



# Mapping and visualizing urban form urban intensification analysis for New Zealand cities

Dr Pengjun Zhao

Postdoctoral researcher  
New Zealand Centre for Sustainable Cities

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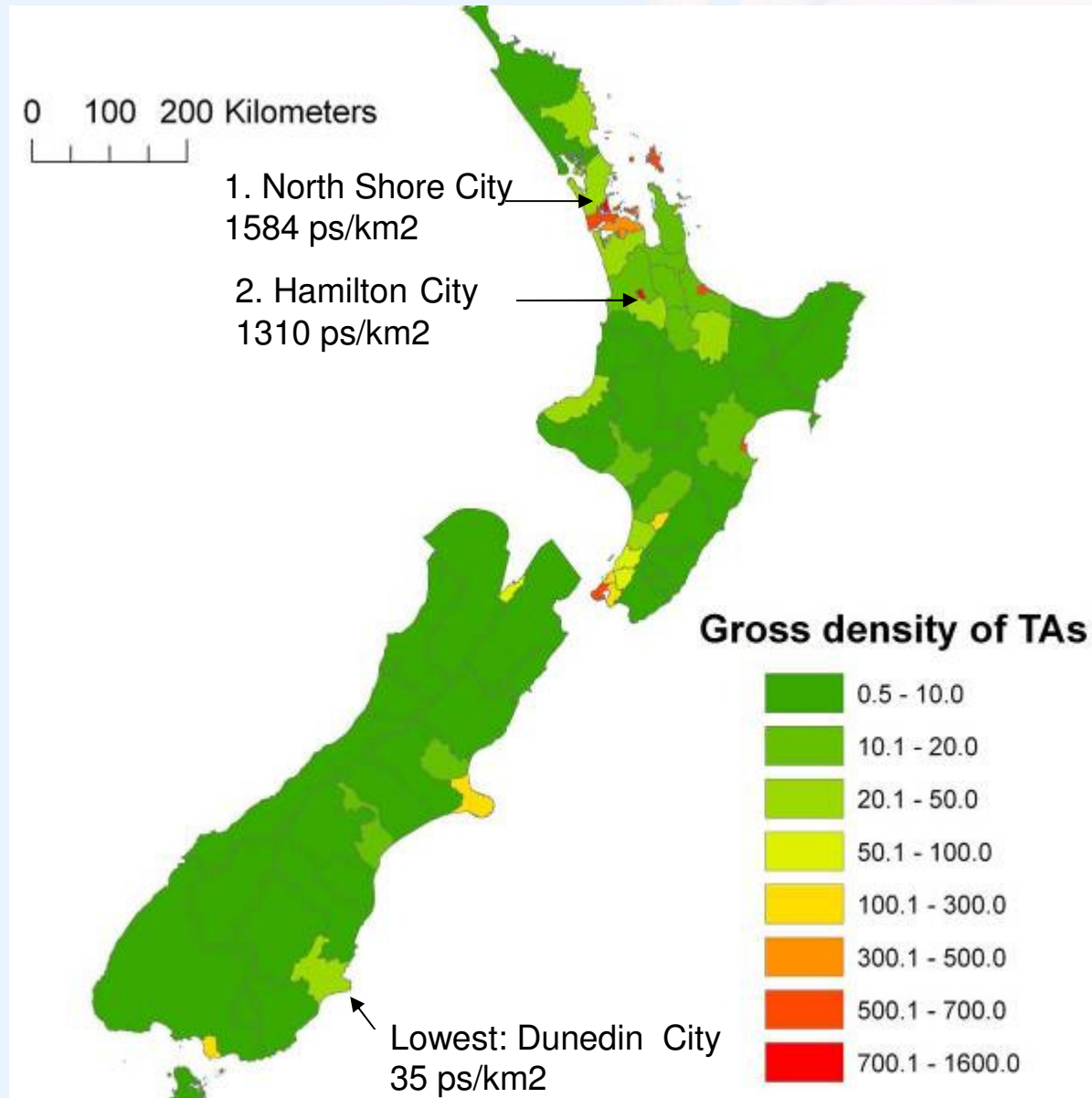
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# Definitions

