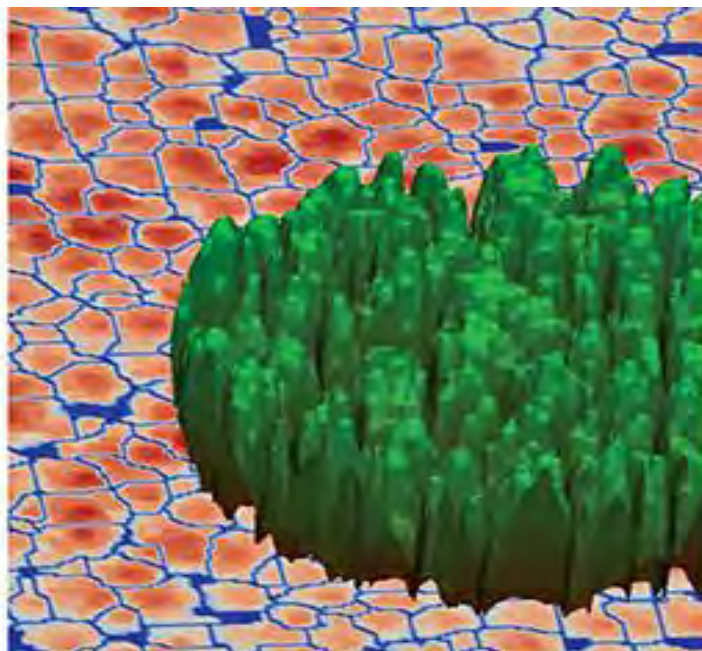# Benefits of demonstrating the full value of planted forests in policy and investment

Richard T Yao

Outline

- Issue
- Forest Investment Framework (FIF)
- Demonstrating forests' broader values
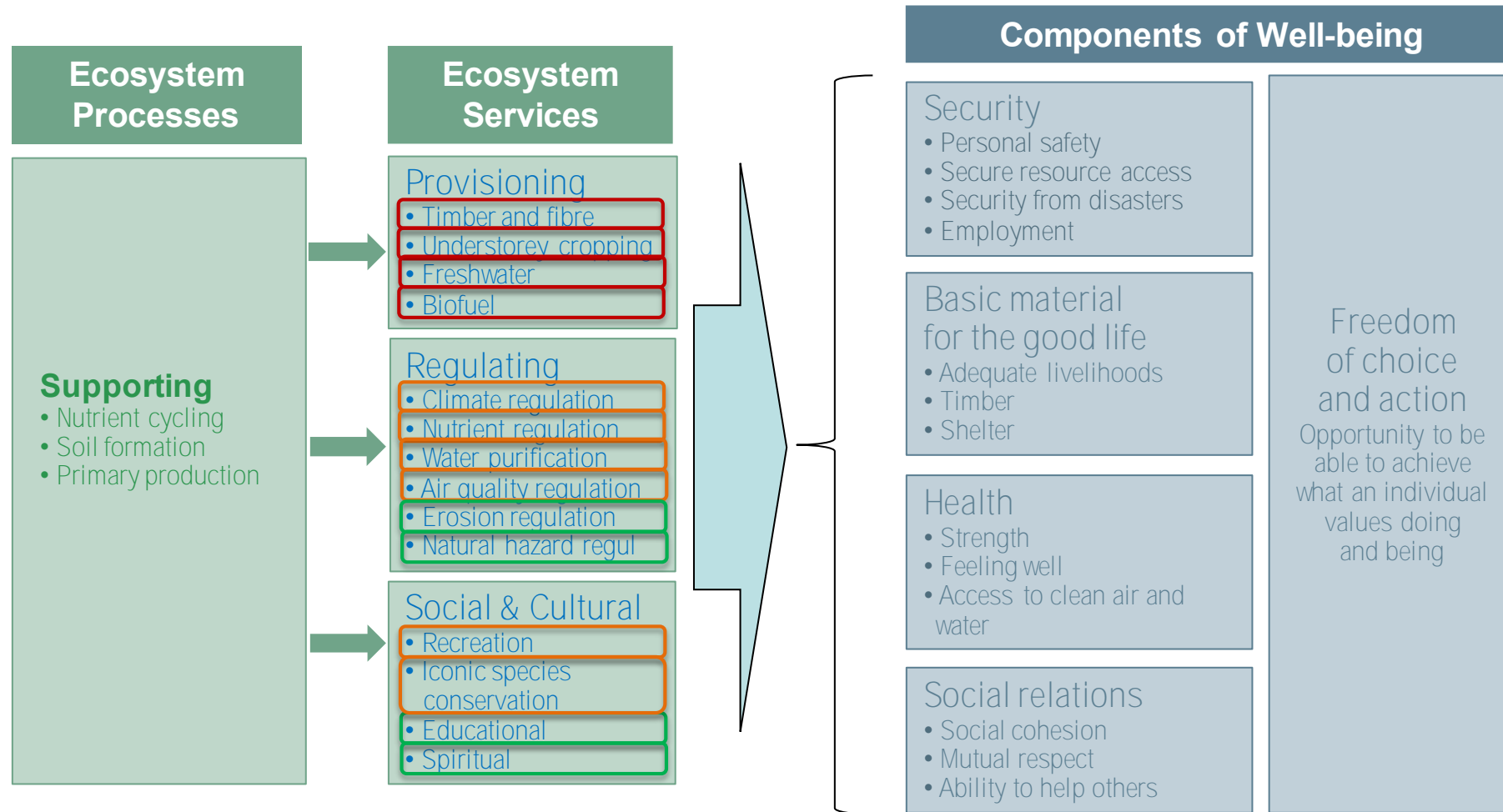- FIF's developing functions
- Conclusions and next steps

