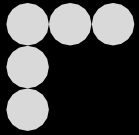




LEFTFIELD INNOVATION

Taranaki Farm Systems, Markets & Land Use Opportunities

Sept 2022



Limited species produce food in quantity...

ECOSYSTEMS, BIODIVERSITY, GENETIC RESOURCES

Just **4** of 30,000 edible plants provide **60%**
of the world's dietary energy intake



rice



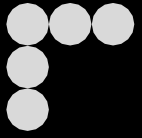
wheat



maize

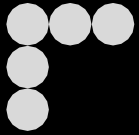


potato



If NZ had been colonised from Asia what would we be growing?





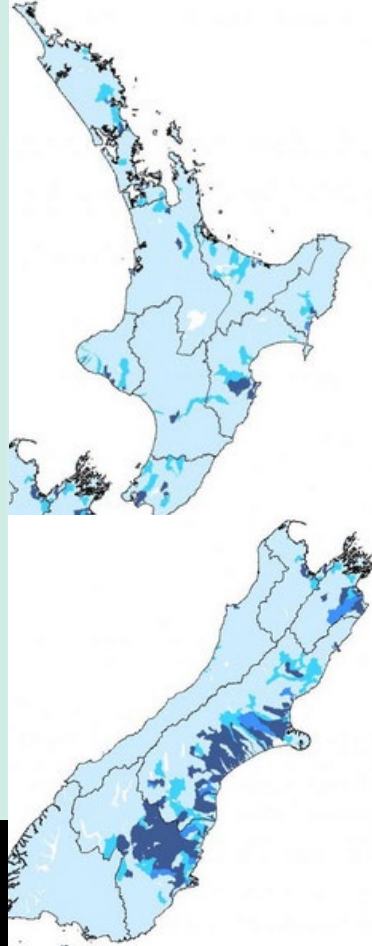
The NZ scene

New Zealand has plentiful fresh water

145 million litres per person per year

Canada	→	82 MILLION LITRES
Australia	→	22 MILLION LITRES
United States	→	9 MILLION LITRES
China	→	2 MILLION LITRES
United Kingdom	→	2 MILLION LITRES

SOURCE: Statistics NZ 2011, World Bank 2013



New Zealand has...

