

SUSTAINABLE CITIES – CASE STUDIES OF ACCESSIBILITY, GREEN INFRASTRUCTURE & EQUITY

**Seminar, Mistra Urban Futures, Chalmers University,
Gothenburg, Sweden**

9 February 2017

Professor John Black

Foundation Professor of Transport Engineering UNSW Australia
Visiting Scholar, Transport Studies Unit,
Oxford University Centre for the Environment

INTRODUCTION

- Research and consultancy on “sustainable cities” dates from 1991 – Australian Government ESD Task Force on Transport
- Strong on goals/visions and solutions – no analytical methods Black, J.A., 1996, "Higher Density Housing and Transport in Australian Cities", in Yoshi Hayashi and John Roy (eds) *Transport, Land Use and the Environment* (Dordrecht: Kluwer Academic Publishers), pp. 55-80.
- David Simon’s recent book makes important contribution so I have used the themes of accessible, green and fair in this presentation

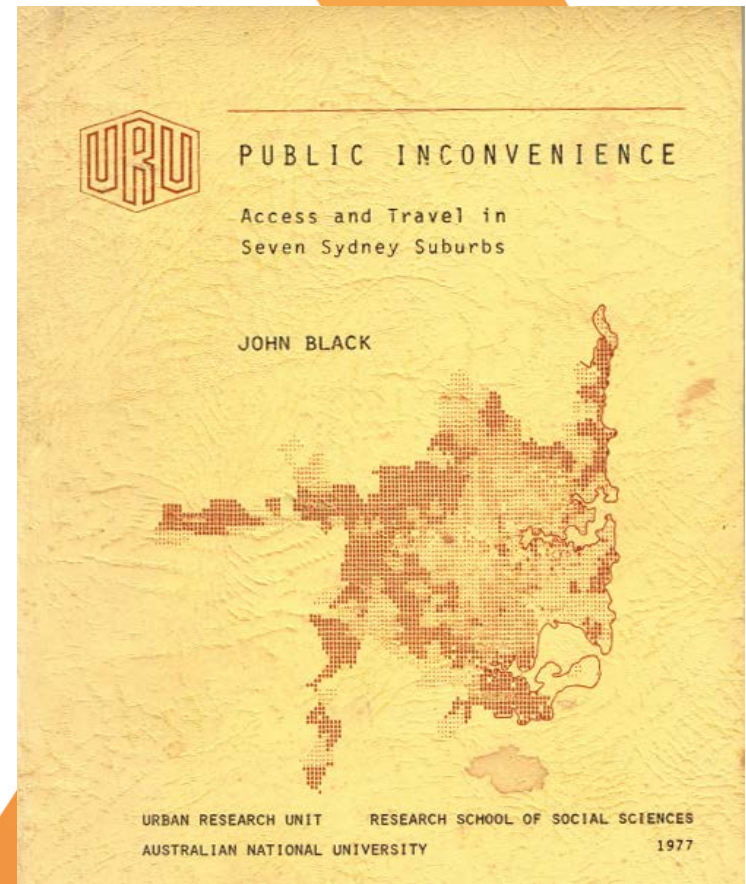
ANU URBAN RESEARCH UNIT 1973-5
***Public Inconvenience - Equity Aspects of Urban
Development, Sydney***

**Driver 1: Whitlam Labor Government – Residential
Location & Quality of Life**

Driver 2: *Social Justice in the City* (Harvey, 1975)

**Policy: Locational Disadvantage (Prime Minister &
Cabinet, 1992)**

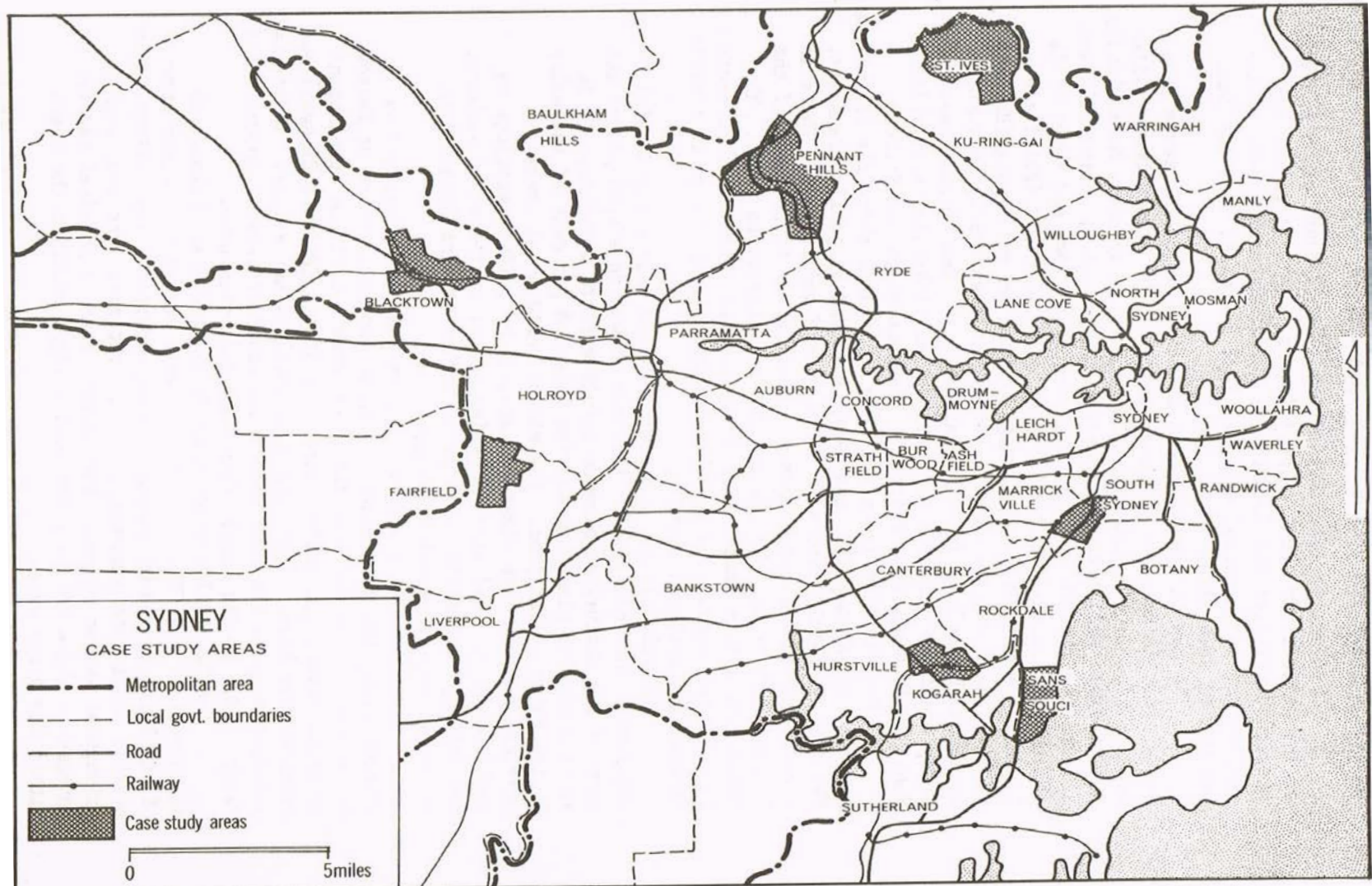
- A 40 year longitudinal study on accessibility changes (Case study Sydney; 1971 – 2011)
- Context is a 1977 analysis titled Public Inconvenience on equity aspects of urban development
- 7 study areas selected with varying socio-economic characteristics; access to public transport



Australian Government
Australian Trade Commission



Sydney – 7 Study Areas (CBD distance, SES, public transport) 1971



Blacktown (Sydney Area Transport Study sample >100 households) - Schools

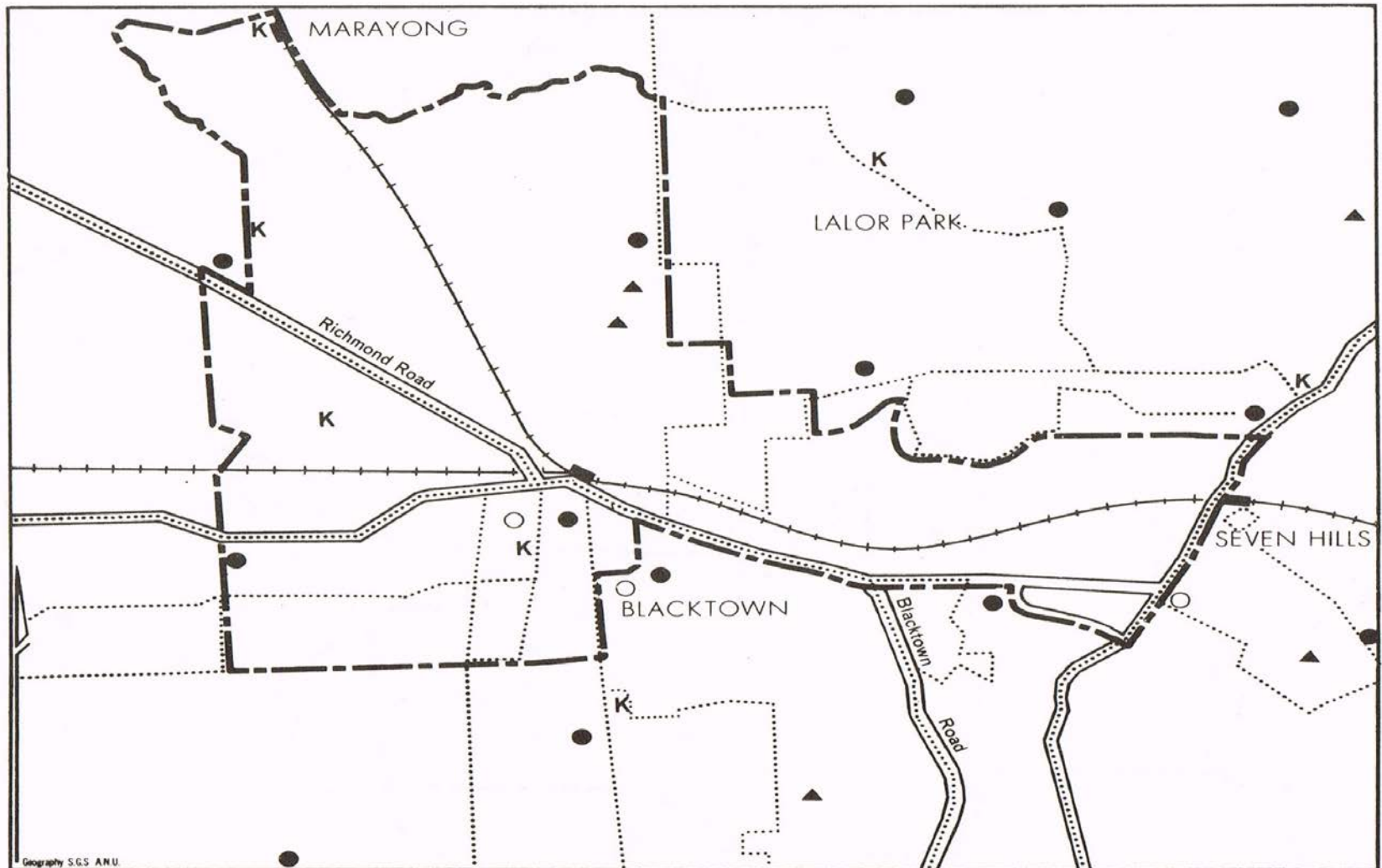
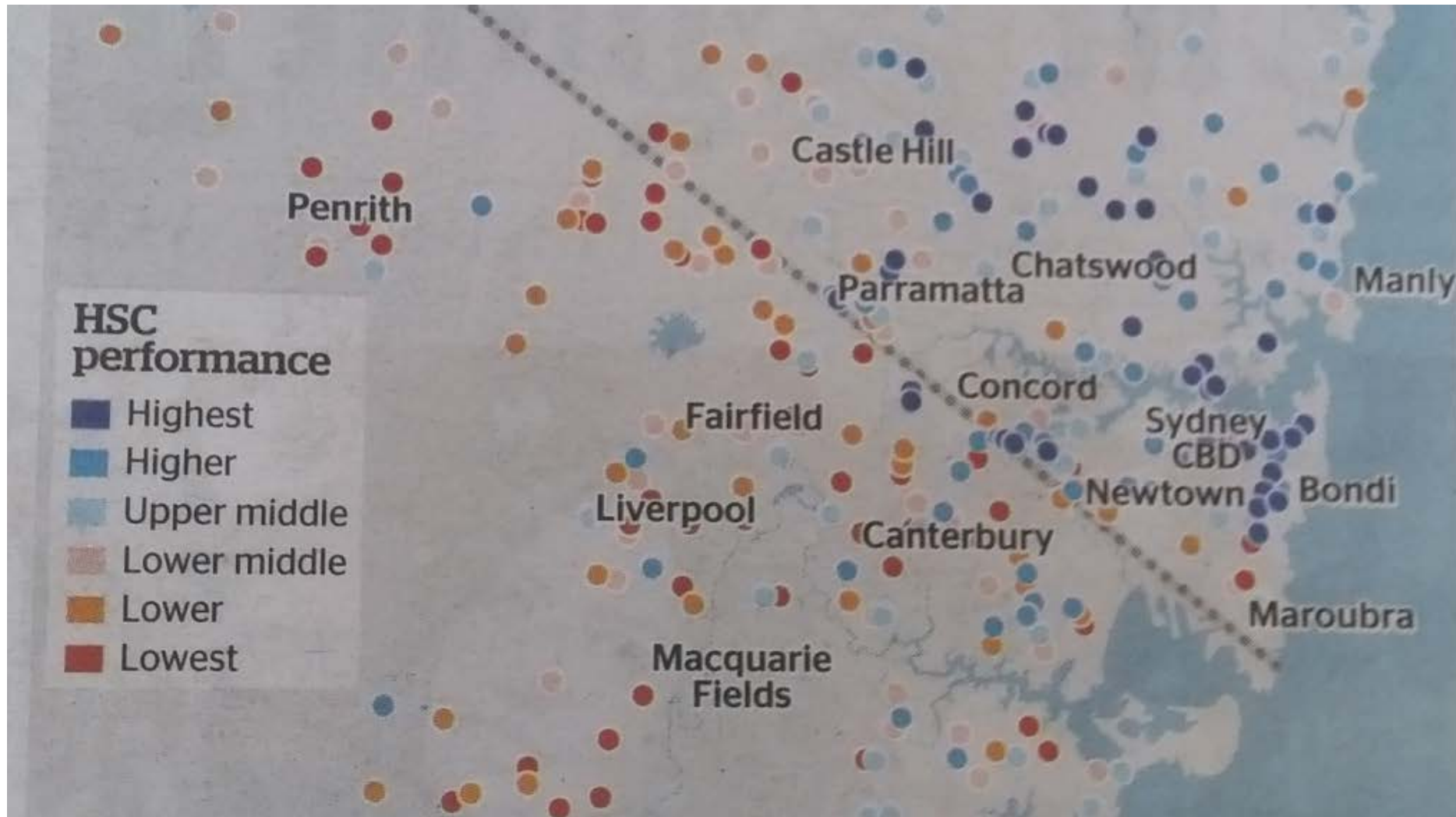


Fig. 3.5 Schools in Blacktown.

