



# Land use optimisation with GIS

Elisa Puccioni – Senior GIS Analyst



# Project team



Elisa has worked for over 12 years in the GIS Industry. She is an expert in creating GIS infrastructure and high level analysis for land-use, environment and renewable energy projects.



Moka has worked in the GIS Sector for the past two decades and is passionate about assisting and empowering iwi to achieve their own aspirations through the use of GIS technologies.





“

*How can I unlock the potential of  
the unproductive areas  
of my land?*

”

# Our spatial solution to the question



## IDENTIFY THE AREAS

A GIS model was run over 233 selected Maori land blocks to identify non productive areas using available data



## PROFIT FORECAST

Profit and cost forecast were created to show the potential of these areas if converted in Manuka or Pine plantations



## ECONOMIC POTENTIAL

This complete overview of the economic potential of the unproductive land can increase the profit of the land block



# Identify unproductive land

Potential non-productive areas are identified as areas subject to medium to high erosion, not suitable for farming, with medium to steep slopes, and not covered by any exotic or indigenous forests

## Areas not suitable for farming

Areas included in the classes 7 and 8 of the LandCare Land-use Capability Index, considered not fit for any kind of farming for several physical and climatic factors

## Areas subjected to medium to high erosion

Areas with a medium to high erosion index in the New Zealand Land Resource Inventory dataset and/or classified as Land Overlay 3A in the Combined Regional and District Plan

## Areas with medium to steep slopes

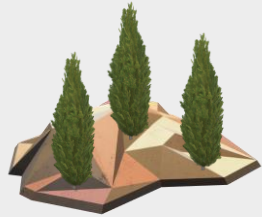
Areas with more than 20 degrees of slope. The Slope map has been derived with GIS analysis tools from the 10m resolution Digital Terrain Model of New Zealand.

## Areas that are currently not forested

Areas identified as potentially unproductive and identified as unforested with land cover analysis using the Gisborne District Council 2012 aerial images