425,000 km
OF RIVERS AND STREAMS



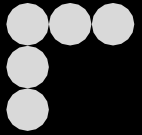
4,000+
LAKES



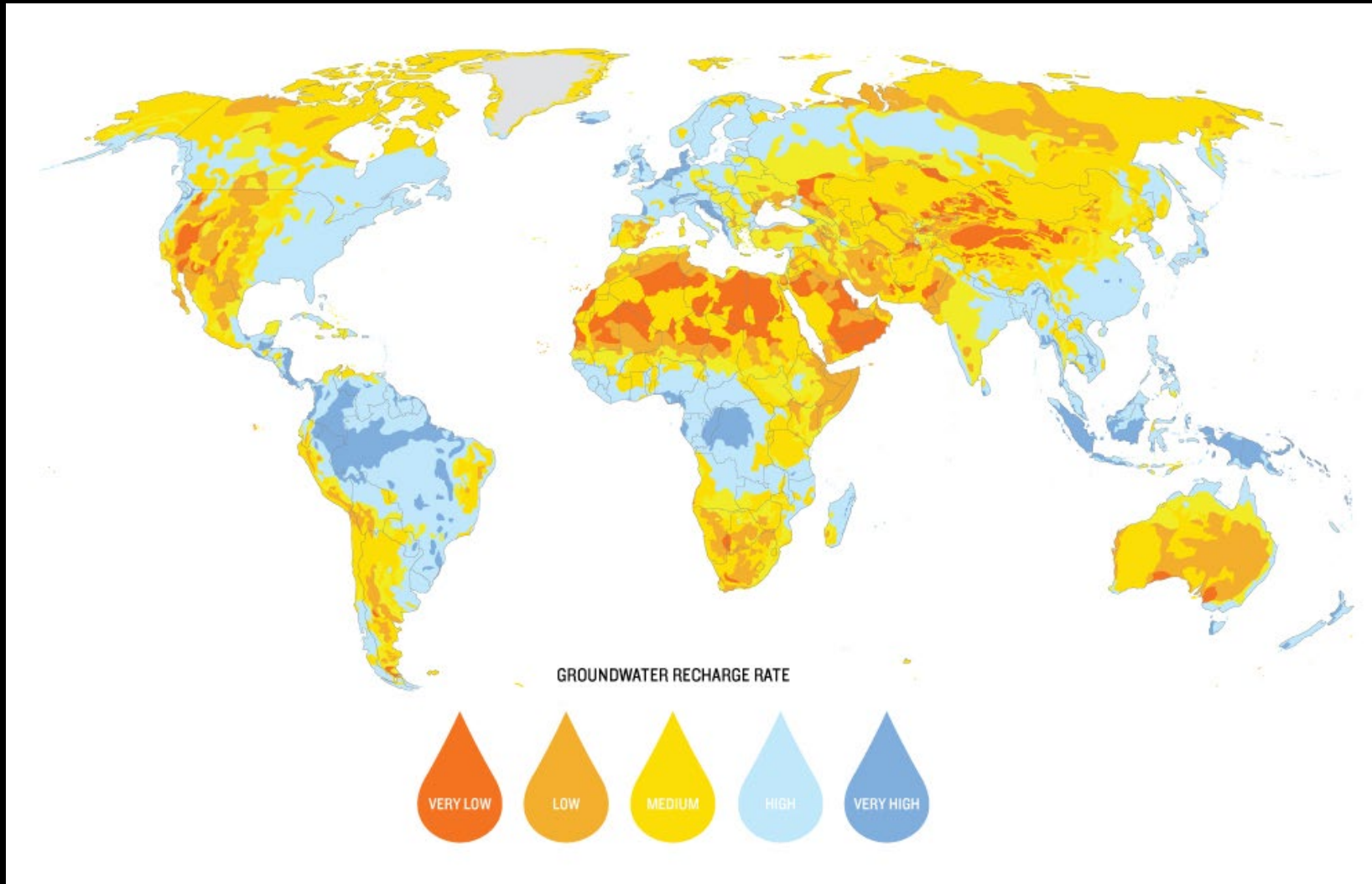
200+
AQUIFERS

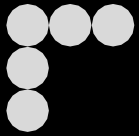
SOURCE: MFE 2007





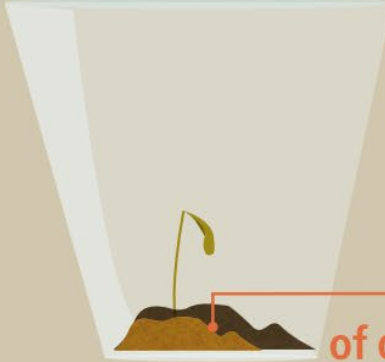
Water as a limiting factor







Soils as a limiting factor


OUR SOILS TODAY




33% of global soil is moderately to highly degraded through **erosion, salinization, compaction, acidification, chemical pollution & nutrient depletion** hampering **soils functions** and affecting **food production**




83% of rural people in **Sub-Saharan Africa** depend on their land for livelihood