Sydney HSC Performance – Spatial Patterns 2016



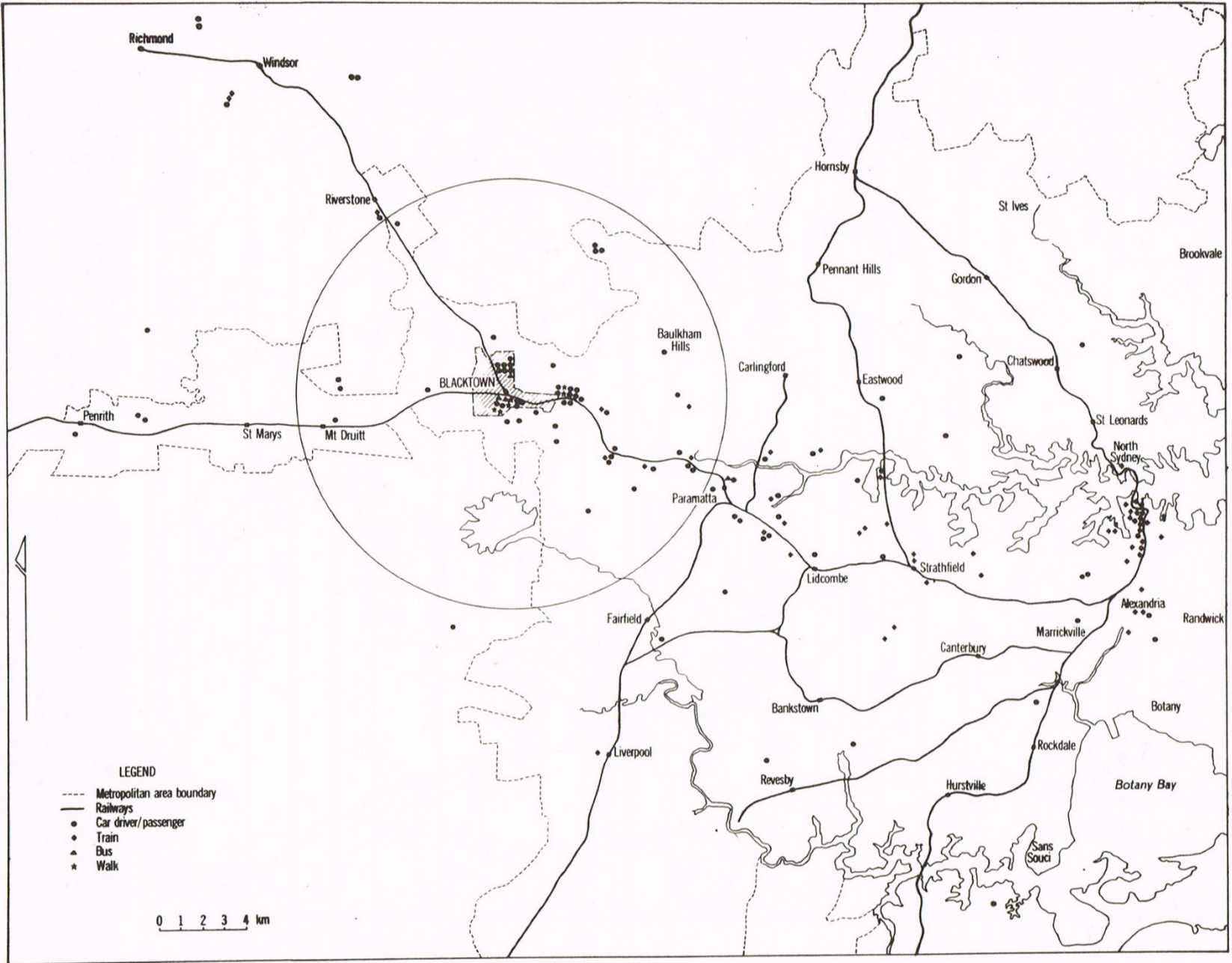
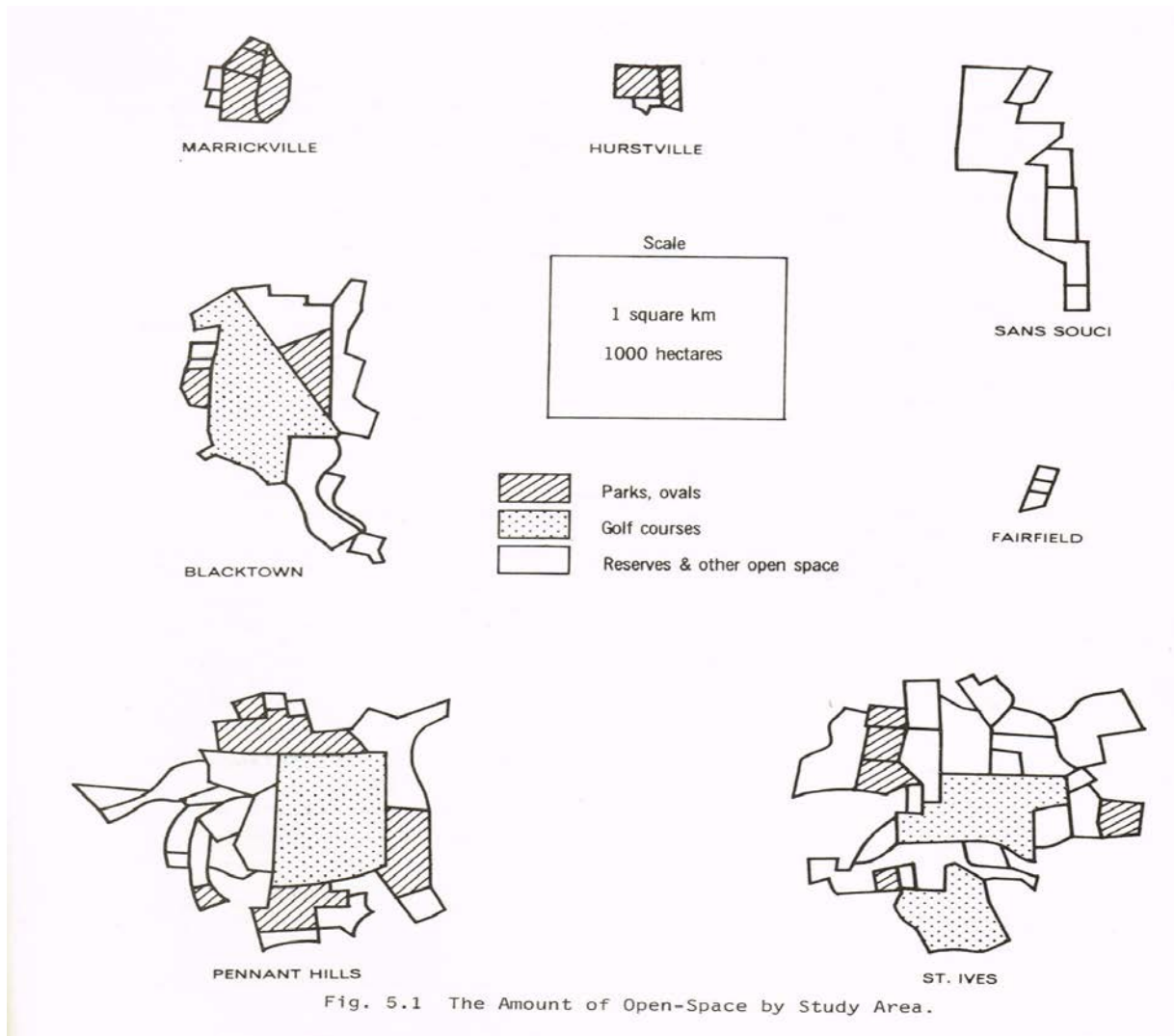


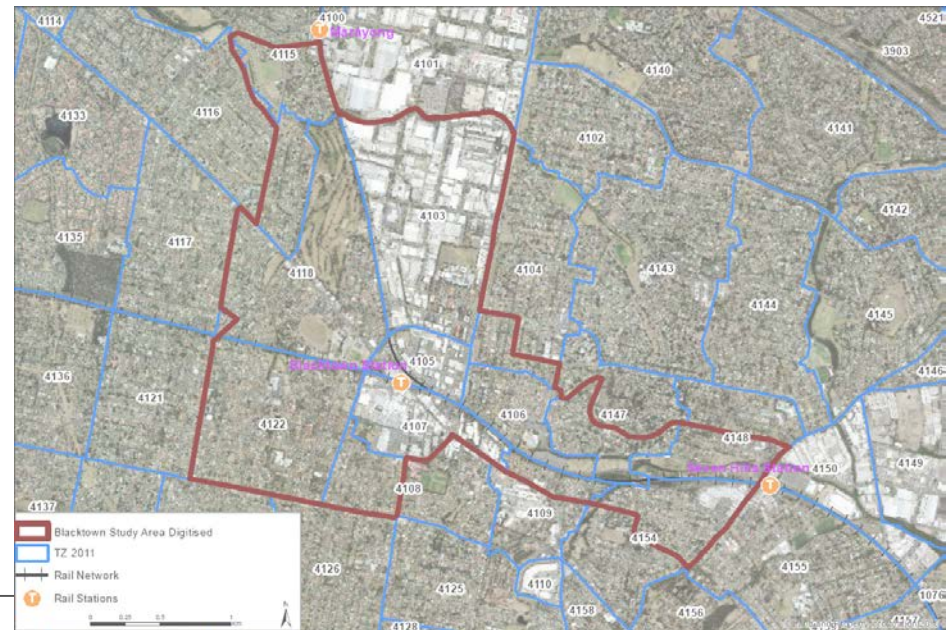
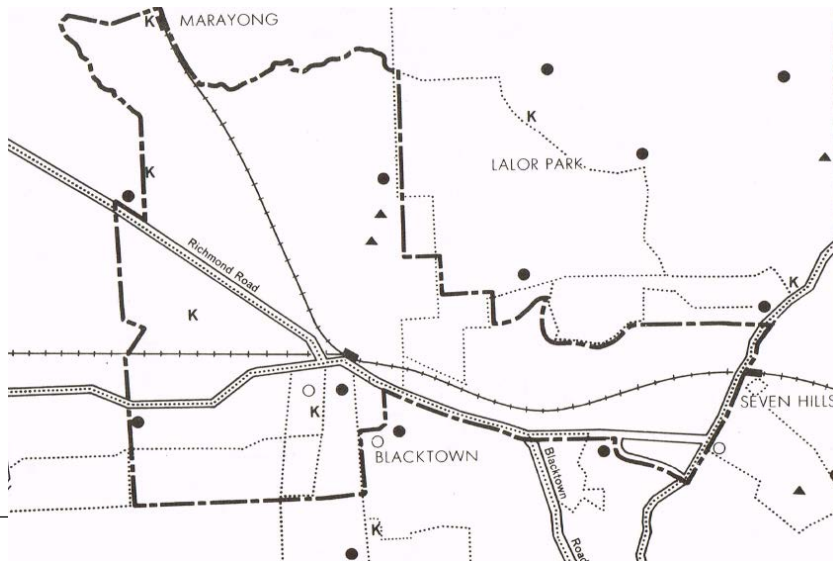
FIG. 2.10 EMPLOYMENT LOCATIONS OF WORKERS LIVING IN THE BLACKTOWN STUDY AREA. The work places of Blacktown residents are generally found along a broad east-west axis passing through the study area towards the CBD. About one-quarter of the workers travel less than 5km but this is offset by those who make very long journeys to work. For example, many work on the east side of Parramatta, either around Auburn, Strathfield or the Alexandria industrial area. There are four main employment nodes - Blacktown commercial centre, Blacktown

Marayong industrial area and Seven Hills commercial centre are within the study area. The fourth is in the CBD. About 10 per cent of workers travel outwards, west and north west, to find employment. For those journeys to work which go past Auburn about 80 per cent are made by train and most terminate in the CBD. Most of these very long journeys to the city centre of Sydney are made by young, female clerical workers.