Issue

- Trees benefit landowners
  - timber revenue
  - income diversification
  - enhance landscapes
  - land productivity
  - wind deflection
- Trees provide environmental & social benefits
  - carbon sequestration
  - improve air and water quality
  - habitats for native species
  - flood mitigation
  - water flow regulation
  - recreation

Costs
$25,000/ha

Full value of forests
$75,000/ha

Adult blue duck on the Pungapunga stream, Waituhi forest

Forest ecosystem services (FES)

Ecosystem Processes	Ecosystem Services

Ecosystem Processes

Supporting
- Nutrient cycling
- Soil formation
- Primary production

Ecosystem Services

Provisioning
- Timber and fibre
- Understorey cropping
- Freshwater
- Biofuel

Regulating
- Climate regulation
- Nutrient regulation
- Water purification
- Air quality regulation
- Erosion regulation
- Natural hazard regul

Social & Cultural
- Recreation
- Iconic species conservation
- Educational
- Spiritual

Components of Well-being

Security
- Personal safety
- Secure resource access
- Security from disasters
- Employment

Basic material for the good life
- Adequate livelihoods
- Timber
- Shelter

Health
- Strength
- Feeling well
- Access to clean air and water

Social relations
- Social cohesion
- Mutual respect
- Ability to help others

Freedom of choice and action
Opportunity to be able to achieve what an individual values doing and being

Adapted from MEA (2005) and Yao et al. (2013)

Forest Investment Framework (FIF)