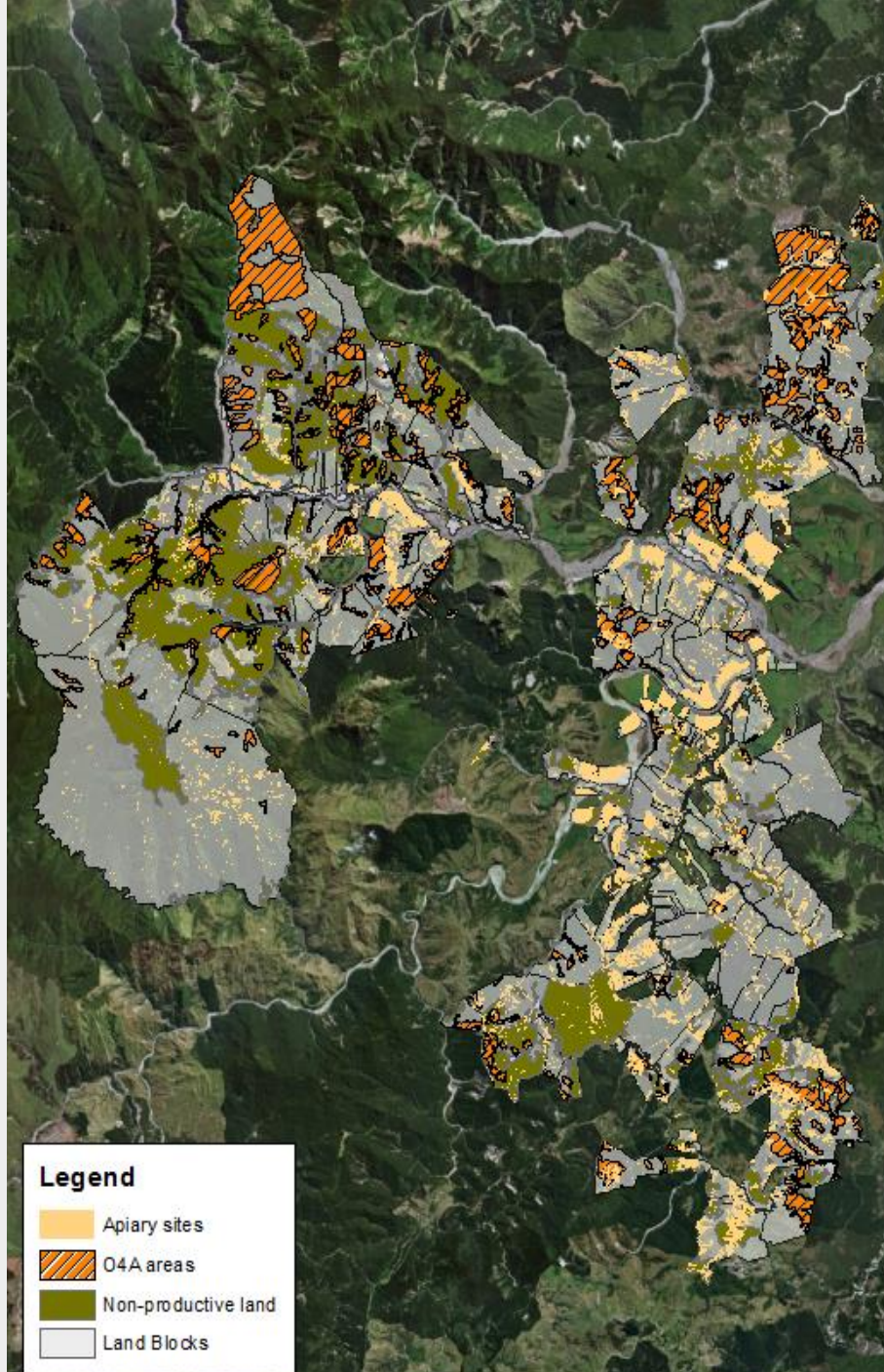


# Pinus radiata...

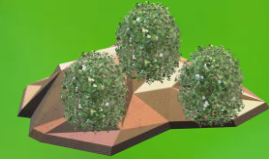


After the unproductive areas are selected in the GIS, the economic forecast model is applied to each land block.

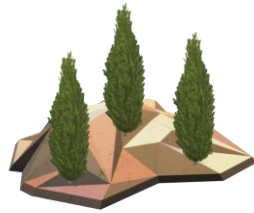
Economic forecasts for pine forestry consider the time from planting to harvesting (and income) as well as the costs to create the infrastructure needed to plant and manage the forest in areas with difficult accessibility. The cost and profit values have been given directly by forestry managers.



# ...or Manuka?



Economic forecasts for Manuka plantation include both oil extraction and honey production profits. Honey production is considered only for areas that are less than 500m from suitable apiary sites, calculated in a separated (and confidential) GIS model. The cost and profit values per ha of honey production have been based on the parameter of 1 hive per ha and determined by industry specialists. The costs and profit for manuka oil have been derived by specialised presentations and websites.