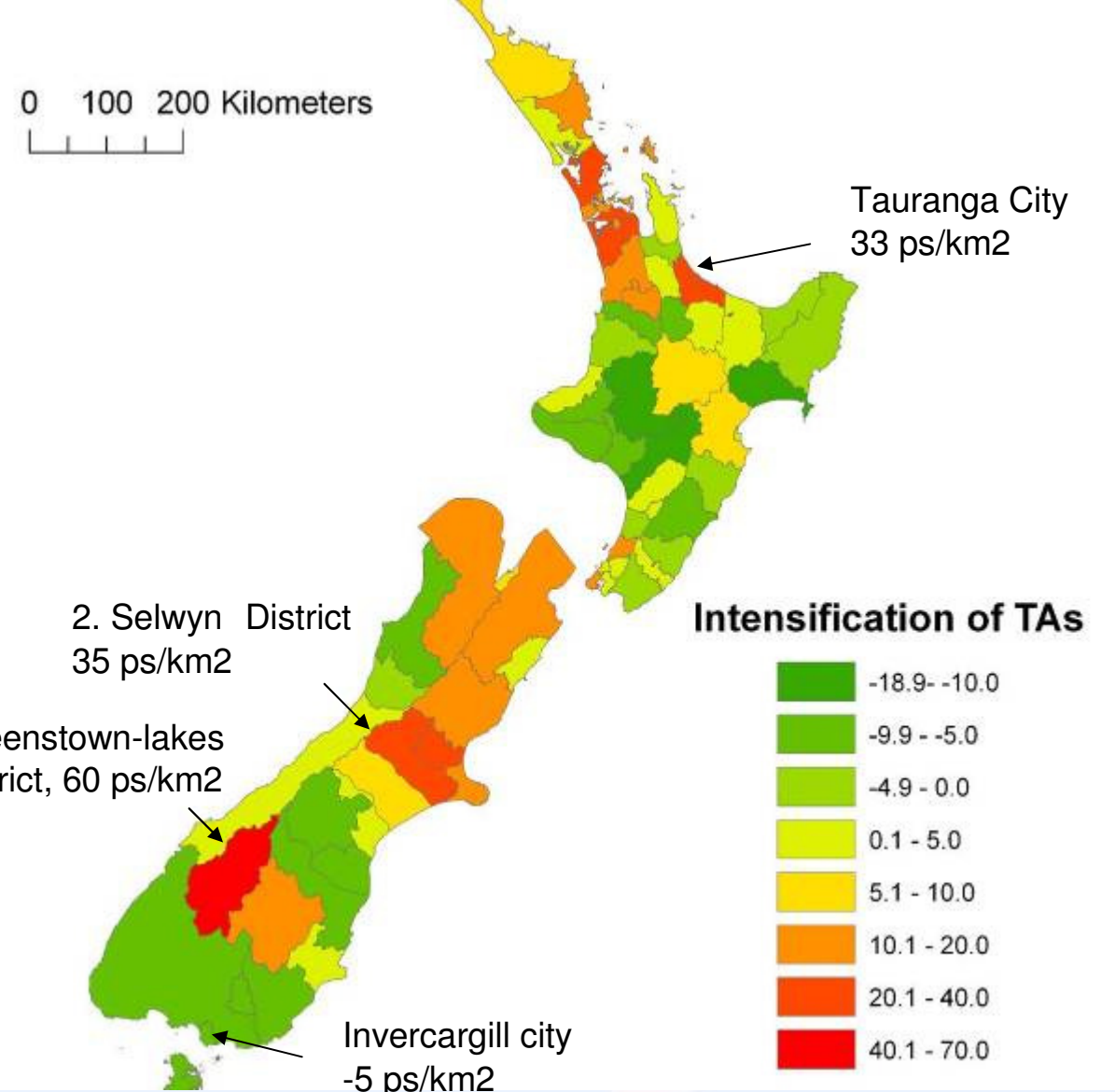
- Density: key element of urban form and local environmental management
- Population density: people per unit area
- Gross density: area density *including* all types of land use
- Net density: area density *excluding* non-built-up land use (green space, water area, etc.)
- Intensification: density growth (% change) in given period
- Based on Census data - 1996, 2006

# Gross density of Territorial Authorities



Almost half  
Territorial  
Authorities have  
density below 10  
persons per  
square kilometre