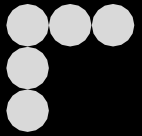


in most countries there is **little opportunity for expansion of arable land**

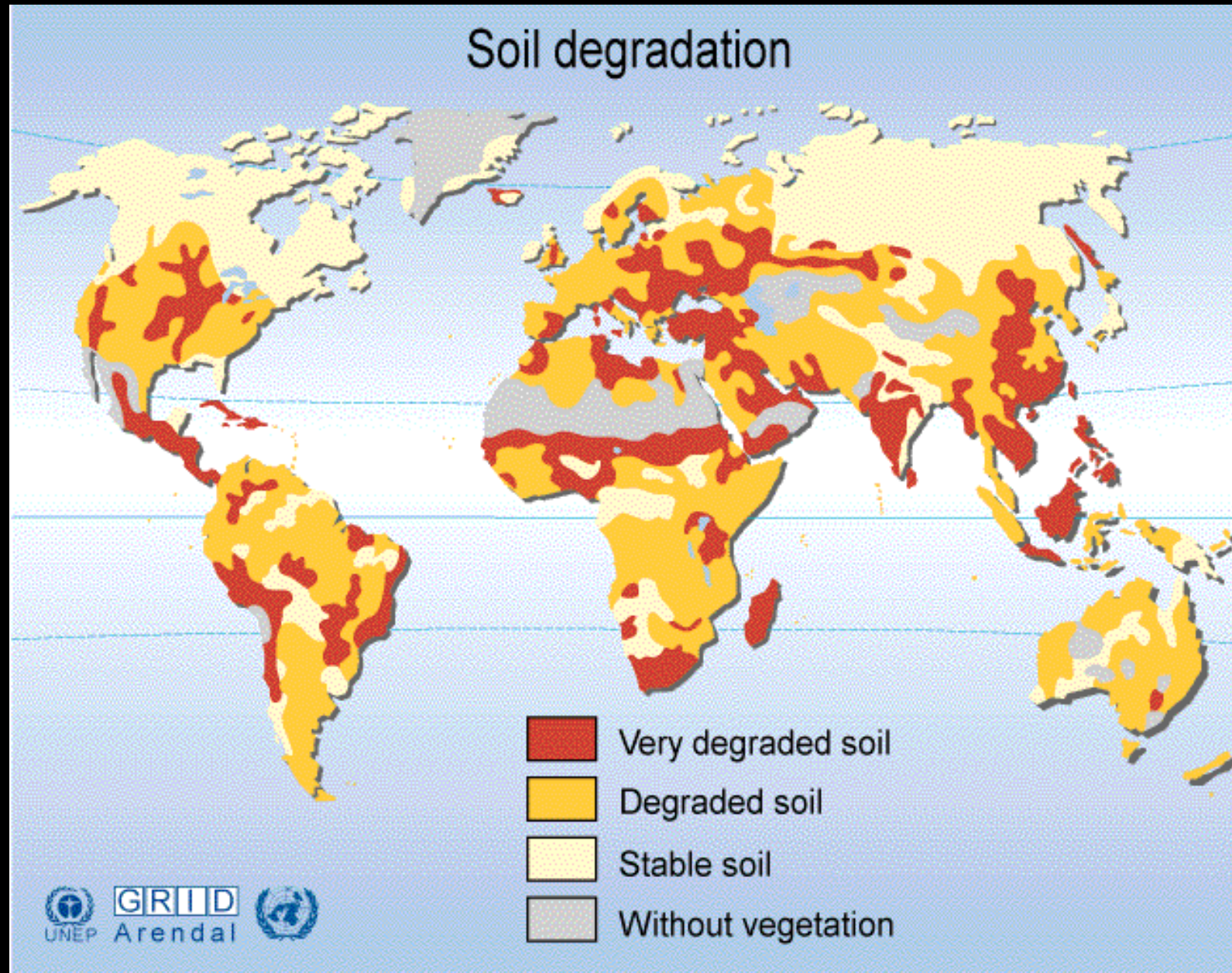


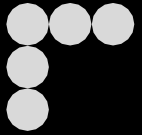
40% of Africa's soils are currently degraded





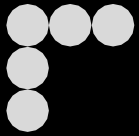
NZ – has soil, use wisely





What is Taranaki's competitive advantage?

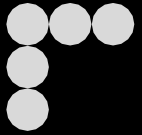
- Water
- Soil
- Skilled food producers
- Sustainable production systems
- Temperate climate
- Stability, agility, integrity,



Land use diversification - Taranaki

Key considerations

- Market – local, domestic, export – now and future, value chain
- Capture value , Create value – what is unique?
- Sustainability – financial, environmental, social, cultural
- Infrastructure – on-farm, in region, accessible
- Skills & labour
- Farm systems – long-term crop, pasture renewal, perennial, environmental.
- What to grow – grains, vegetables, environmental

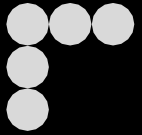


A sustainable whole farm system

Integration of land use activities into an operational framework and business model to benefit current and future generations.

- Environmental – climate, soil, weeds and pests, water and nutrients, biodiversity
- Economic - capital investment, time frame, resilience, infrastructure
- Social – employment, skills, networks, community
- Cultural - Whānau are connected to whenua

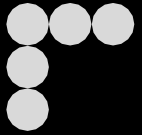




Environmental impacts of a farm / crop system



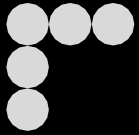
- Soil – increase nutrient return, minimise cultivation, improve water infiltration & storage, erosion, compaction, organic matter - restorative crops, deep rooting.
- Nutrient loss / use – target low nutrient loss.
- Water use – maximum water use prior to water deficit.
- Biodiversity – maintain above and below ground
- Agrichemicals – reduce use and resistance risks, animals.
- Greenhouse Gas Emissions – Carbon zero