Inequality in the Provision of Green Space

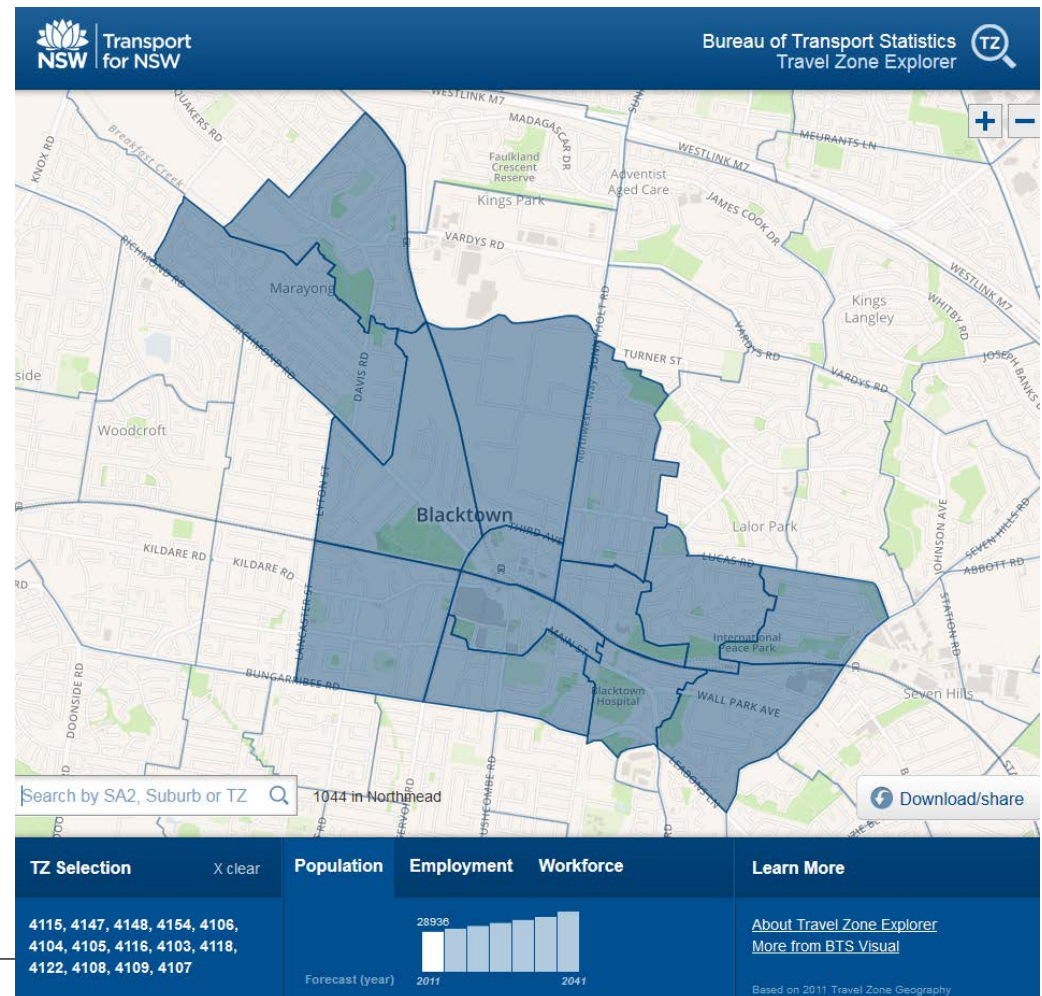


- Revisiting the ‘Blacktown’ study area
- Area has seen significant population growth and changes in land-use activity since 1971
- Current research (Doust & Doust) tracks changes in study area (population demographics, employment , workforce, accessibility) to 2011



- Accessibility: access by public and private modes to employment, schools, shops, leisure, entertainment and health

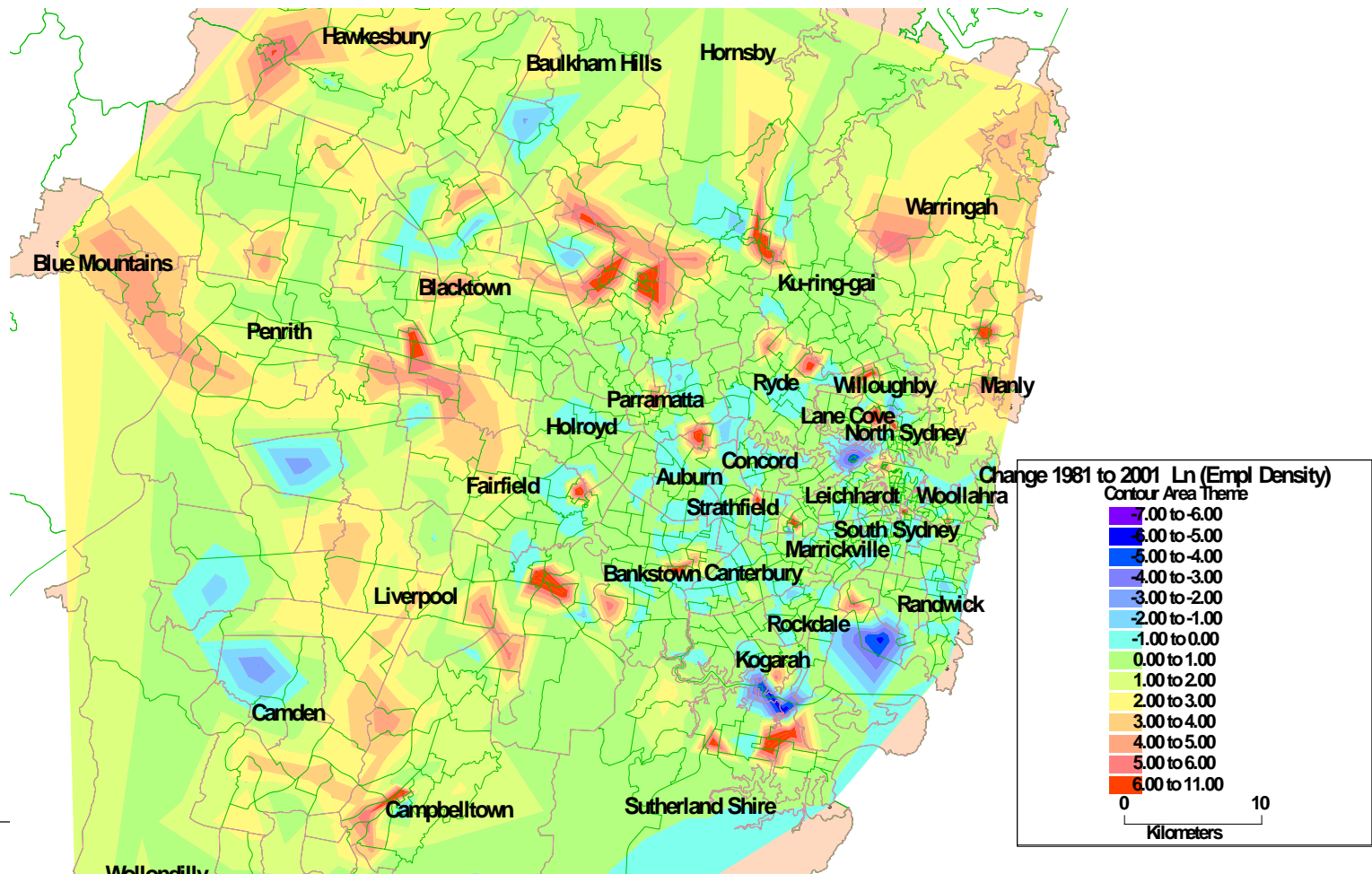
- Using data sources from successive census years 1971 – 2011 and corresponding journey to work travel datasets



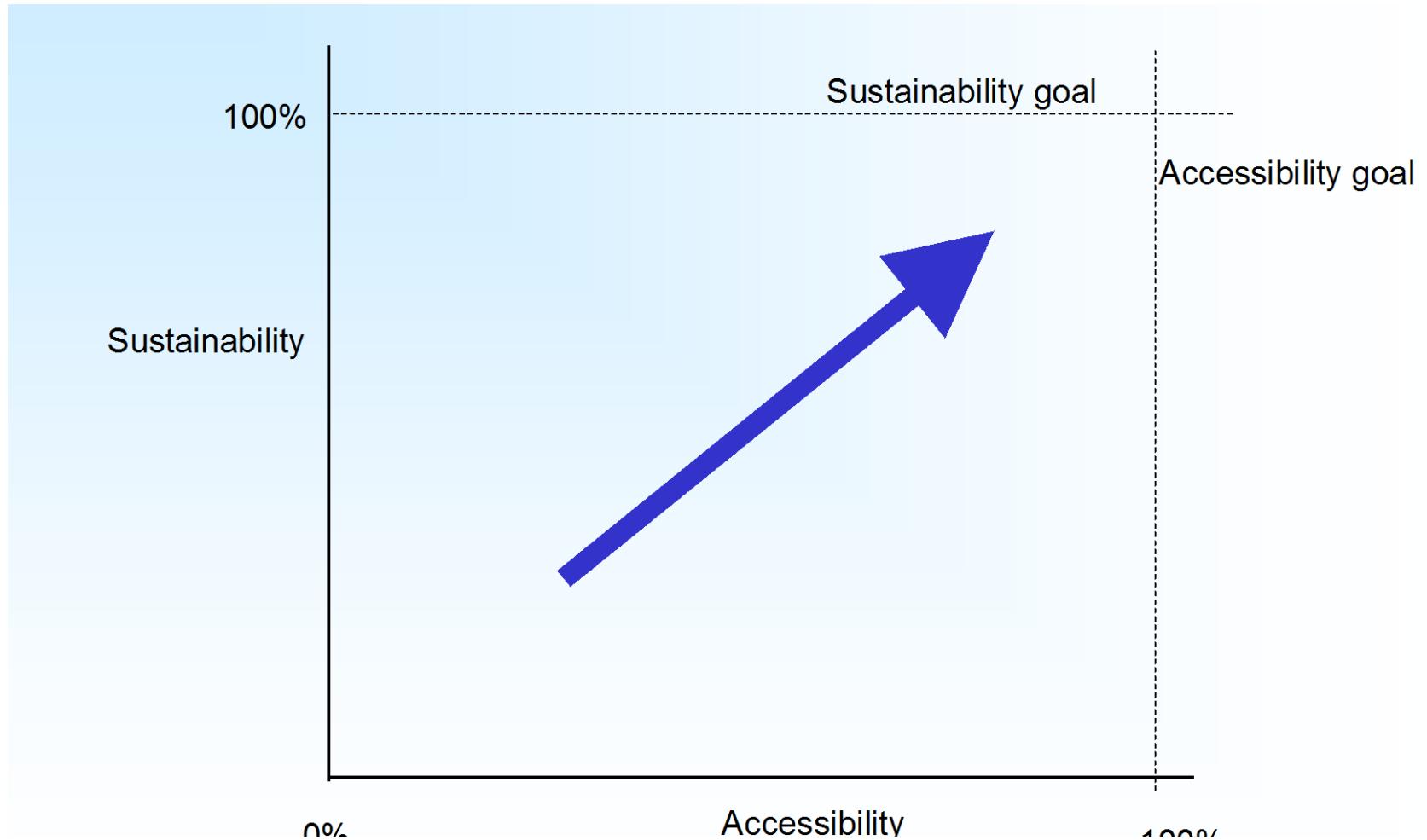
Source: <http://visual.bts.nsw.gov.au/tz>

ACCESSIBILITY TO EMPLOYMENT (1971-2011)

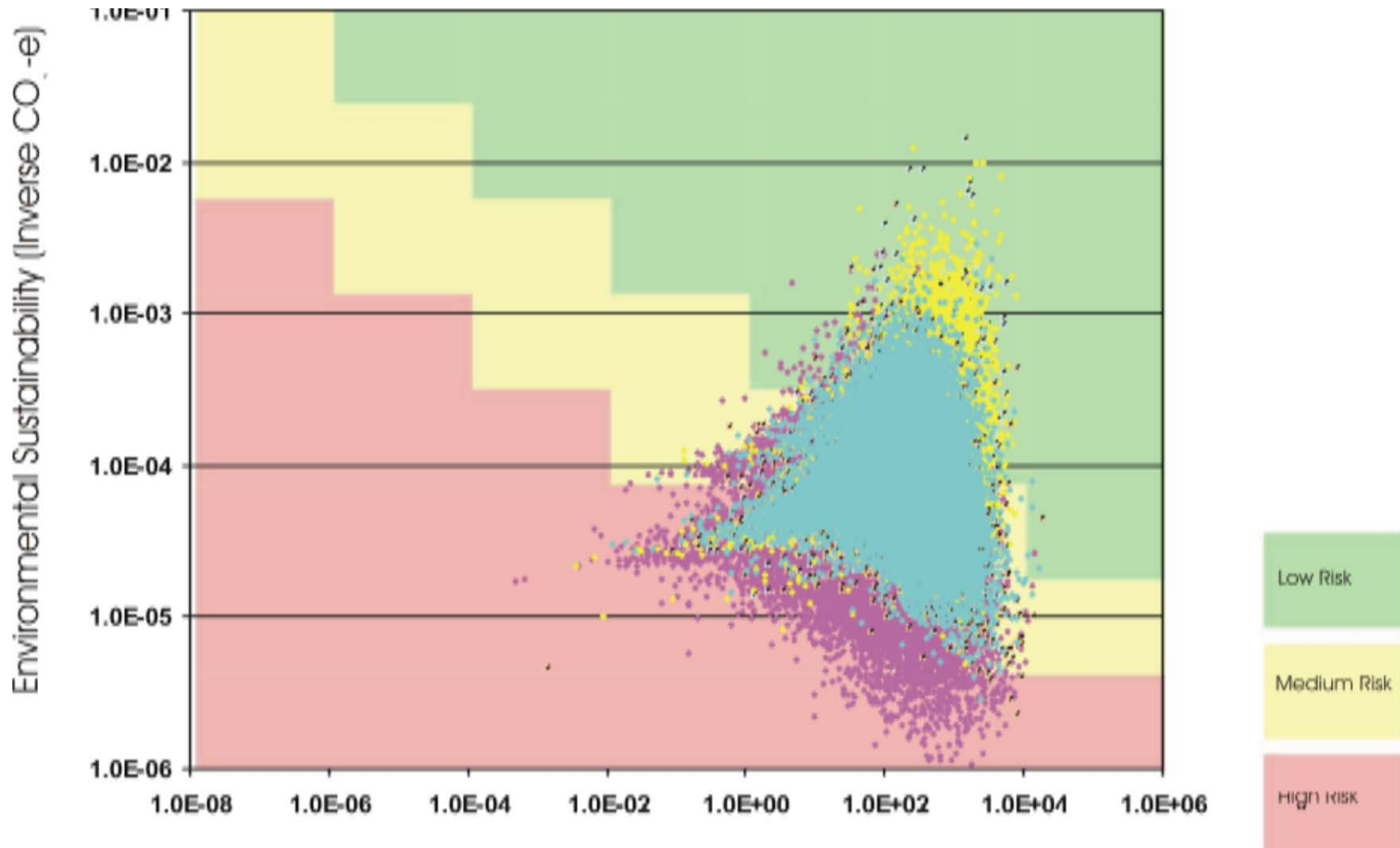
Investigate policy instruments and other drivers for any observed changes to accessibility