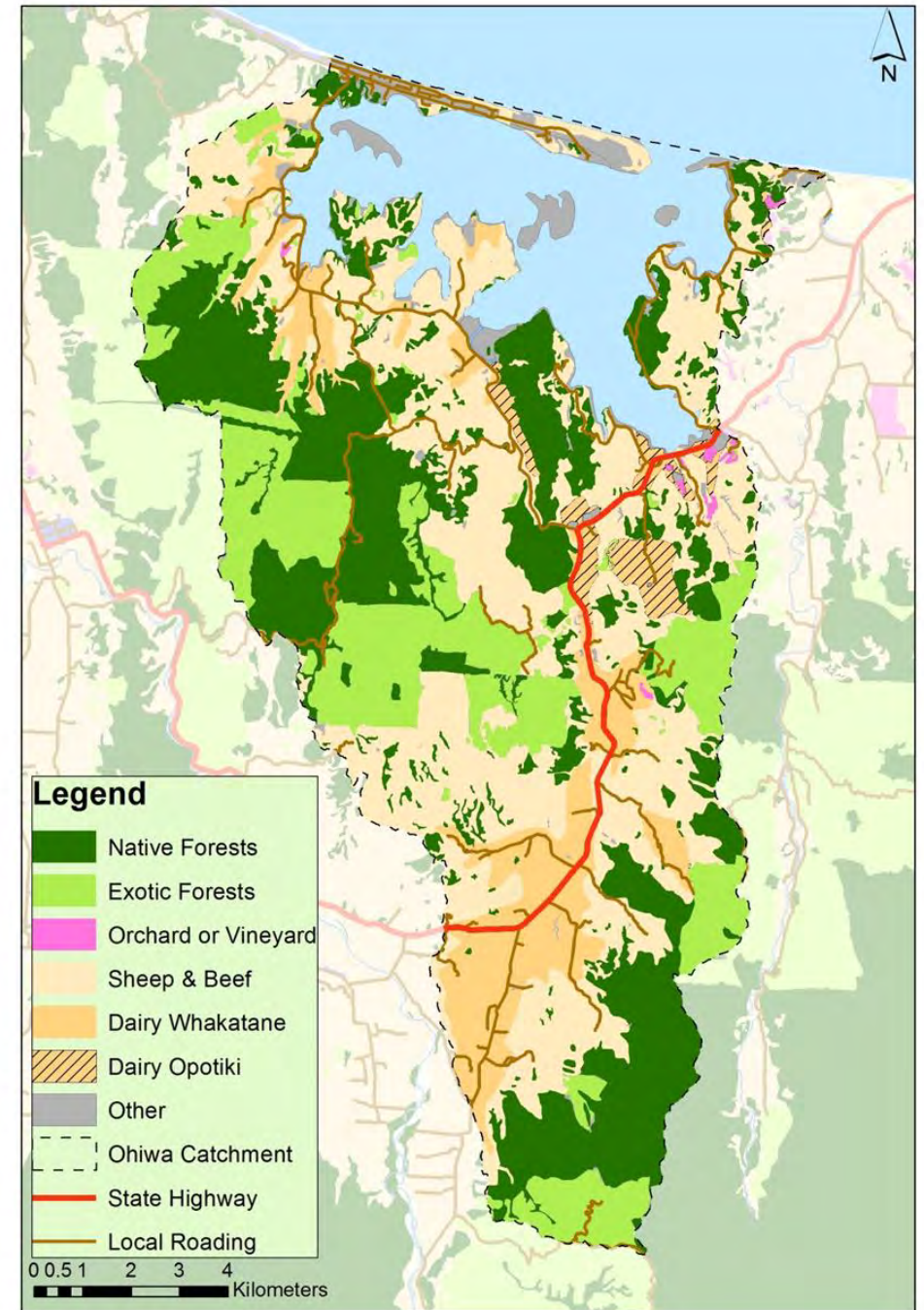300 Index, Site Index, Temperature

- A spatial economic tool
  - biophysical, economic and environmental data
  - Forestry (profitability) and ecosystem service components (C-sequestration, avoided erosion, native species habitat)
  - FIF's spatially explicit outputs include maps and tables of values of forests broader benefits

