

LECTURE 2_18:

MAR. 18, 2014

URBAN ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL ISSUES IN CITIES

Text Reference: Dearden and Mitchell (2012), Ch. 13, pp. 466-473.

Outline

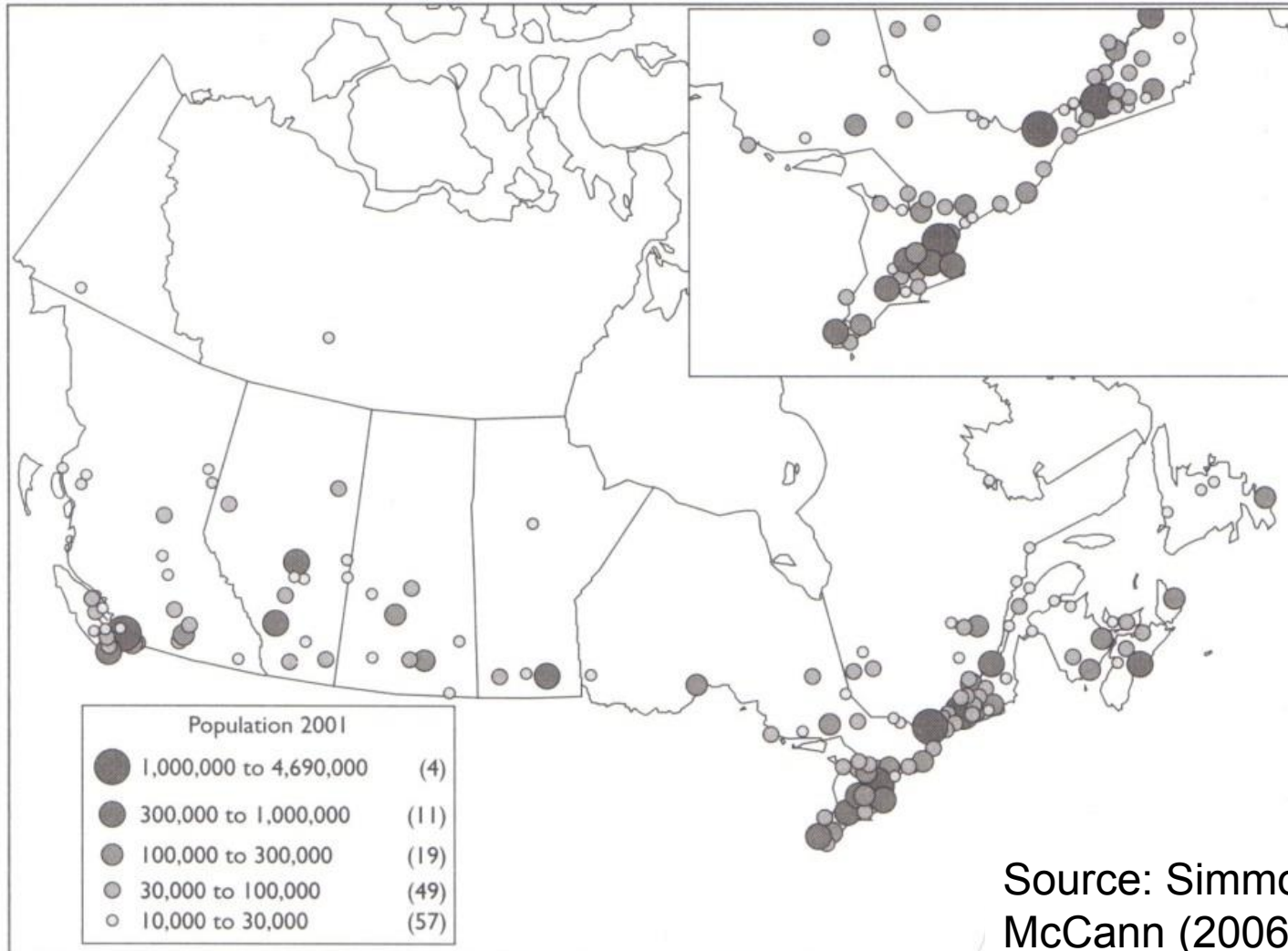
2



- Upcoming Class Lectures:
 - ▣ **March 18 (Environmental Issues in Cities)** Source: Dearden and Mitchell (2012)
 - ▣ March 20 (Urban Sustainability and Best Practices in Urban Areas)
- Other lecture / film of interest
 - ▣ Wed. March 19th, 7 pm, Ryan Bldg 1022, “**Thunder Bay North Harbour Sediment Management Options Report.**” .. By Cole Engineering ... more information and detailed documentation about the extent, characteristics and risk associated with this contamination is accessible at:
<http://www.infosuperior.com/thunder-bay-pac-meeting-march-19th-2014/>
 - ▣ Wed. March 19th, 7:00 pm, Paramount Theatre (Downtown northcore) “**The Human Scale**” - A critical view on the way we build and use our cities. Director: Andreas Dalsgaard Denmark/2013/77 min

Canadian Urban Places in 2001

Figure 3.1 Urban Places in the Canadian Urban System, 2001



Source: Simmons and McCann (2006)

Topics

- **Definitions:** urban forms (*v. brief recap*)
- Urban issues (**physical**)
 - Sprawl
 - Farmland loss
 - Air pollution
 - Air quality
 - Urban heat island
 - Hydrological impacts
- Urban issues (**socio-economic**)
 - Changing economic functions
 - Declining and aging cities vs Rising cities
 - Immigration to and within cities
 - Gentrification
 - School closures

Topics cont'd

- Urban issues (**political**)
 - Urban growth boundaries
 - Farmland protection vs development rights (e.g., Ontario Green Belt)
 - Neighbourhood preservation vs freeway construction
 - Transit
- Urban issues (**environmental / solutions**)
 - Sustainability
 - Transit-oriented developments (e.g., Vancouver's Regional Town Centres)
 - Walkability
 - Intensification
 - Smart Growth
 - Brownfield Development

Recall from earlier lectures

Urban vs Suburban vs Exurban forms



- Madrid and Granada





- **Postwar sprawl:**

car-oriented, segregated land use, suburban sprawl around many cities (Photo: sprawl in Colorado)

Exurban Development

- non-farmers/non-loggers/non-fishers living in rural settings;

larger-lots – often estate-sized lots;

increased commuting distance – more distal bedroom communities



Cadallic Circle near Thunder Bay (~10 km from LU), c/o Google Earth 2011



← Near Winnipeg, photo credit: T.Randall

Urban Issues (physical)

- Sprawl (land, energy consumption, commuting)
- Farmland Loss
- Air Pollution
- Air Quality (smog, health connections)
- Urban Heat Island
- Hydrological Impacts

Suburb-Farmland Interface



1954



1963



1976



2008

South Richmond, BC

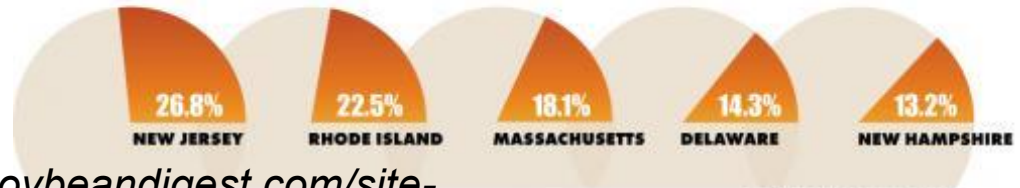
Photo credits: *Alternatives Journal* Vol. 34 Issue 3, 2008

Land pressures (e.g., Stoney Creek on Niagara fruit belt / escarpment)



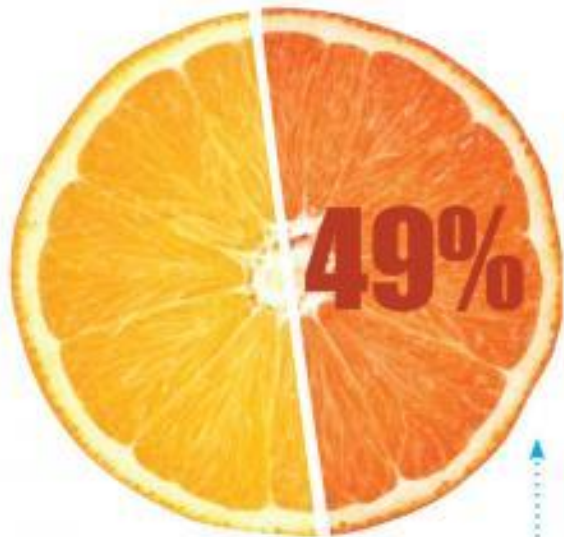
Farmland Losses

States that developed the largest percentage of their agricultural land:



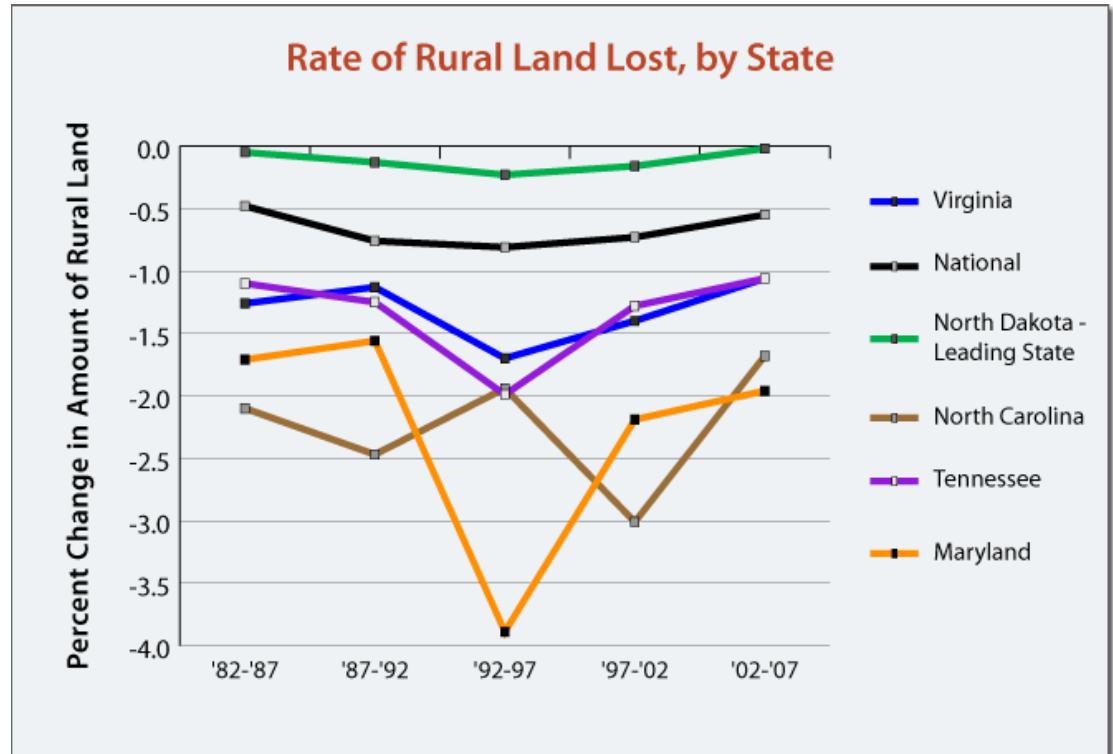
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California and Florida, two of the three states that lost the most agricultural land, account for nearly half of the acreage devoted to growing fruit and vegetables nationwide.

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<http://vaperforms.virginia.gov/indicators/naturalResources/landPreservation.php>

“Pressure builds on Agricultural Land Reserve”

Vancouver’s Georgia Straight, Dec. 2008

<http://www.straight.com/pressure-builds-agricultural-land-reserve>



Concern that the **municipality of Delta (in BC's Lower Mainland)** may be the next Richmond

<https://stephenrees.wordpress.com/tag/agricultural-land-reserve/>

Car is the mode of choice in *most* North American cities....

