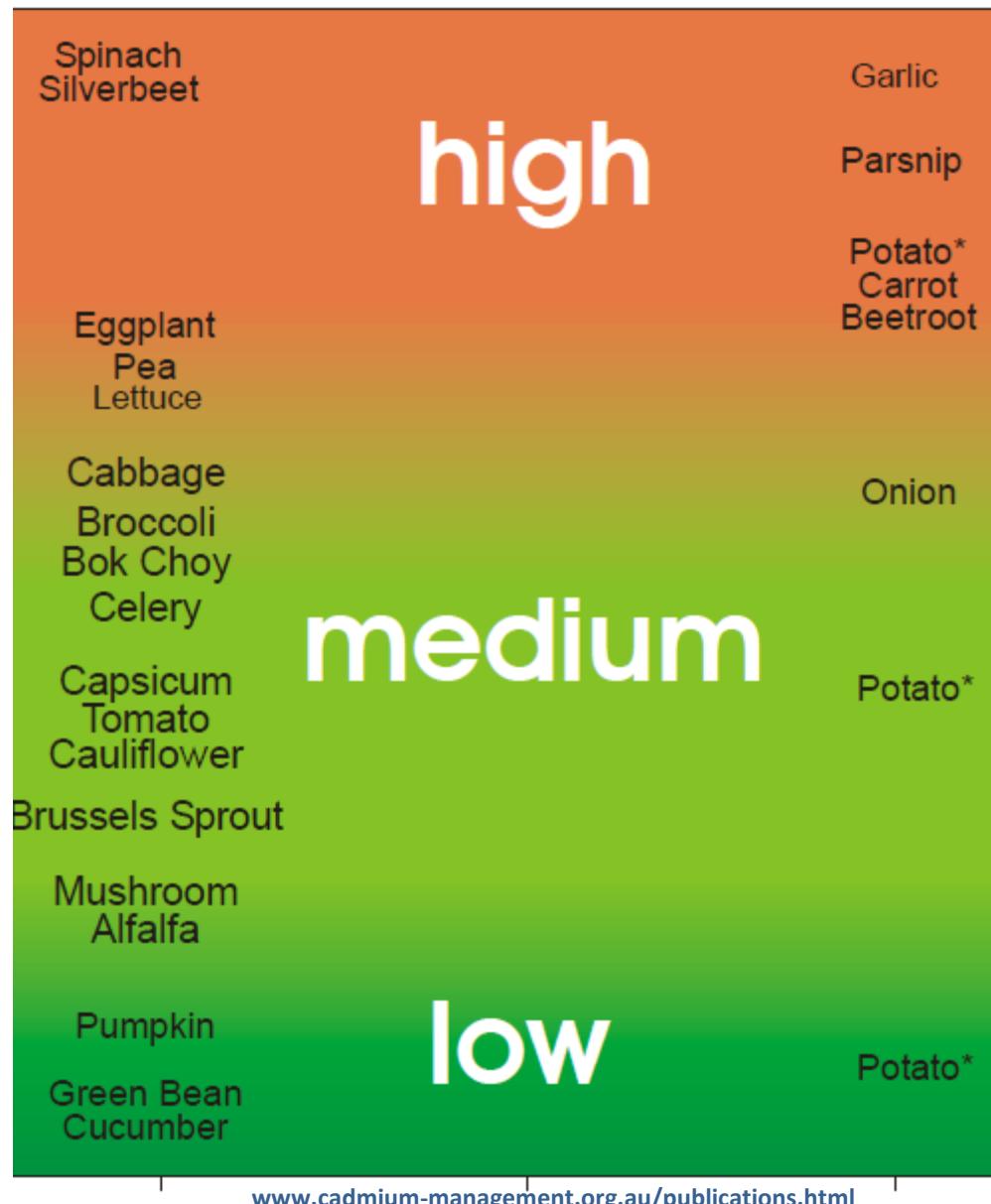
Managing risks from contaminants - Cadmium derived from P fertiliser

Plant availability of Cd

Description	Factor affecting Cd uptake
Soil factors	Amount of Cd present in soils
	pH (increase pH = decrease Cd uptake)
	CEC (increase sorption = decrease Cd uptake); adsorption onto oxides, organic matter
	Competition with micronutrients, especially Zn
	Salinity (CdCl complexes) promotes Cd uptake
Crop factors	Species and cultivars; weeds > grass > clover
	Plant tissues; leaves > grain, fruit, roots
	Leaf age; old > young



Reduce Cd accumulation in plants



Crop management

- use cultivars with low Cd concentration (eg. Wheat and potato)

