



Our Land & Water Symposium – The Way Forward, Wellington, 4-5 April 2018

Precision Productivity Services

Ngā Rātonga Tino Hāngai mō te Whakaputaranga

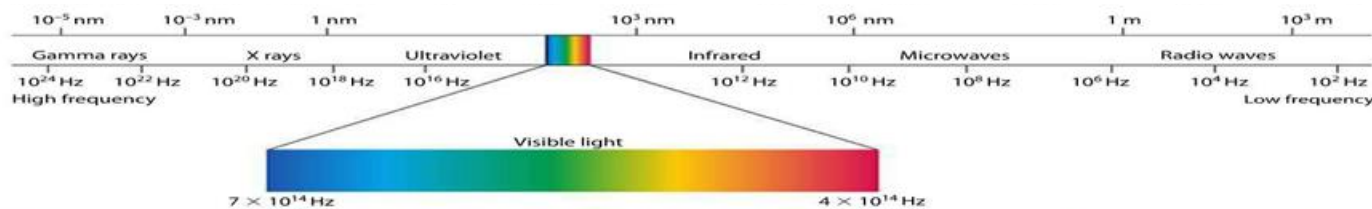
Carolyn Hedley & Pierre Roudier



The Challenge: enhance value of primary sector;
maintain/improve land and water quality

Addressing the Challenge:

- Precision sensor surveys quantitative soil variability (<10m)
- In-field connected sensors timely management decisions (<1day)
- Precision maps and continuous feedback = high spatial and temporal resolution data



Gamma



visual



- Lidar



Vis-NIR



IR



radio



EM

Precision soil management



- Mapping

- Sensor surveys = quantitative soil variability maps

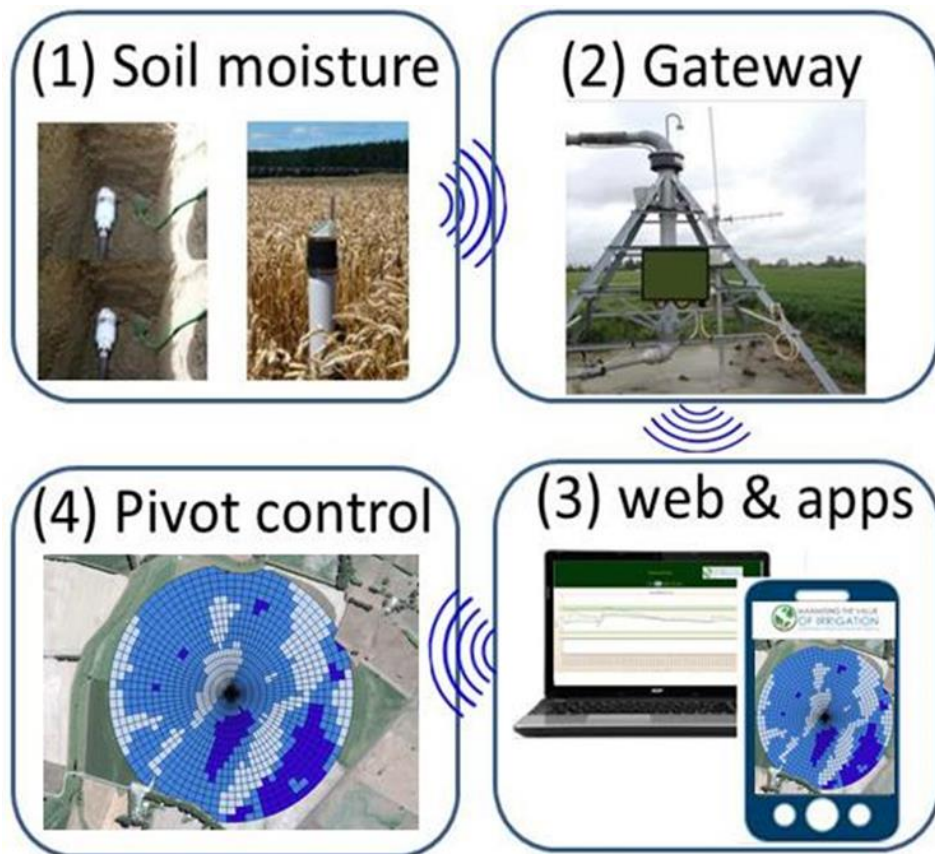
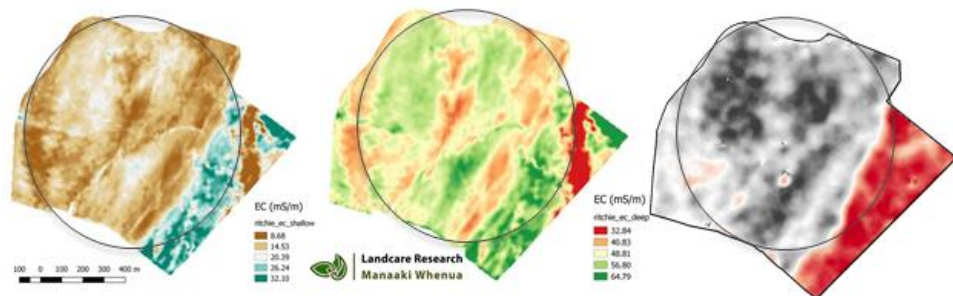
- Monitoring