- Used by scientists, forest companies, iwi, government agencies for various purposes
- Developing functions - avoided nutrients, water yield, recreation
- More info available at
  https://www.scionresearch.com/science/sustainable-forest-and-land-management/valuing-the-forest-ecosystem/forest-investment-framework
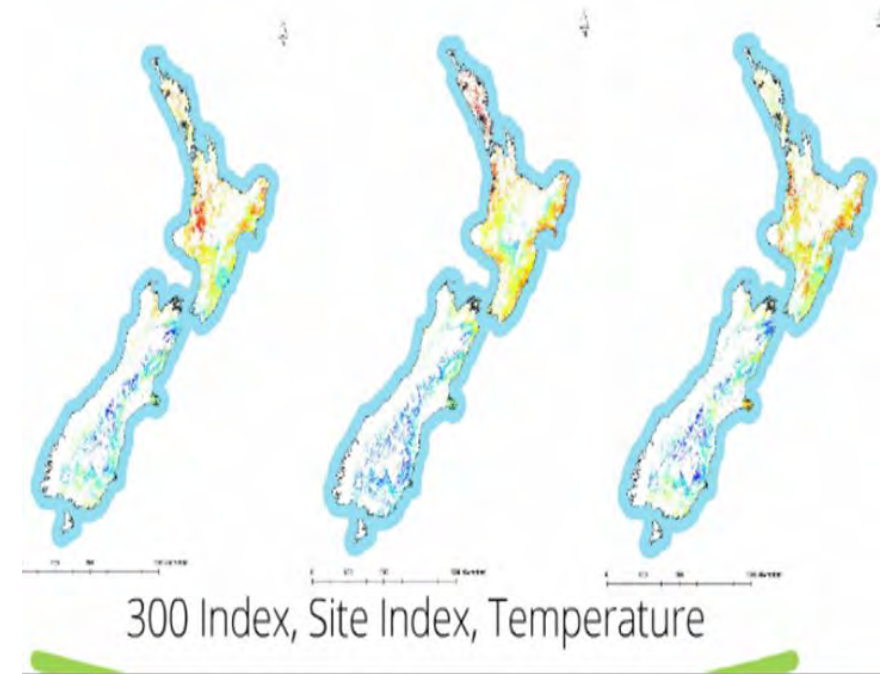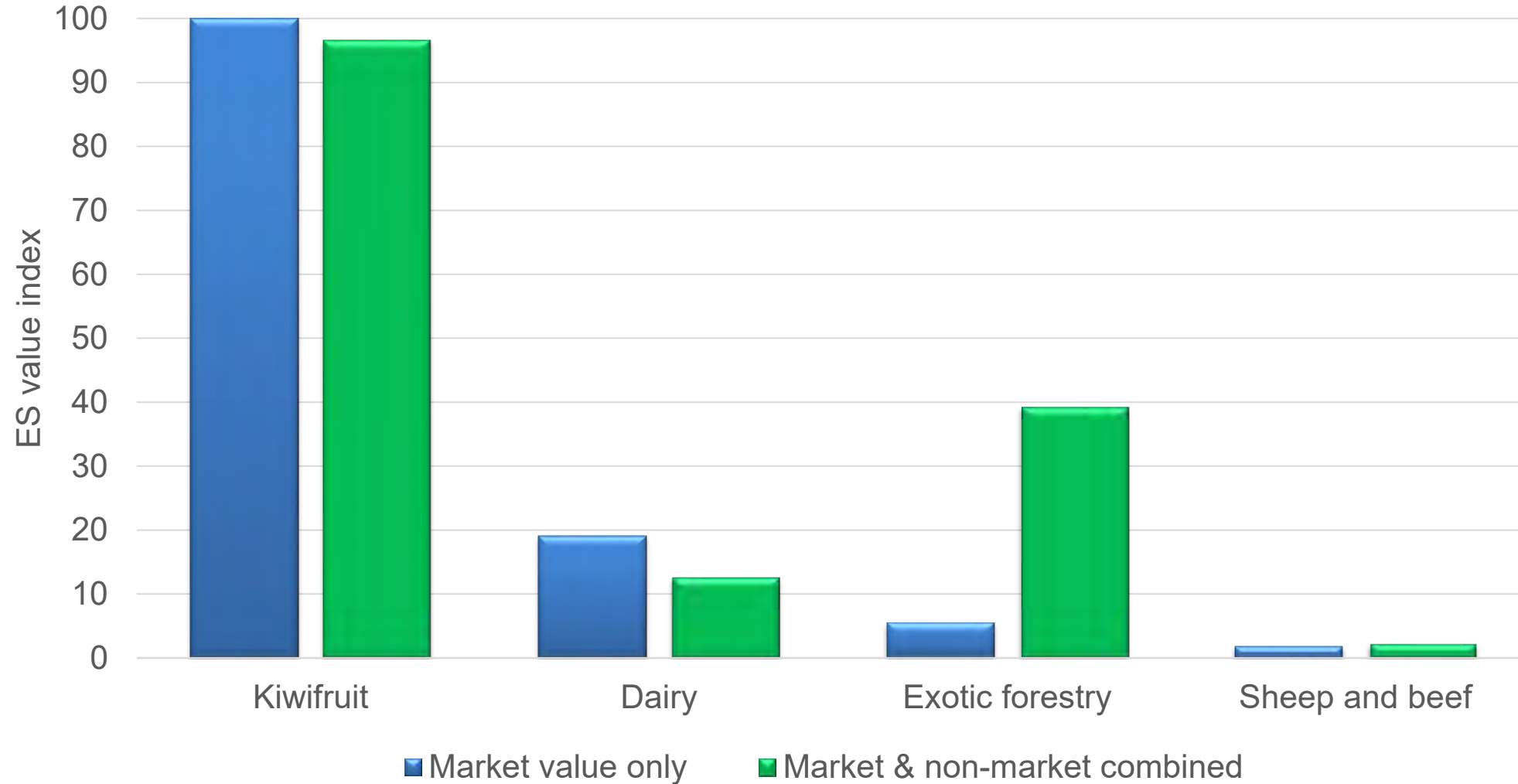
Ecosystem services in Ōhiwa