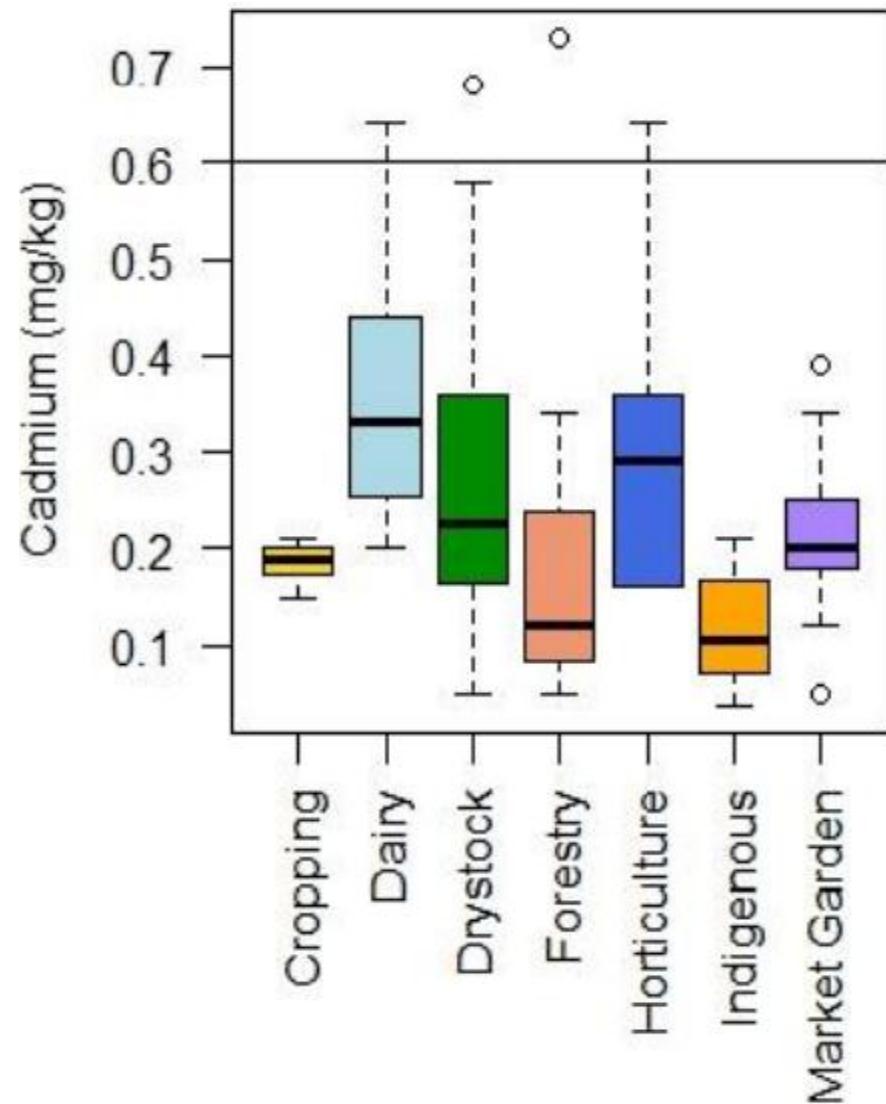
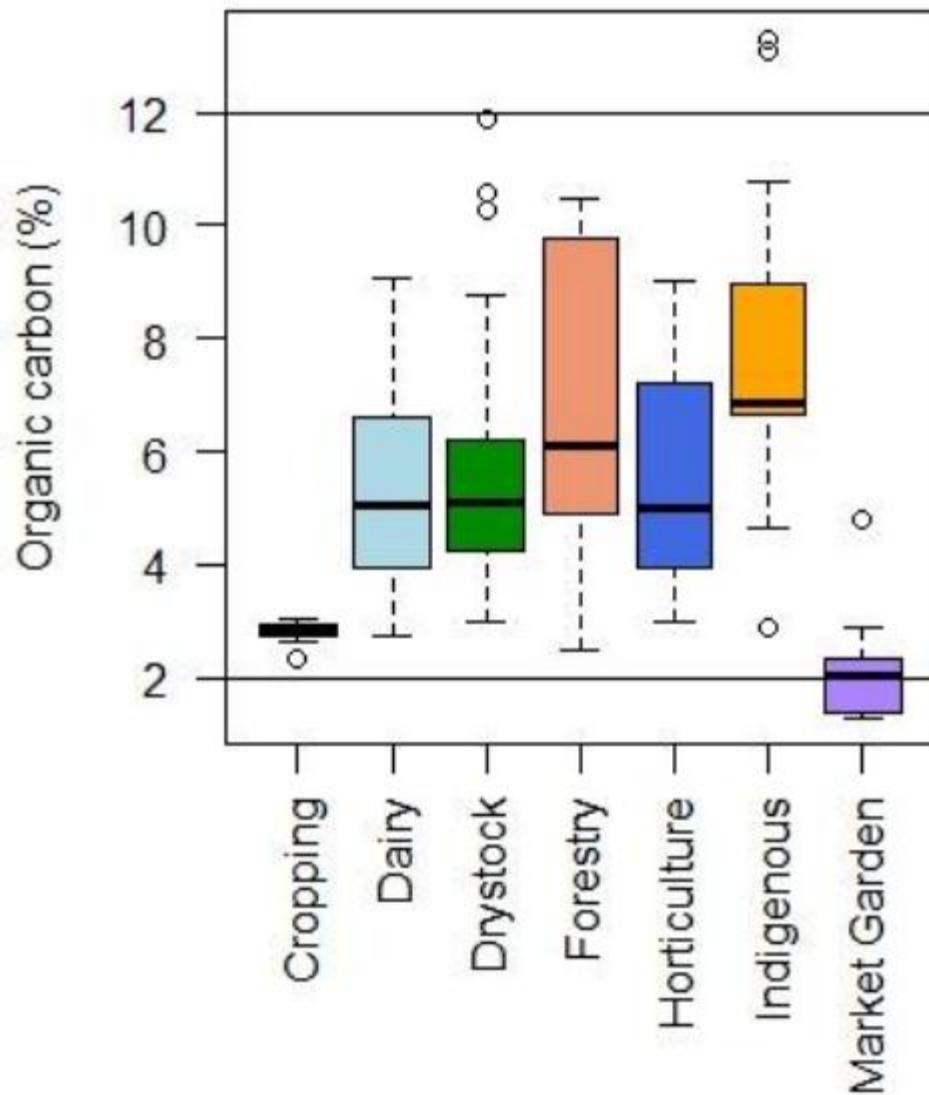
Soil/land management:

- Liming
- Maintaining high soil organic matter
- Alleviating Zn deficiency
- One off deeper cultivation



Are we managing risks from cadmium ?

Data from the soil quality survey of Wellington regional council



Are we managing risks from cadmium ?