- near real-time sensor feedback
- High resolution in space and time

- Management

- Precision machines
- Precision control
- right time, right place, right amount

5–30% saved water, inc. yield, payback 1-4y



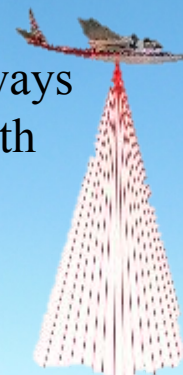
Precision services

Transforming agriculture



LiDAR

- flow pathways
- plant growth
- elevation
- wetness
- aspect
- slope



Spectral reflectance

- fertility
- moisture
- soil attributes

Crop/pasture sensors

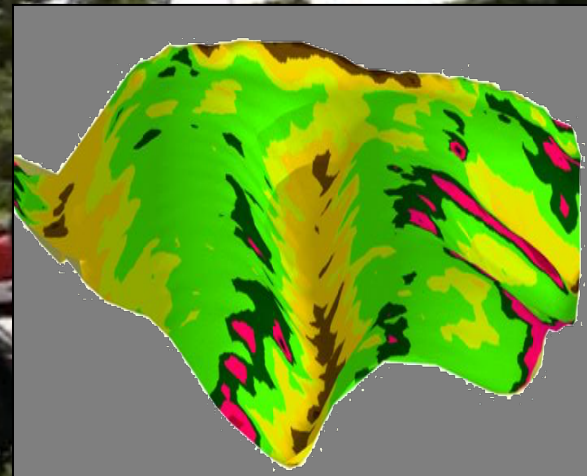
- fertility
- stress
- biomass

Redox probes

Water quality Nitrate sensors



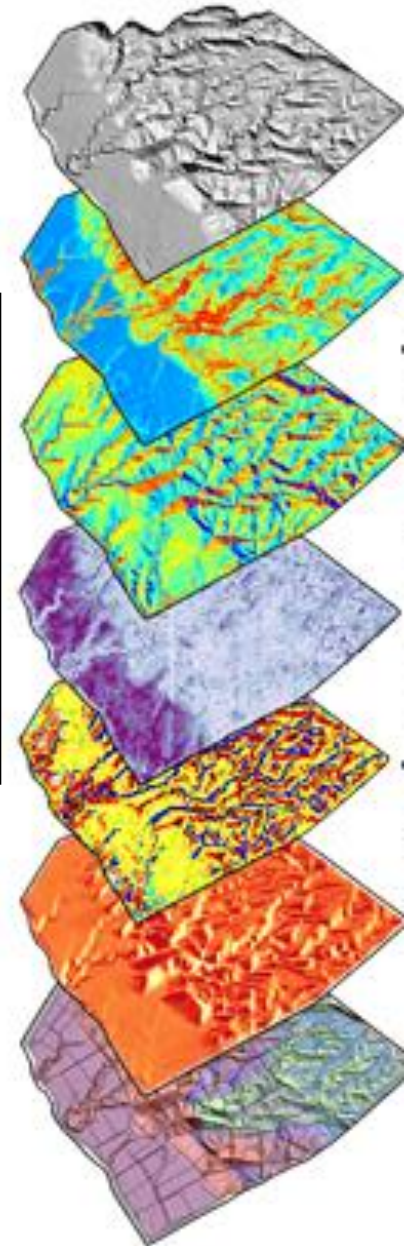
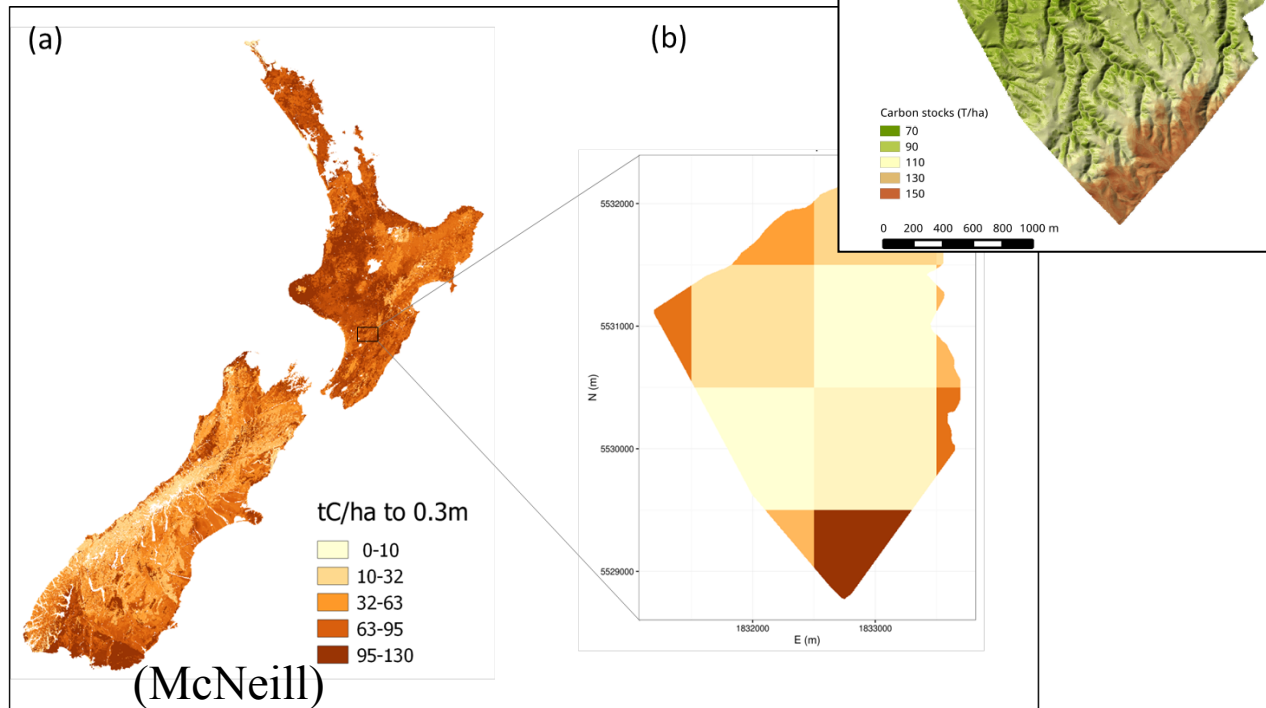
- Soil mois sensor netw
- Irrigation
 - Fertigation
 - Drainage
 - Runoff
 - Saturation
 - Compacti