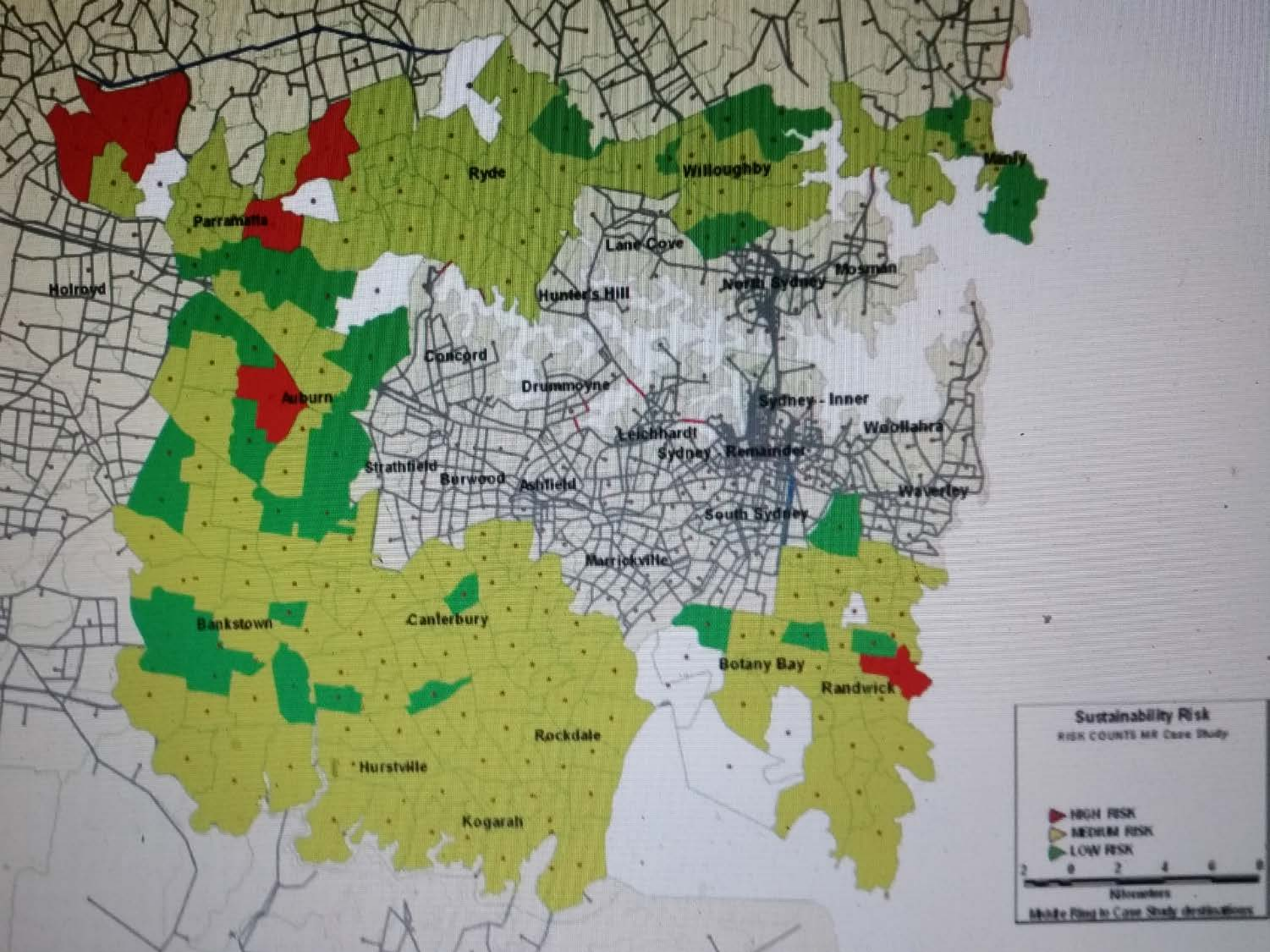


Accessibility Goal for Sustainable Cities

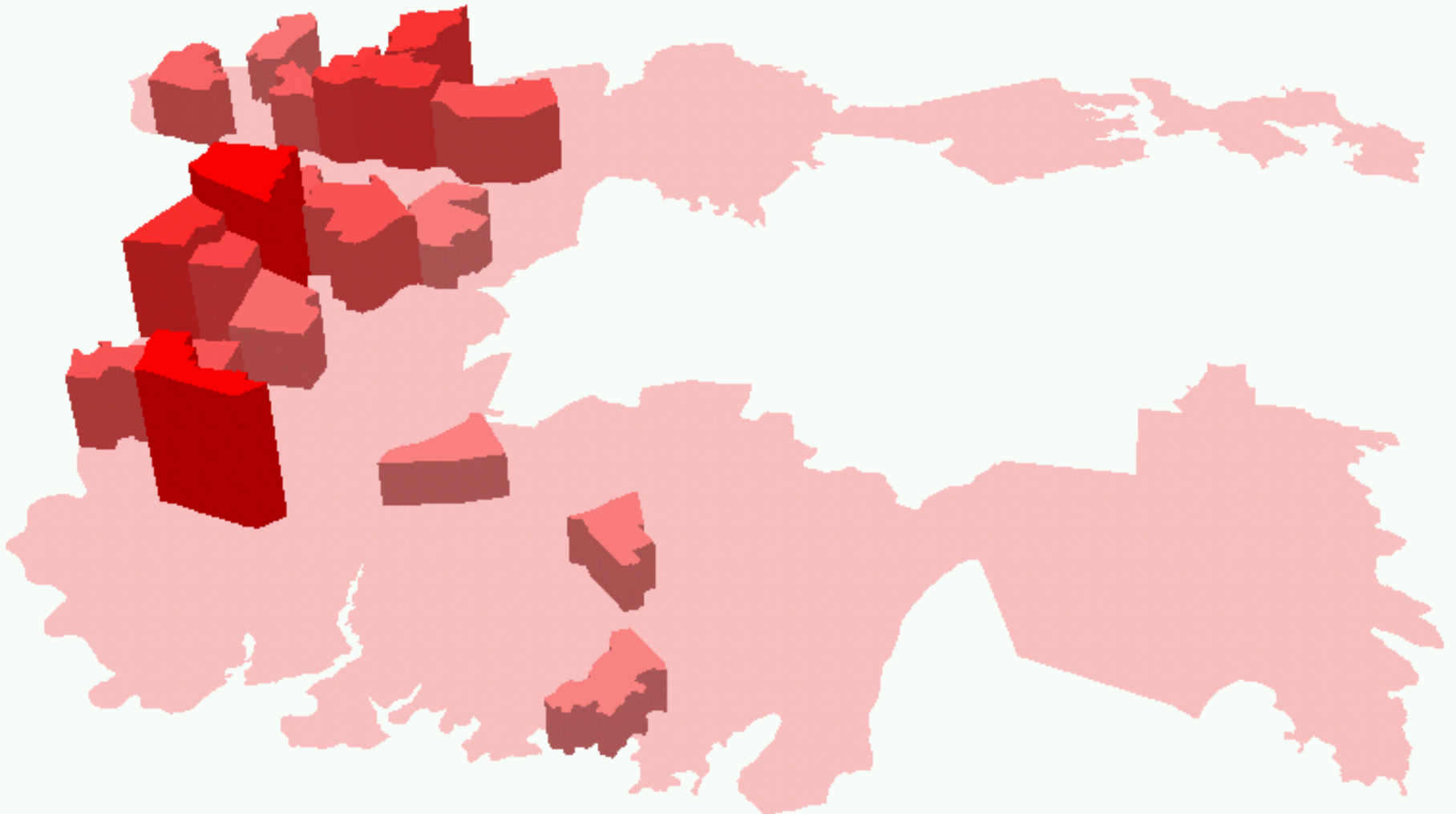


Accessibility v. CO₂ (environmental goal)





High Risk to Sustainability - Outer Sydney



MEASURING ACCESSIBILITY IN ASIAN CITIES (1979-83)

Bangkok, Jakarta, KL, Manila, Sapporo, Singapore

Disaster 1: Field Notes destroyed in Manila hotel fire

Re-boot 1: EASTS Collaborative Research Funding (2005-

8) “Dynamics of Employment Distribution” –

Fairer Over Time?