Table 2.1 **Modal Choice and the Journey to Work: Metropolitan Areas in Canada and the US**

	United States (2002–3)	Canada (2001)
	(%)	(%)
Driving self	80.4	70.8
Carpool	9.2	6.6
Mass transit	6.1	14.8
Walking	2.6	5.7
All other	1.7	2.1
	89.6	77.4

Note: Mass transit refers to bus, streetcar, subway, elevated road, and railroad; carpool includes those who are pas

Source: England and Mercer (2006)

Table 3.6: Calculated commuting times for three hypothetical commute types

Commute Type	Time on each leg of Home-Work-Home Trip (min/day)	Total Time Spent Commuting	
		(hour/year)	(weeks/year)
light	15	183	1.1
medium	30	365	2.2
heavy	60	730	4.3

sizeable



Gasoline use per capita versus urban density in 1990

($R^2 = 0.8594$)

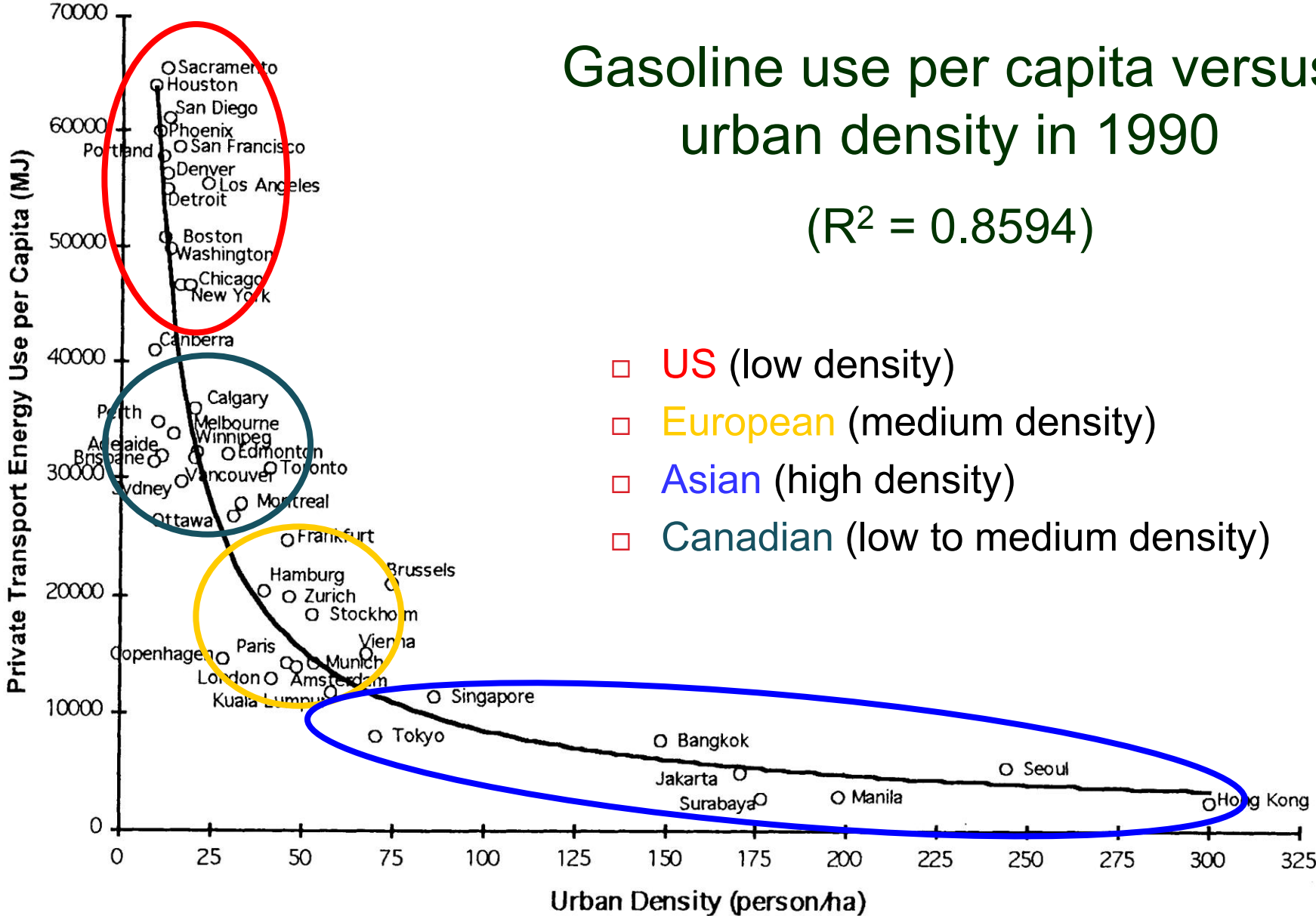


Figure 3.2. Energy use per capita in private passenger travel versus urban density in global cities, 1990.

Source: Newman and Kenworthy (1999)



Typical Commercial Strippart of the *sprawl* problem; not conducive to pedestrians or cyclists.

Photo: North end of Memorial Ave *circa* 2004 (Thunder Bay)

Air Quality / Air Pollution

- Air pollution does not respect international borders (the atmosphere is a ‘commons’ – shared resource) – recall “acid rain” issues of 1980s;
- Air pollution from both point and mobile sources;
- Poorer air quality in cities versus countryside;
- Improving AQ trends in recent years ...
- Related ‘downstream’ health impacts ... and costs ...



Sarnia, ON



Burlington, ON



Toronto
From: Globe and
Mail.com 2012

Vancouver



<http://www.vancitybuzz.com/2012/07/vancouver-smog-due-to-russian-wildfires/>

Air Pollution trends (Canada)

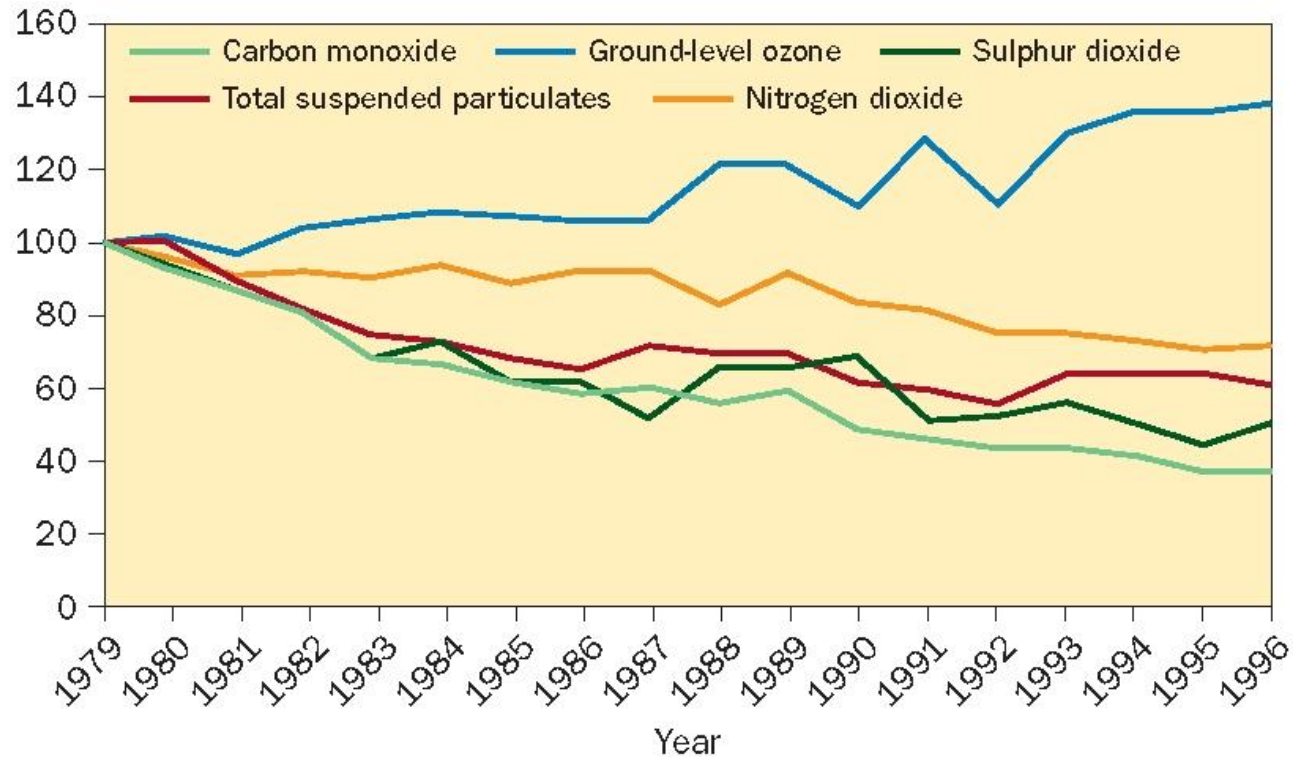
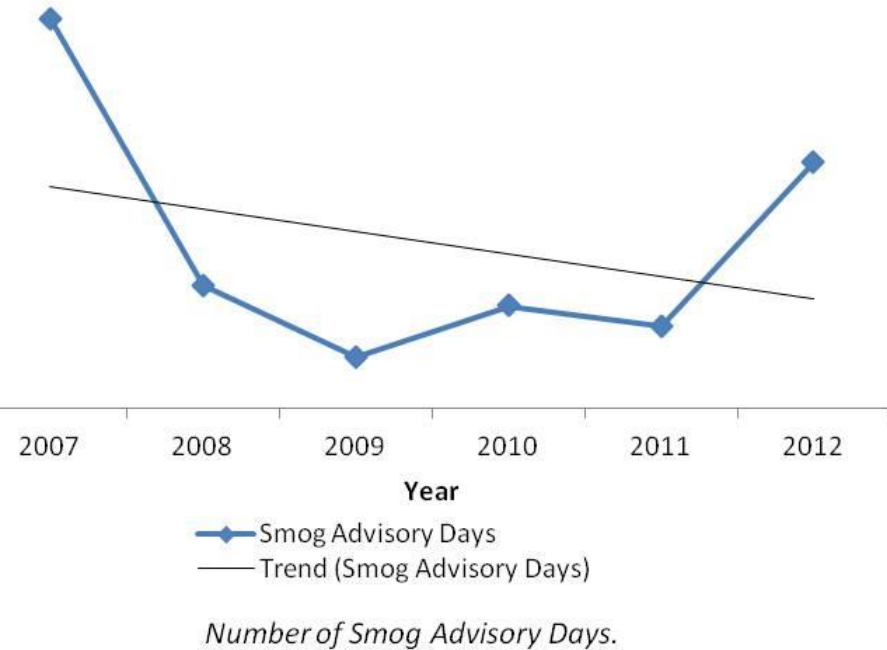


Figure 13.1 | Concentration of common air pollutants, Canada, 1979–96. Source: Centre for Sustainable Transportation. 2002. Sustainable Transportation Indicators, Report on Phase 3, 39. © Environment Canada 2002.

Air Quality Index – Smog Days



Four Reasons Why Shanghai Just Had Its Worst Smog Day Of All Time

12/06/2013 <http://www.bullfax.com>

1) Pressure & Wind; 2) the Cold (more coal burned) 3) Cars; 4) Christmas Season (industrial production)

<http://www.citywindsor.ca/residents/environment/Environmental-Master-Plan/Goal-A-Improve-Our-Air-and-Water-Quality/Pages/Air-Quality-Index-Indicator.aspx>

“Air filters and face masks offer little protection to big city air pollution”

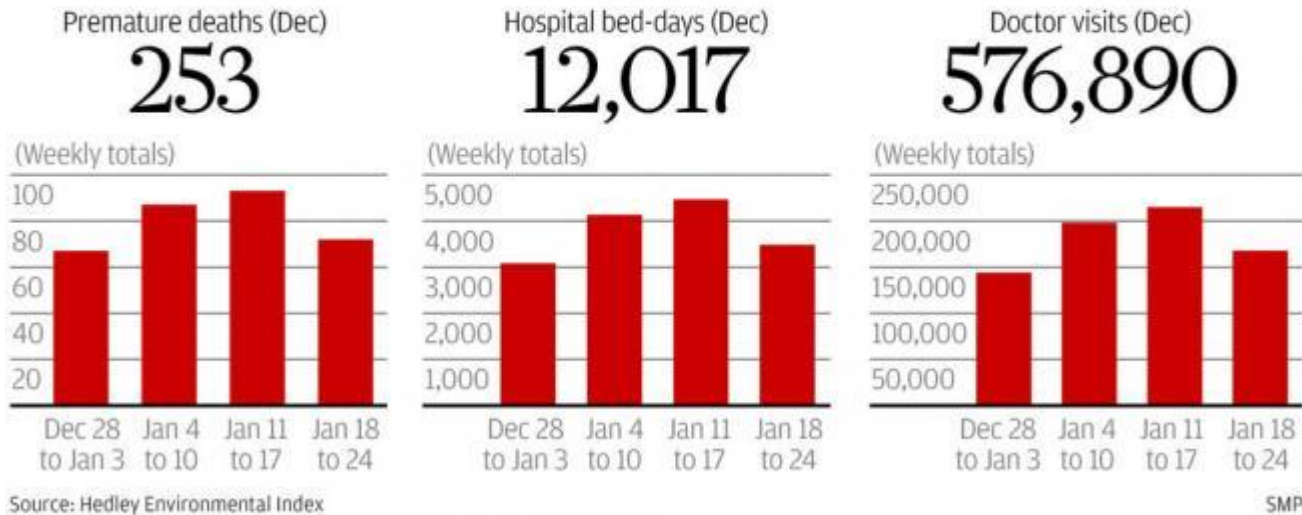


South China Morning Post (Mar 17, 2014) – raising awareness
(distributing masks to pedestrians)

<http://www.scmp.com/lifestyle/technology/article/1136763/air-filters-and-face-masks-offer-little-protection-big-city-air>

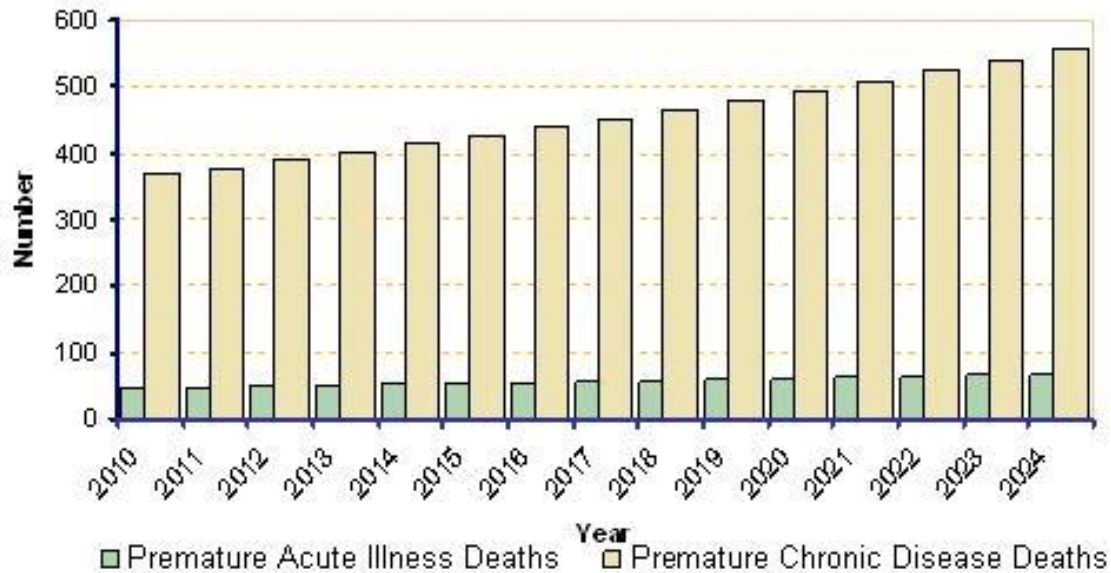
Avoidable harm

The University of Hong Kong School of Public Health has devised a formula to calculate the number of Hong Kong deaths, hospital stays and doctor visits that could have been avoided in a given period with proper pollution-control measures.