Possible crops

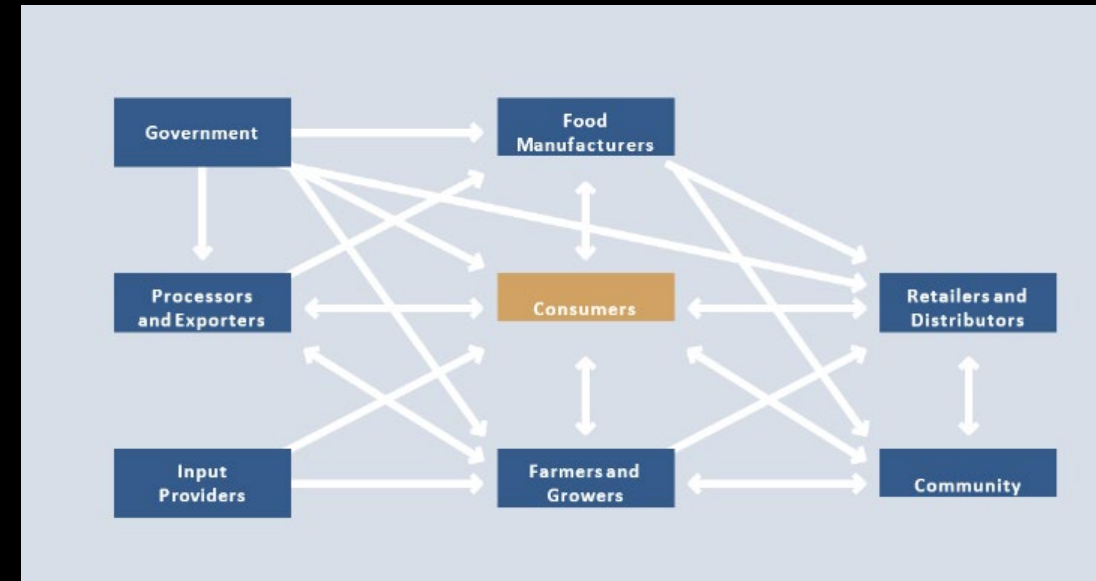
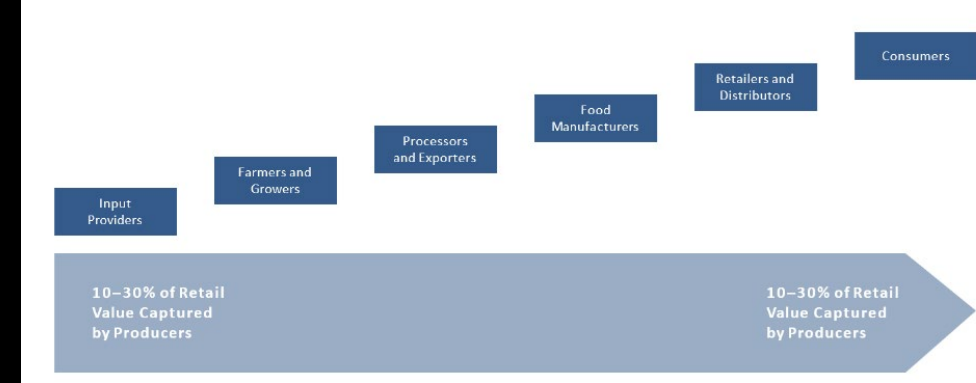
Annual crops to suit Taranaki soils and climate.

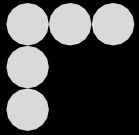
- Grains – wheat, maize, sorghum
- Legumes – faba beans, annual clover
- Vegetables – kūmara, sweetcorn, garlic