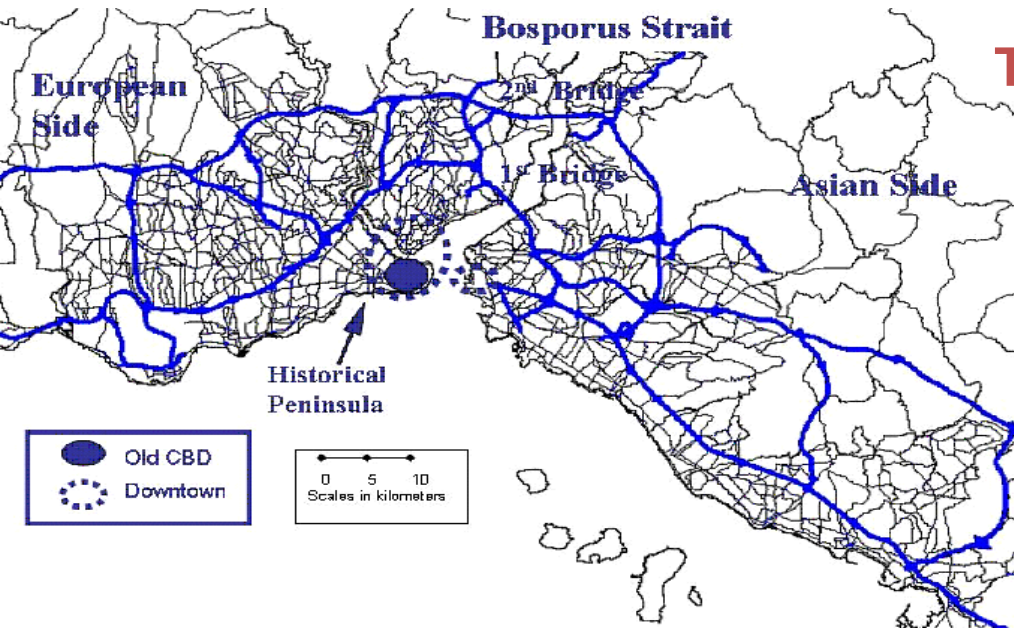
Shanghai



1990



2010

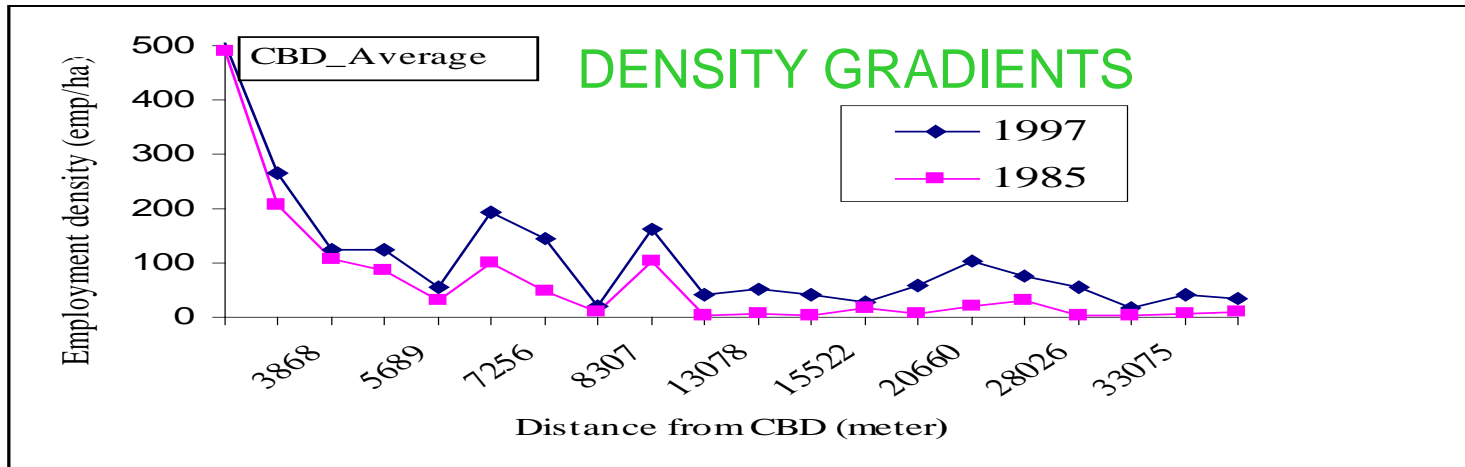


TAZ and Local Municipalities

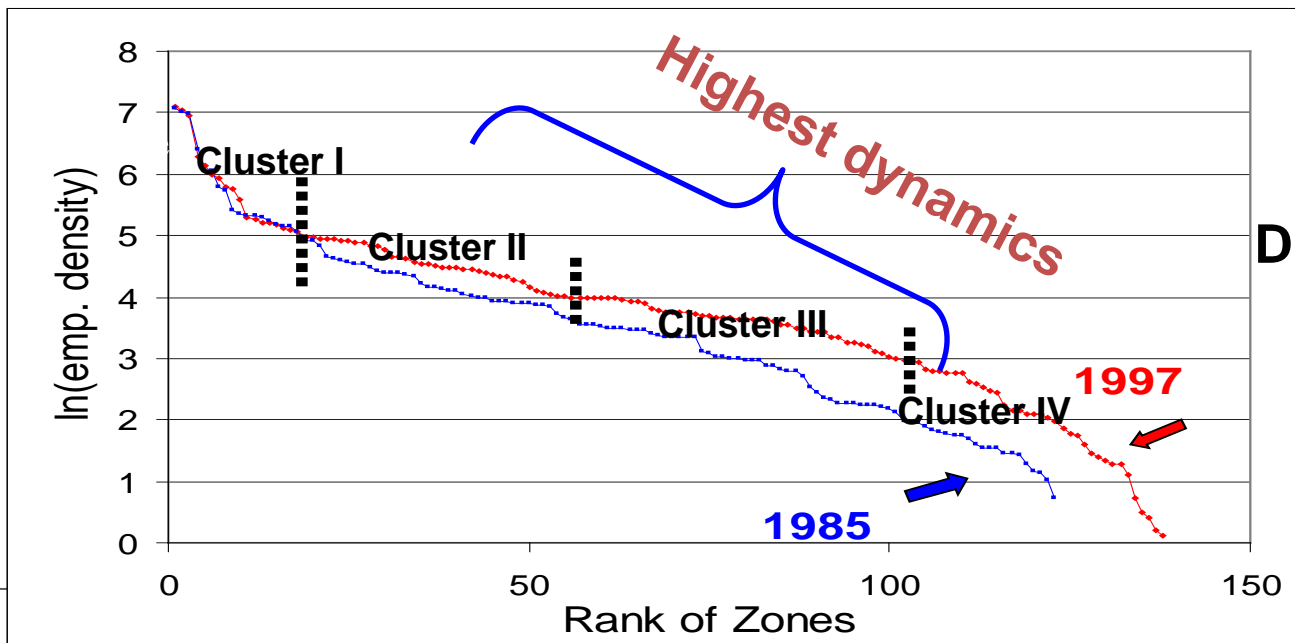


ISTANBUL

	Master Plan 1985	Master Plan 1997
Metropolitan area population	5,347,147	9,057,747
Metropolitan area employment	1,875,500	2,794,223
Metropolitan area GDP per capita (US\$)	2750	4420
Car ownership per 1000 persons	71	103
Traffic Analysis Zones		209
Data Source	O/D and Land use field Survey	
	% 13 of the total population	
	% 1 of the total national area	
	% 21,5 of total GDP	

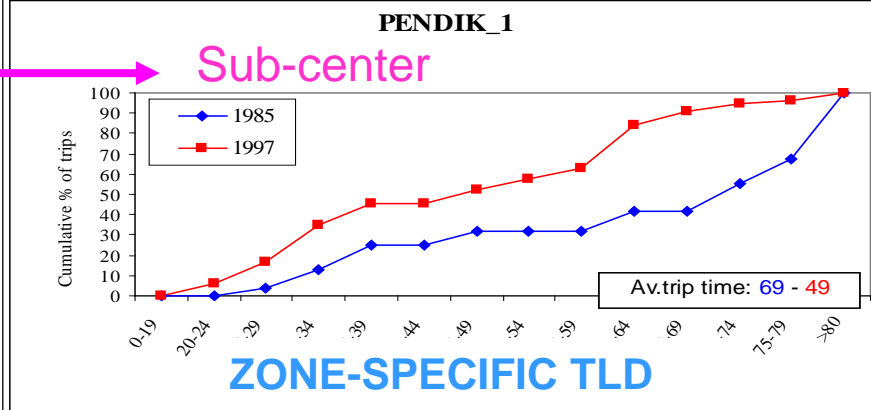
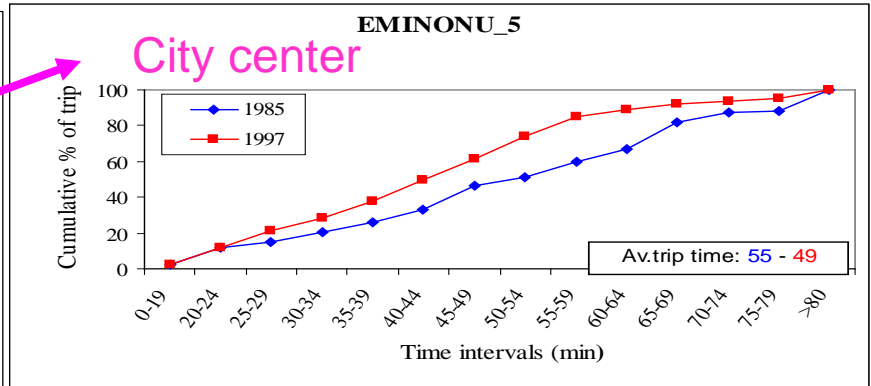
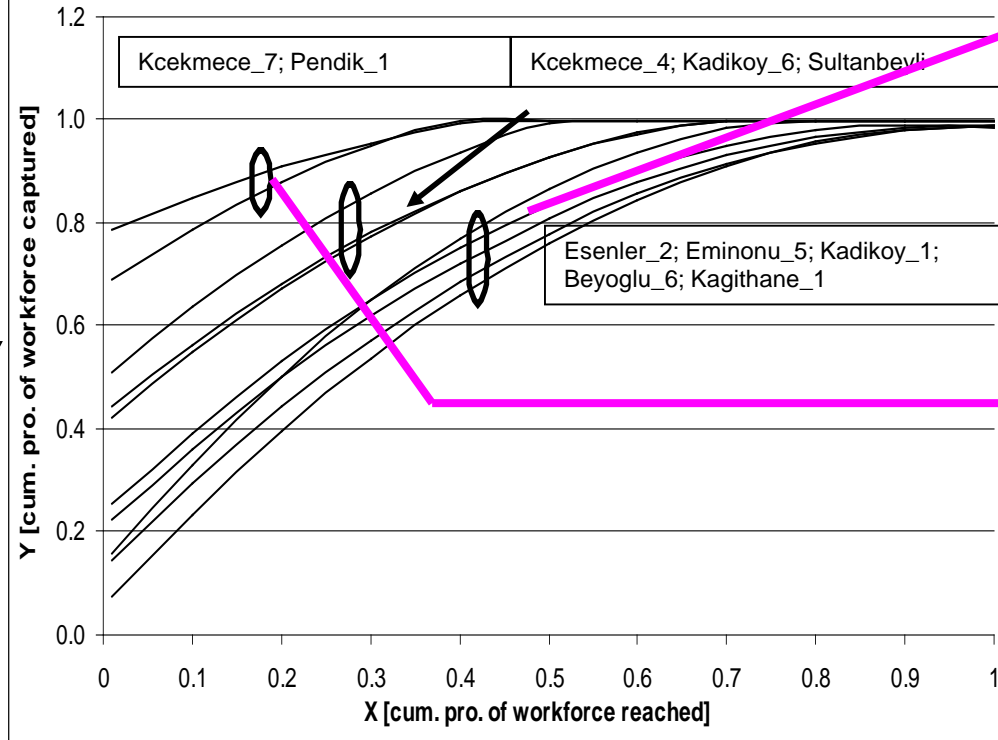


- There is an obvious upward shift in the density gradients of the sub-centers but almost no change for CBD



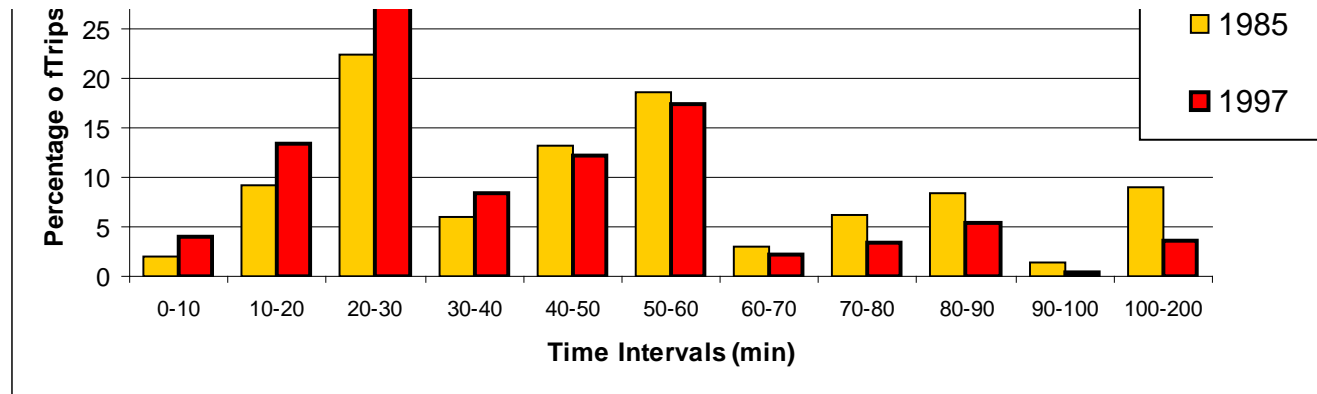
EMPLOYMENT PREFERENCE FUNCTION ANALYSIS

EMPLOYMENT PREFERENCE FUNCTION



→ Historical CBD has a more flat function where two newly emerging sub-centers on east and west attracted more laborforce from closer distance.

Metropolitan area morning peak commuting trip time distribution 1985-97 – Why Decreased?



Metropolitan area morning peak commuting average trip time

1985

53

1997

41

→ Construction of Second Bosphorus Bridge and its express beltways

→ Location choices that bring jobs and houses closer

Geography of Dalian



Central District

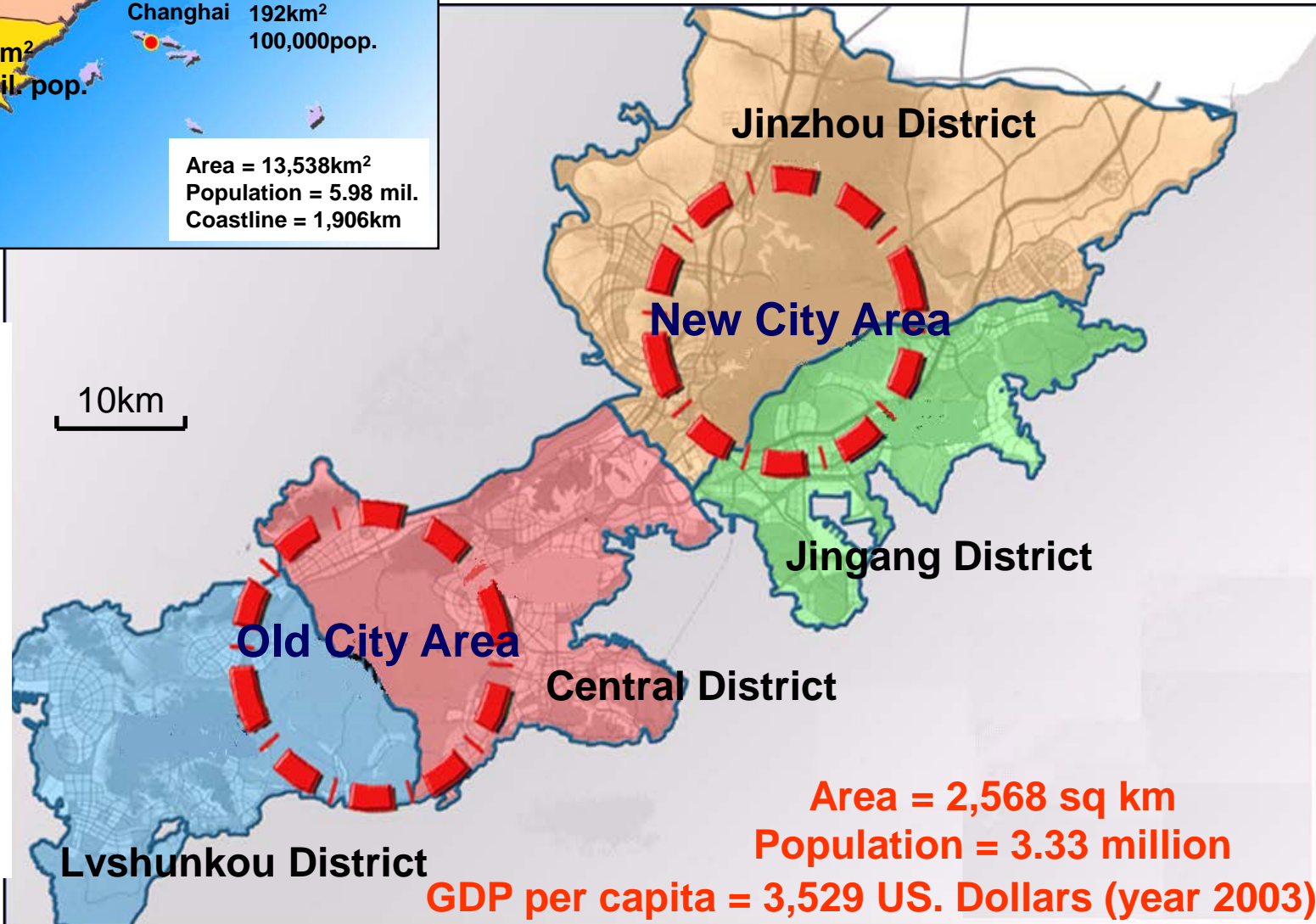
includes

Zhongshan
District,

Xigang District,

Ganjingzi
District and

Shahekou
District.