South China Morning Post (Mar 17, 2014)
<http://www.scmp.com/lifestyle/technology/article/1136763/air-filters-and-face-masks-offer-little-protection-big-city-air>

Estimated Annual Number of Premature Deaths Attributable to Air Pollution (O₃, PM_{2.5}) Simcoe Muskoka, 2010-2024



Data Source: ICAP, Version 3, 2008, Canadian Medical Association

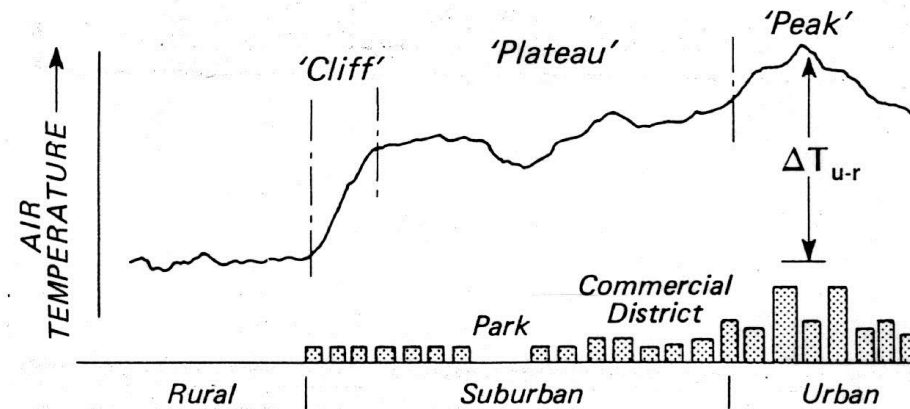
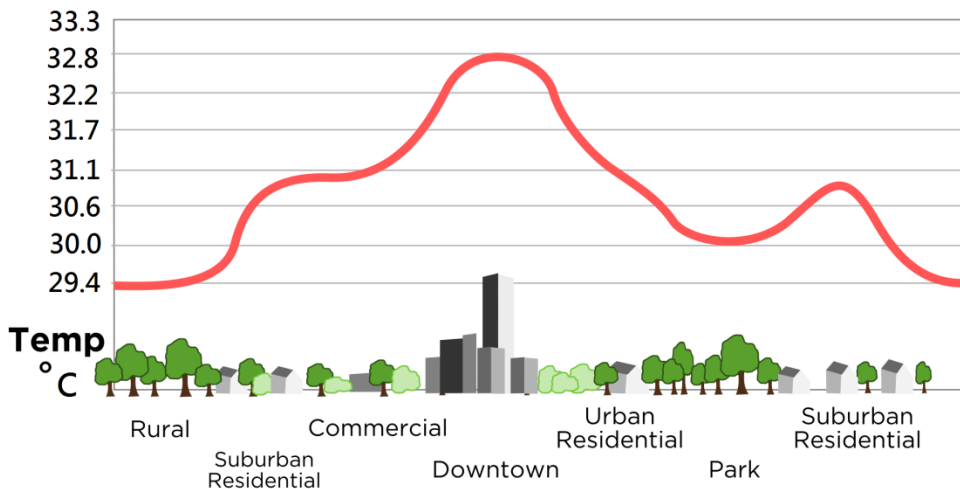
<http://www.simcoemuskokahealthstats.org/Topics/Environment/OutdoorAir/AirPollutionICAP.aspx>

Figure (above) shows the projected increases in premature mortality over the next 15 years in Simcoe Muskoka. The **number of premature chronic disease deaths attributable to air pollution** is expected to increase from an estimated 320 deaths in 2010 to around 550 deaths in 2024. The number of premature acute illness deaths attributable to air pollution is also expected to increase over the same 15 year time period, from around 50 in 2010 to 70 in 2024.

Urban Heat Island

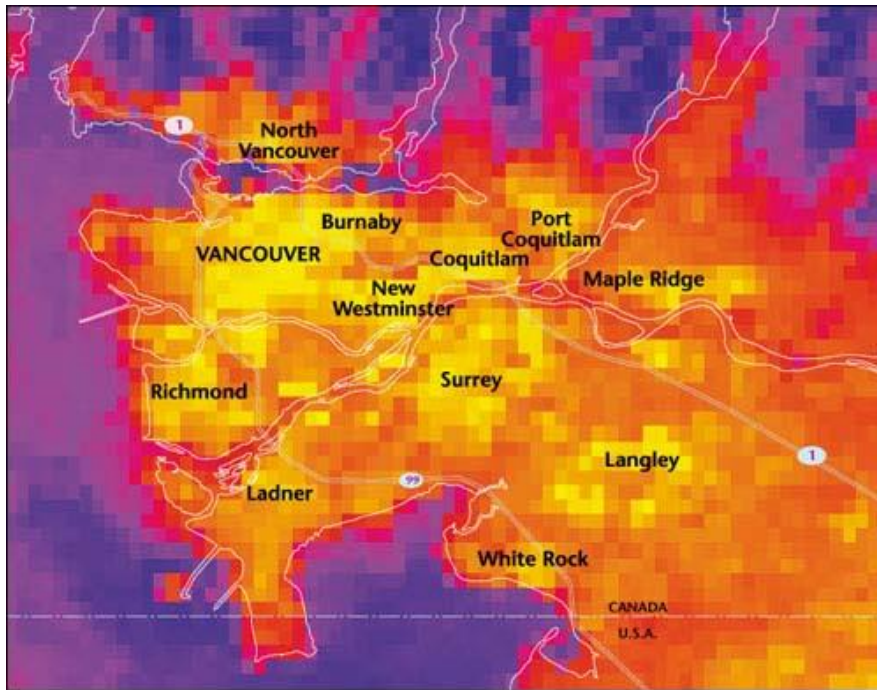
- Caused by:
 - Thermal properties of built up (buildings, paved surfaces) versus rural areas;
 - Air pollution (localized enhanced greenhouse effect)
 - Lack of vegetation

URBAN HEAT ISLAND PROFILE

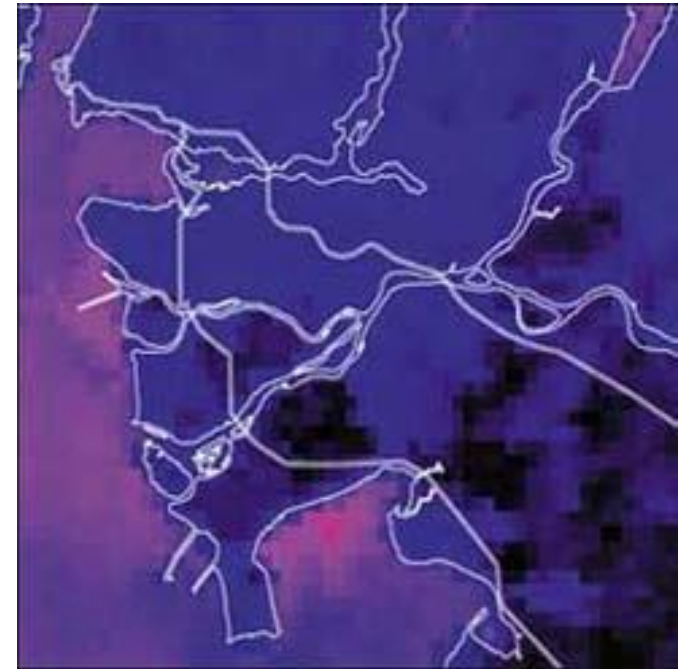


Source: Tim Oke (1978; 1987)

UHI (Vancouver, day vs night)



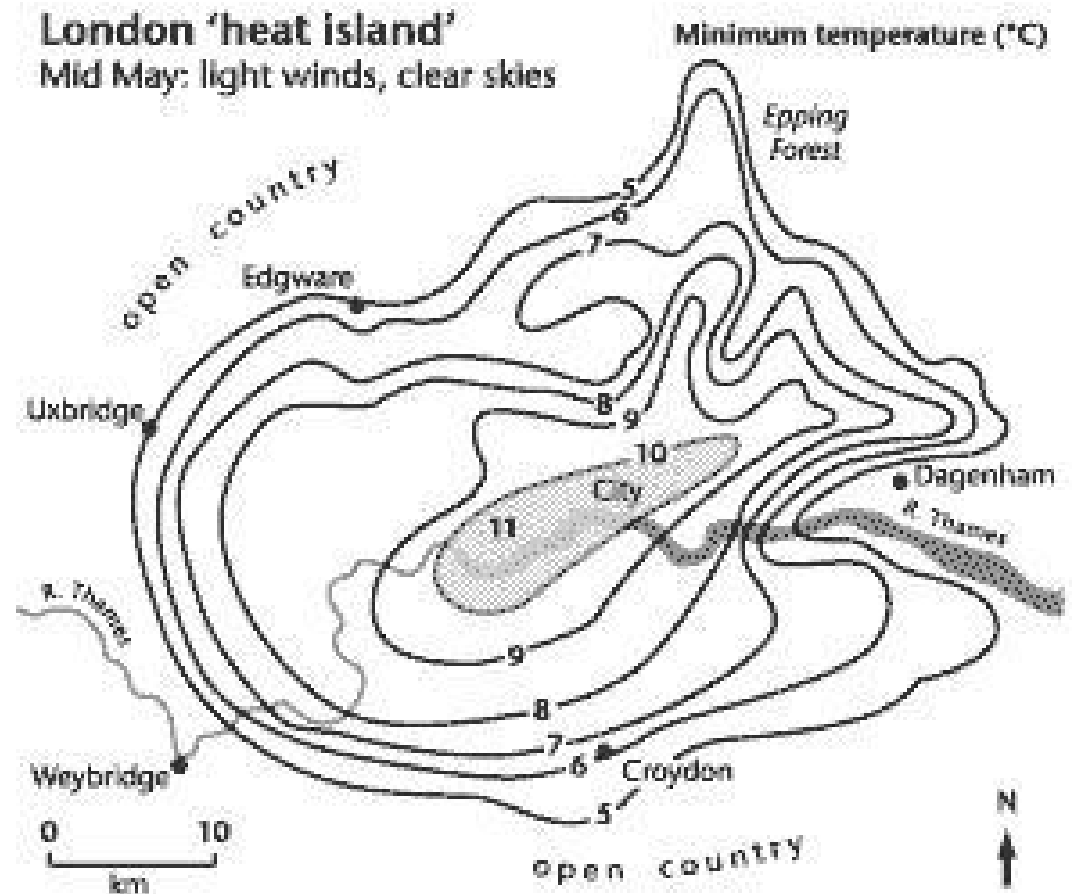
One pixel = approximately one square kilometre



... from satellite sensors ... surface temperatures in **the city core at 3:30 p.m. on an August day are higher than the rural surroundings** and that industrial and commercial zones, major highway intersections, shopping malls and airports tend to be hottest. ... At 5:30 a.m. the next day, urbanized areas remain warmer than rural surroundings, due to a slower release of heat from building materials and paved surfaces. The ocean, meanwhile, acts as a heat sink, where temperatures barely change from day to night.

