Our Land and Water National Science Challenge

Toitū te Whenua Toiora te Wai

Next Generation Systems

Robyn Dynes, Anita Wreford, Alan Renwick, Warren King, Paul Johnstone, Peter Clinton, Carolyn Hedley, Grant Edwards.
Beyond business as usual

Exports: adding Value to Volume

Environmental outcomes

Next Generation Systems
Linking to other Challenge research & aligned research
Sources & Flows

The Problem

- We know Water Quality needs to improve
- We know the contaminants are coming from the land

- So **what** do we need to do on the land and **where**?
  - Within a catchment
    - **Sources** = what to target
    - **Flows** = where to target

Next Generation Systems:

- new systems
- New technologies
- Transformational change
Feedback from receiving environments to land use decisions at source areas.
The value chain

Next Generation Systems:

- Science supporting business innovation
- Selecting NGS in with complex drivers
- Multiple criteria decision making.
Vision Mātauranga

--- partners in transformation

--- sharing collated data

---- case studies in value chain

----- case studies in supply chain development?
Why science in NGS

• Development, redesign, New technologies

• Science supporting innovation
• Business decision
• Which solutions have comparative advantage??
Which system?
Financial
- Capital investment
- Return/ha (profitability of enterprise)
- Return on Investment
- Payback period
- Variability in profit

Market factors
- Scale of market
- Ability to capture value added
- Supply variability
- Strength of supply chain

Environment Domain
- N leaching, Erosion
- P losses, E. coli
- GHG emissions

Regulation
- Water,
- Animal welfare
- Food safety
- Building

Social well-being
- Community acceptability
- Impact on communities
- Quality of life

Knowledge base
- Current state of knowledge
- Similarity to existing systems
- State of Technology
- Level of Confidence

System choice
Case study-sheep milking
Weights at Domain Level

Equally Weighted
Weighting of each alternative under each criteria – sheep dairy example
## Selection of Preferred Options

<table>
<thead>
<tr>
<th></th>
<th>Milking Sheep (Actual)</th>
<th>Dairy Goats</th>
<th>Blueberries</th>
<th>Specialty seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int 1</td>
<td>3.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Int 2</td>
<td>3.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What are the benefits from partnering with NGS?

**Business**
- Certainty of investment
- Less risk

**Science**
- Investment priorities

**Industry**
- Consistency of desired product
- Valued NZ brand
- Shifting culture and performance
Next Generation Systems: partnerships with innovators

- Corporate farming: redesigning systems within nutrient limits
- Corporate farming: diversifying portfolio
- Maori: iwi and collectives exploring alternatives
Next Generation Systems: case studies of optimised systems

- Value chain – Taupo beef
- Precision Agriculture - Greenvale pastures
- Continuous-harvest forestry
- Iwi – supply chain development
- ????