Business model

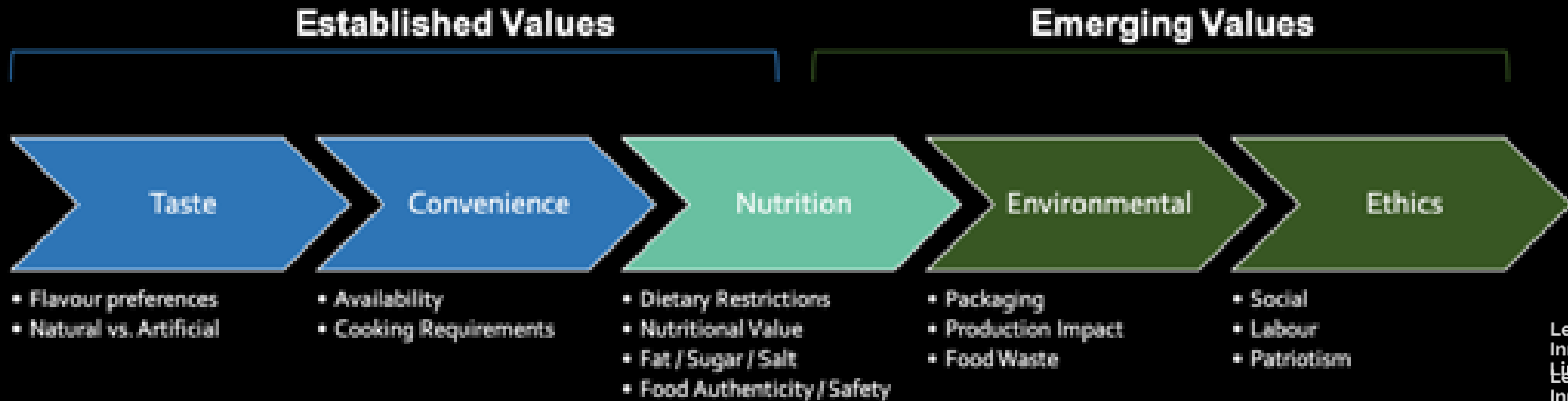
- Aligned values (economic, environmental, social and cultural)
- Supply chain vs web
- Landowners interacting with and understand customers and consumers
- Shared value - price fluctuates – participants share
- Landowners participate beyond the farm gate
- Long term supply agreements - volume based / price related formula
- Quality-based pricing structure - continued quality improvement
- Diversified land uses – spread risk
- Joint approach to troubleshooting and risk management
- Build on the values or provenance of the participants
- A high-trust relationship

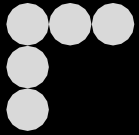




Market

- Local
- Domestic
- Export
- Value Capture – Value create
- Provenance, niche, taste, health, sustainable
- Commodity





Market positioning

Early market - Sweetcorn, kūmara

Niche market – Sorghum, garlic, faba beans

Winter market – Grazing, vegetables

Trend market – Sorghum

Health – Kūmara, sorghum

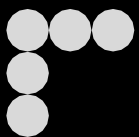
Commodity market – Wheat, faba beans, sorghum, maize

Provenance market – Kūmara, garlic

Export market – Kūmara, sweetcorn, garlic

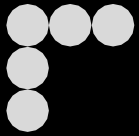
Processed – Kūmara, sweetcorn, sorghum, garlic, wheat, maize, faba beans





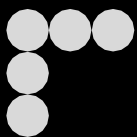
Infrastructure

Product	Growing	Harvest	Storage	Transport	Packing	Processing	Market
Sorghum	Precision drill	Combine	Drier Seed store	Bulk	Seed cleaner	Dehuller	Import substitution
Maize	Maize drill	Combine	Drier Seed store	Bulk	Seed cleaner	Mill	Domestic
Wheat	Drill	Combine	Drier Seed store	Bulk		Flour / feed mill	Local
Kūmara	Specialist planting - tipu	Specialist harvester	Coolstore	Bulk Bins	Grading & packing	Possibly	Domestic & export
Sweetcorn	Precision drill	Hand or machine	Coolstore	Bulk or bins	Grading & packing	Possibly	Domestic & export
Garlic	Specialist planter	Specialist harvester	Drier Coolstore	Bins	Grading & packing	Possibly	Domestic & export
Faba beans	Drill	Combine	Drier Seed store	Bulk		Dehuller Feed mill	Local



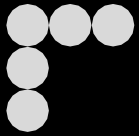
Infrastructure kūmara

- Tipu production – nursery, beds, cloches, workspace, coolstore
- Cultivation – tractor, cultivator, moulder, mulcher, fertiliser spreader, sprayer
- Planting – trailed planter, watering system
- Harvest – rotary slasher, kūmara lifter, bins, tractors, bin trailers
- Storage – service hub loading / unloading sheds and pad, forklift, coolstore
- Packing – packhouse, grading machine, packing machine
- Processing – depends on the product