Sensed images credit to Canadian Geographic (2002)

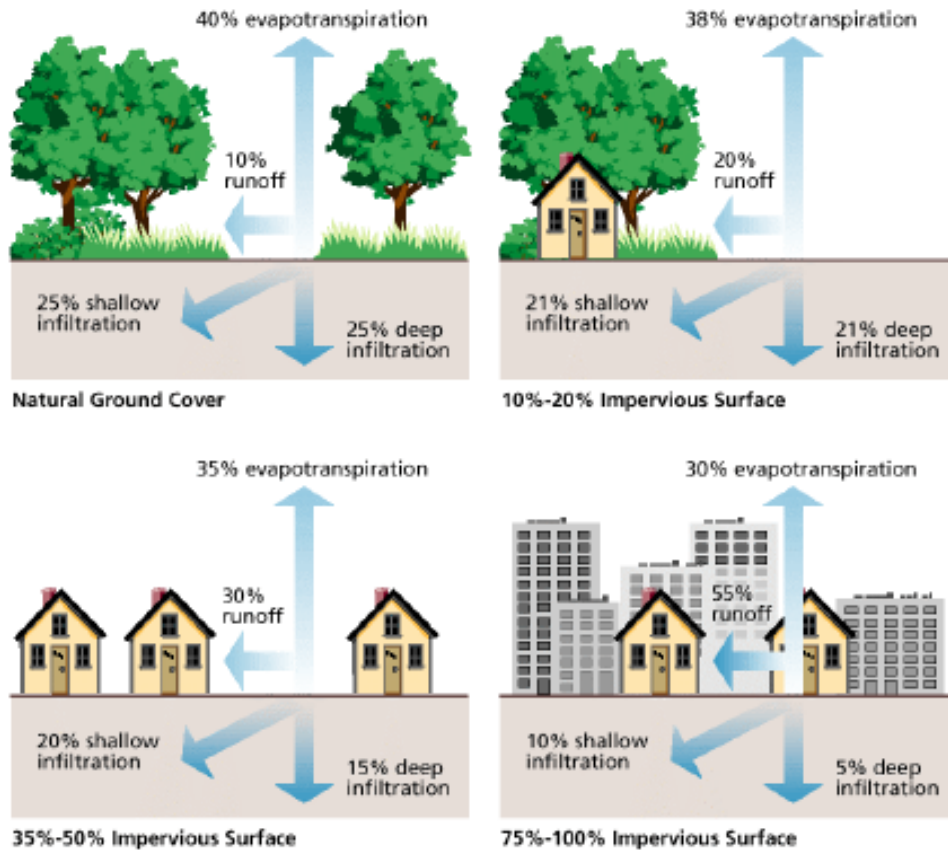
Urban Heat Island, London



London, UK Urban Heat Island ...the mean winter temperatures are on average 1-2 degrees Celsius higher in urban areas, in comparison to rural areas. The **mean summer temperature may be on average 5 degrees Celsius higher than surrounding rural areas**. This can be seen in London's Heat Island (see image) http://www.coolgeography.co.uk/A-level/AQA/Year%2013/Weather%20and%20climate/Microclimates/Urban_climates.htm

Hydrological Impacts – urban areas

Figure 5-4: Typical Impact of Imperviousness on Surface Runoff.



1. Precipitation → surface runoff more quickly – less likely to infiltrate / soak into the soil;
2. Greater potential for surface flooding;
3. Decreased recharge of groundwater aquifers (ie. Less infiltration)

Source: GVRD (Oct. 1999) Stormwater Management Plan

Urban Issues (socio-economic)

- Changing Economies
- Demographic Changes / Aging Cities
- Declining Cities
- Immigration (to and within cities)
- Gentrification
- School Closures

Economic changes ...

- Decline of manufacturing centres of the NE

American Manufacturing Belt

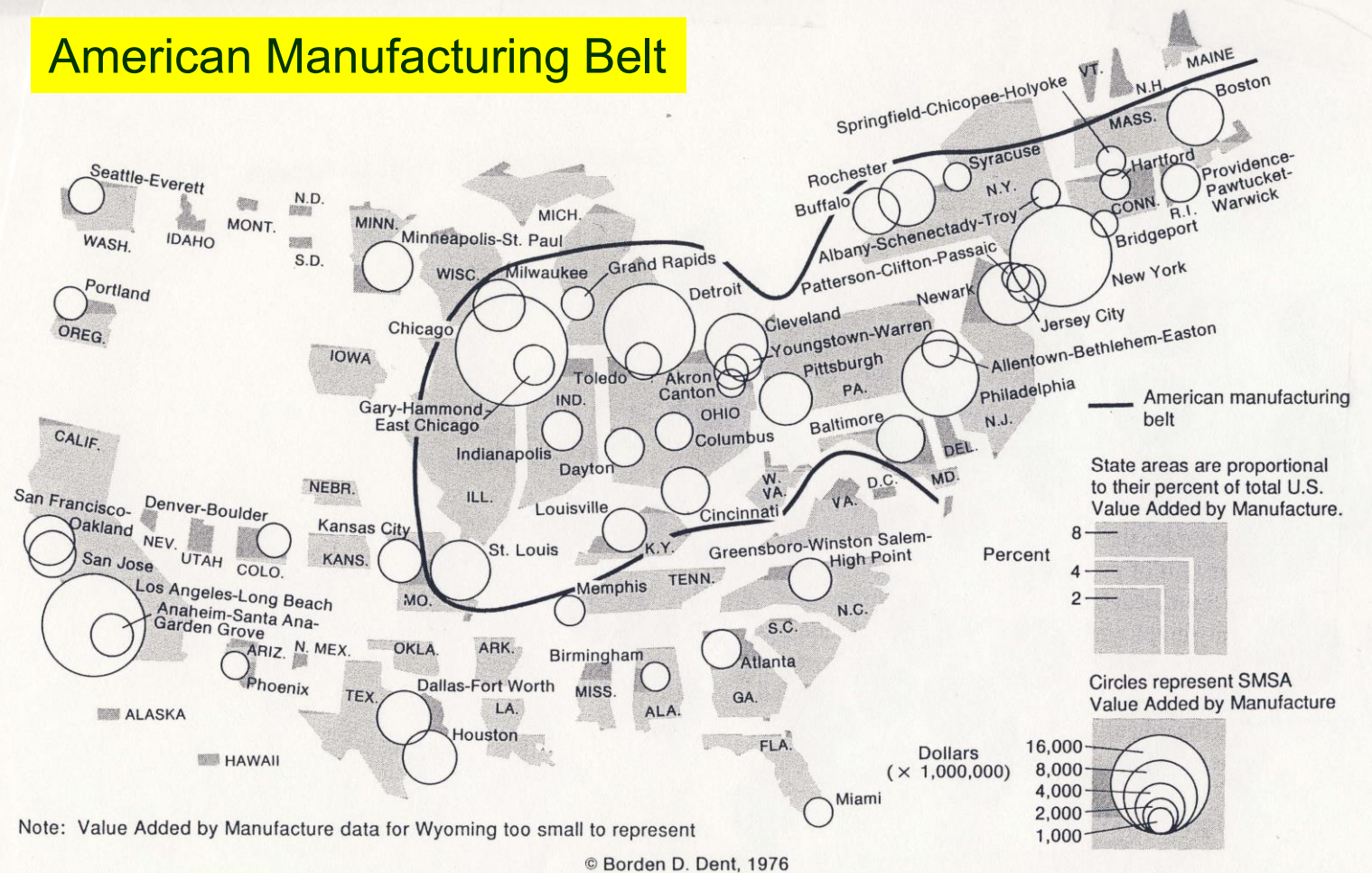


Figure 7-6. American Manufacturing Belt. First identified in 1919, the manufacturing belt in the Northeastern United States remains the core area of manufacturing activity in the country, but has declined in dominance since World War II. The top 6 of 10 manufacturing centers in the country today are identified with the manufacturing belt. Source: Red

Source: Hartshorn (1992)

Changes in Manufacturing / Service Employment Mix in the US (from Hartshorn, 1992)