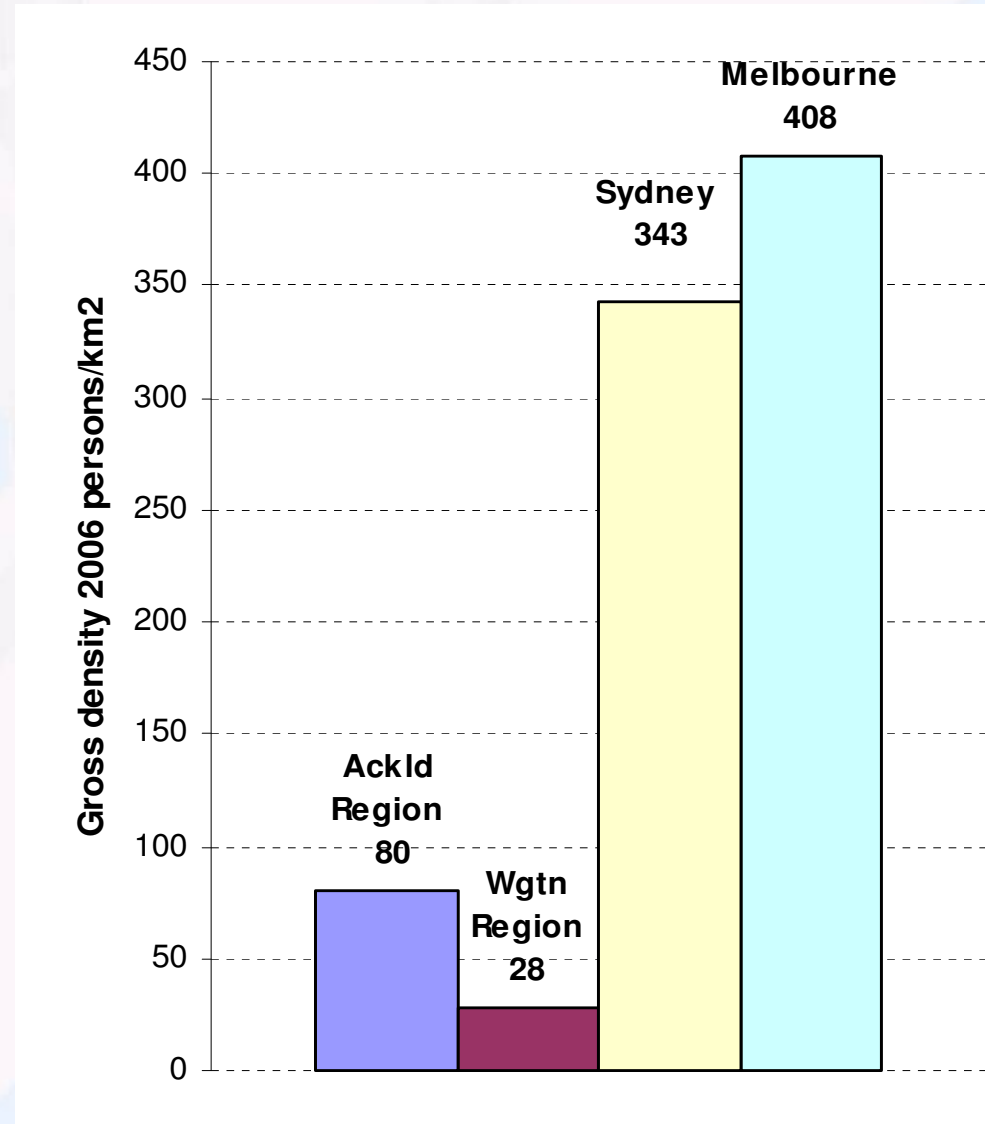
# Intensification at TA level, 1996 -2006



One-third of Territorial Authorities became more dense between 1996 to 2006.