Data from the soil quality survey of Waikato regional council

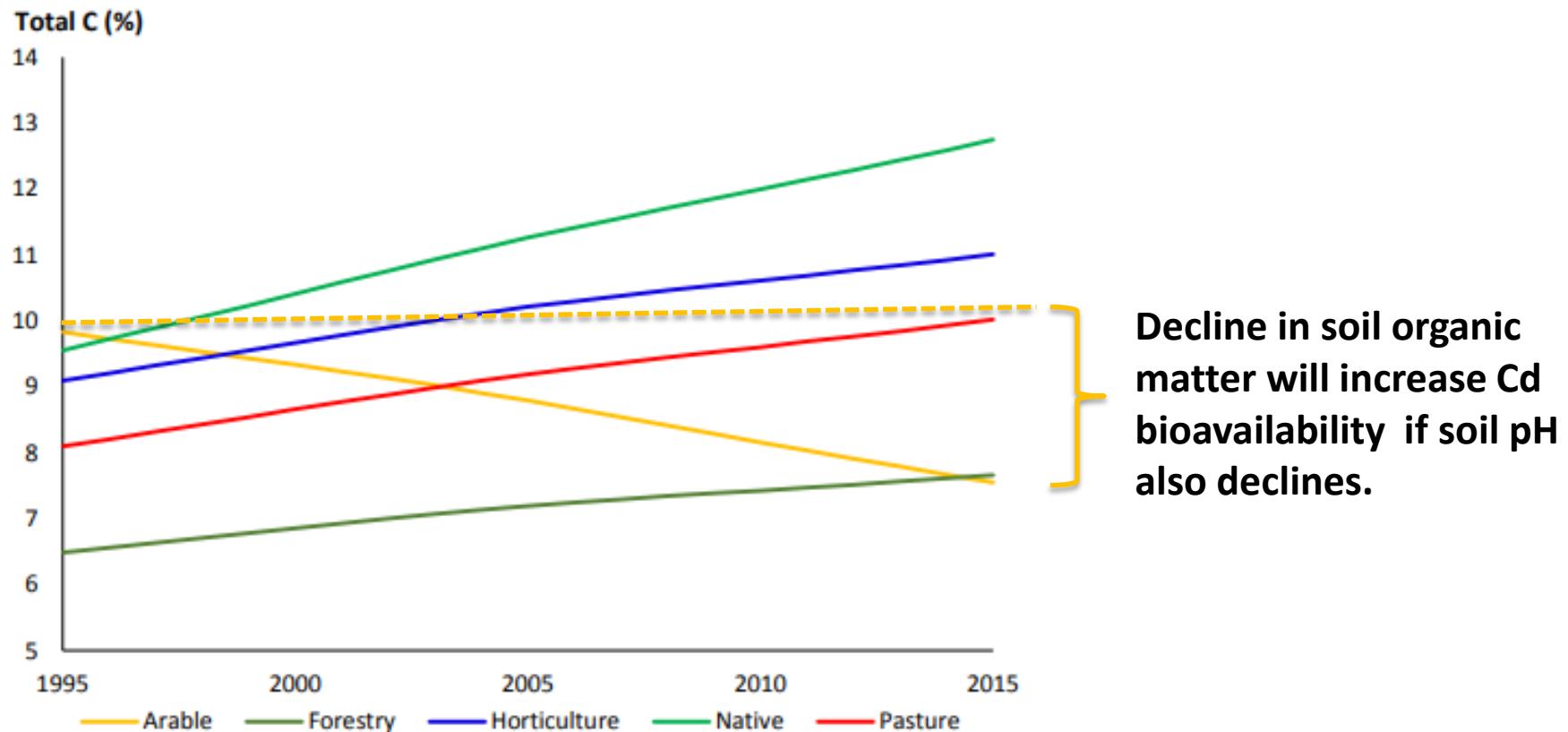


Figure 29: Change in mixed modelling average total C 1995-2015 by land use.

M.Taylor, 2013



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Sustaining productive capacity will require.

- **Education on soils and landuse**
- **Farm mapping: soils and landuse**

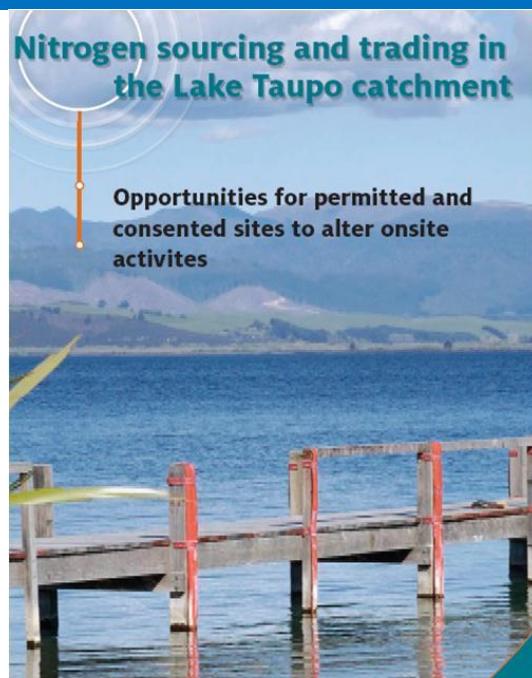
With particular emphasis on .

- **Physical management**
- **Water supply**
- **Securing essential Nutrients**
- **Avoiding Soil contamination**
- **Managing environmental risk**



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Nutrient Management Plans – Cost effective nutrient use, minimising nutrient loss to the environment and primary product quality assurance



Rural Environmental Compliance Loan.

The farming sector is the driving force of the New Zealand economy, and to ensure it stays that way, it's important that New Zealand's farmers get the balance right between productivity and sustainability.

We want to help you succeed in meeting your local council's environmental by-laws by minimising the cost to your business through a low interest **Rural Environmental Compliance loan**.