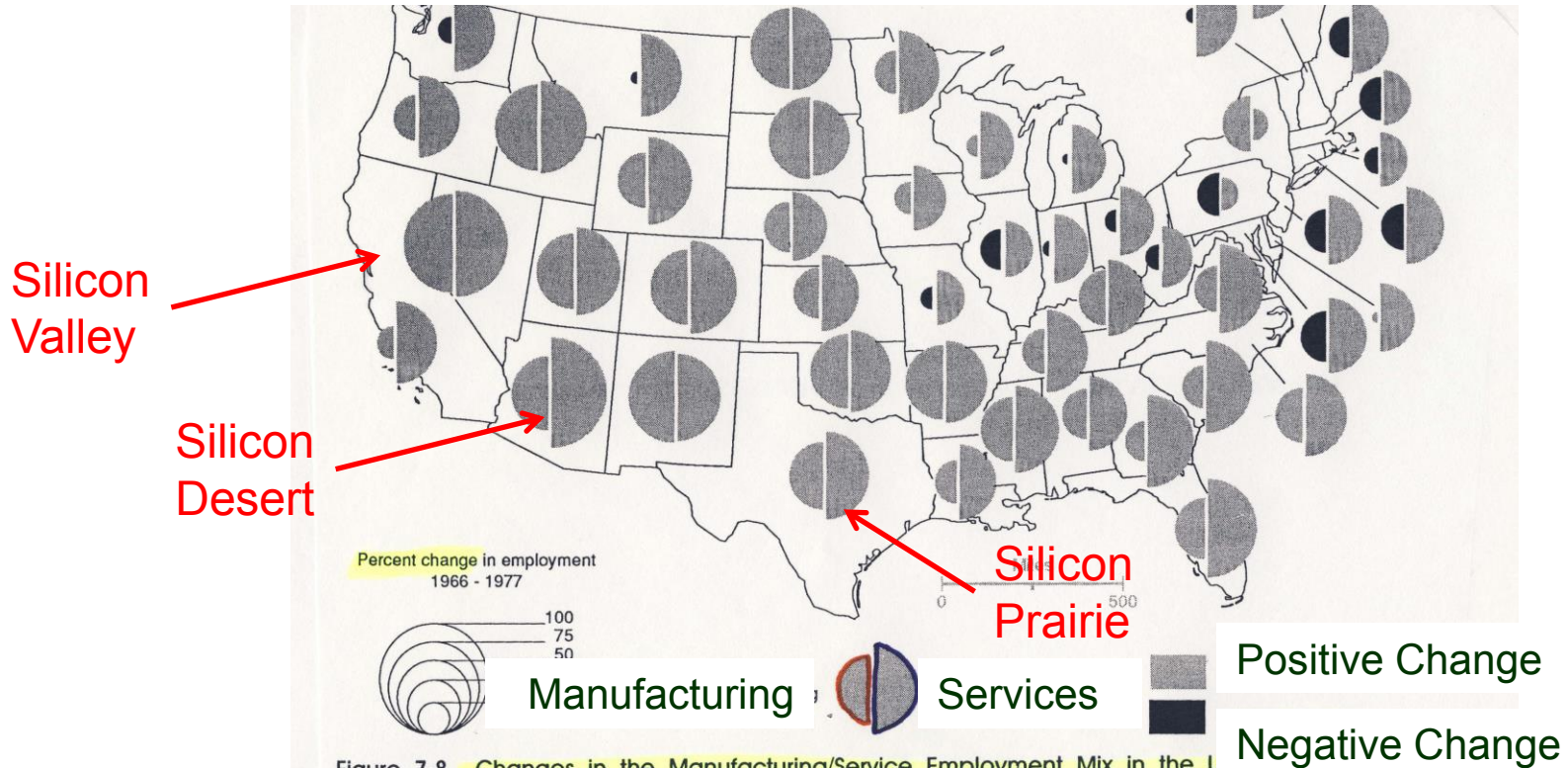


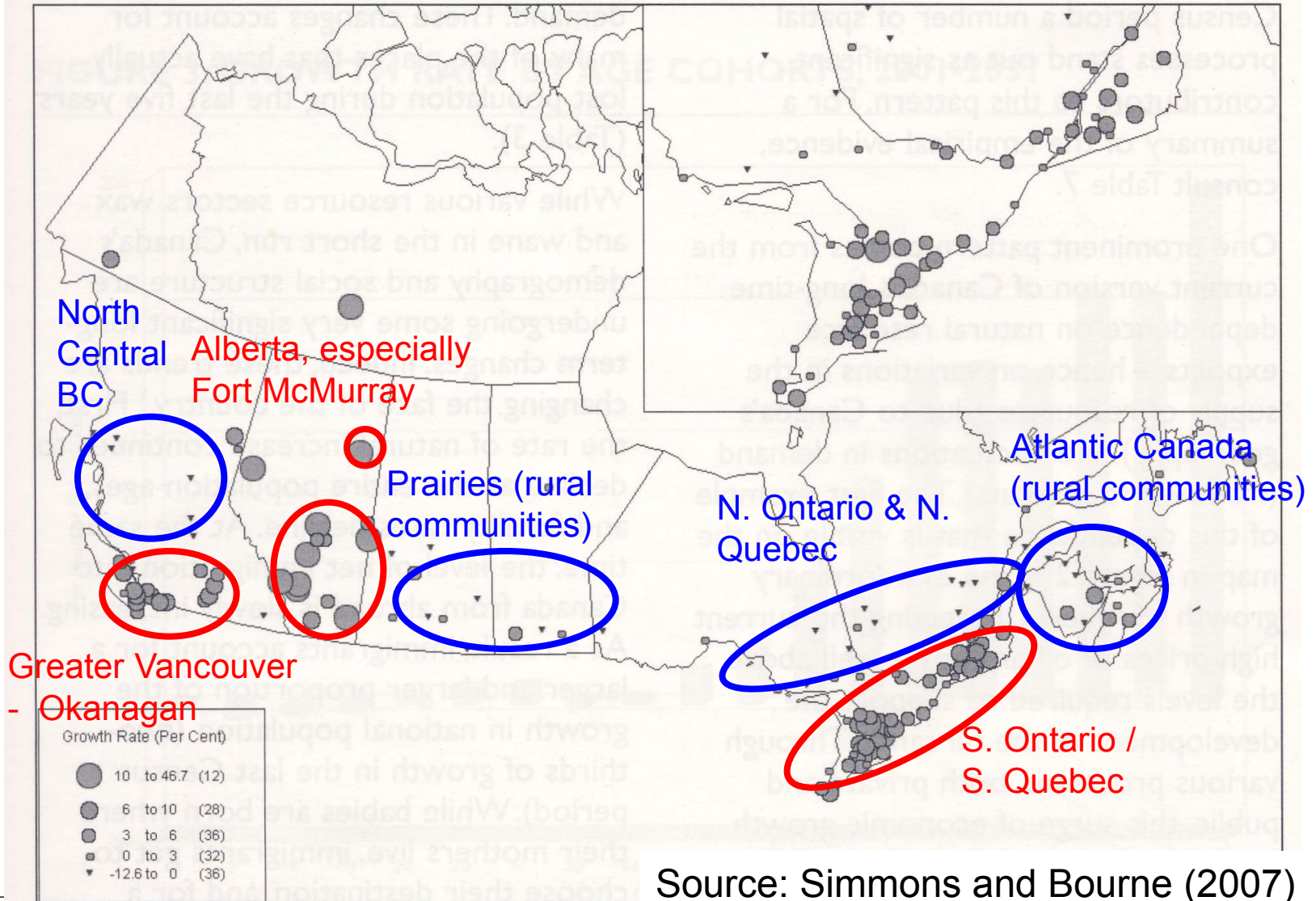
Figure 7-8. Changes in the Manufacturing/Service Employment Mix in the U.S. The post-industrial service economy gained momentum in the 1970s, a fundamental change occurred in the manufacturing/service employment mix. While the biggest shifts occurred in the northeast, where there was a decline in manufacturing employment, the modest gains in manufacturing employment in the rest of the country were far overshadowed by service economy growth. *Source:* Modified after Allen J. Scott, *Metropolis: From the Division of Labor to Urban Form*, University of California Press, Berkeley, 1988, p. 21. Used by permission.

Urban Change in Canada

- **dramatic urbanization** over the 20th century;
- From census data:

	1921	1996
urban / suburban	49%	78 %
rural – farm	51%	2.5 %
rural – non-farm / exurban	n/a	20 %

FIGURE 2: POPULATION GROWTH RATE, 2001 TO 2006



Source: Simmons and Bourne (2007)

Demographic Change in Cities

a) *Demographic Changes*

- ↓ in number and proportion of children & youth
- Rapid ↑ in elderly population

- *Boom, Bust & Echo*
by D. Foote (1996)

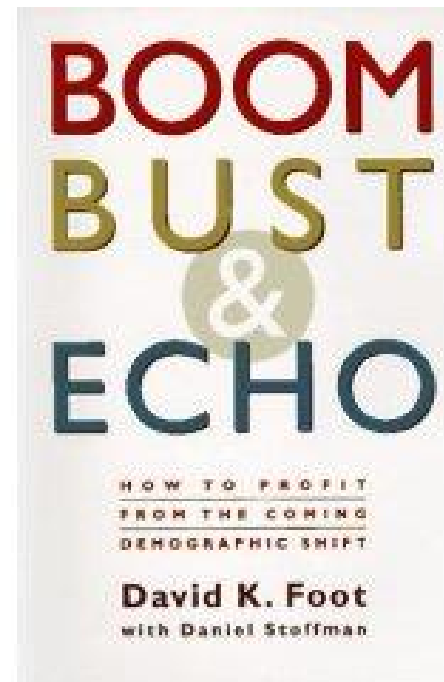
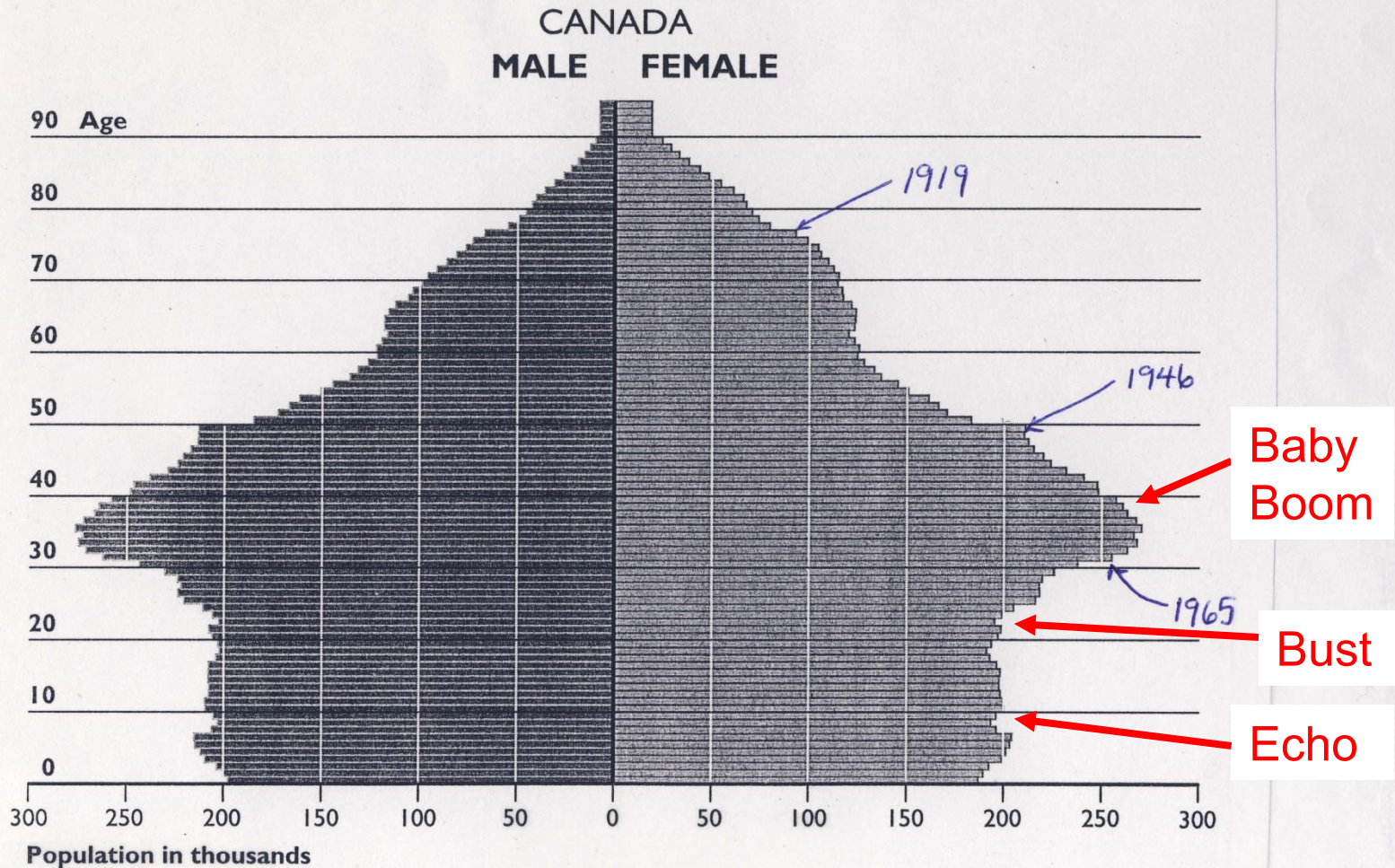


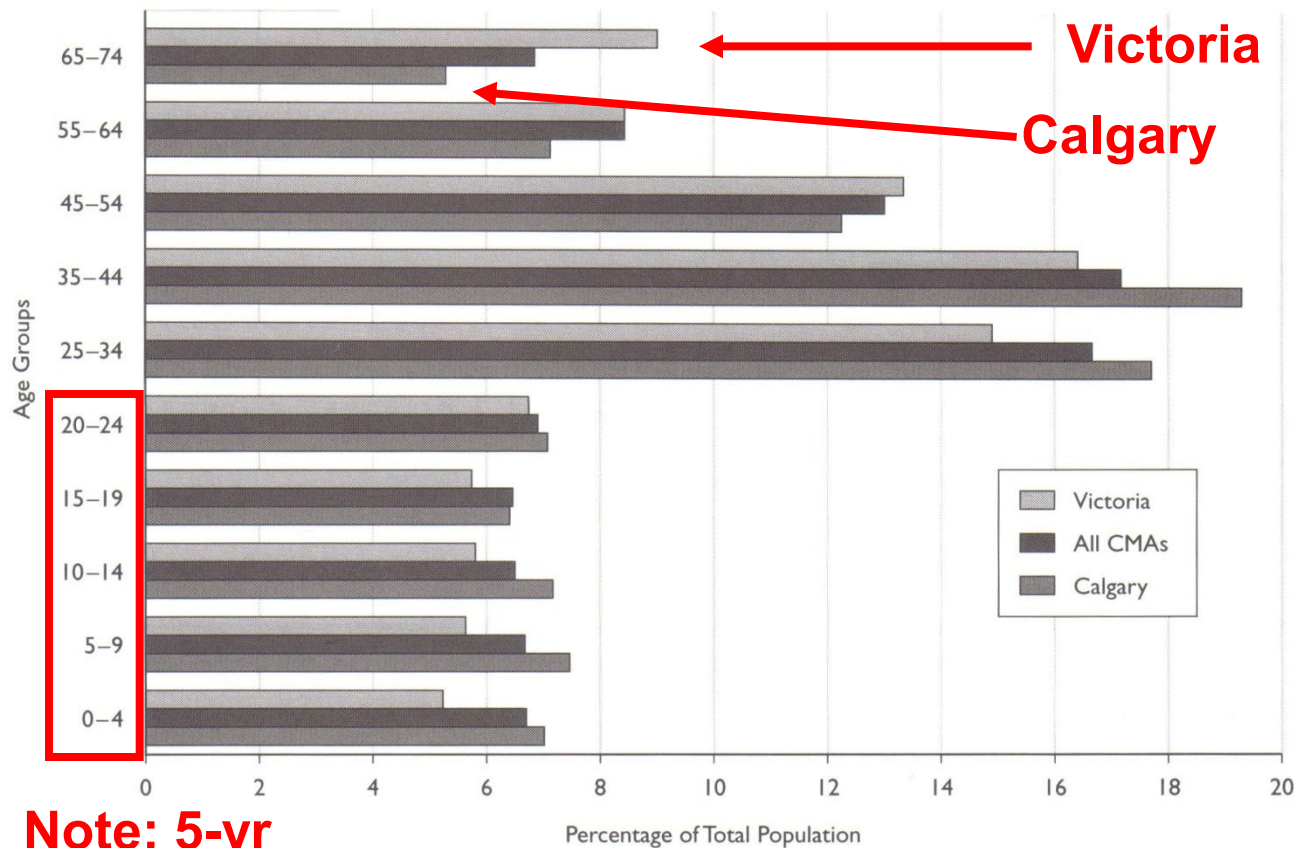
FIGURE 1: CANADA'S POPULATION PYRAMIDS, 1996



Boomers born 1946-1965 (aged 47 to 66 years in 2012)

Aging City populations?