Digital Soil Mapping = Next-gen. soil maps

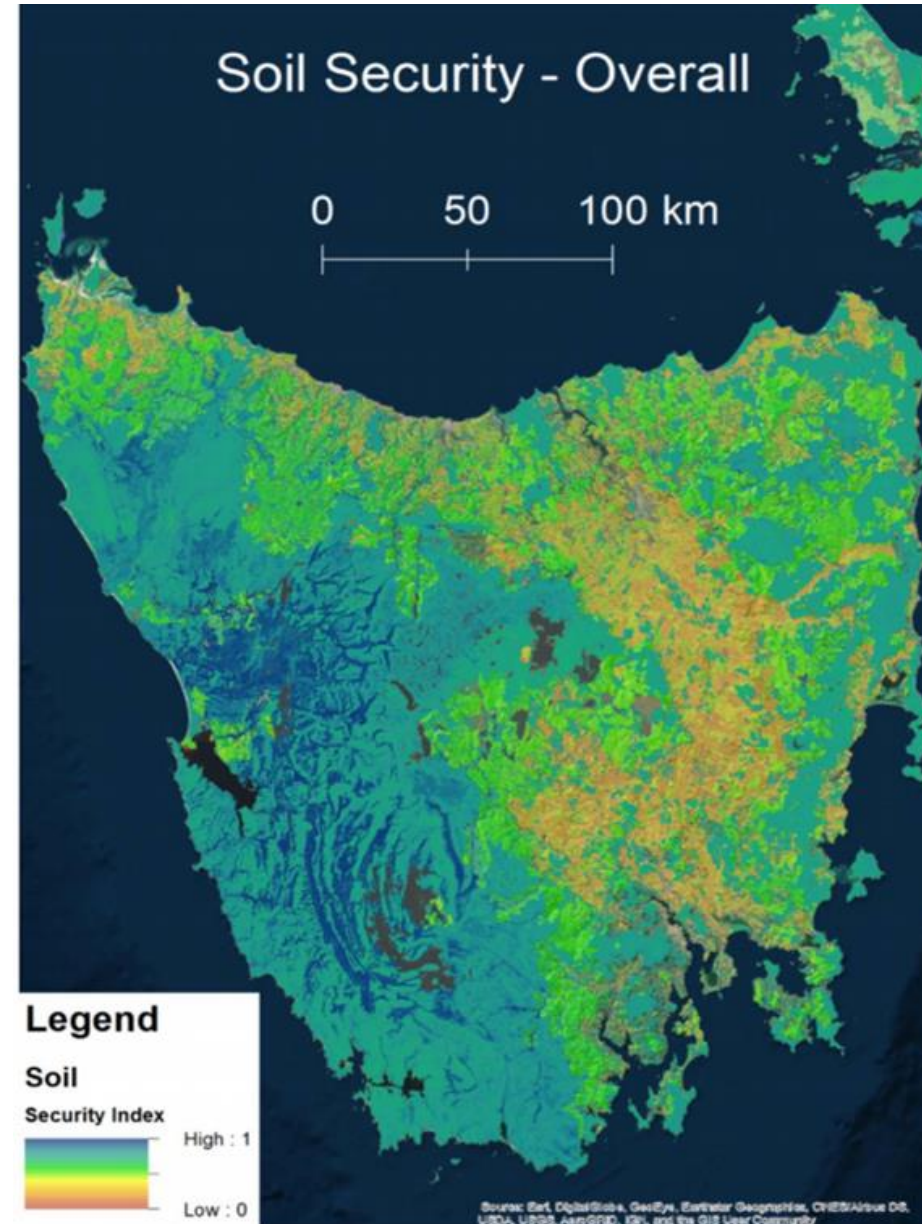


- leveraging wealth of environmental data
- machine learning (statistical inference) with covariates
- derive soil attribute maps
- predicting at different scales



Digital Soil Information

- **Dynamic** mapping of properties **critical to management**
- **Digital Soil Assessment** of land suitability
- **Soil Security** – a measure to prioritise soil protection for food security & the ecosystem services it provides
- **Connecting to hydrological models**, e.g. recharge (Westerhoff).



Kidd et al., 2015, 2018

Co-innovation short cuts science output

- Regional
 - Co-innovate environmental monitoring
 - Co-innovate regional models to inform public good
 - Interact with national networks, e.g. LAWA
- Research providers
 - holistic soil – hydrology modelling ~ paddock to region (Rogier Westerhoff)
 - Digital soil assessments (Darren Kidd)
 - Redox & nitrate sensing (Ranvir Singh)
- Industry
 - Co-innovate precision tools & decision support (Waterforce, Lindsay Int. ANZ)
- Land managers
 - Participatory research ` valuing the resource beyond capital value`
 - Guardians of our land ~ Kaitiakitanga