ASB's Floating Base Rate of just **3.80%***

Maximum loan amount of \$200,000 to be used to fund environmental compliance initiatives

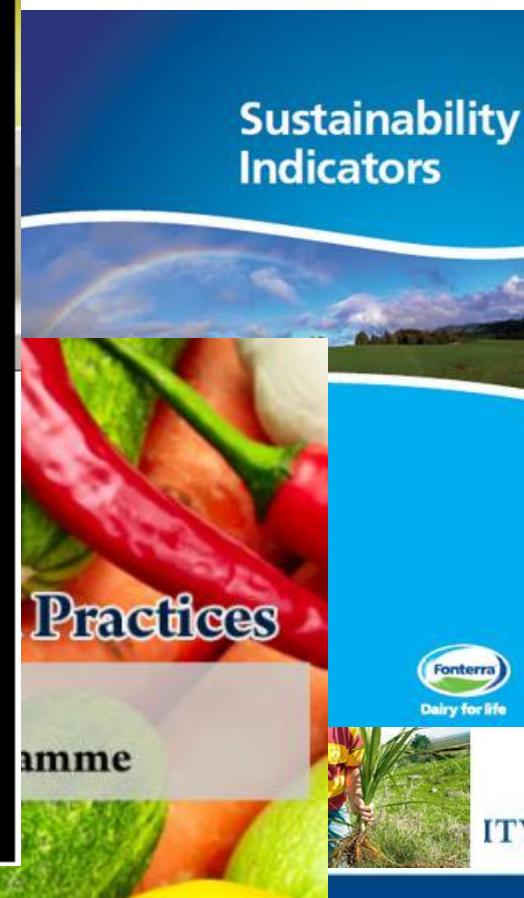
No establishment fee

Maximum term is **5 years**

 **Contact your Rural Manager**

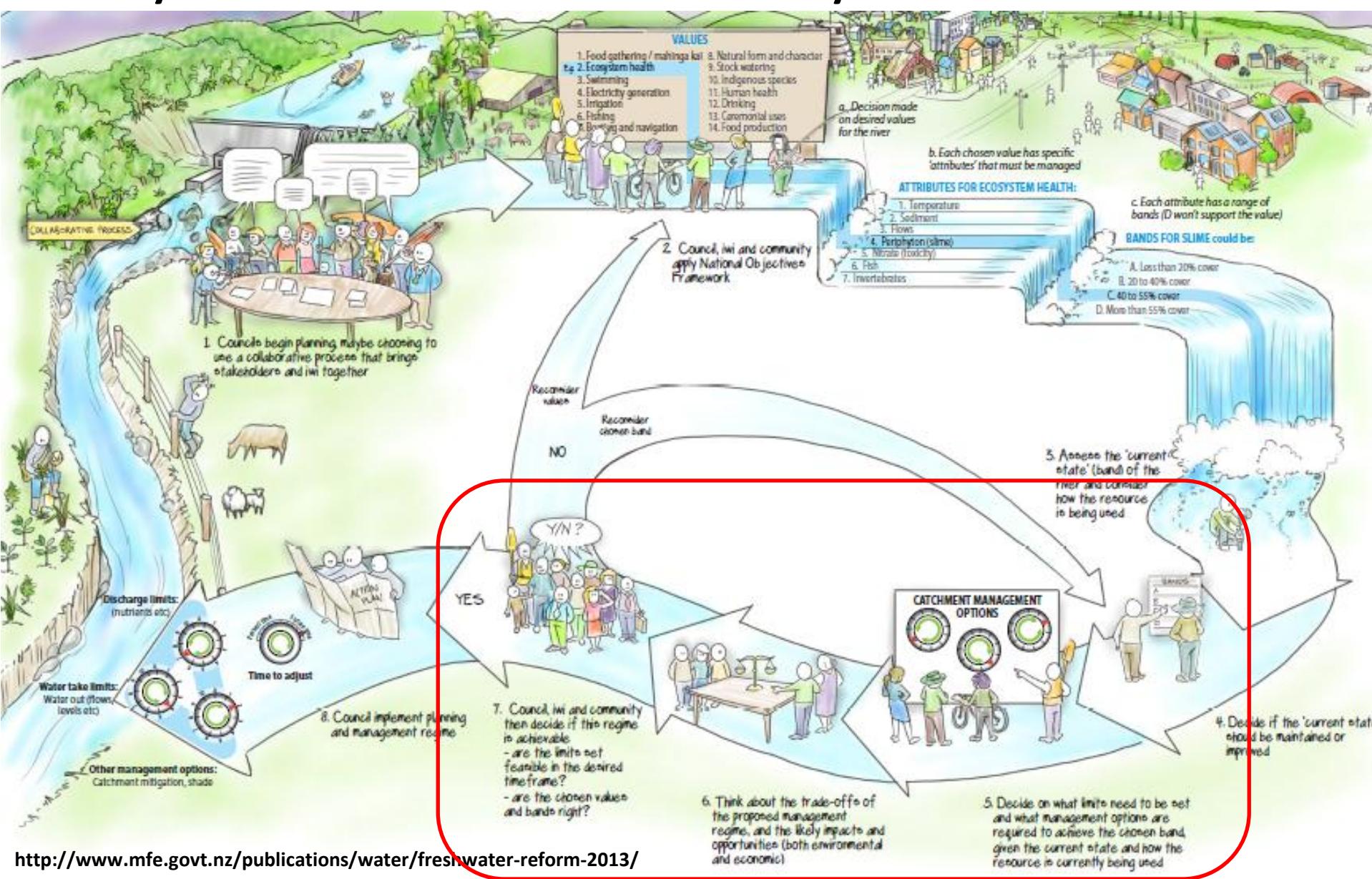
g?

What is the process?



