Landcare Research
Manaaki Whenua

# Post-2012 Roundtable Discussion on

# The Forestry Sector

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Landcare Research

# From a research perspective

Potential for carbon storage in forests and shrublands

Significance of soil carbon storage

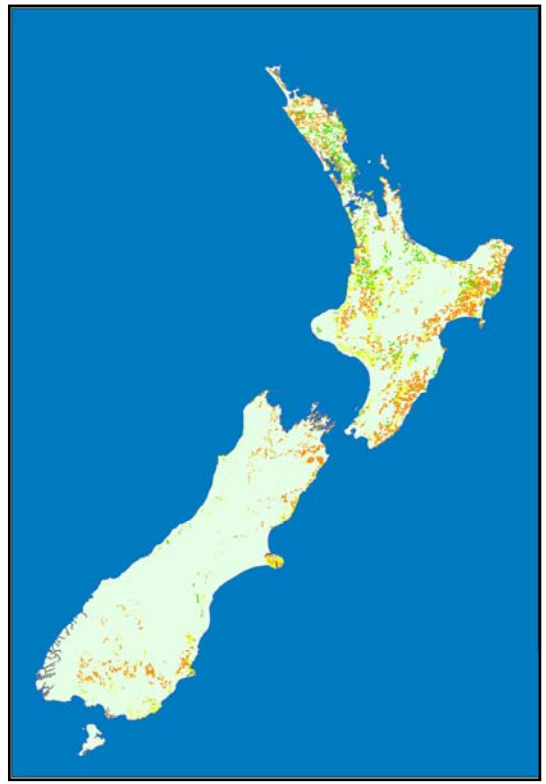
Reductions in methane and nitrous oxide emissions

Multiple benefits of forestry

Integrated assessment for policy development

# Potential for carbon storage in forests and shrublands

- Exotic forests will account for 78% of required reductions in emissions for 2008-12 period
- Additional carbon sinks from regenerating indigenous shrublands on steep, erosion-prone hill country, unsustainable for farming
- Consistent with PFSI
- National potential for 1.45 Mha with seed sources available if livestock is excluded
- Potential to reduce emissions liabilities by $ 60 million*



* based on carbon price of NZ$ 15/t $CO_2$

## Average rates of total carbon storage

| | t C $ha^{-1}$ $year^{-1}$ |
|---|---|
| Mixed age indigenous forest | 1.5 |
| Tall shrubland (40 years) | 2.2 |
| *Pinus radiata* (rotation) | 8.0 |

- Indigenous shrublands accumulate carbon for up to 35-40 years
- Storage up to 140 t C $ha^{-1}$ have been recorded
- Carbon trading can potentially tip the balance in favour of shrubland reversion when carbon prices reach NZ$ 25-30/t $CO_2$

## Albedo effect

- Minimal effects where snow is not common
- Minimal effects where tree growth rates are high
- Direct radiative forcing effect for ‘typical’ New Zealand conditions with a 5% decrease in albedo from pasture to forest is about 25 t C $ha^{-1}$, equivalent to offsetting carbon accumulation in a typical pine forest by about 3 years
- Indirect effects on evaporation and clouds are much more complex to estimate
- Possible to include discounting of ‘albedo effect’ into greenhouse gas negotiations

# Significance of soil carbon storage

- High carbon storage in soils
- National average soil carbon in terrestrial systems is 100 t C $ha^{-1}$
- Pasture to shrubland and forest results in small soil carbon losses
- Losses in shrubland are offset by net carbon accumulation in the litter of 11.5 ± 0.5 t C ha $year^{-1}$
- Accounting for soil carbon dynamics after land-use change from pasture to forestry could reduce liabilities by $ 30 million*

* based on carbon price of NZ$ 15/t $CO_2$

# Reductions in methane and nitrous oxide emissions

- Forest soils are mainly a sink for methane
  10 kg $CH_4$ $ha^{-1}$ $year^{-1}$ compared with
  1 kg $CH_4$ $ha^{-1}$ $year^{-1}$ for pasture
- Potential of present day land use to offset 14% of national livestock methane emissions, reducing liabilities by $ 9 million*
- Removing grazing animals from reverting shrubland reduces methane and nitrous oxide emissions substantially

* based on carbon equivalent price of NZ$ 15/t $CO_2$

# Multiple benefits of forestry

- Soil recovery
- Improved water quality
- Erosion control
- Reduced flooding risk
- Improved biodiversity
- Long-term succession to indigenous forest
- New industries eg. honey, plant extracts
- Eco-tourism
- Sustainable land management: the integrating dimension

EcoClimate { Integrated Research on the Economics of Climate Change Impacts, Adaptation and Mitigation

# Integrated assessment for policy development

- Collaborative approach across biophysical, economic and social issues
- Identify impacts of global change
- Determine impacts of policy scenarios
- Quantify effects of policies on adaptation and mitigation