- Better understanding of ES values
  - milk, meat, timber, fruits
  - carbon sequestration, avoided erosion, nitrogen leaching
  - recreation, species conservation
- ES from key land uses
  - Dairy, S&B, Horticulture
  - Planted and native forests
  - Native scrub and wetlands
- Provide indicative ES values for policy discussion

Legend
- Native Forests
- Exotic Forests
- Orchard or Vineyard
- Sheep & Beef
- Dairy Whakatane
- Dairy Opotiki
- Other
- Ohiwa Catchment
- State Highway
- Local Roading

0 0.5 1   2   3   4
Kilometers

Ecosystem service values in the Ōhiwa catchment

ES in the Wenita Forest Products Estate
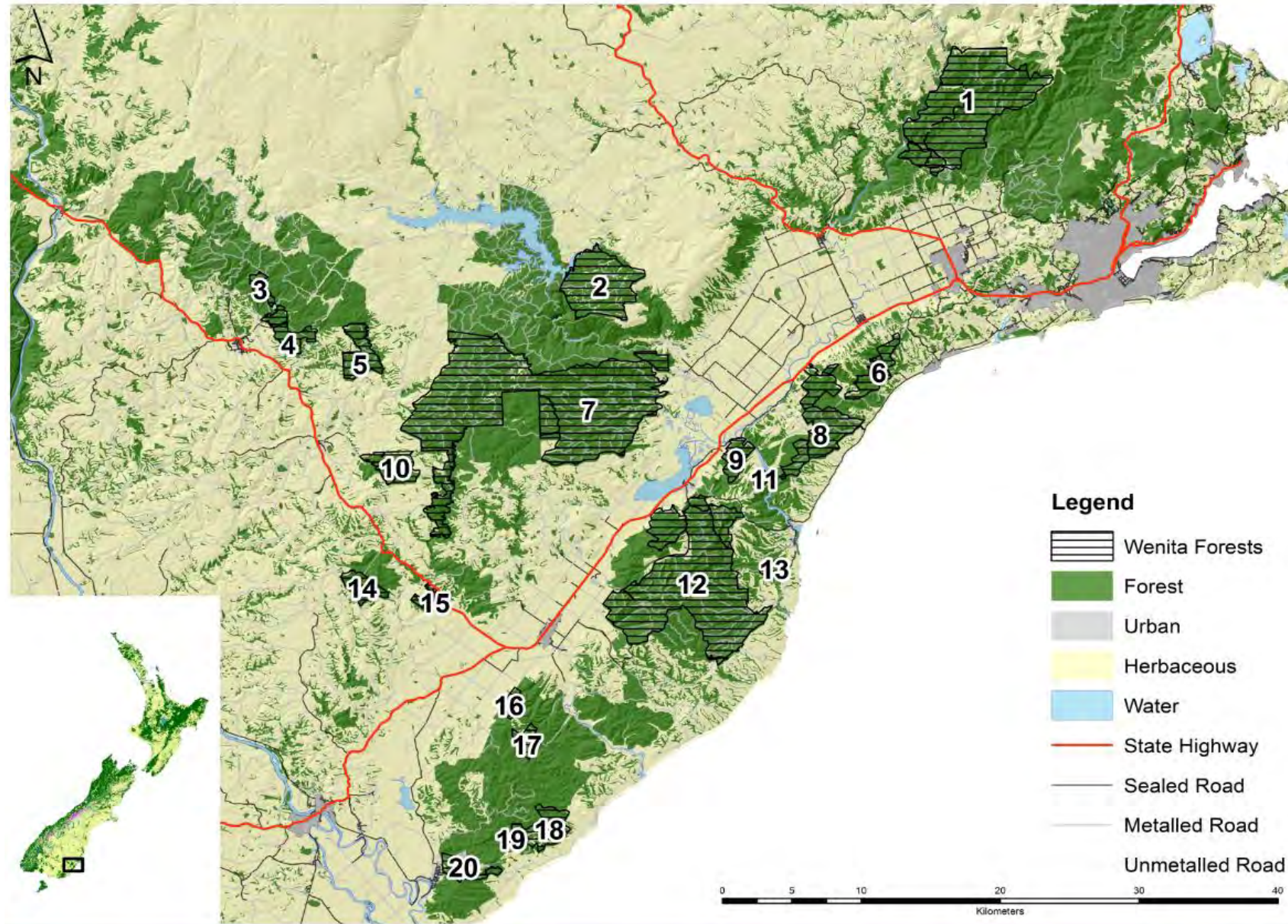
Timber, carbon sequestration & avoided erosion values
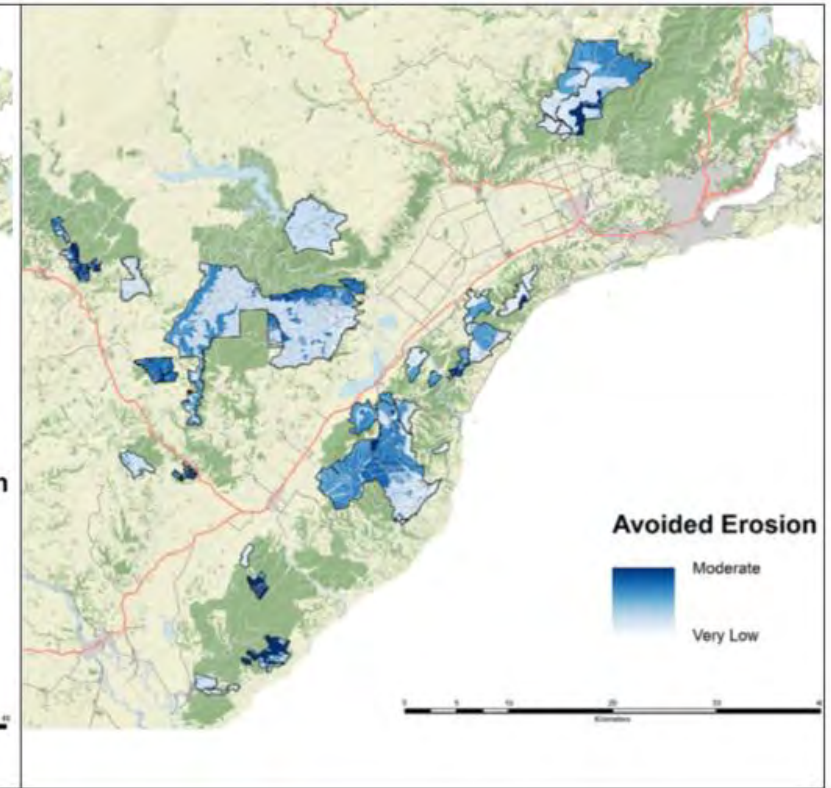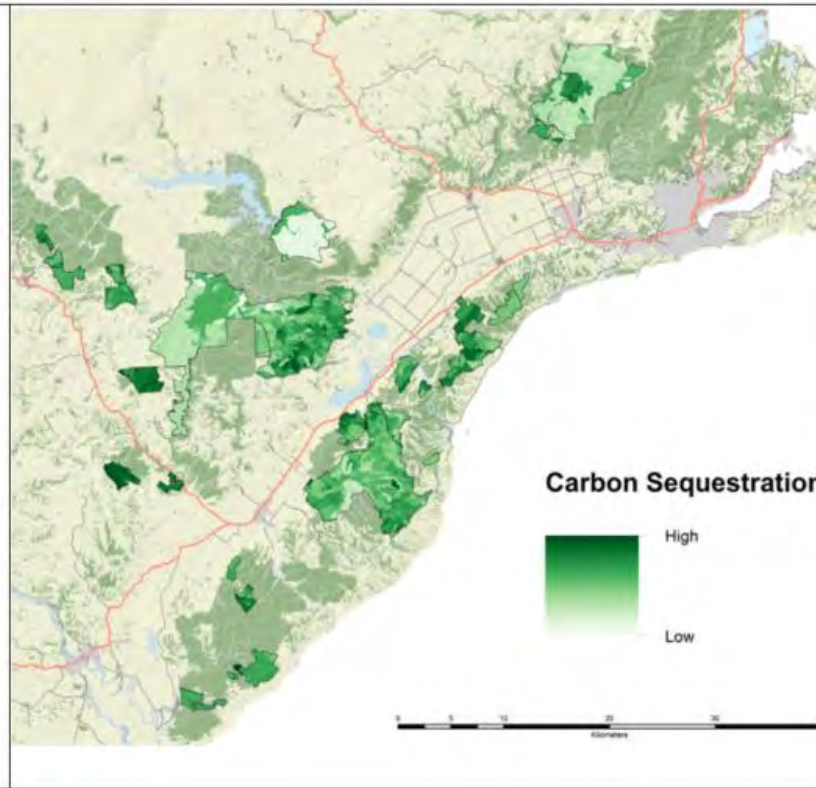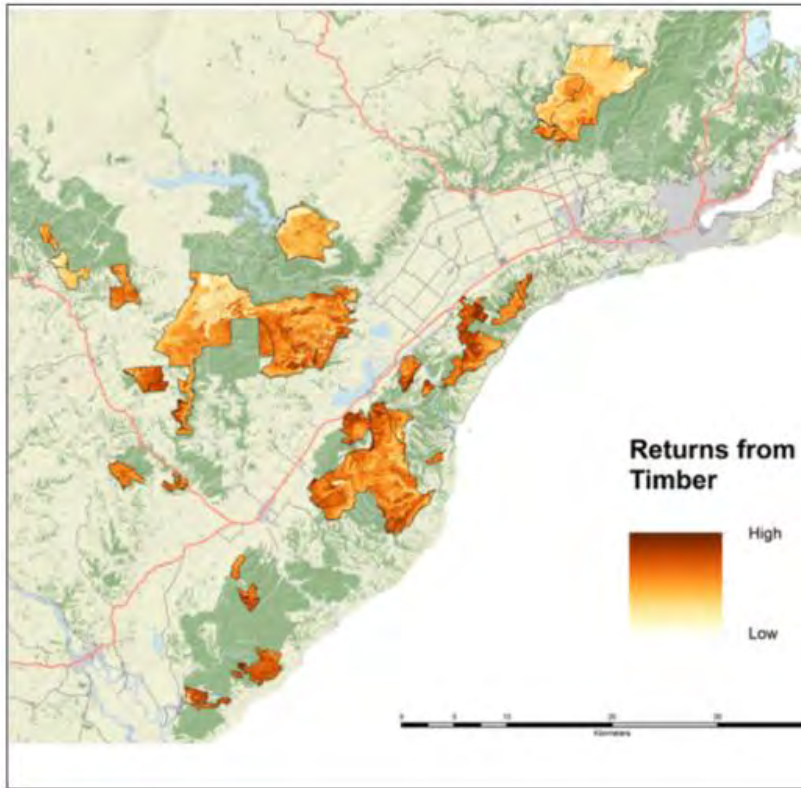
Distribution of FES values by forest block