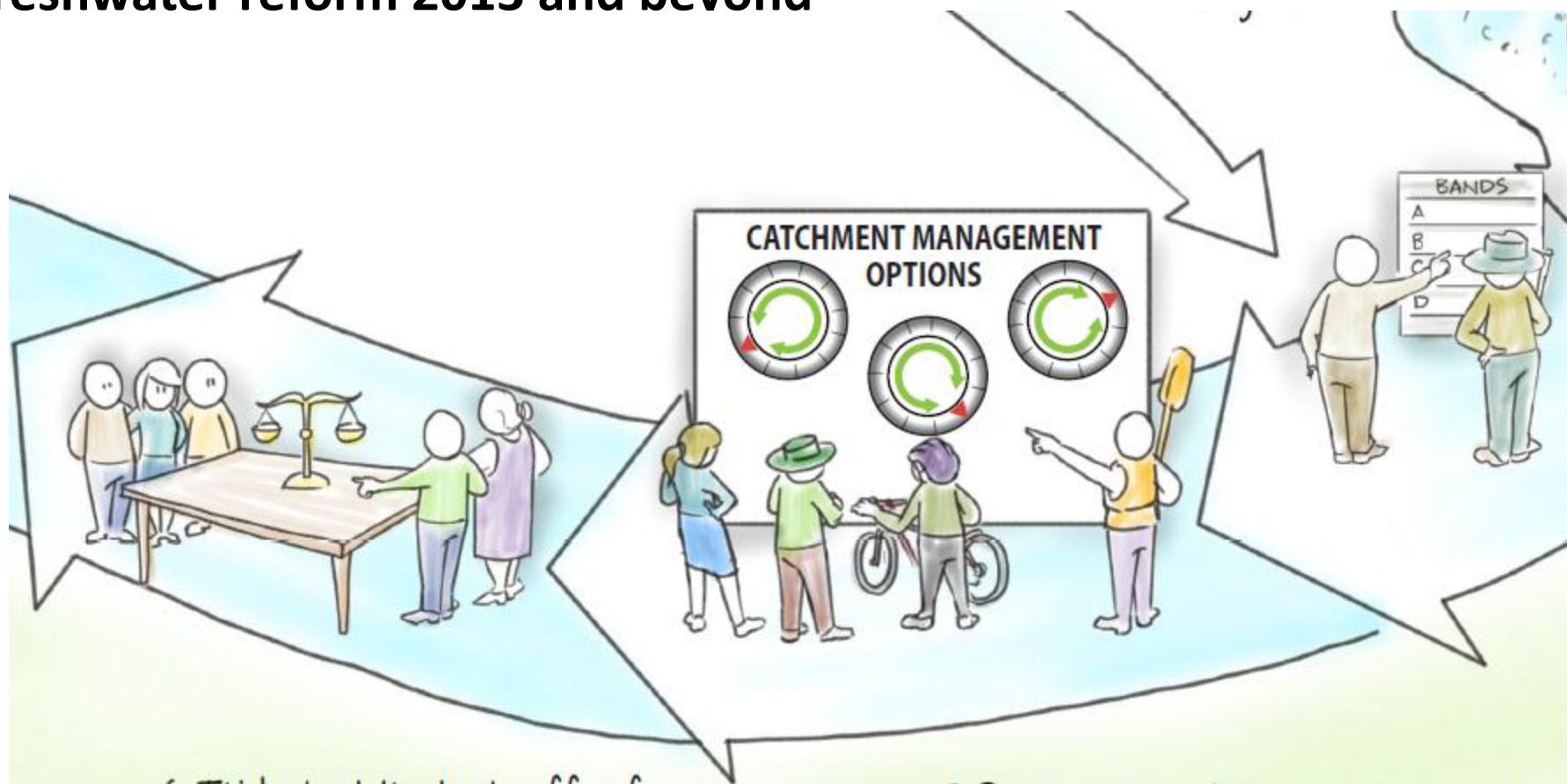
Nutrient Management for the Farm, Catchment and Community

Pathway to Freshwater reform 2013 and beyond



Nutrient Management for the Farm, Catchment and Community

Freshwater reform 2013 and beyond



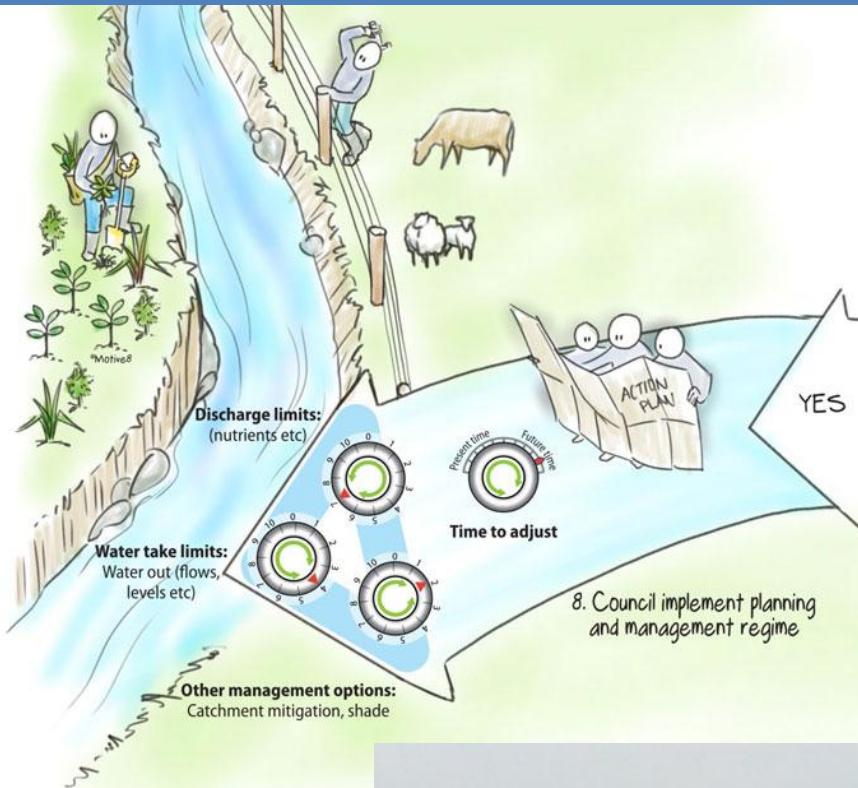
6. Think about the trade-offs of the proposed management regime, and the likely impacts and opportunities (both environmental and economic)