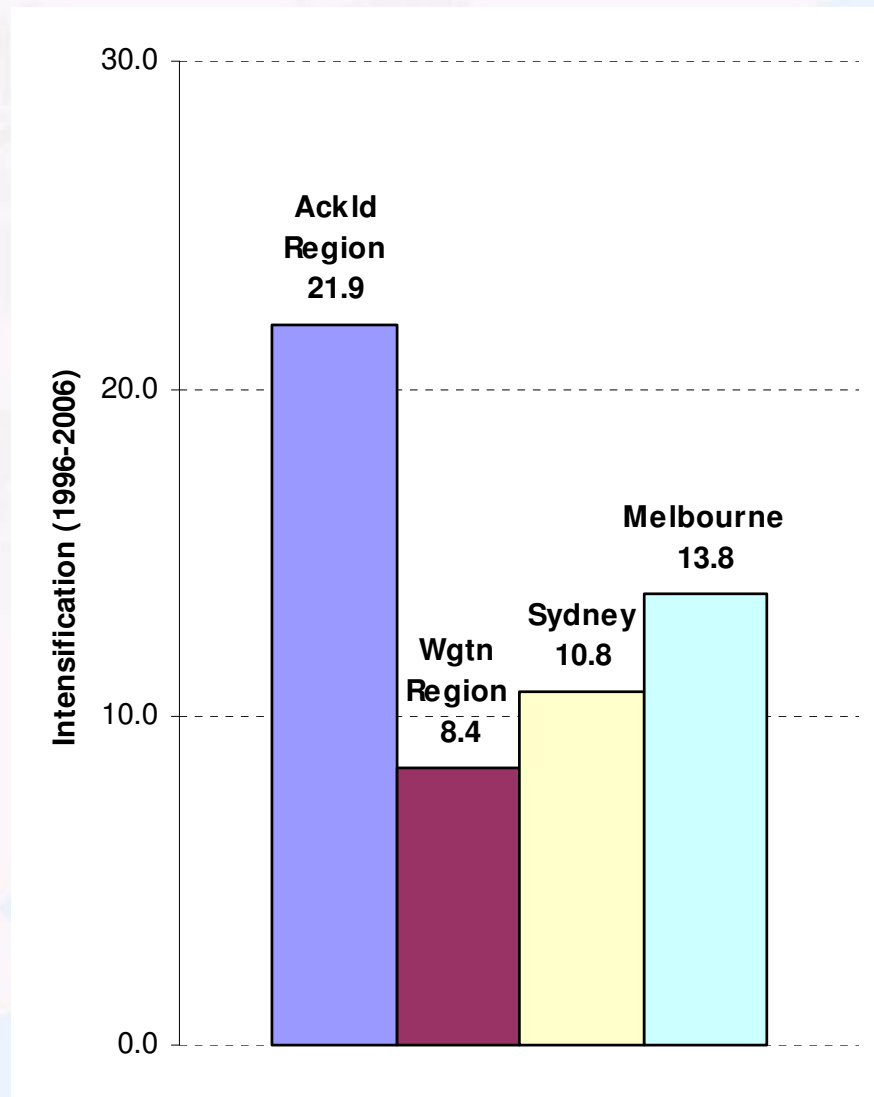
# Comparison with Australian cities: gross density of large metropolitan regions

- Auckland Region: 80 persons/km<sup>2</sup>, 1/5 of the density of Melbourne Region
- Wellington Region: 28 persons/km<sup>2</sup>, 1/12 of the density of Sydney Region



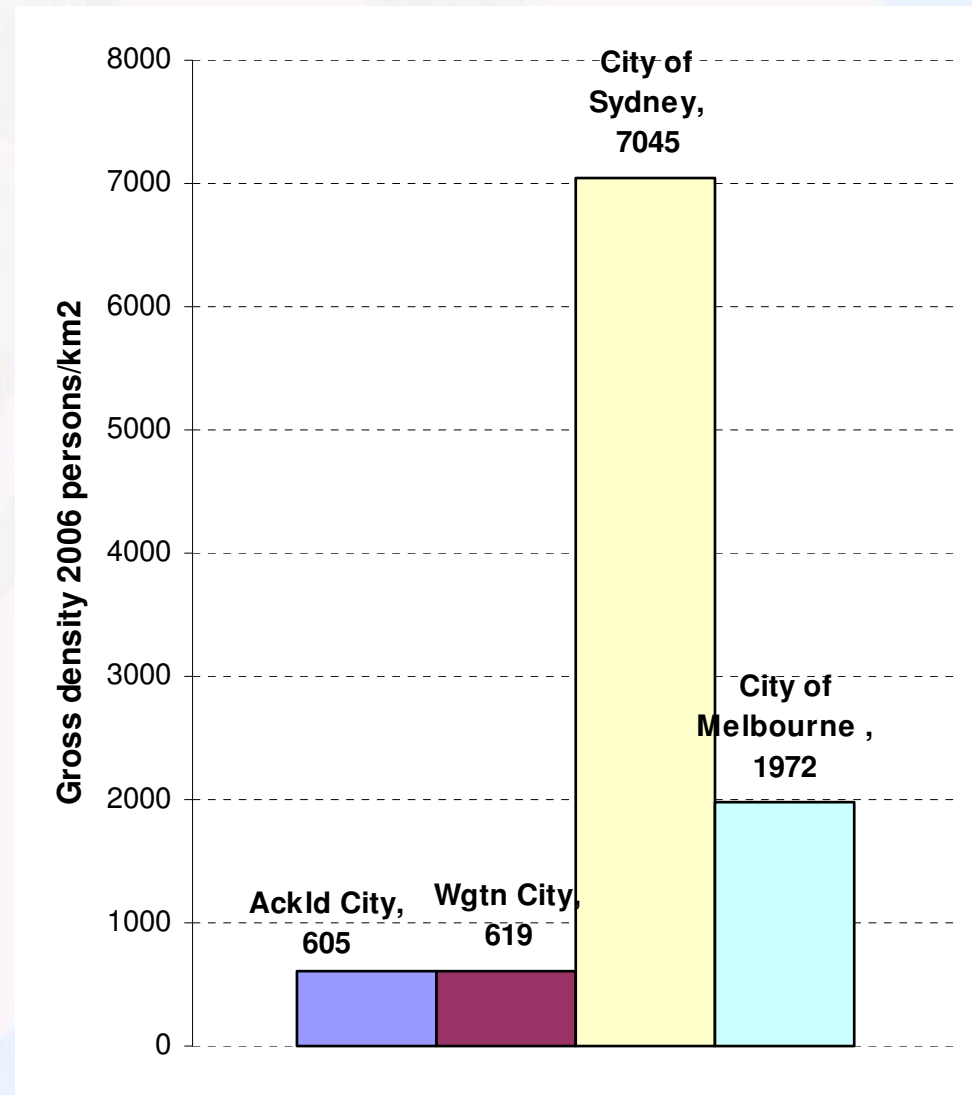
# Comparison with Australian cities: intensification of large metropolitan regions