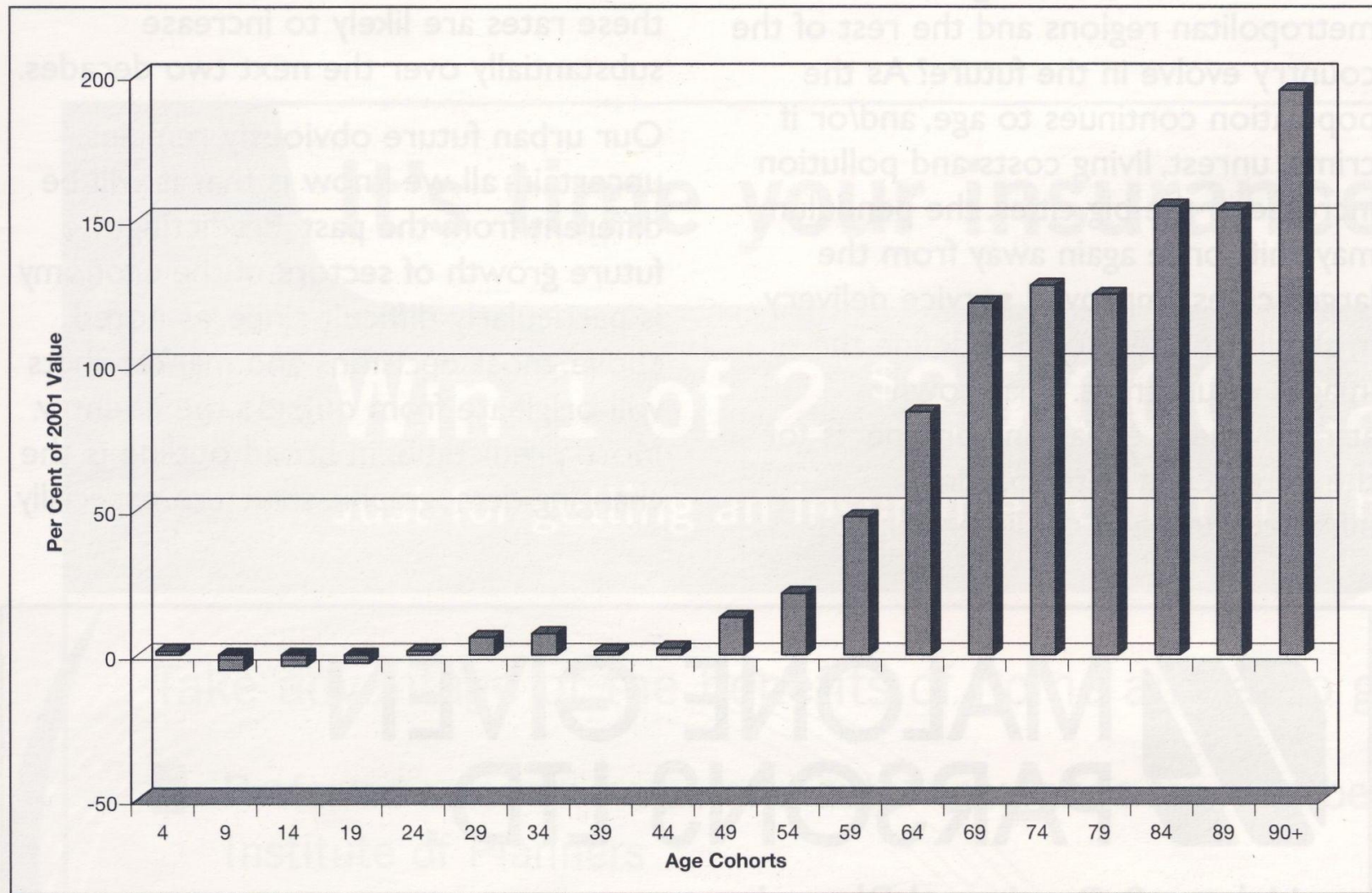
Figure 9.1 Age Distribution: Calgary, Victoria, and All CMA, 1996



Source: Statistics Canada, *Census of Canada*, 1996.

Canada's projected aging ...

FIGURE 3: GROWTH RATE BY AGE COHORTS, 2001-2031

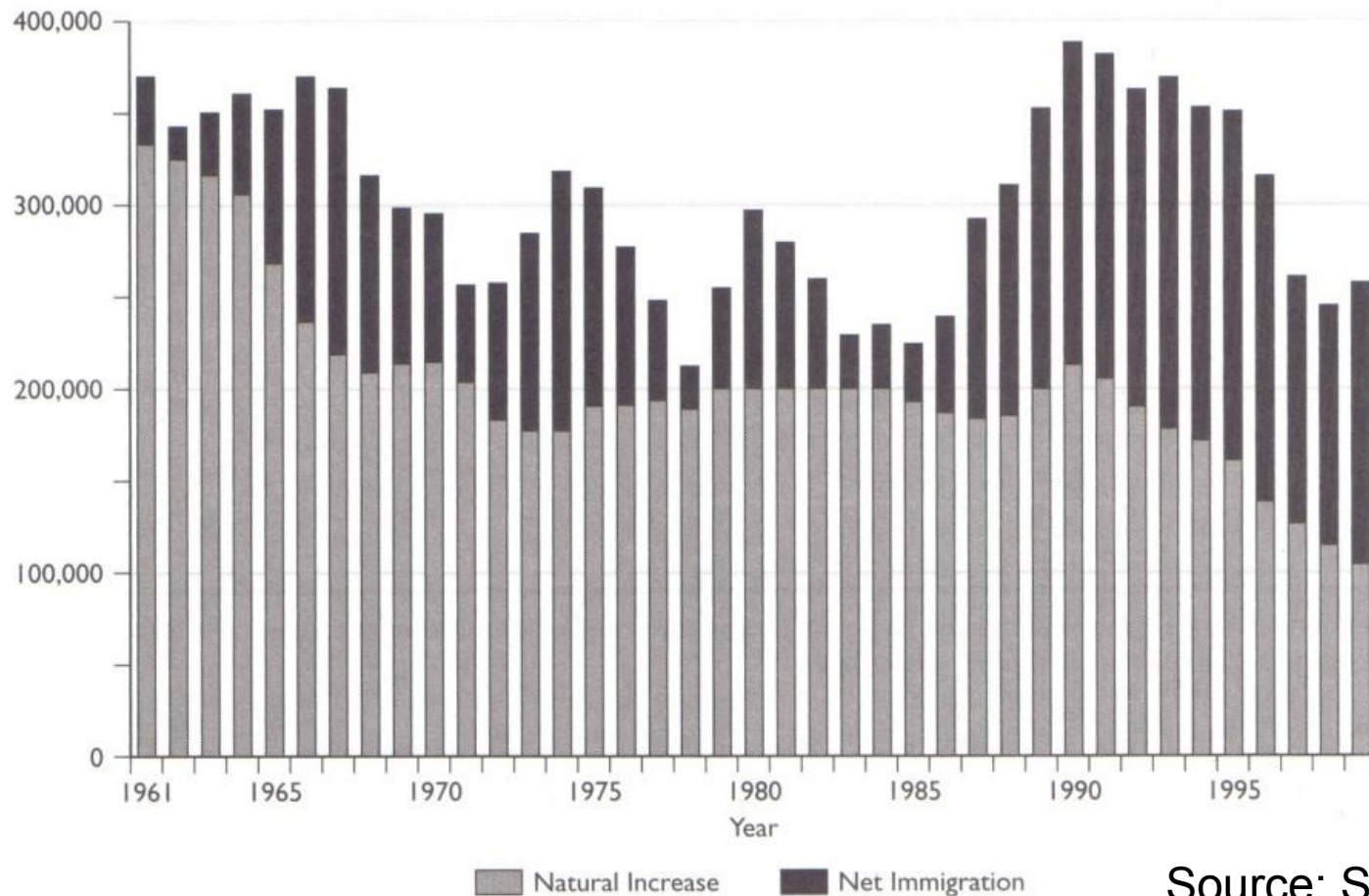


Demographic Changes...

- What might we expect as baby boomers retire and age?
 - Aging cities ... types of services
 - Need for family houses
 - Need for public transit (mobility becomes a challenge sans license!!)
 - Investment opportunities (seniors' care, recreation)

Continued internationalization of our cities, especially the “gateway cities” ...

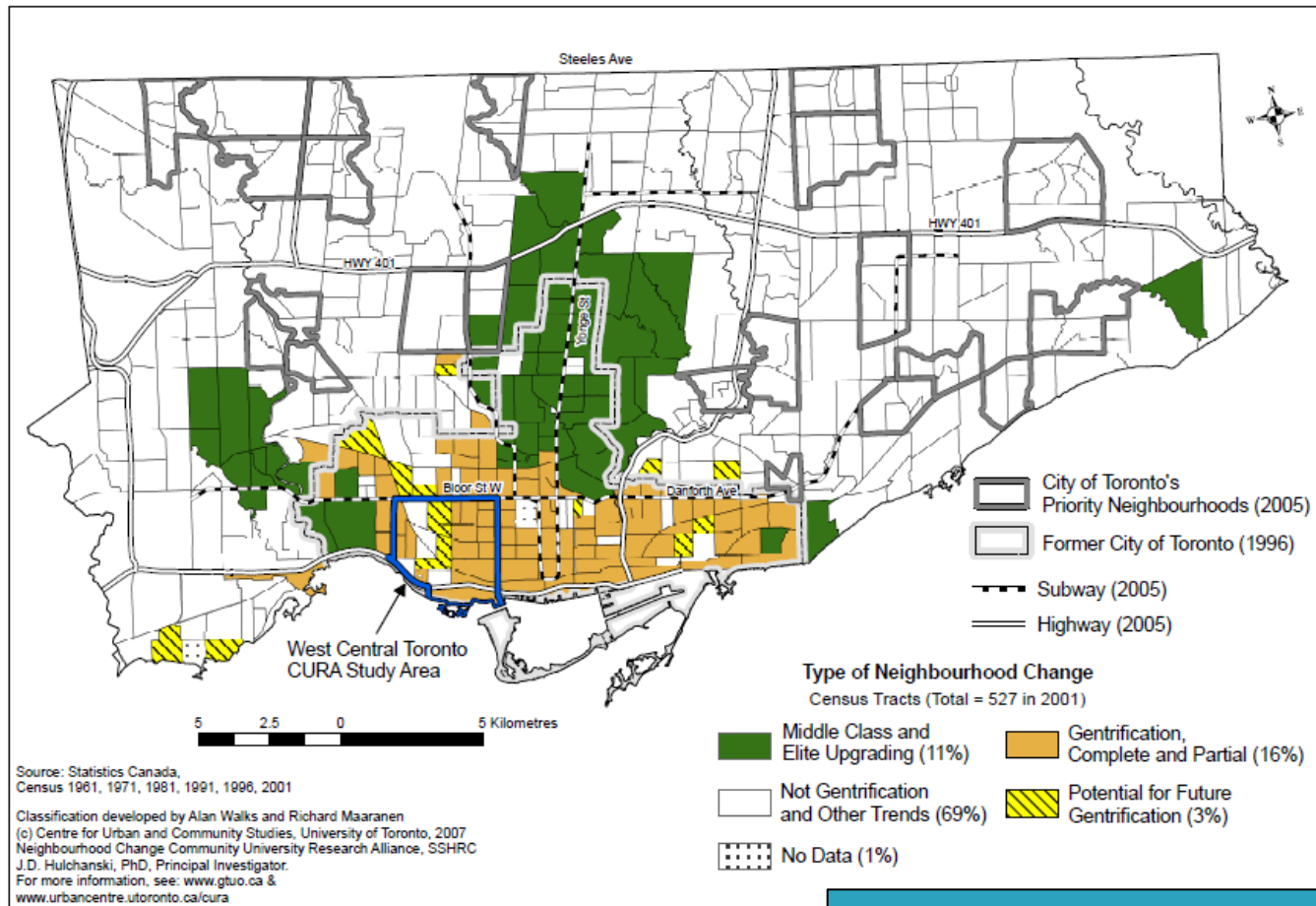
Figure 3.6 Sources of Population Growth, 1961–99



- **gentrification**: residential rejuvenation of urban core, often displaces low income residents; “upscaling”

Neighbourhood Gentrification in Toronto, 1961 to 2001

Census Tracts



From Hulchanski (2007) – see map caption

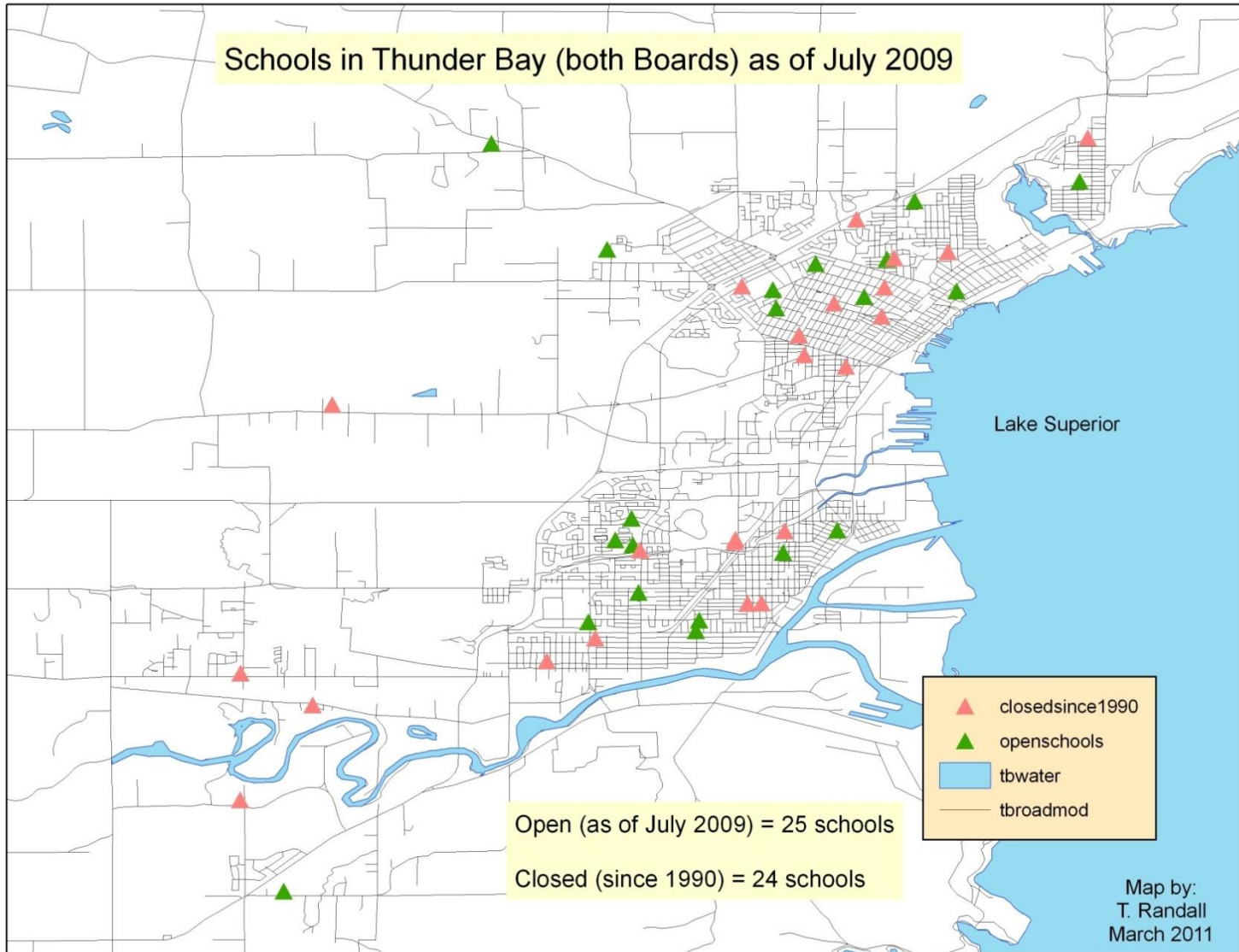
School Closures in Thunder Bay

- **22 schools** closed by Lakehead Public School Board between 1991 and 2007 (B. Sauder, pers. Comm, Aug. 2007)
- **higher rate of closure** (e.g. versus Windsor and Saskatoon, see Phipps 2006)