5. Decide on what limits need to be set and what management options are required to achieve the chosen band, given the current state and how the resource is currently being used



Nutrient Management for the Farm, Catchment and Community

Professional development and decision support



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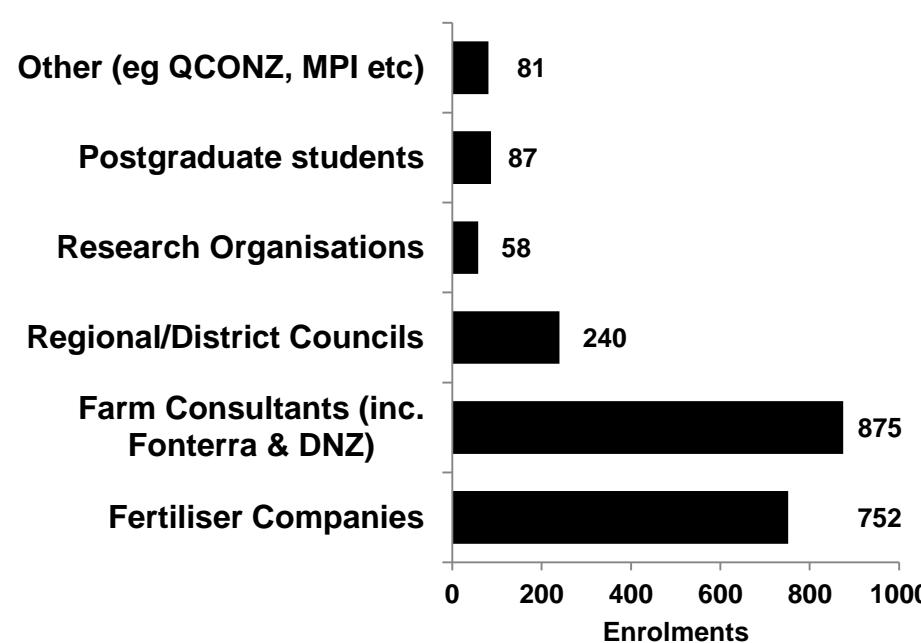
SUSTAINABLE NUTRIENT MANAGEMENT

Who is capable of Nutrient Management Planning ?