- Auckland Region: 21.9%  
1.6 times the intensification of Melbourne region and 2 times that of Sydney region.
- Wellington Region: 8.4%  
less than the intensification of Sydney region

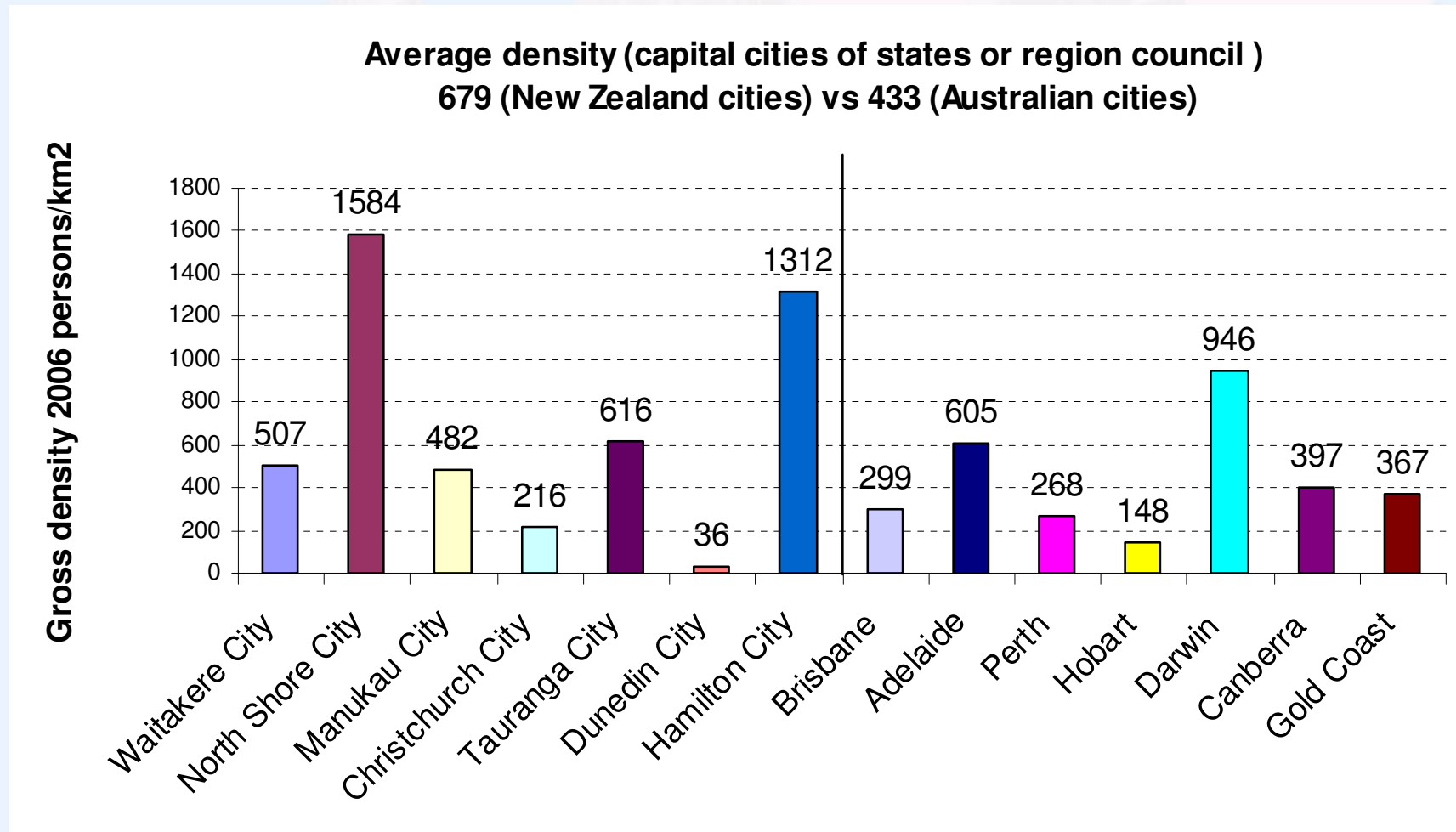


# Comparison with Australian cities: central cities of large metropolitan region

- Auckland City: 605 persons/km<sup>2</sup>, 1/3 of the density of Melbourne City
- Wellington City: 619, 1/11 of the density of Sydney City