86%

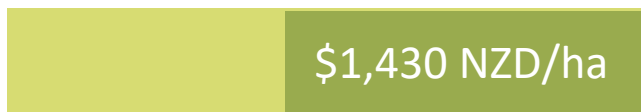


**Time to harvest**

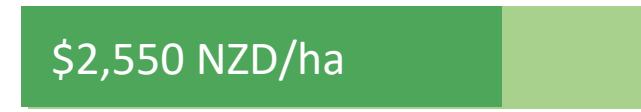


14%

36%

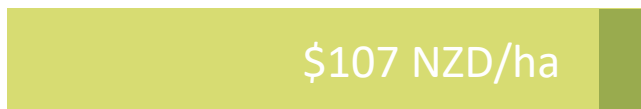


**Capital Costs**



64%

66%



**Ongoing Costs**



34%

25%



**Profit**



75%

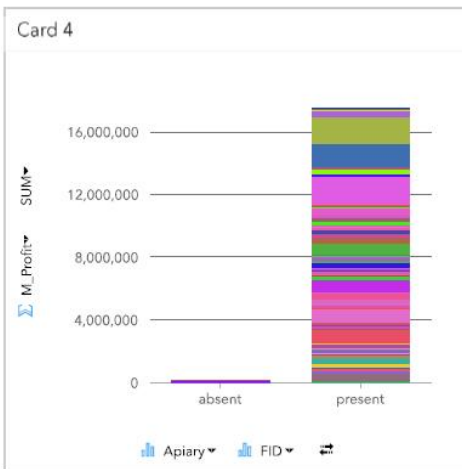
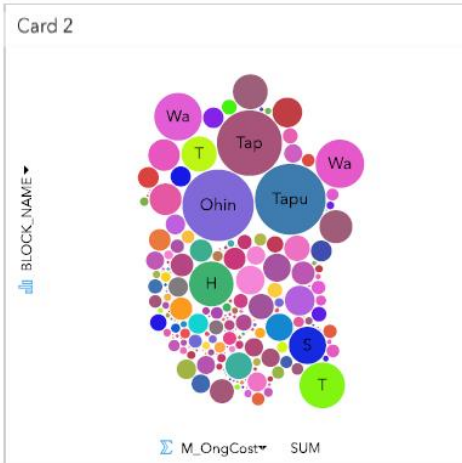
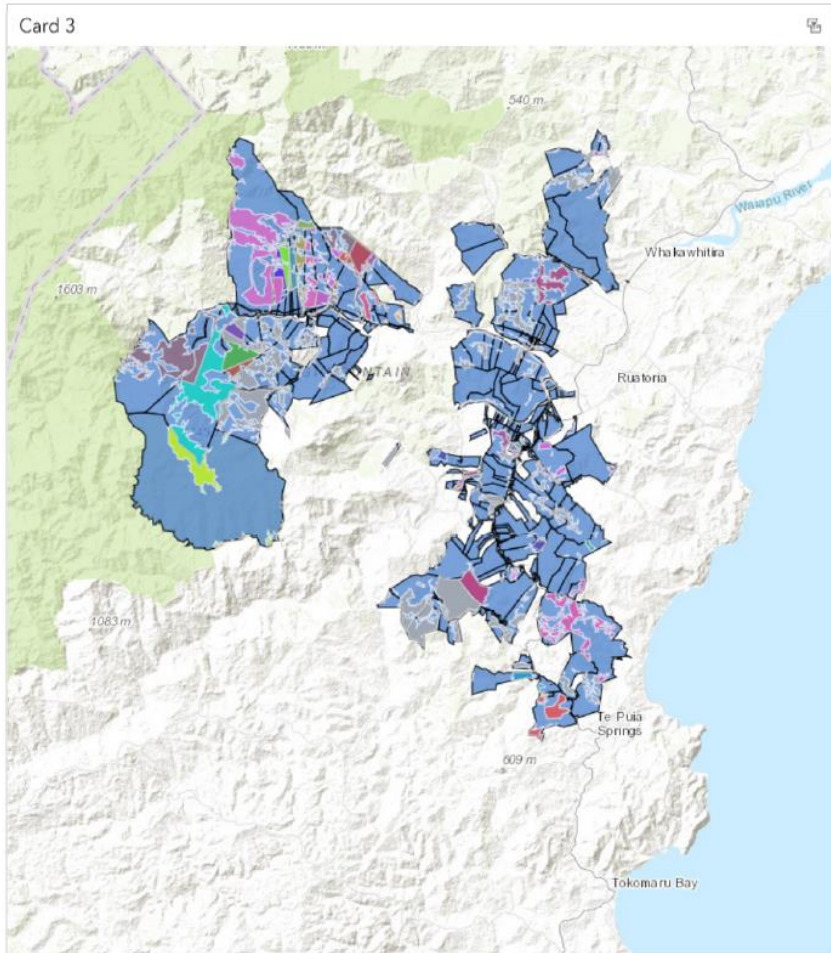
^  
\$2,450 honey

^  
\$150 oil >

4%

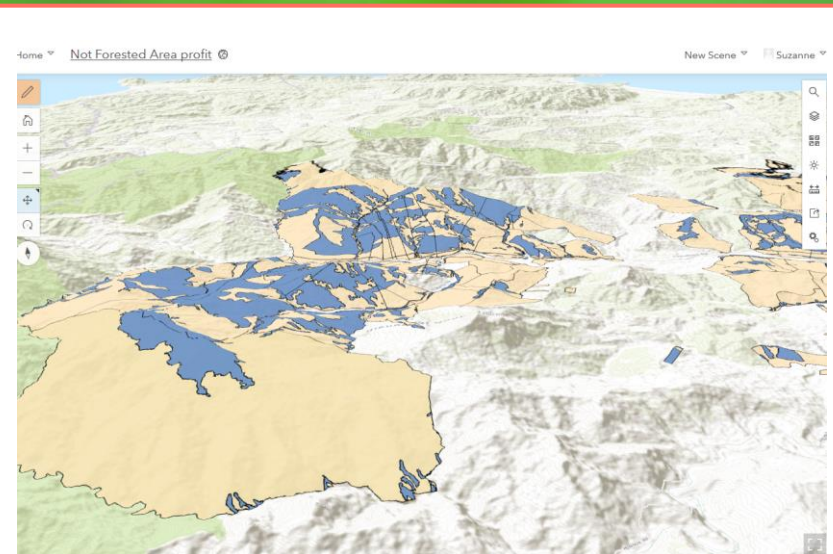
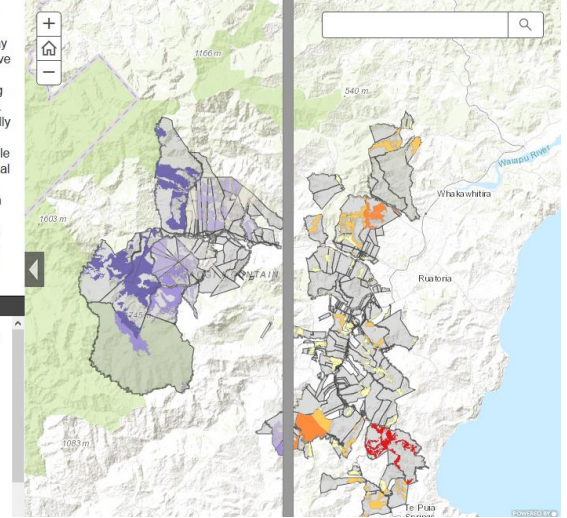