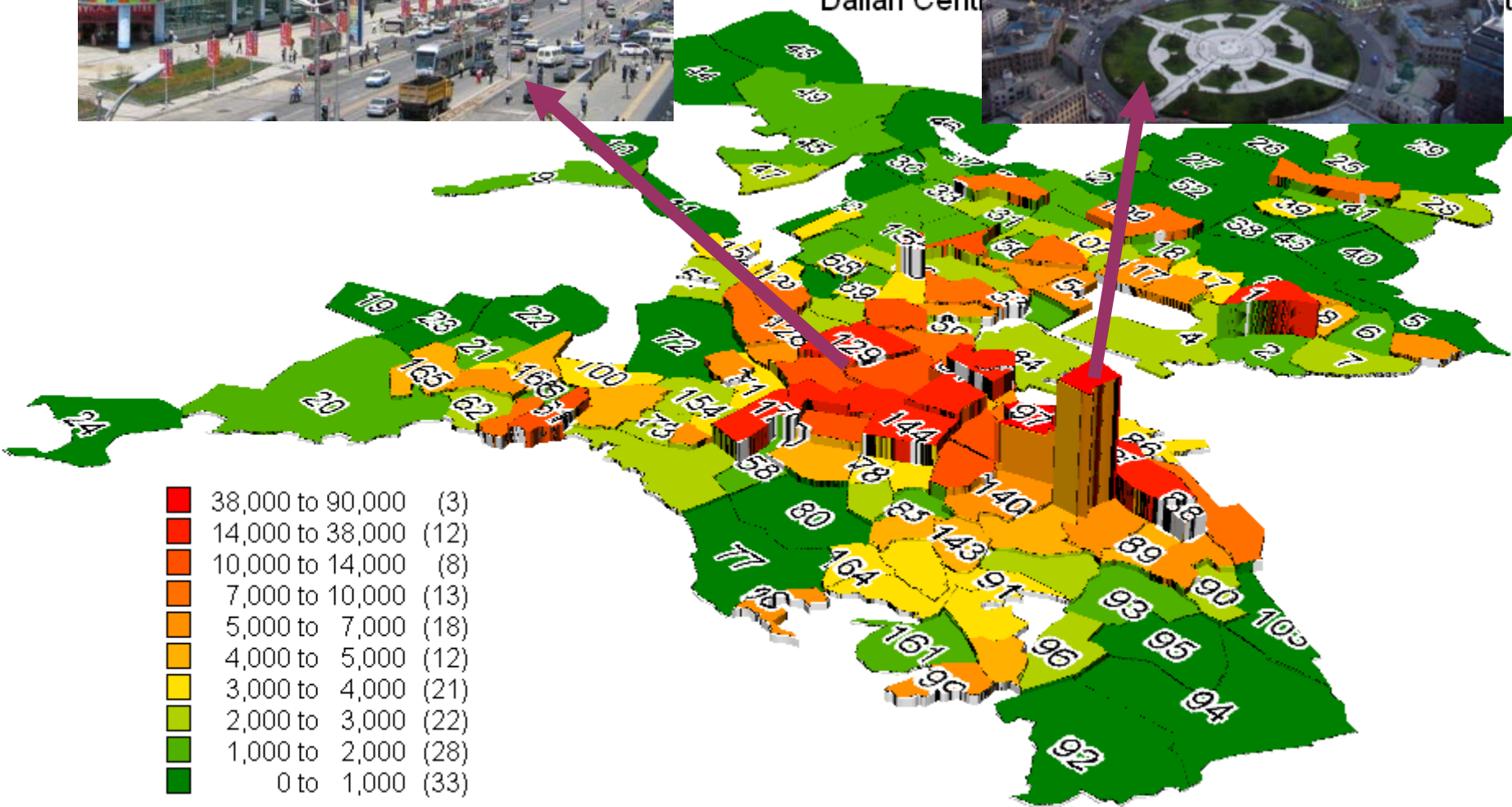
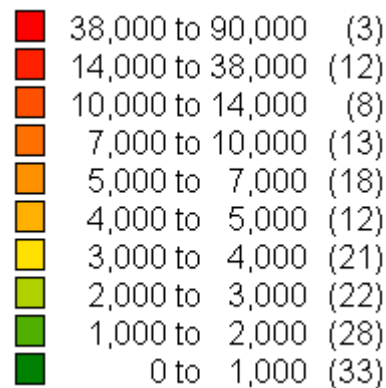


Dalian, China – Employment Clusters



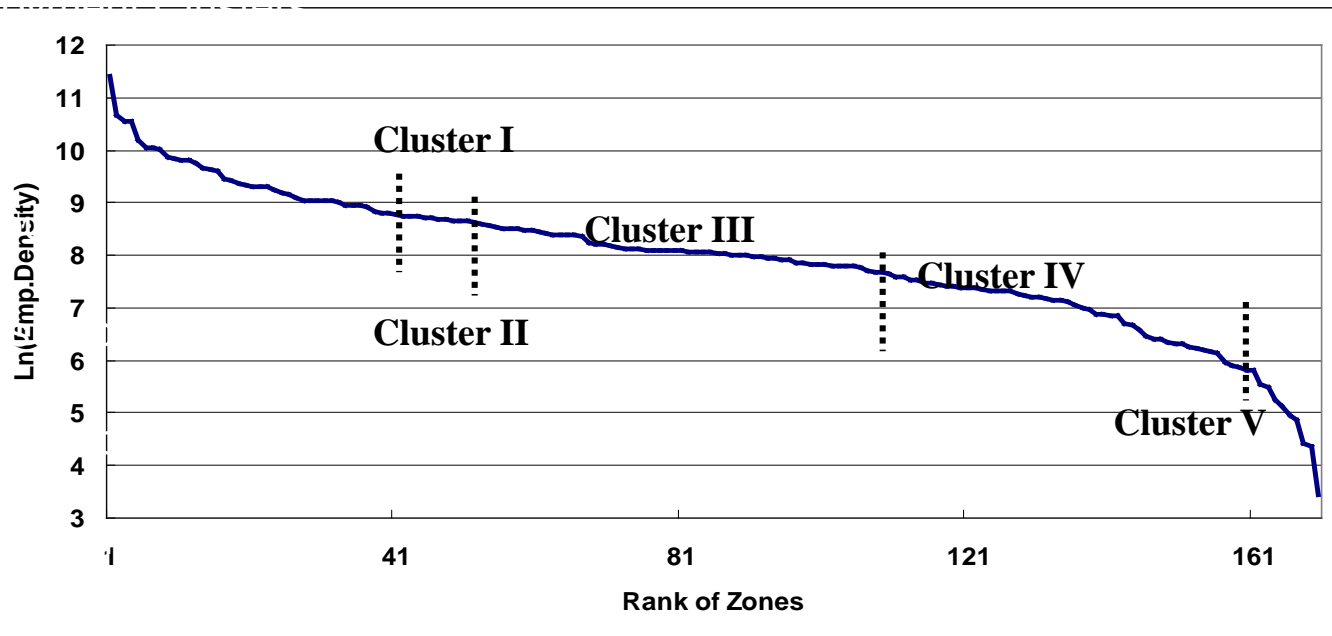
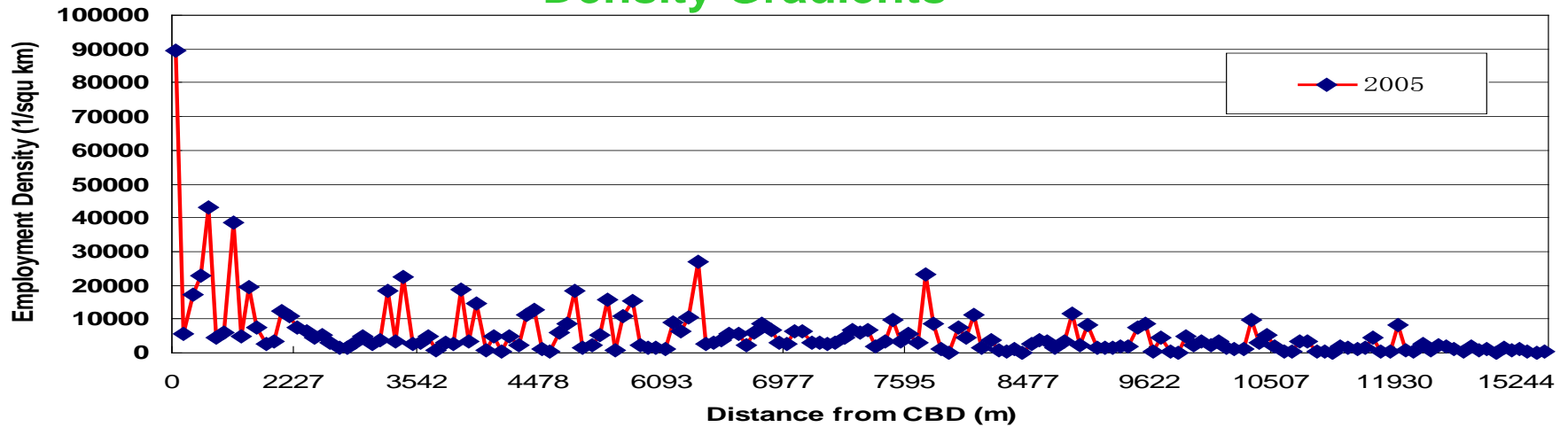
Dalian Center