Annual value of pig hunting = NZ$250,000

# Developing functions of FIF - forests and water

- Literature review
  - Forests improve water quality (filtration, sediment reduction)
  - Forests conserve water & slow down flood flows
  - Forests reduce water yield
- Interview with NZ councils
  - 13 councils participated
  - responses being processed
- Working with GCFF scientists
  - Building on the developing "water use" model
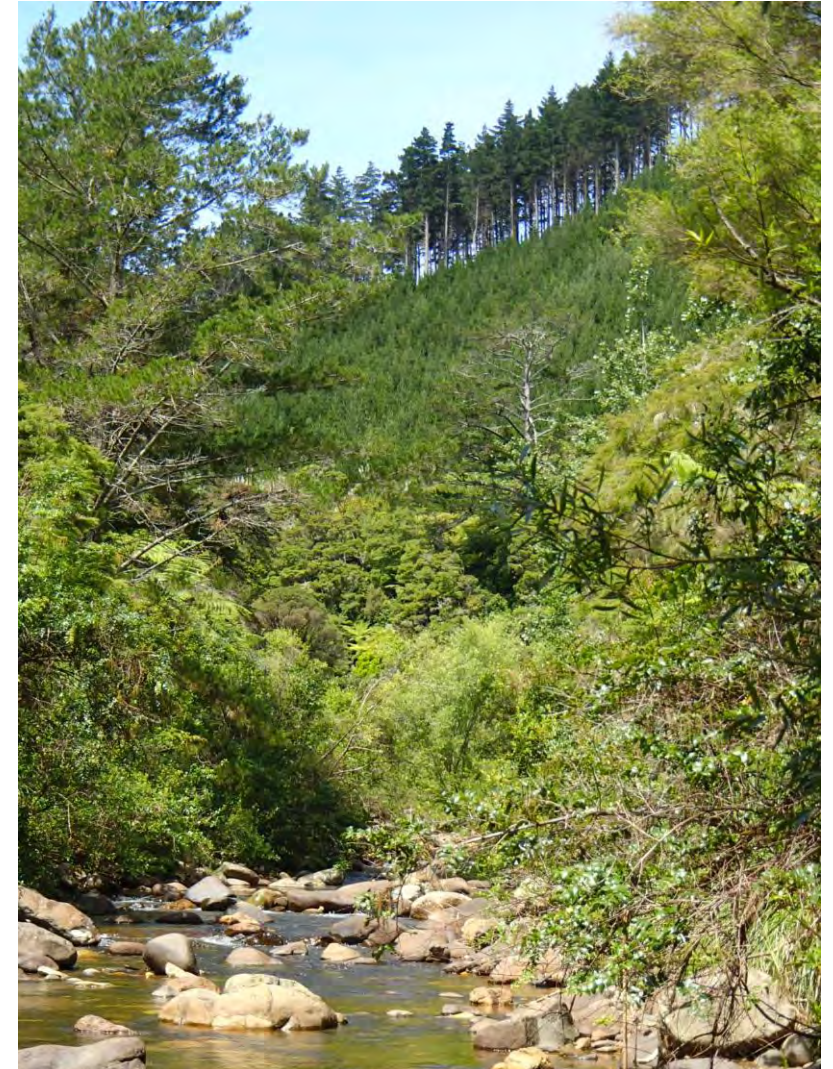
Forests and water services/supply values

Service/Disservice	Benefit (NZ$)	Cost (NZ$)	Country
Water conservation	293/ha/yr		Beijing, China
Flow regulation - Hydroelectric power	1,570,056/yr		Yangtze River, China
Water conservation – reducing surface runoff	21,052/ha/yr		Japan
Water filtration from existing forests	159/ha/yr		Vosges, France
Water filtration from future forests	2,036/ha		Gisborne, New Zealand
Water supply reduction		21/ha/yr	England and Wales
Water supply reduction		56/ha/yr	Ireland