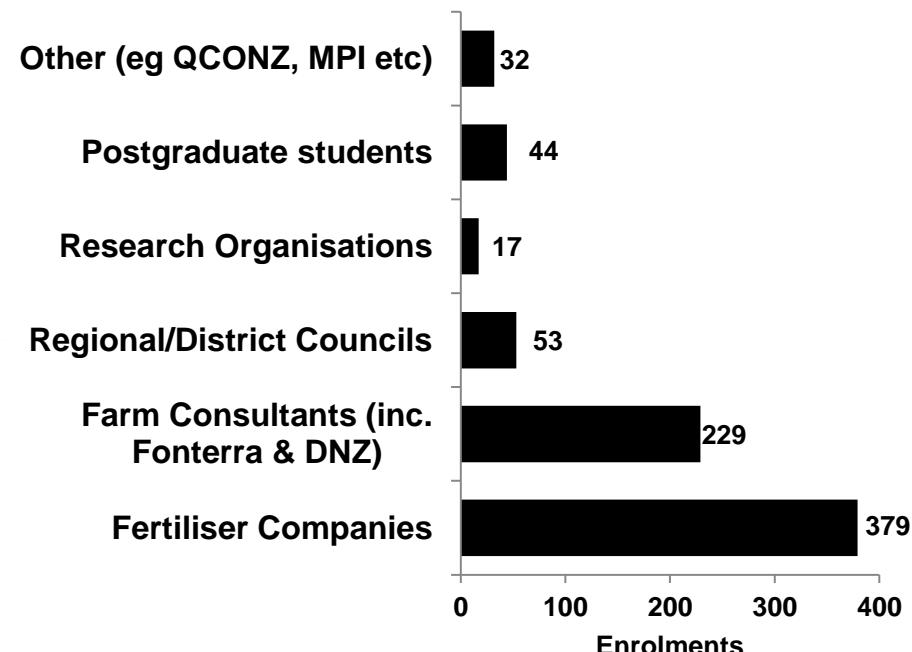


**Trained in Sustainable Nutrient Management
plus Industry Experience**

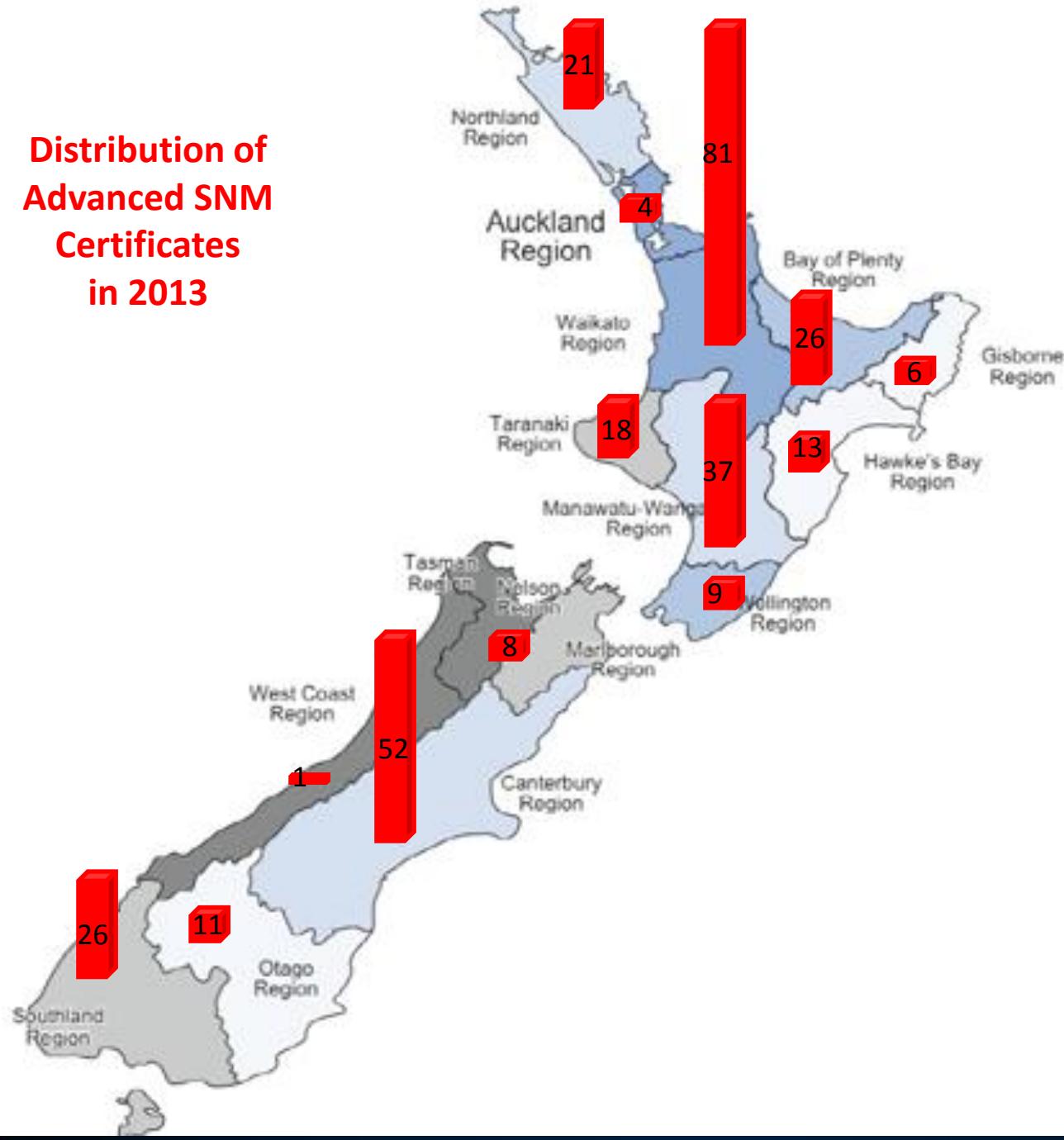
**Intermediate SNM course
2093 enrolments since 2002**



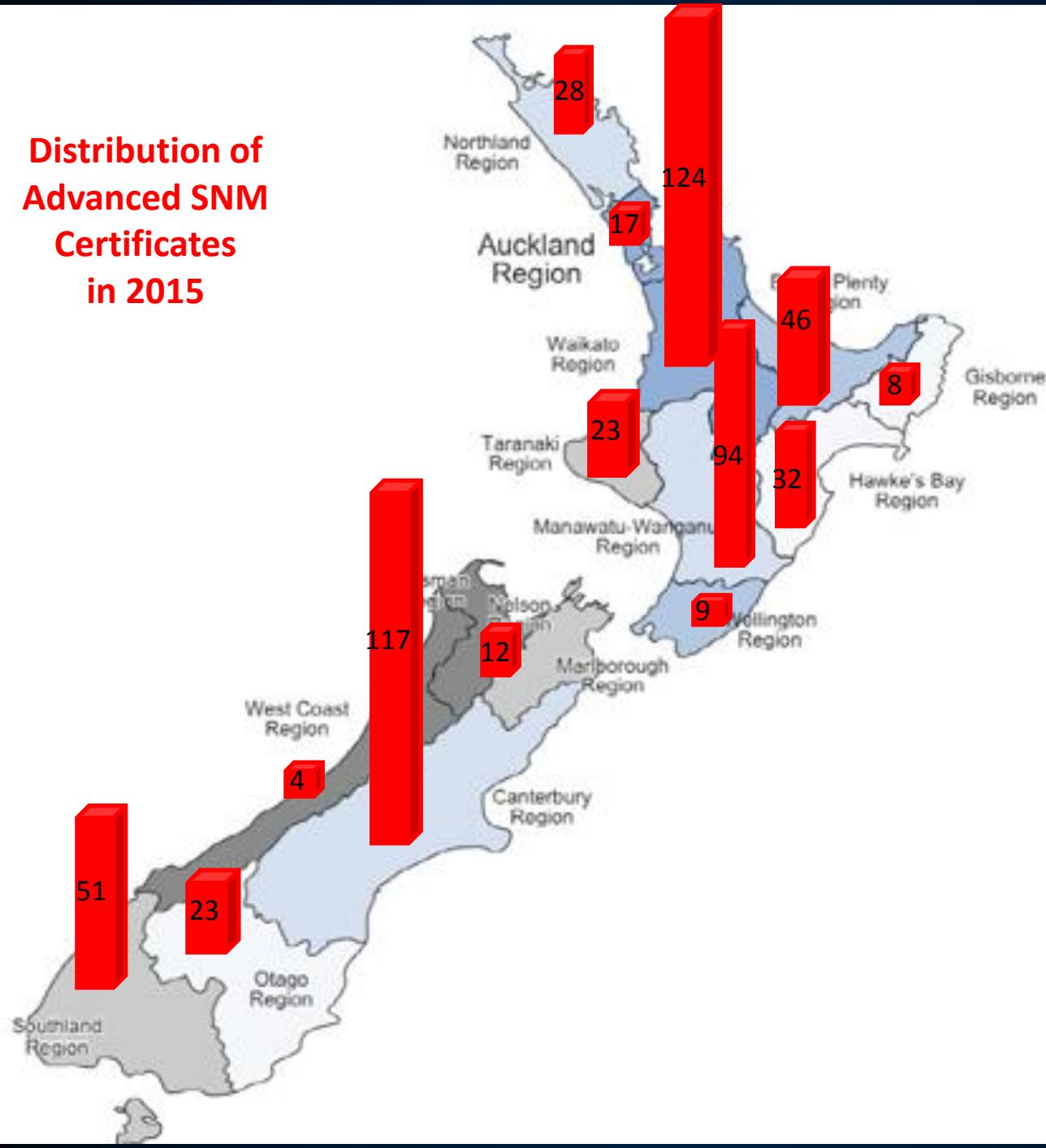
**Advanced SNM course
856 enrolments since 2002**