ty

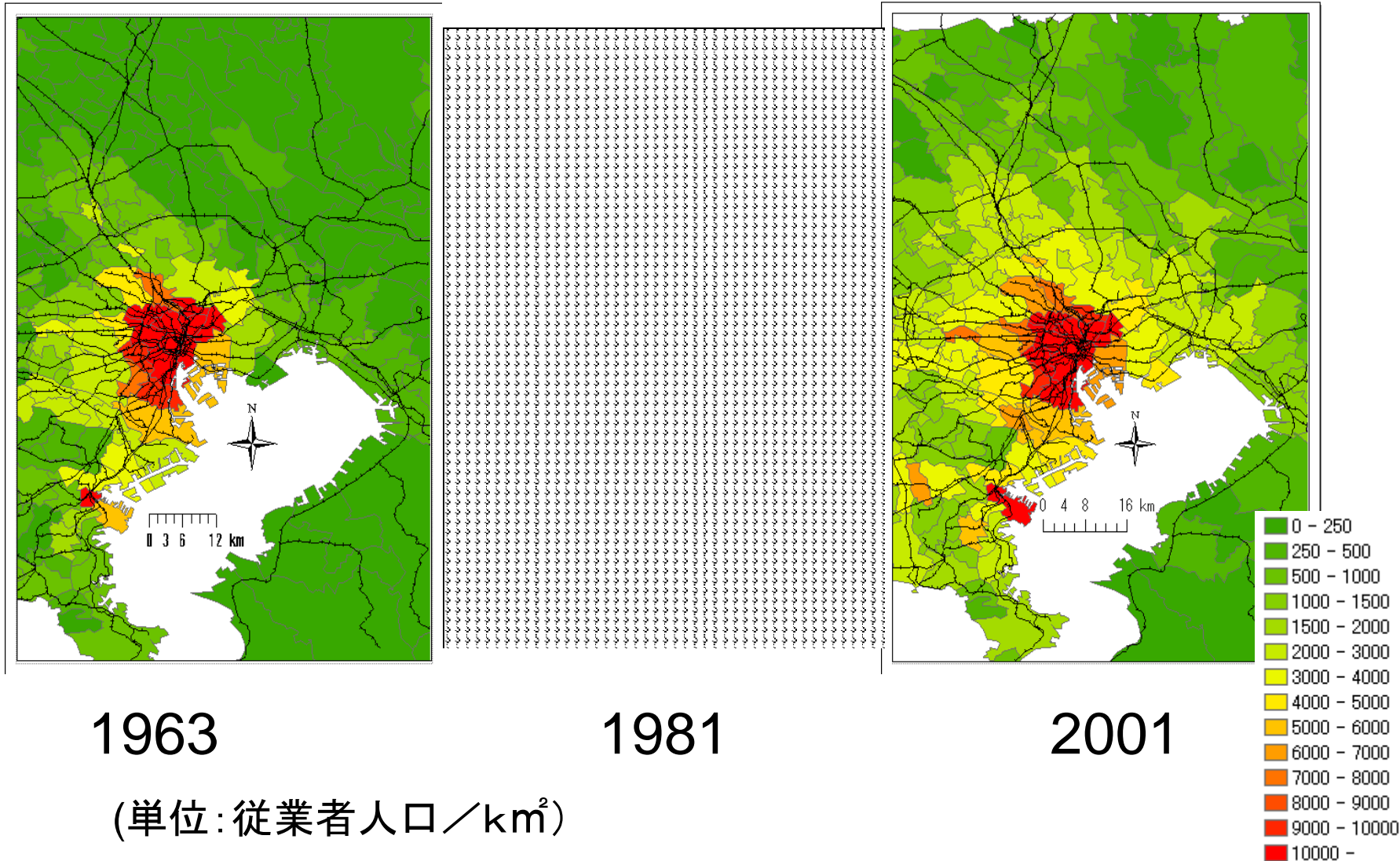


Dalian – Employment rank-size

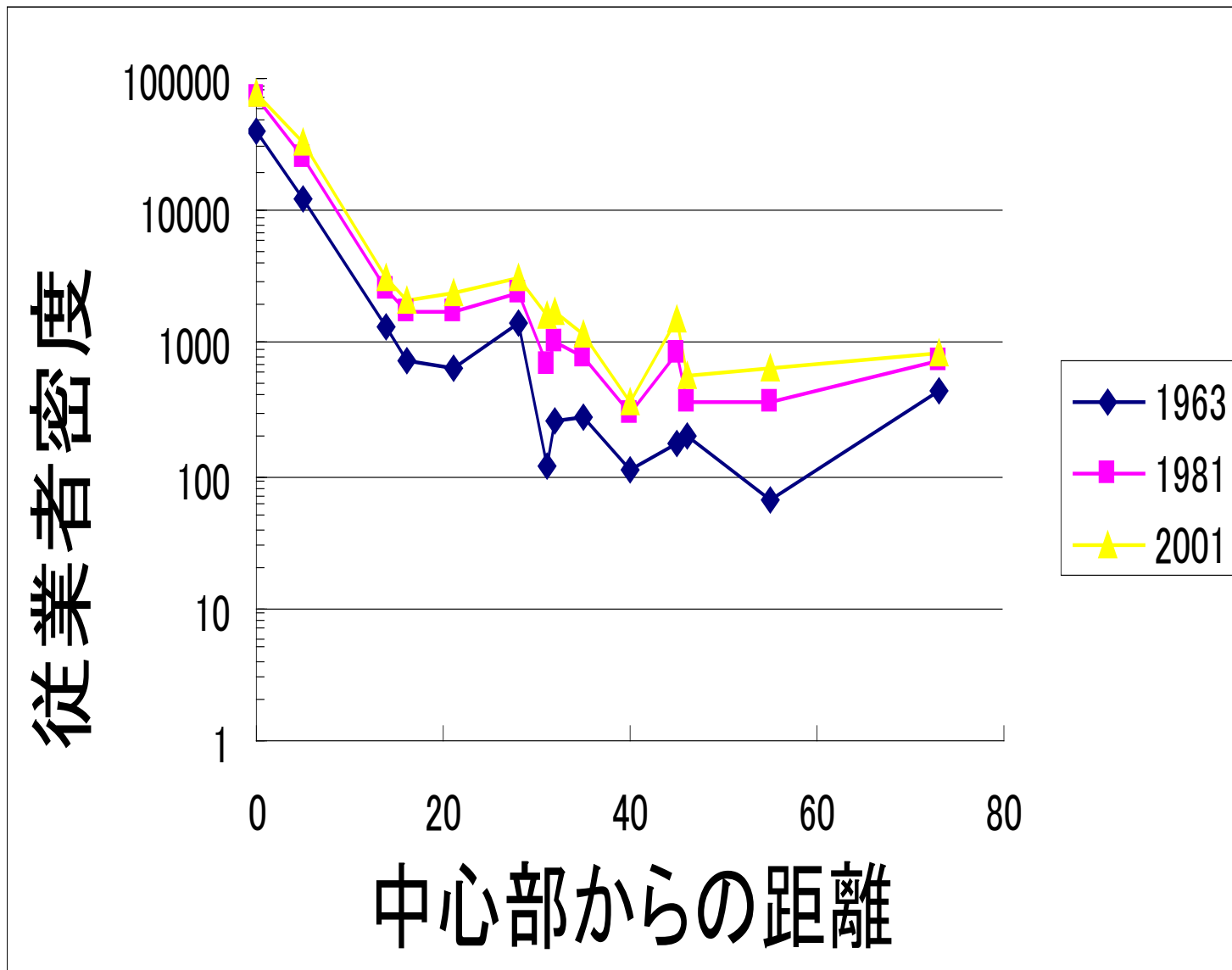
Density Gradients



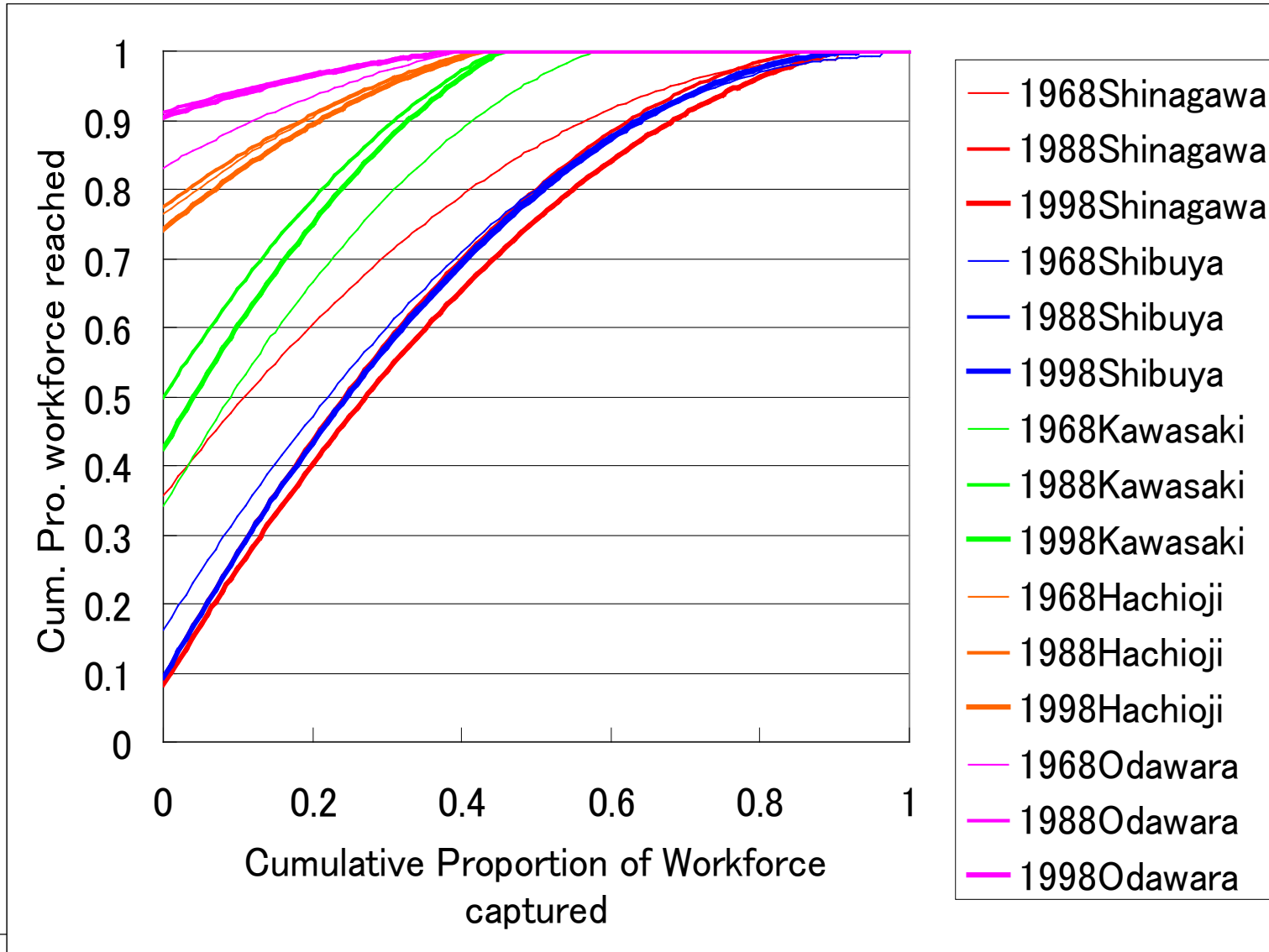
Tokyo – Population Density 1963 - 2001



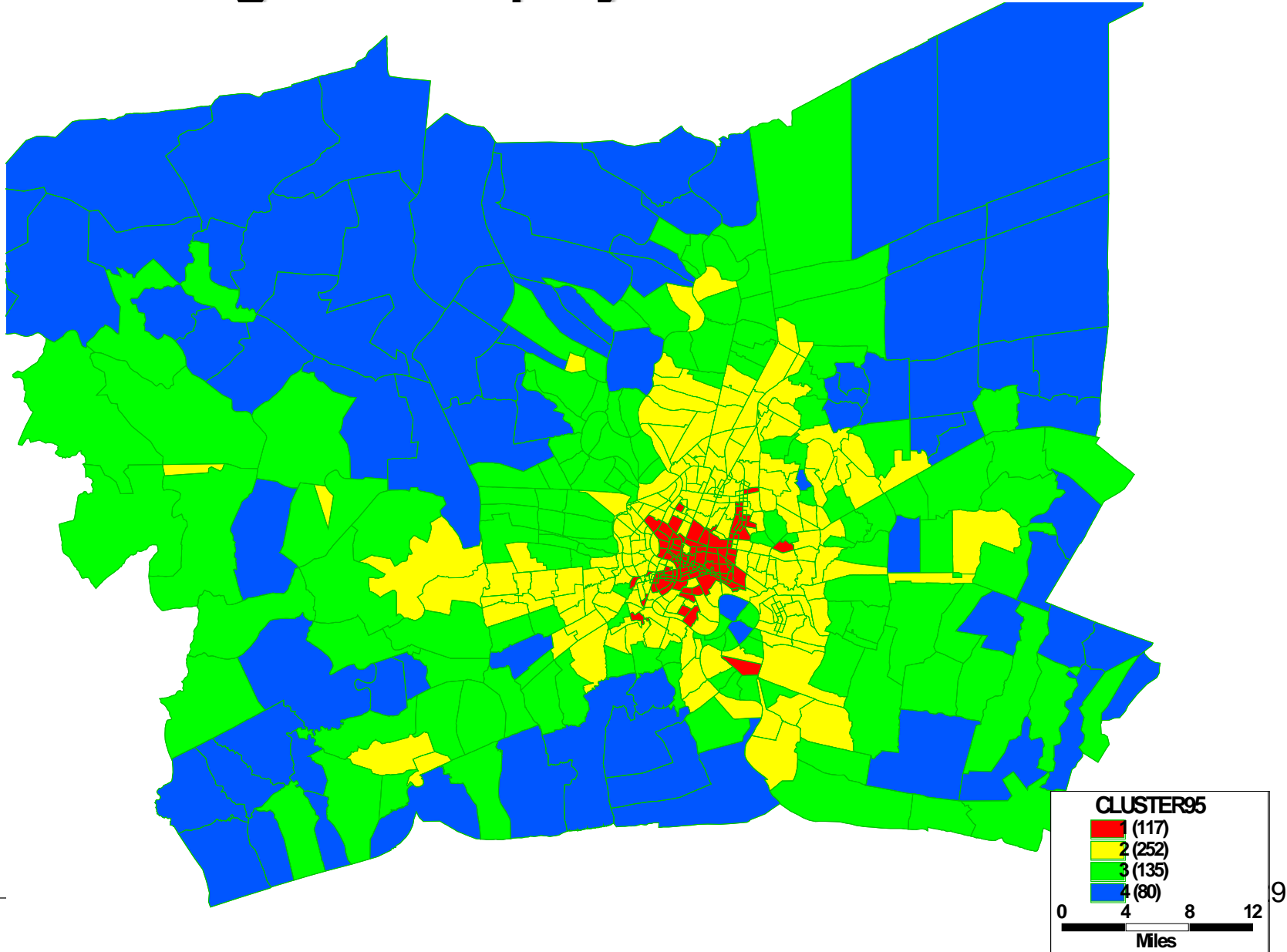
Tokyo – Suburbanisation of Jobs 1963-2001



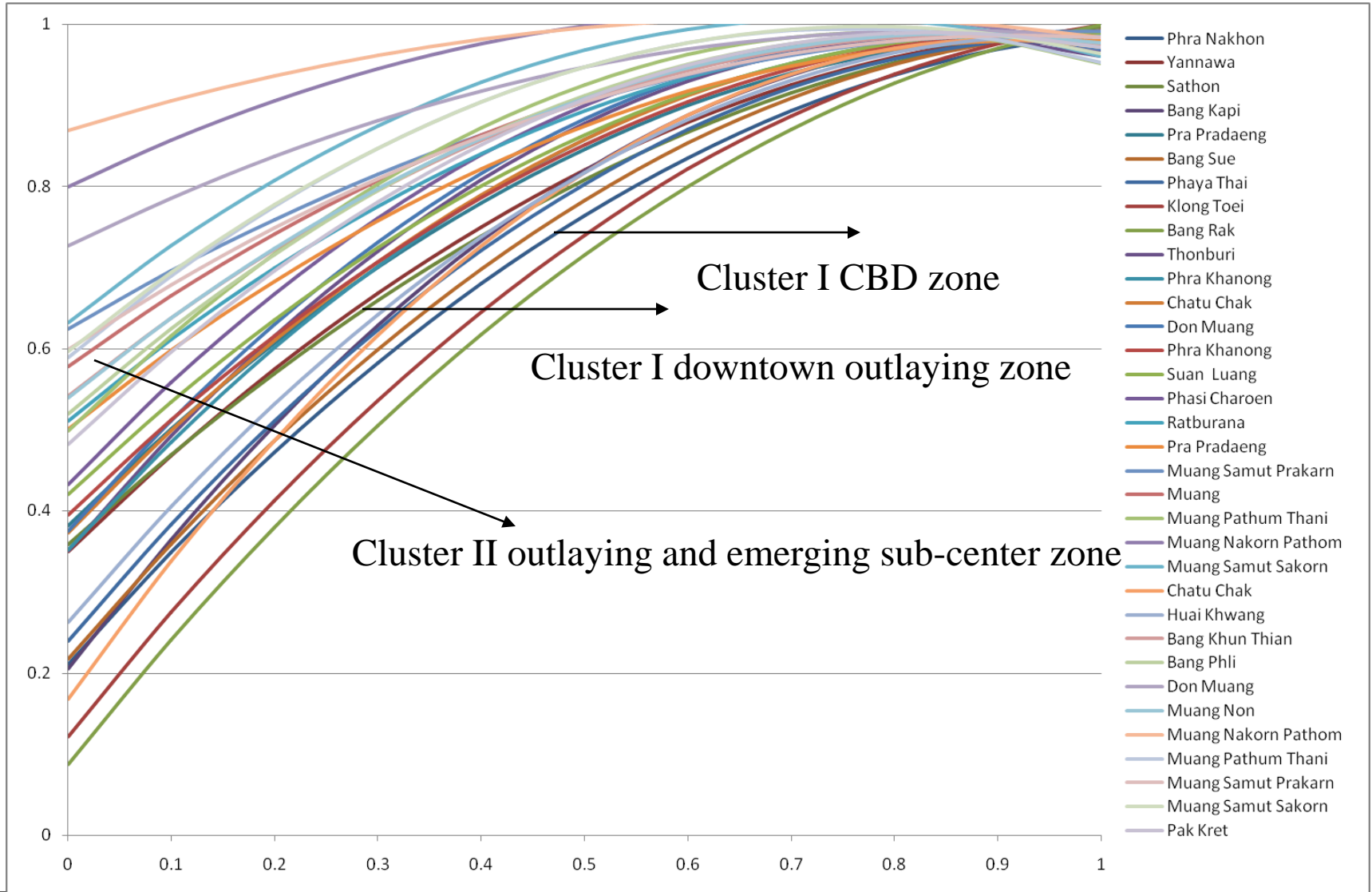
Shorter Commutes in Suburbs 1968-1998



Bangkok - Employment Clusters 1995



Bangkok Preference Function Jobs to Home 2005



GREEN INFRASTRUCTURE

Chicago, San Francisco, Emeryville (2015)

Transit Oriented Development, Isfahan, Iran

Green Infrastructure in USA

In April 2011, the US Environmental Protection Agency released the Strategic Agenda to Protect Waters and Build More Liveable Communities through Green Infrastructure.