Radiata water use – percentage surplus rainfall over 30 years

Legend
- ● < 20%
- ● 20 - 30%
- ● 30 - 40%
- ● 40 - 50%
- ● 50 - 60%
- ● > 60%
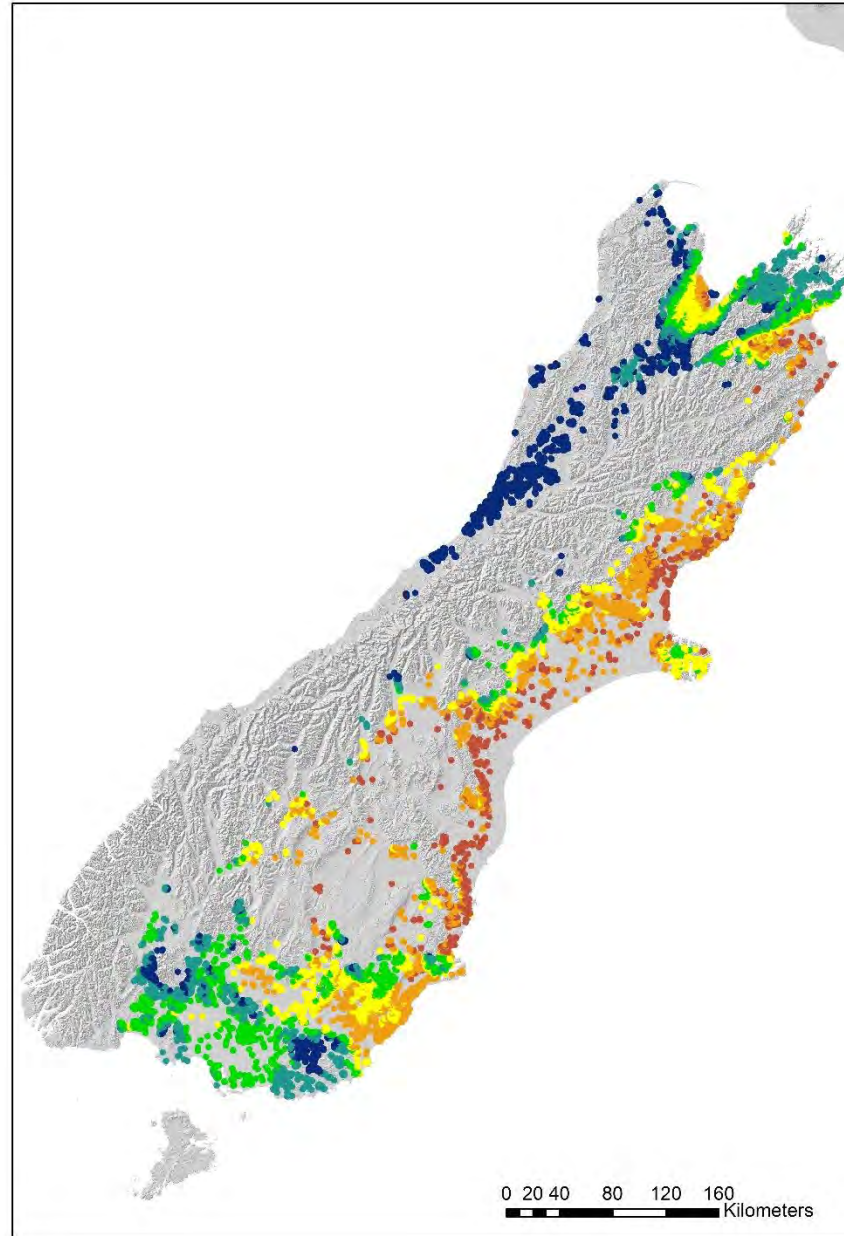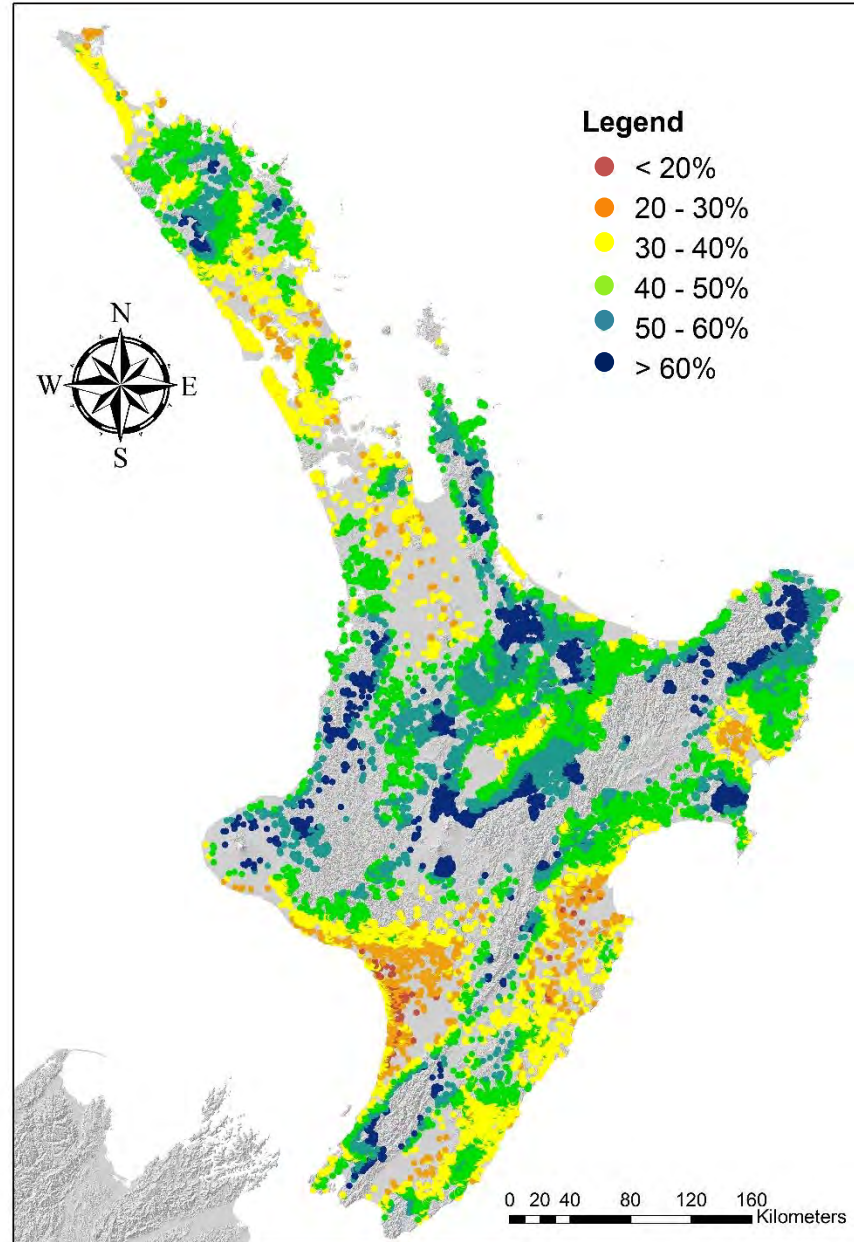
Conclusions

- Demonstrating the forests' full value is beneficial to
    - policy and investment
    - product certification
    - educating people

- Integrated land management
    - better land use comparison
    - sustainable use of natural capital within limits

- ES assessment is becoming increasingly important

Next steps

- Apply all FIF's spatial functions to quantify the full value of forests

- Enhance partnerships with the industry, government, iwi, universities & scientists on the full value of forests

- Modelling forests' broader values for developing NZ forest environmental accounts

- Examine the connections between forests and neighbouring ecosystems using the ES framework

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