*Former Green Acres Public School,
Southward Thunder Bay ~ Nov. 2008*

School Closures in Thunder (since 1990)



Reasons for School Closures

- **Demographic changes**

- a -2.1% population change in Thunder Bay (1991-2001)
- aging of neighbourhood populations rather than rejuvenation

- **Suburbanization of the population**

- Closure of inner city schools (e.g., Cornwall, Oliver Road, Isabella, Forest Park, Fort William Collegiate)
- New schools (e.g., Woodcrest)

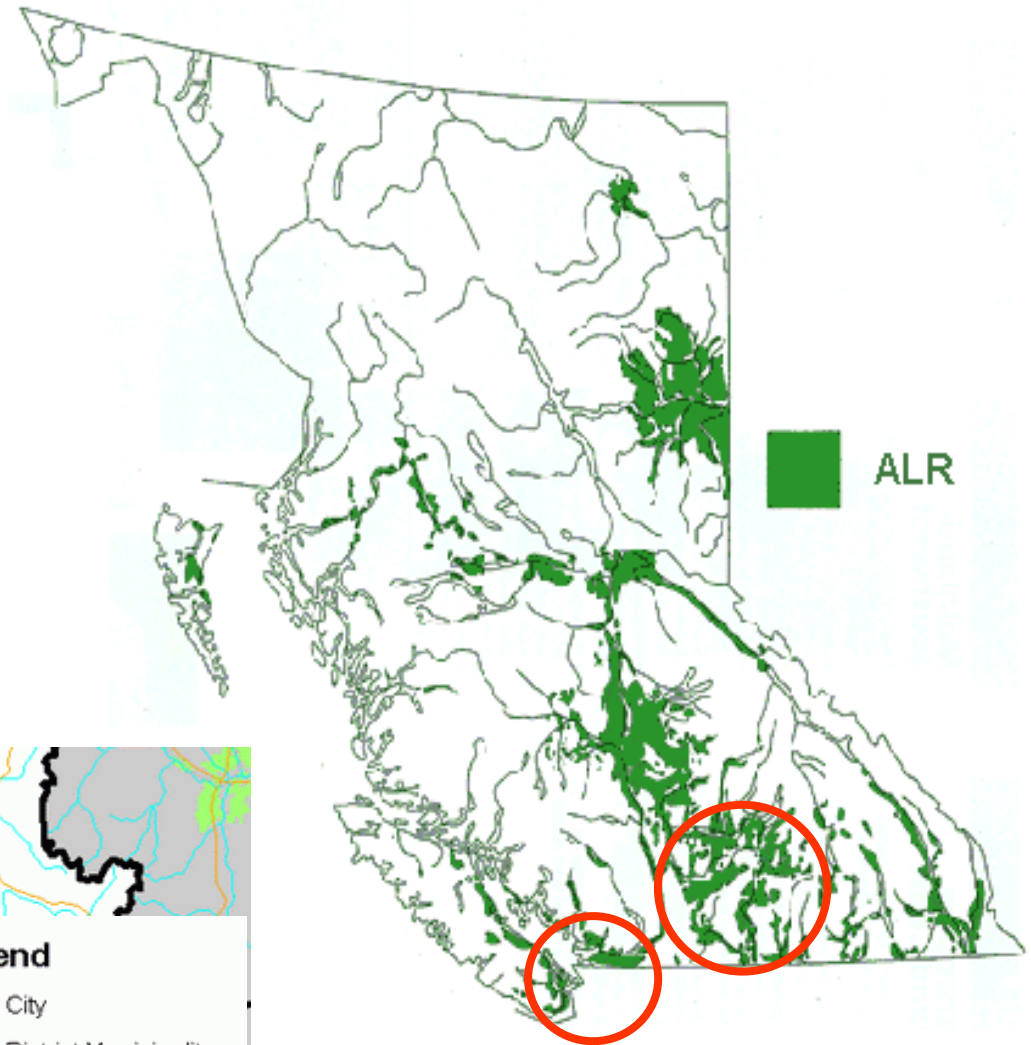
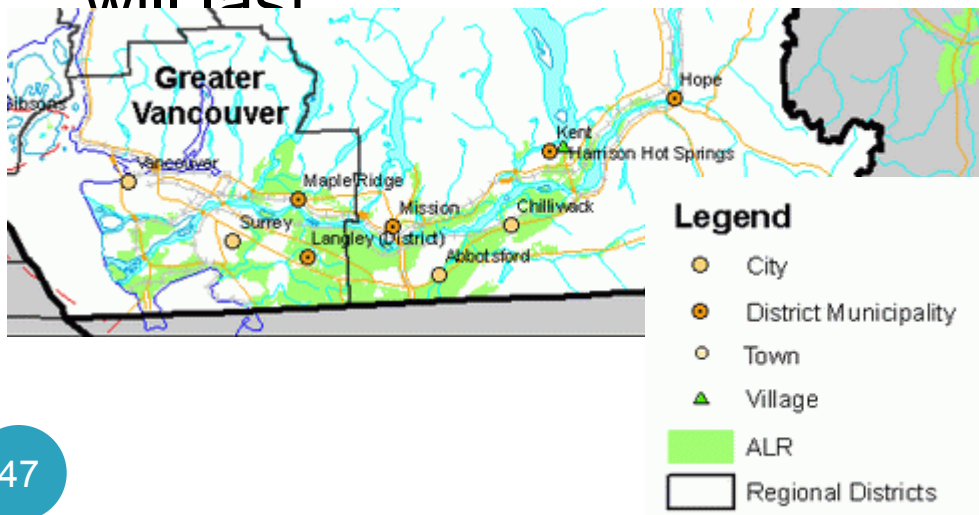


Former Fort William Collegiate, Southward Thunder Bay ~ Nov. 2008

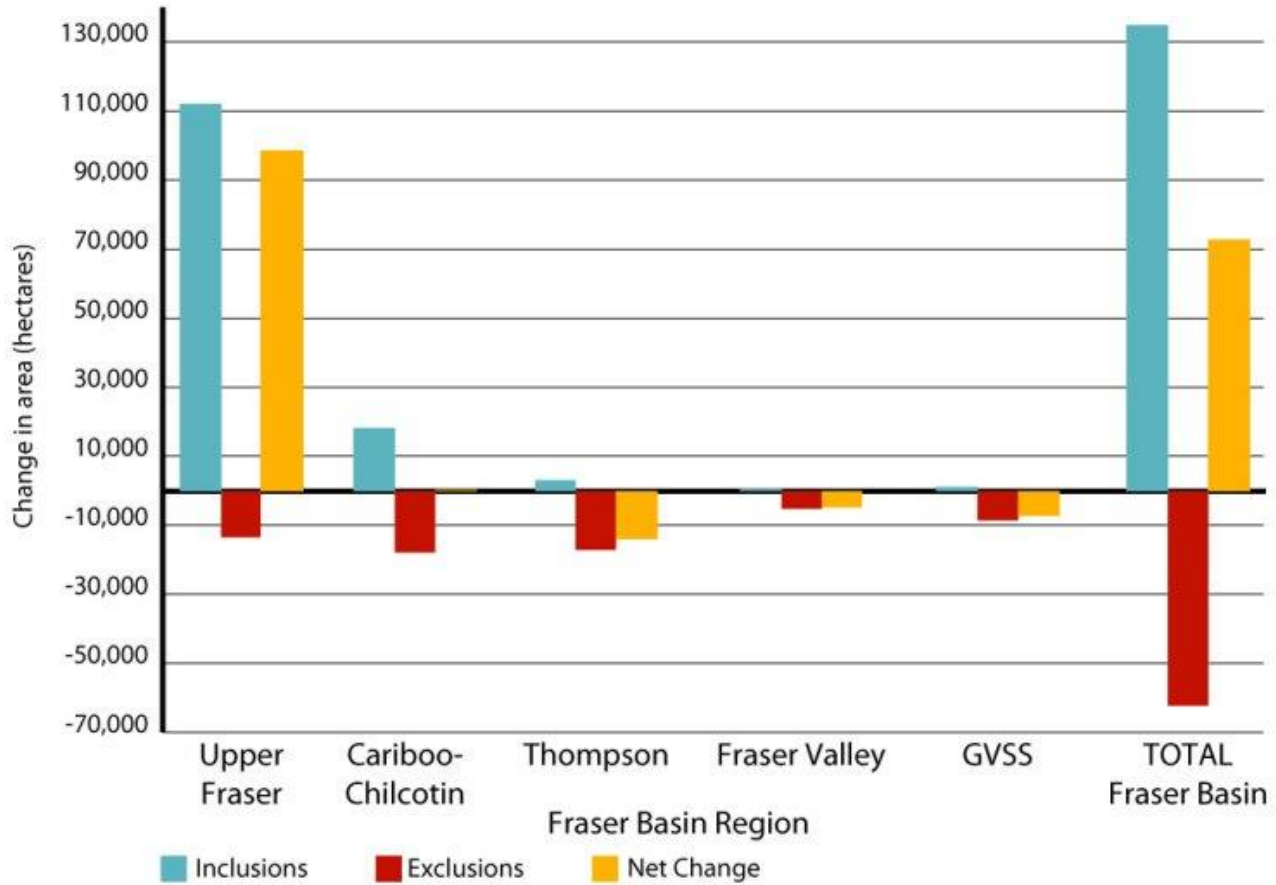
Urban Issues (political)

- Urban growth boundaries
- Farmland protection vs development rights (Green Belt, ALR)
- Neighbourhood preservation
- Toronto's Transit City (2011 Mayoral election issue)