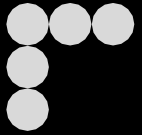
Infrastructure costs

Equipment / infrastructure	Indication of possible price
Tractor 250-300hp low hours	\$170k
Rotary hoe or power harrow 6m	\$60k
Off set discs and packer	\$70k
Kūmara moulder	
Mulch laying machine	\$10k
Three row Kūmara harvester	\$300k
Sprayer trailed – 24m	\$60k
Fertiliser spreader	\$25k
Coolstore	\$1200/m ²
Packhouse costs	
Bins	\$140 each
Direct drill 6m	\$90-150K
Combine harvester / jockey bin	Contracted
Bird scarer	\$6k each
Auger – grain, seed	
Silo – grain and seed	\$250/t
Seed cleaner	\$50k+
Precision planter – sorghum, beans, melons	\$50k +
Dehuller – sorghum	
Flour mill – price depends on scale	
Sweetcorn harvester (single row)	\$25k +
Hydrocooler - sweetcorn	
Drier	



Labour

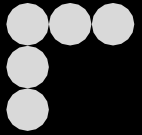
Month	Hand labour field	Hand labour packing	Machine field
January	Harvest sweetcorn and garlic	Packing sweetcorn, garlic	Garlic, faba bean harvest
February	Harvest sweetcorn and garlic	Packing sweetcorn, garlic	Harvest wheat, faba bean, garlic
March	Harvest sweetcorn and kūmara	Packing sweetcorn, garlic kūmara	Harvest kūmara
April	Kūmara harvest	Packing kūmara	Harvest sorghum. Winter crop planting
May		Packing kūmara	Harvest sorghum. Winter crop planting
June	Moving break fences	Packing kūmara	Garlic planting
July	Moving break fences	Packing kūmara	Garlic, faba bean planting
August	Moving break fences	Packing kūmara	Wheat, faba bean planting
September	Kūmara tipu preparation		Wheat planting
October	Kūmara tipu preparation, kūmara field planting		Kūmara, sorghum land preparation and planting
November	Kūmara field planting		
December	Kūmara field planting		



Possible key crop - Kūmara

- Growing season – Sept – April. 140-170 days
- Cultivation - intensive
- Crop management – agrichemicals
- Climate - Soil temp over 15C. 20-25C. Drought sensitive- irrigation, mulch
- Labour intensive – planting and harvest
- Infrastructure – on farm and storage.
- Market – early domestic, export, fresh & processed
- Environmental – soil erosion, nutrient loss, agrichemical use

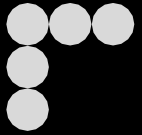




Possible crop - wheat

- Growing season – Sept to Feb (grain or silage) 140-170 days
- Cultivation - semi - intensive
- Crop management – weed control
- Climate – dry harvest window. Drought tolerant.
- Labour low – mechanical planting and harvest
- Infrastructure – harvest and storage.
- Market –2 categories (feed, food). Local, Domestic. Commodity.
- Environmental – soil erosion, deep rooting, nutrient recycling





Possible Crops

Garlic

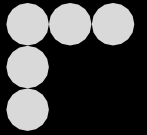


- 180- 200 days
- Cultivation – intensive
- Crop management – fertiliser, weed
- Climate – susceptible to drought and wet
- High labour
- Specialist machinery at harvest
- Market – domestic, possibly export
- Environmental – nutrient, ag chem, deep root

Sorghum



- 150 days, soil temp over 16C
- Cultivation – light
- Crop management – weed control, roots to 60cm
- Climate – drought tolerant
- Low labour
- Specialist machinery at harvest
- Market – target food grade
- Environmental – herbicides