# Sharing the results with the Landowners – GIS web portal



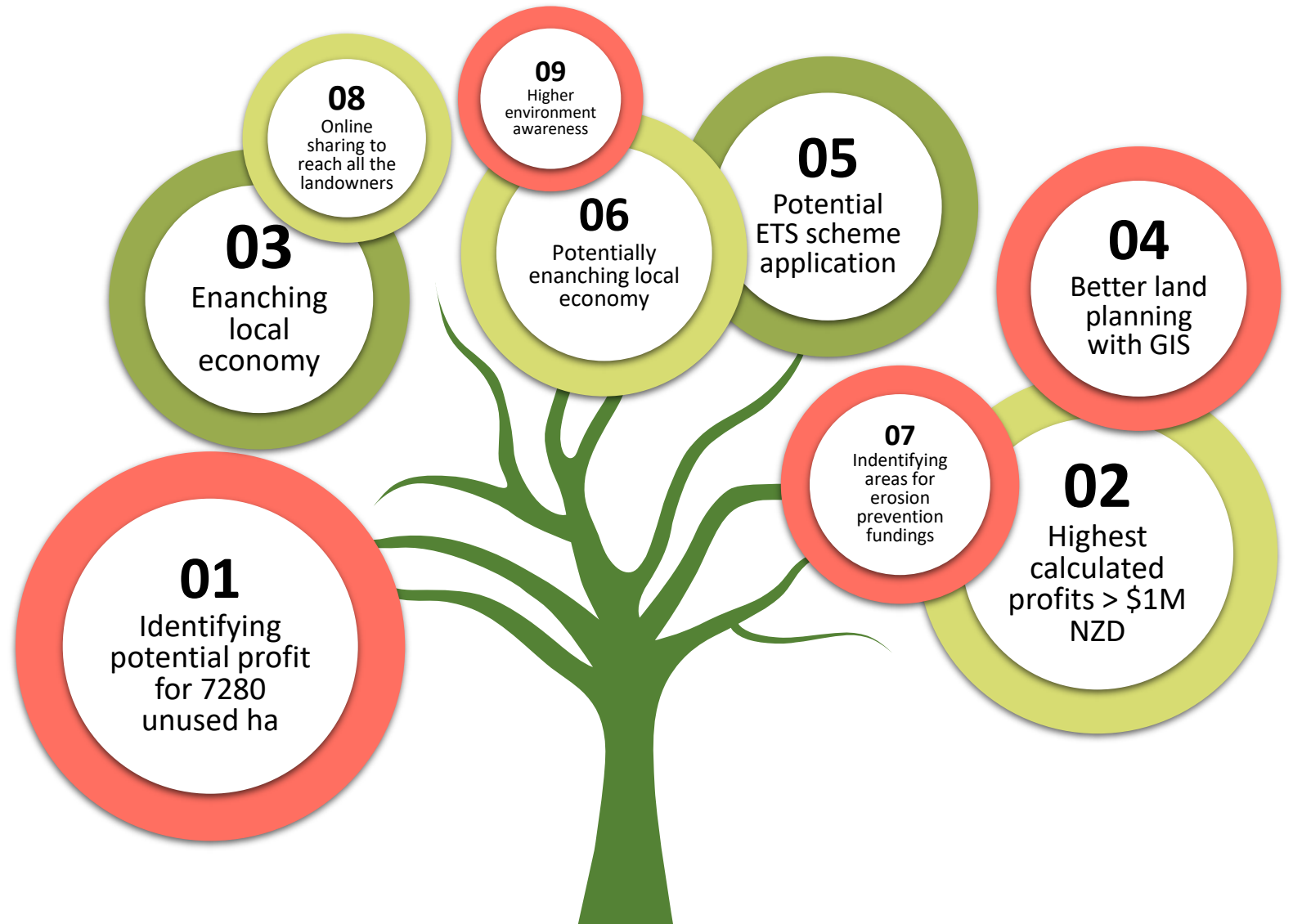
## Profit comparison for not forested land

This story map shows an easy and quick way to compare forecast profits for non-productive land. The selected land is not forested and has a LUC class of 7 or higher, with planting a forest as the only recommended land use. Manuka plantation, both for oil and eventually honey, can be a new opportunity for increasing the value of this kind of land, while pinus radiata plantation is the most traditional way to get this land profitable. The map quickly compares the forecast profit for both plantations. Furthermore, in the attributes related to each polygon, the user can see a more complete overview of profit and costs related to both options for each land block.





# Conclusions





Thank you

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