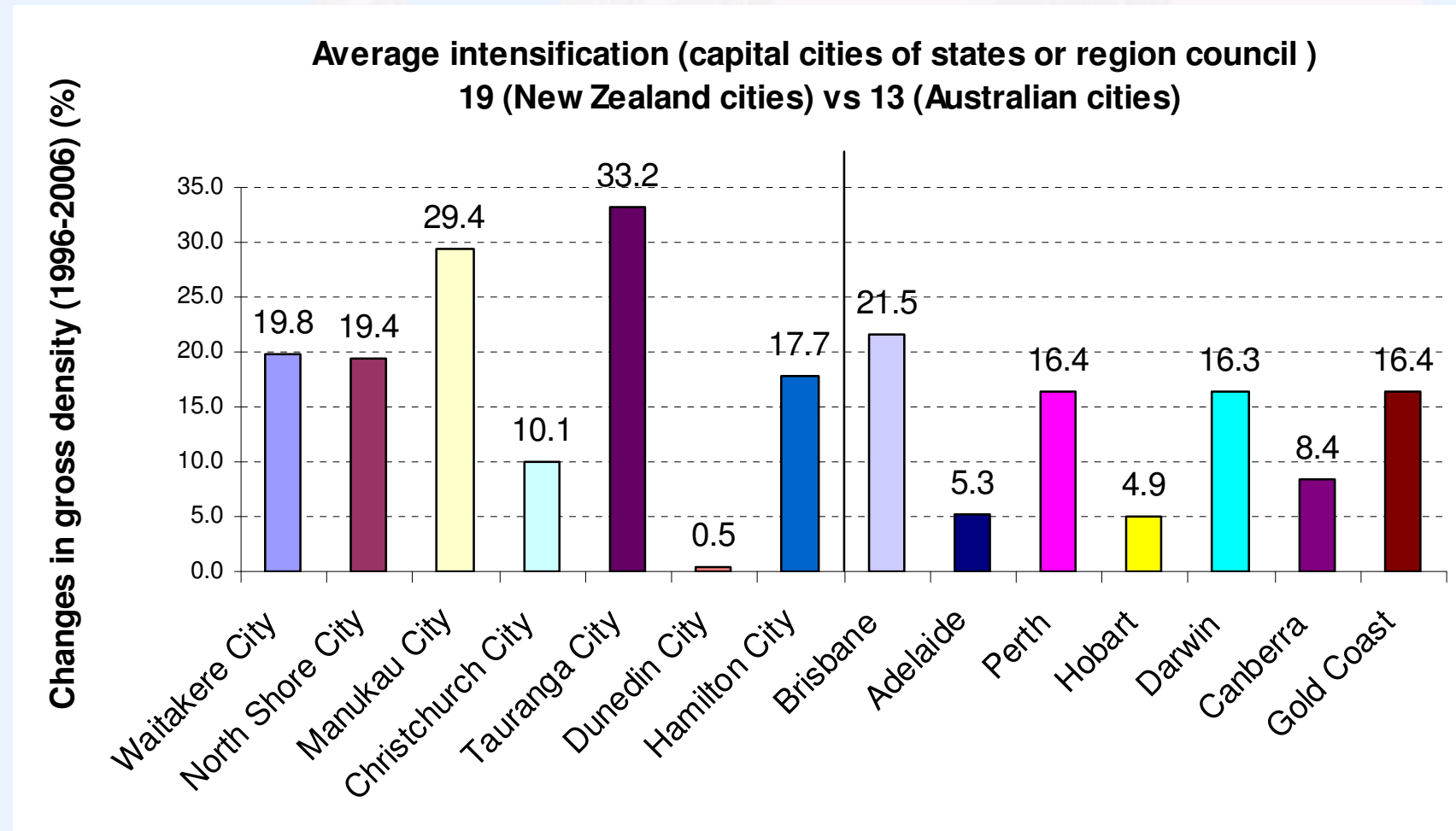


# Comparison with Australian cities: **Gross density** of state capital cities in Australia vs. main cities of regional councils in New Zealand



North Short City 1.7 times the density of Darwin city, the densest state capital city in Australia