Winter crops

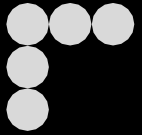
Grazing

- Beans and oats
- Grass
- Annual clover



Vegetables





Forage rape winter grazed



Wheat



Annual clover winter grazed



Sorghum



Garlic



Four year crop rotation

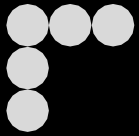
Kūmara



Winter - Beans and oats

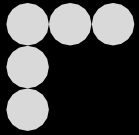
Grass winter grazed





4 year crop rotation - example

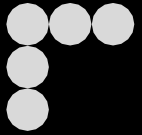
Land area	Year 1		Year 2		Year 3		Year 4	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
25%	Sorghum	Beans & oats Grazed or silage	Kūmara	Grass Grazed	Garlic	Forage rape	Wheat	Annual clover Grass Grazed
25%	Wheat	Annual clover Grass Grazed	Sorghum	Beans & oats Grazed or silage	Kūmara	Grass Grazed	Garlic	Forage rape
25%	Garlic	Forage rape	Wheat	Annual clover Grass Grazed	Sorghum	Beans & oats Grazed or silage	Kūmara	Grass Grazed
25%	Kūmara	Grass Grazed	Garlic	Forage rape	Wheat	Annual clover Grass Grazed	Sorghum	Beans & oats Grazed or silage



Pasture renewal - crop

- Nutrient capture – wheat, sorghum, sweetcorn
- Nitrogen fixing – faba beans
- Weed management – broad leaf, grass
- Soil structure – faba beans
- Soil surface remediation – garlic, kumara



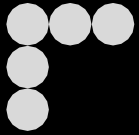


Environmental management

Miscanthus

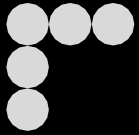
- Uses – bioenergy, bedding, nutrient management
- Perennial crop
- Harvested in winter





Next steps

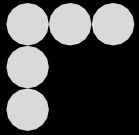
- Crop / farm system selection
- Detailed market insights research and product attributes
- Value chain assessment
- Business model development
- Field trials – cultivars, growing techniques



Kūmara

- Health – high potassium, low GI, high carbohydrate, high vitamin A & C
- Global growth 2.5% p.a.
- Major competitors – Kaipara, China, North America
- Imports – significant (needs confirmation) China (84%)
- Opportunities – provenance, early market, baby food, food service (50% would prefer as a healthy option to fries)

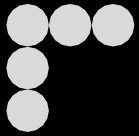




Sorghum

- Health – gluten free, low GI, high fibre
- All product is imported to NZ
- Global growth 4.4%
- Uses – food, animal feed, biofuels
- Major market in NZ flour as a gluten free flour – mixed with other flours as is dry





Wheat

- High quality - traceable
- Replacing imported wheat - provenance
- Grown to specifications – agrichemical
- Uses – food, low grade to feed
- Niche milling



FLOUR TO THE PEOPLE

The New York Times Magazine

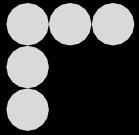


Bread Is Broken

Industrial production destroyed both the taste and the nutritional value of wheat. One scientist believes he can undo the damage.

By FERRIS JABROCT. 29, 2015
[read the full article here](#)

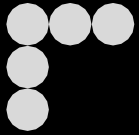
Photo: Kenji Aoki for The New York Times



Faba beans

- A rich protein source – 27 -32%
- A good source of fibre
- Other non-nutrient compounds important for human health
- Some anti-nutritional compounds
- Used as flour or bean for food – healthy snacks
- Animal feed – 35% of monogastric diet





Garlic

- Health benefits – claimed not proven
- NZ produces 1200t, imports garlic \$10.3m
- China largest producer at 23 mill tonnes
- China trade to USA dropped by 50%
- USA growth 1.6%, 108,000t p.a.
- Uses – fresh, processed, powder etc.

THE CASING
boutique

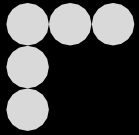


Garlic Powder

50g

1.90 NZD





Market / value chain

Local

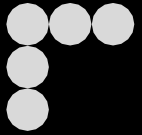
- Increased focus on grown local – provenance, quality, food miles

Domestic

- Increased focus due to shipping, international conflicts, world food demand, biosecurity

Export

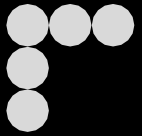
- Increasing opportunity sustainability, quality



Exporting water



Only 6 hours or 6 days away?



Recommendations

- What makes Taranaki unique?
- Capture and create value - Provenance, health and traceability should be captured.
- Kūmara – understand market opportunities, set up and test a Taranaki growing system.
- Commodity crop, suited to crop rotation, **ONLY PROGRESS** if secure long term viable markets.
- Scale – need to collaborate / partner other landowners and processors.
- Animals are integral to the farm system – collaborate.
- **START WITH** – Define and confirm market, business model, value chain analysis, field trial.





Thank you