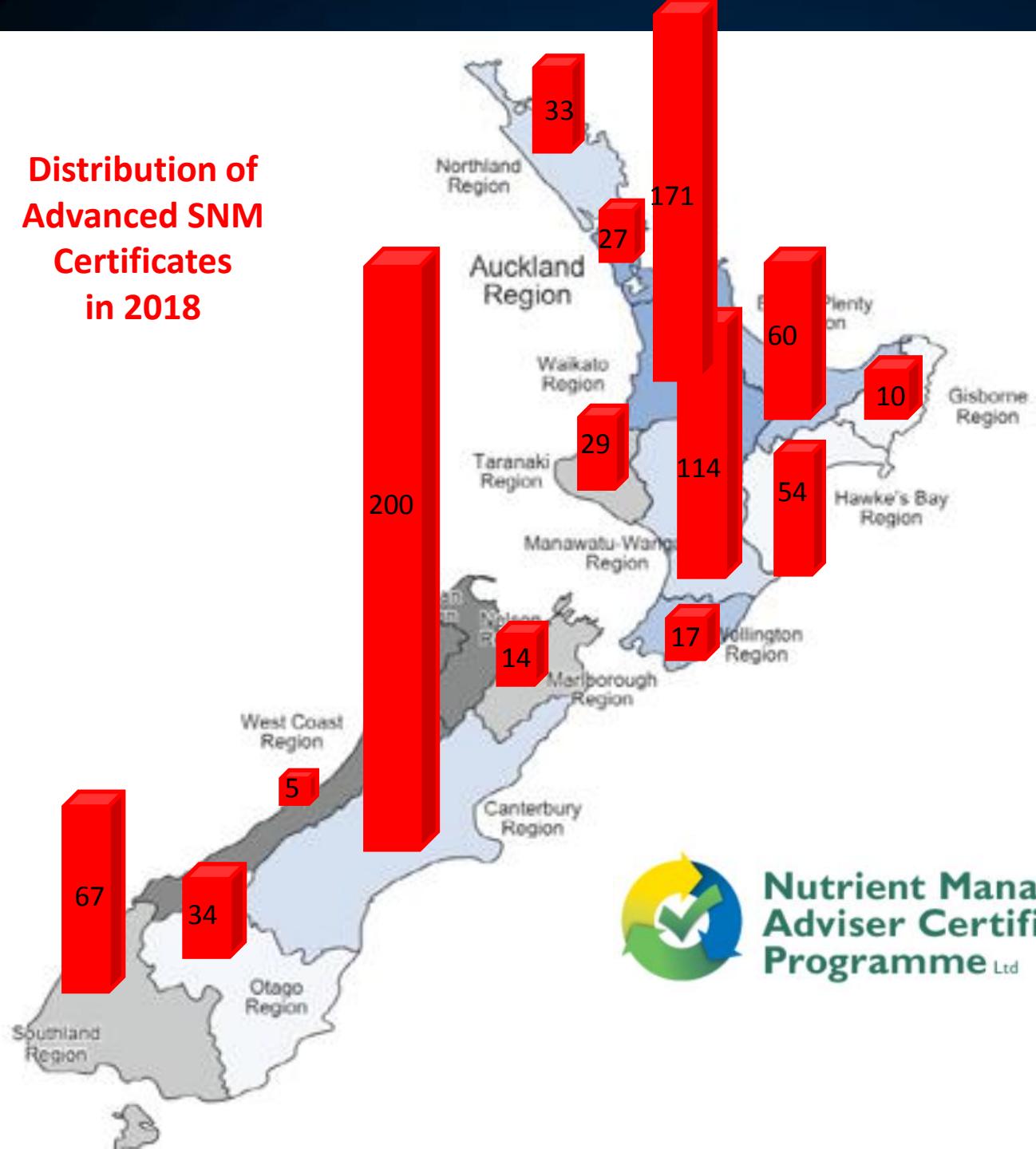
Distribution of Advanced SNM Certificates in 2013



Distribution of Advanced SNM Certificates in 2015



Distribution of Advanced SNM Certificates in 2018



**Nutrient Management
Adviser Certification
Programme** Ltd

What will the nutrient management plan include ?

- **Farm/Block description – farm property map**
- **Soil and Land Use Capability Map at paddock scale**
- **Soil, plant test information**
- **Crop management plan, irrigation plan**
- **Nutrient budget, fertiliser recommendations**
- **Compliance Checklist**
- **Mitigation Plan – if required to reduce loss of nutrients, sediment and reduce contaminant accumulation.**
- **Communicate implementation to – staff and contractors.**
- **Describe a monitoring programme to re-evaluate plan periodically**