# Comparison with Australian cities: **intensification** of state capital cities in Australia vs. main cities of regional councils in New Zealand



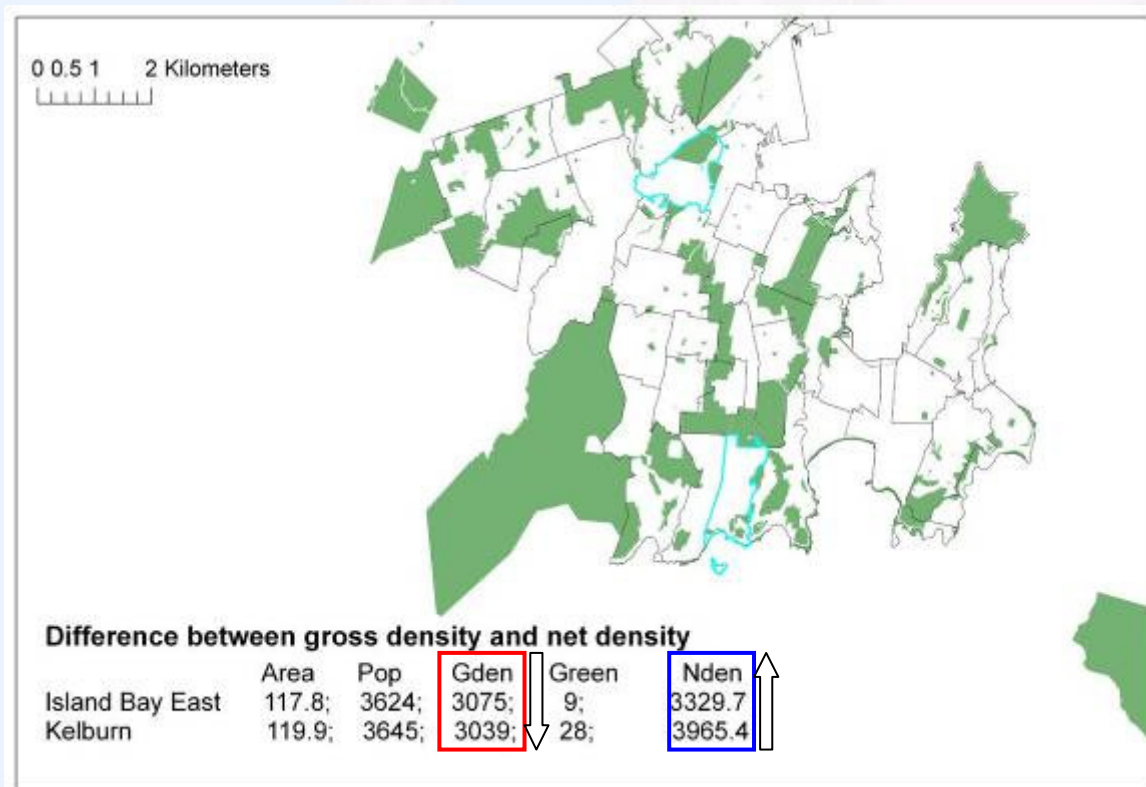
Main cities of New Zealand had a higher average intensification than that of state capital cities in Australia.

# Summary findings

- Auckland and Wellington regions had lower densities than Melbourne and Sydney regions
- Auckland and Wellington regions became denser
- Auckland Region had higher speed of intensification than Melbourne and Sydney metropolitan regions.
- Main cities at Territorial Authority level in New Zealand had a higher average density than their counterparts in Australia.
- In NZ clear potential to increase densities in the two main metropolitan regions.

# Wellington Region gross and net density

Difference between Gross density and net density



The large difference between gross density and net density reflects local hilly topographic condition is one main factor influencing the density in Wellington Region. Policy-making should think about this.

	Wellington City	Porirua	Upper Hutt City	Lower Hutt City
Gross density	619	266	71	259
Net density	1836	816	819	1275