Green infrastructure uses vegetation, soils, and natural processes to manage water.

Green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.

Chicago - The Sustainable Urban Infrastructure Guidelines and Policies

The mission statement is supported by three purposes and need statements, which express the high-level outcomes and goals of the principles, objectives, requirements and processes:

“To create a safe, livable, and sustainable city with great streets and healthy places.

To provide simple, pointed design, construction, and maintenance guidance for the creation of a sustainable urban infrastructure for all Chicagoans.

To prepare the city’s infrastructure to respond to the challenges of climate change and enact policies to reduce its negative impacts”

Chicago, Pilsen; Emeryville, California (2015)

TREATING WATER NATURALLY

Like wetlands do, this rain garden filters water. It holds on to rainfall for a while, letting it soak slowly into the soil. Hardy plants and tons of microbes biochemically break down fertilizer, oil, heavy metals, and other pollutants.



When rain falls on pavement, it runs off directly into drains instead of soaking into the ground.

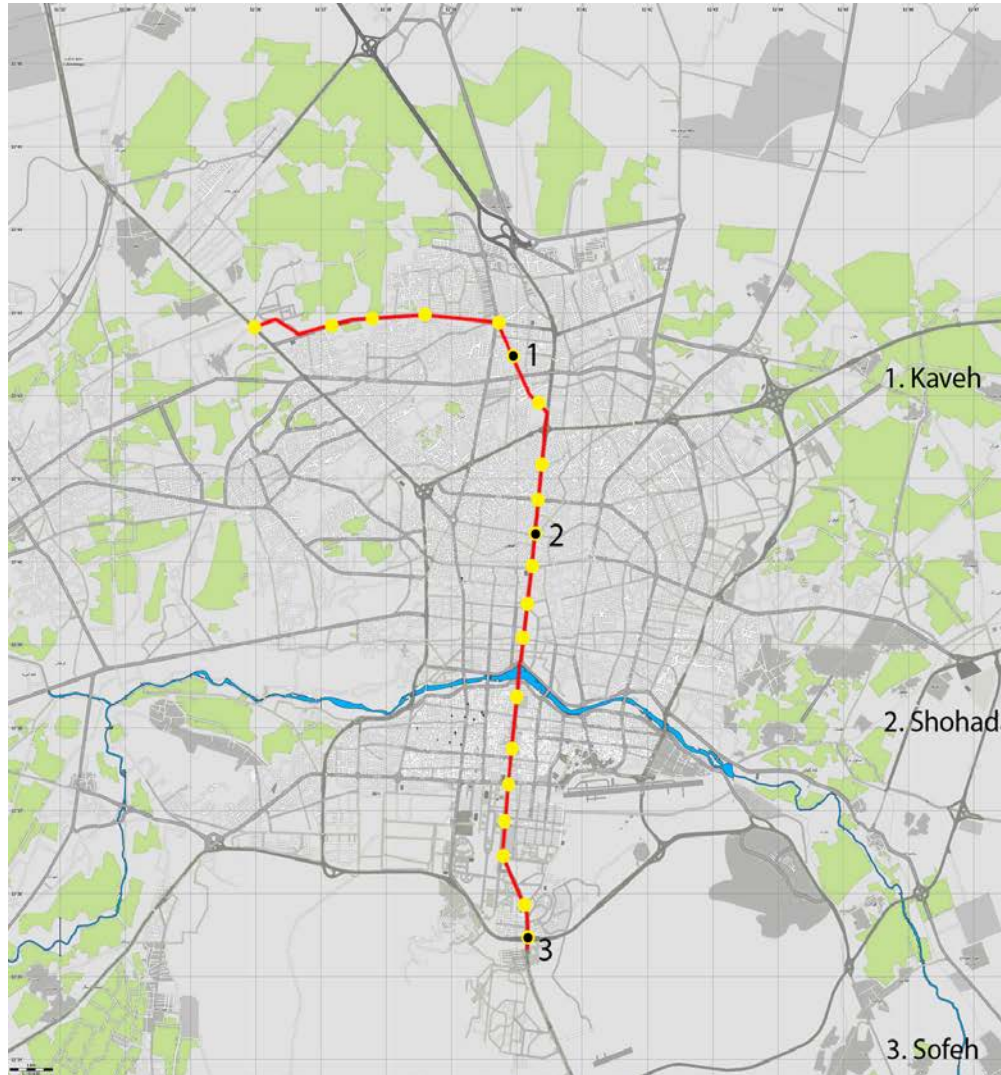
THIS PLACE WAS WETLANDS ONCE

For a long time, San Francisco Bay was lined with marshland. Where you're standing used to be flooded at each high tide. The mudflats and salt marshes caught and filtered water before it flowed into the Bay.

Now those marshes are filled and mostly paved, sending rain and pollutants right to the Bay. But rain gardens like this help store and clean water the way the marsh once did.



Isfahan – Metro Problems & TOD Opportunities



Chamran Station



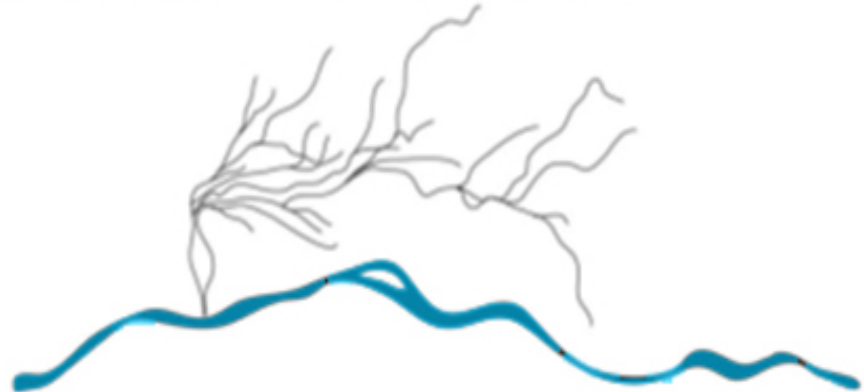
Isfahan History – Green Infrastructure

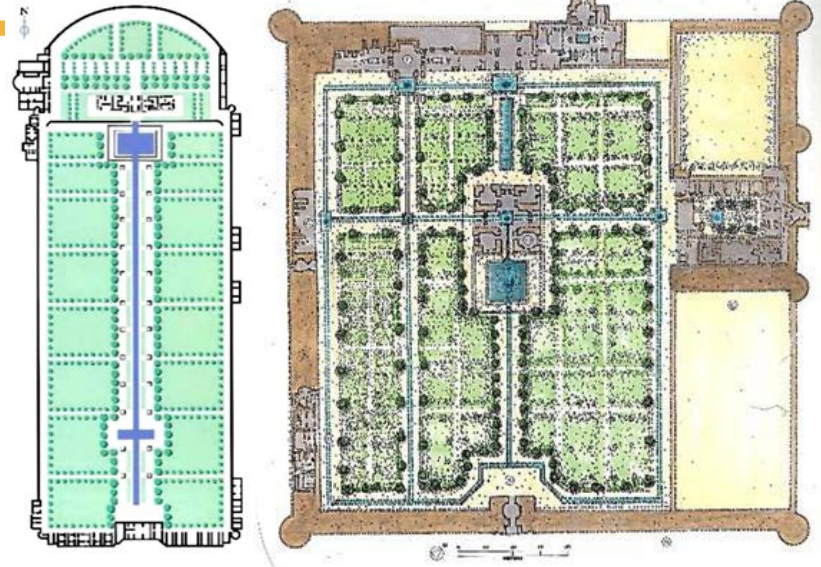


Chaharbagh Street



Niasarm stream





Design rules and principles:

- Enclosure (Internal paradise)
- Hierarchy
- Symmetry (Four quadrants divided by pathways and waterways)
- Centrality (focal point)
- Rhythm & harmony
- Unity & Multiplicity
- Naturalism

Persian Garden of Eden

A sustainable model for TOD

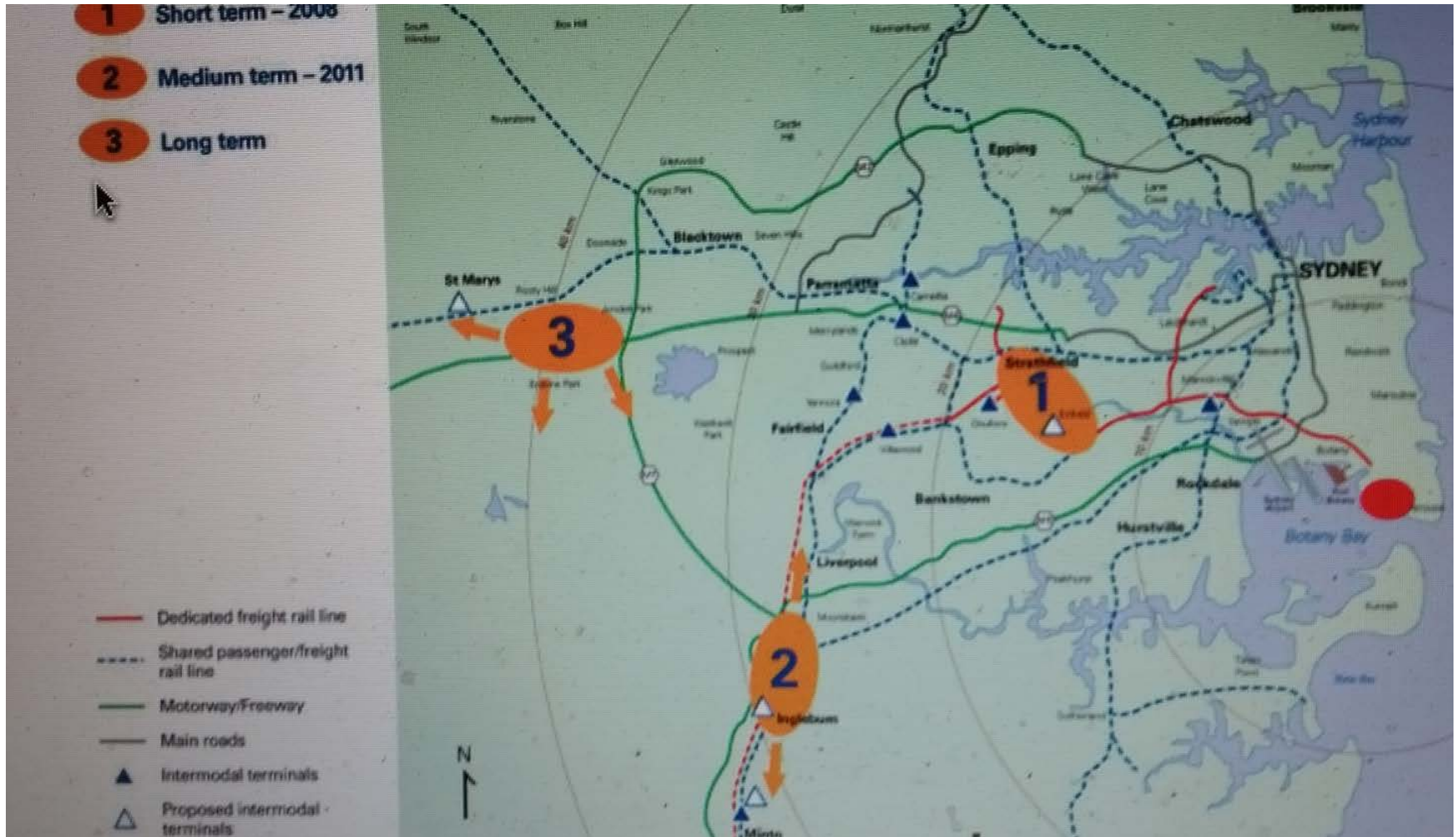
**Green Logistics –
Inter-modal Terminals in Sydney and Environmental
Impacts
(Dr Violeta Roso, Chalmers University; Dr Naoya Akita,
Kobe University)**

GHG Emissions by Ships in Port

Sydney (2013)	Goteburg (2015)
1370 annual ship visits	5999 annual ship visits
2 Ro/Ro ships	3048 Ro/Ro ships
813 container ships	785 container ships
95 000 tonnes CO2 equivalent	150 000 tonnes CO2 equivalent

Location	Operators	Siding Length (Metres)	Estimated Capacity (TEU)
Camellia	Patrick PortLink	300	80 000
Chullora	Pacific National (inter-state)	680	300 000
Cooks River	Maritime Container Services	500	150 000
Villawood	Mannway	350	20 000
Minto	Macarthur Intermodal Shipping Terminal	390	45 000
Yannora	Patrick PortLink/QR National	500	50 000

Inter-Modal Strategy – Sydney Ports (2011)



Moorebank – Financed Through PPP Federal, State and Private Enterprise

(Source: KPMG 2012)

Department of Finance
and Deregulation

Moorebank Intermodal
Terminal Project

Detailed Business Case

6 February 2012

Moorebank Inter-Modal Terminal Plan from EIS



Questions?

- Equity in the City
- Sustainable transport
- Green infrastructure
- Green logistics