N. 3 times G.

N. 11 times G.

# Wellington Region net density

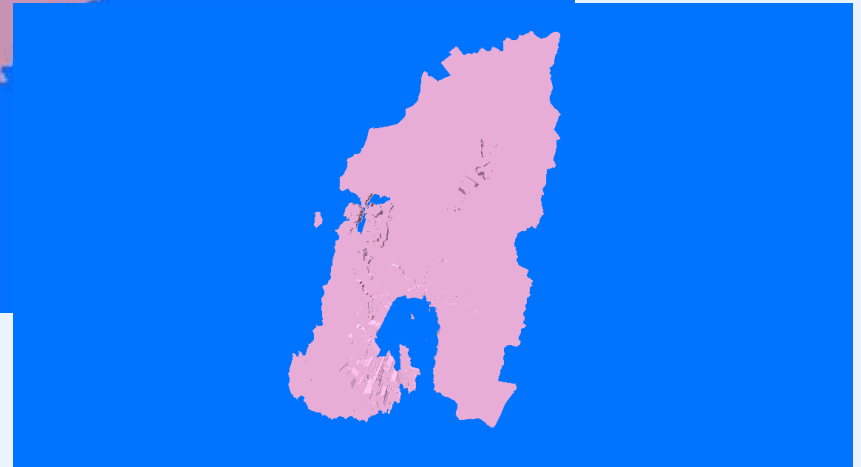
3D visualization

How net density shapes out urban form?

Spatial distribution of density across Wellington region



Click right map for movie



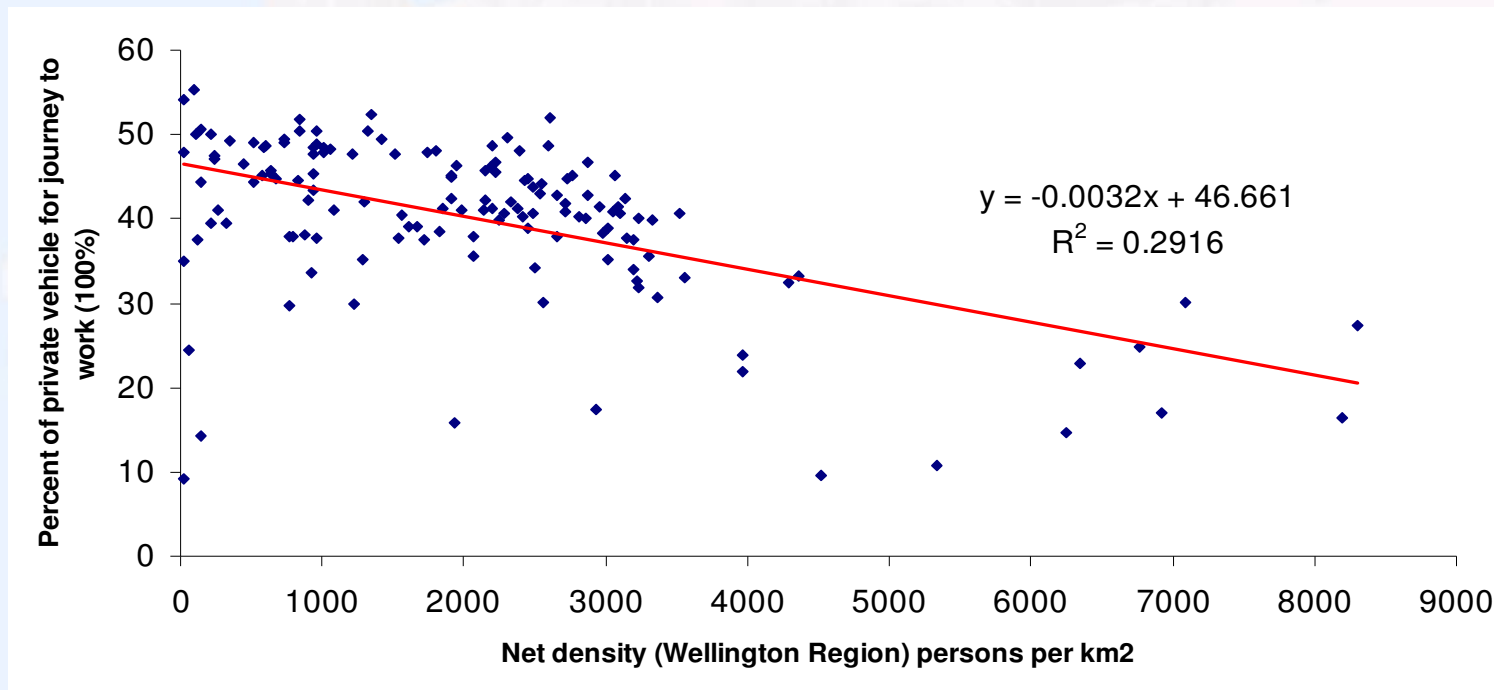
# Discussion



- How are New Zealand Cities sprawling?
- Where and to what extent can we enhance intensification?
- Are there 'New Zealand' models for sustainable urban development in a hilly region?
- What sorts of new data and methodology can be used to measure urban form better?

# Next step research

## Links between density and transport energy consumption in New Zealand



10 people more per hectare reduces 3.2 percent of private vehicle in commuting

Policy implications: housing development, transport, energy saving, and environmental management