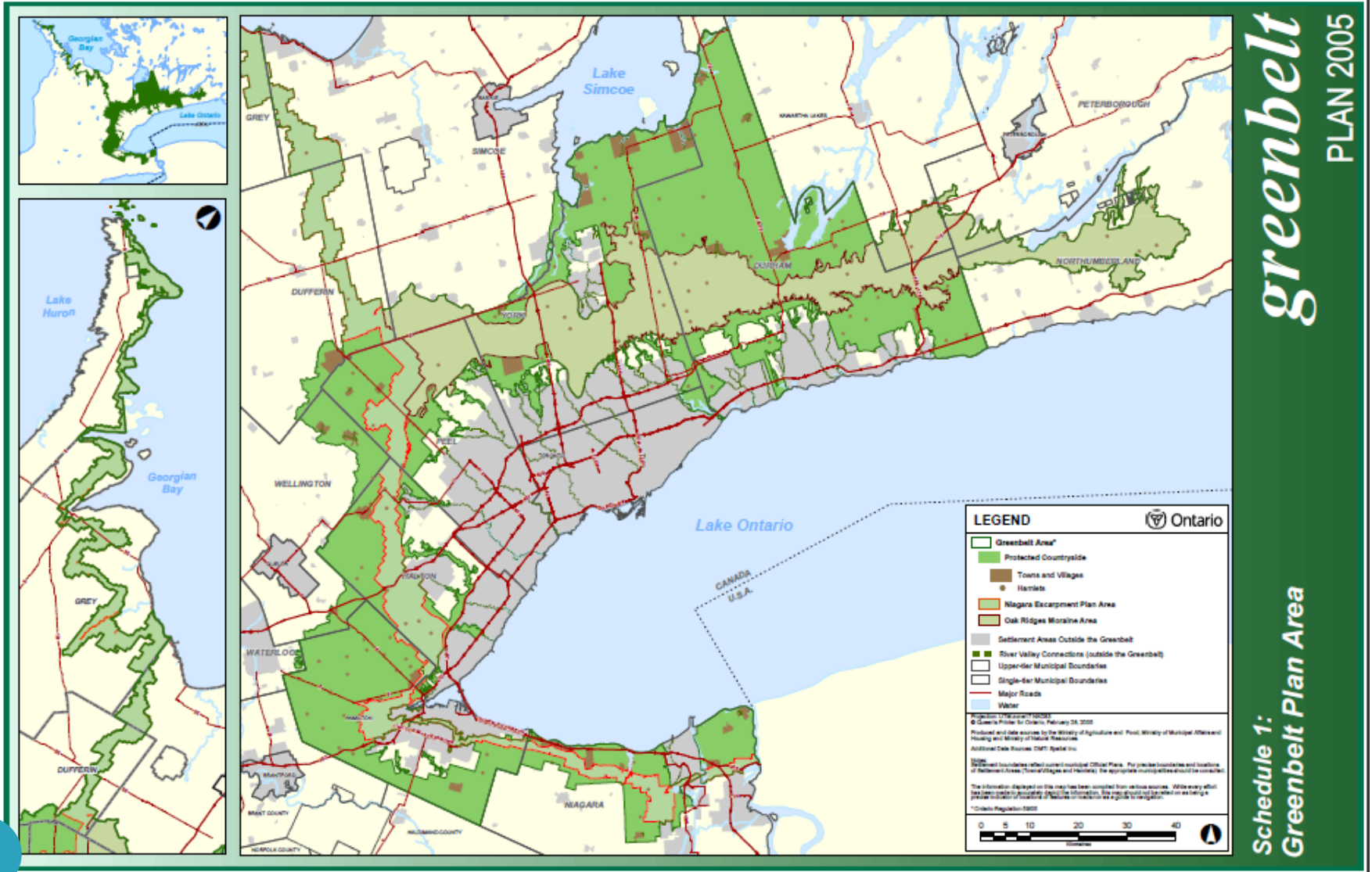
- British Columbia's Agricultural Land Reserve (**ALR**) – since 1974
- Has been strong tool to constraint physical sprawl in Greater Vancouver ... how long will the political will last



Change in ALR Area in Fraser Basin Regions (1974-2005)²

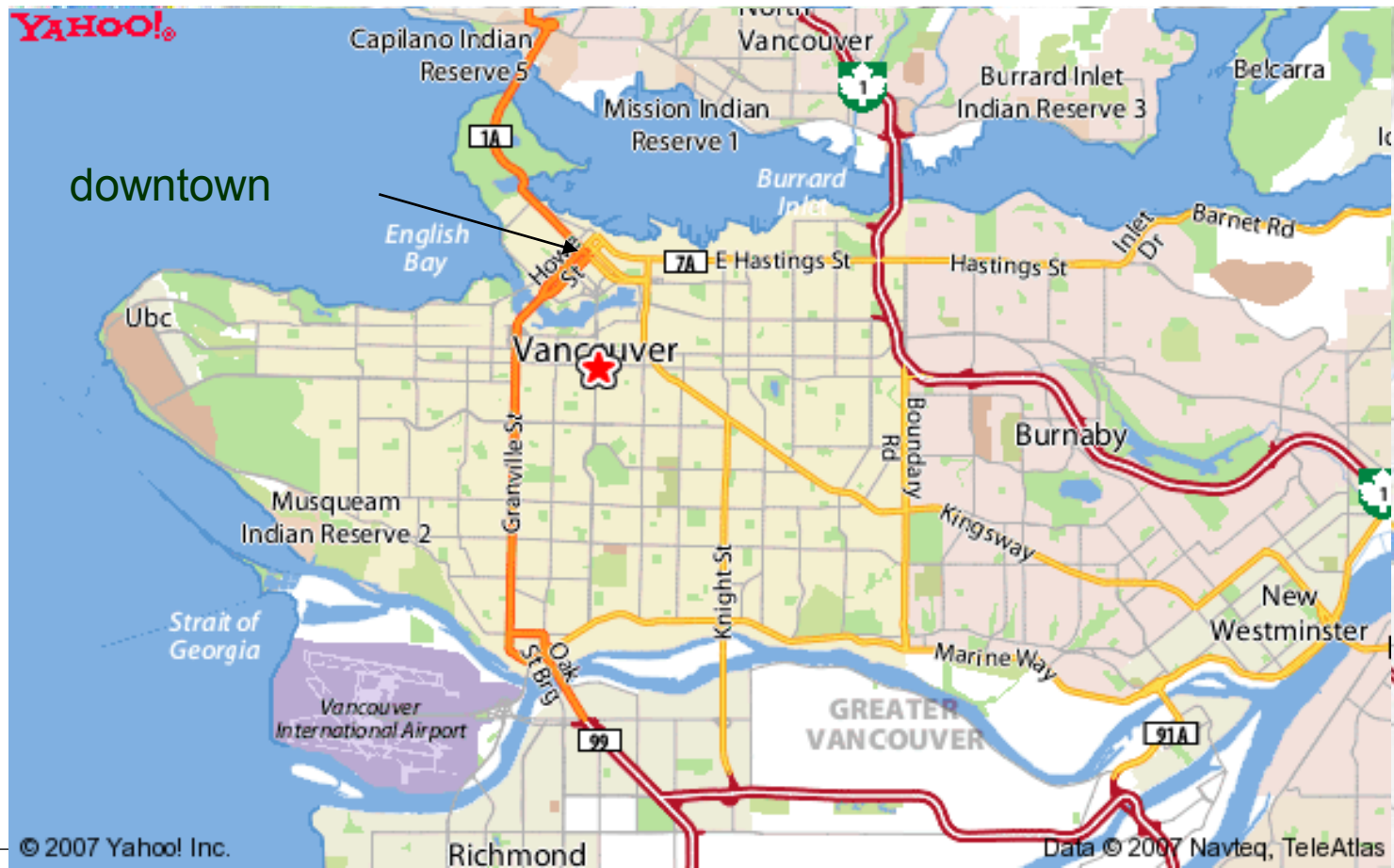


- Ontario's Green Belt – since 2005



Freeway Resistance / Neighbourhood Preservation

- strong opposition occurred in:
 - **Toronto** (Spadina Expressway defeated in 1971)
 - **Vancouver** (municipal election issue in early 1970s)



Transit City Light Rail Plan



Transit City Map (Toronto) as of August 2010

- Key election issue in Mayoral election (Fall 2010) – Mayor Ford elected on pro-suburban, somewhat anti-Transit City platform

Concluding Thoughts – Urban Issues

- Physical Issues
- Socio-Economic Issues
- Political Issues

Urban Issues (environmental solutions)

- Sustainability
- Transit-oriented developments (e.g., Vancouver's Regional Town Centres)
- Walkability
- Intensification
- Smart Growth
- Brownfield Development

Sustainability Concept

- Reduced consumption of ENERGY, RAW MATERIALS and LAND
- Achieved via:
 - Use of Renewable Forms of Energy
 - Use of Recycled (rather than Virgin) Materials
 - Re-Use of Urban Land (rather than Continued Expansion onto Greenfields)
- Sustainable Community Design

Brownfield Development – land re-use



Bethlehem Steel Warehouse

Photo Credit: Sean M.L. Galbraith Photography

Density Spectrum

- what intensification is appropriate?



West End, Vancouver (2001)

City Density	146.3 du/ha
	203.0 persons/ha
Occupancy	1.4 persons/du



River Terrace, Thunder Bay (2001)

City Density	10.6 du/ha
Net Residential Density	14.3 du/ha
Occupancy	3.1 persons/du

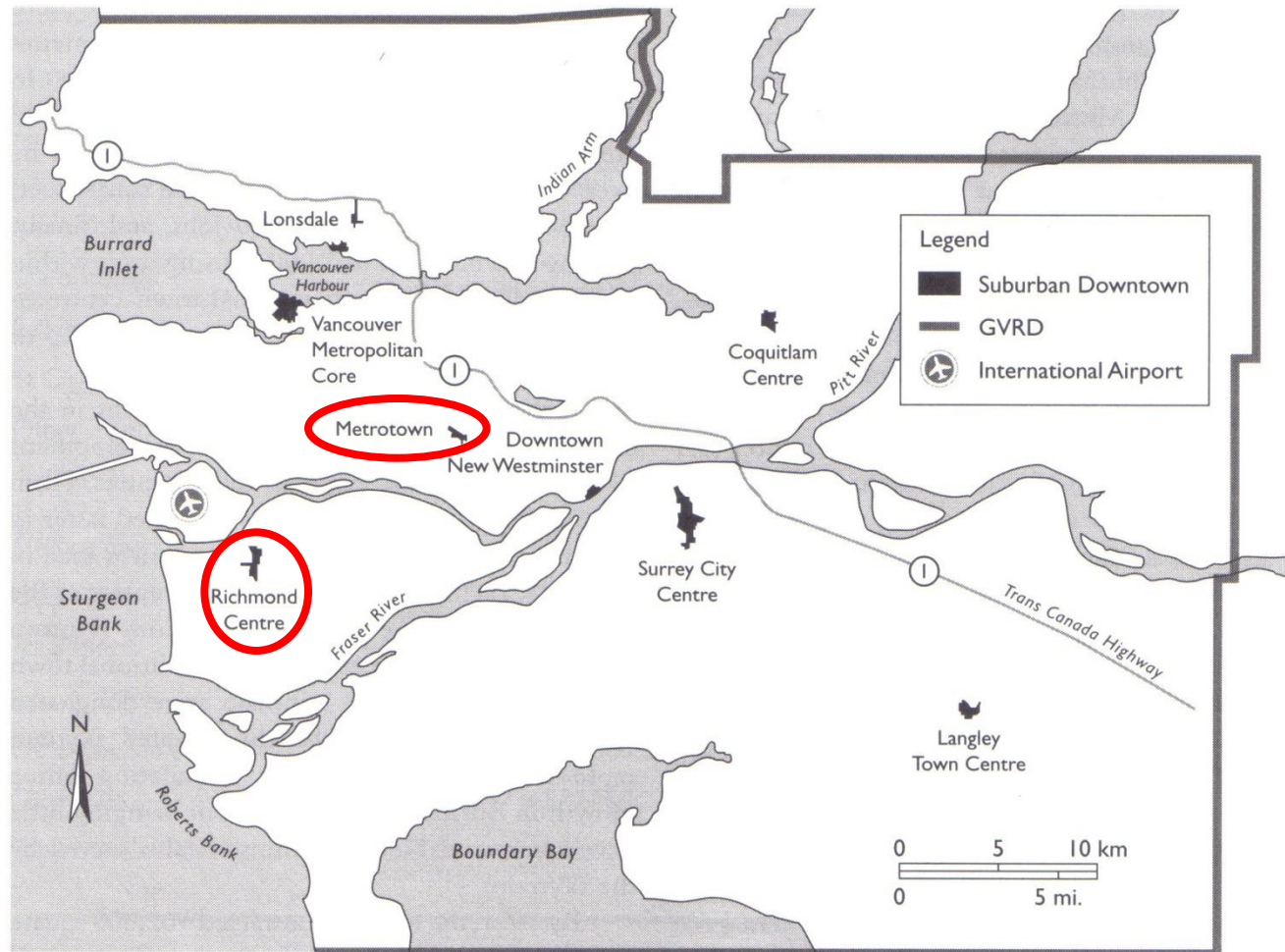
Source: Canada Census 2001

Examples of Photos Shown in VPS



Vancouver's Regional Town Centres (RTCs)

Figure 11.5 Location of Vancouver Suburban Downtowns



Vancouver's Regional Town Centres (RTCs)

- were part of the **Livable Region Strategy** (1976→), included 4 measures ...
 1. *encourage increased housing density near CBD*



Vancouver's Regional Town Centres (RTCs)

2. decentralize jobs to four RTCs in the suburbs

Table 11.3 Vancouver's Regional Town Centres

	Office Space (sq. m.)		Retail Space (sq. m.) 1991	Employment 1991-2
	1983	1991-2		
CBD	1,596,000	2,183,000	1,305,000	173,000
Broadway	318,000	418,000		
Metrotown	77,000	223,000	227,000	17,000
Richmond	52,000	139,000	281,000	20,400
Lonsdale	30,000	111,000	92,000	15,300
Other 3 RTCs	129,000	182,000	362,000	27,400
Total RTCs	288,000	655,000	962,000	80,100
Other	1,285,000	1,770,000	3,700,000	561,000
Total GVRD	3,487,000	5,026,000	5,967,000	814,100

Sources: GVRD (1991, 1993a, 1993b).

50%
in
CBD

40%
in
CBD

From: Gad and
Matthews (2000)

3. *improve public transportation*



Express Bus (B-line), Richmond
Town Centre Photo Credit: J.
Jorgensen



SkyTrain Extension (**Canada Line** to
Airport) Under Construction June 2006

Vancouver Transit with Google Maps

Route [today] [future]

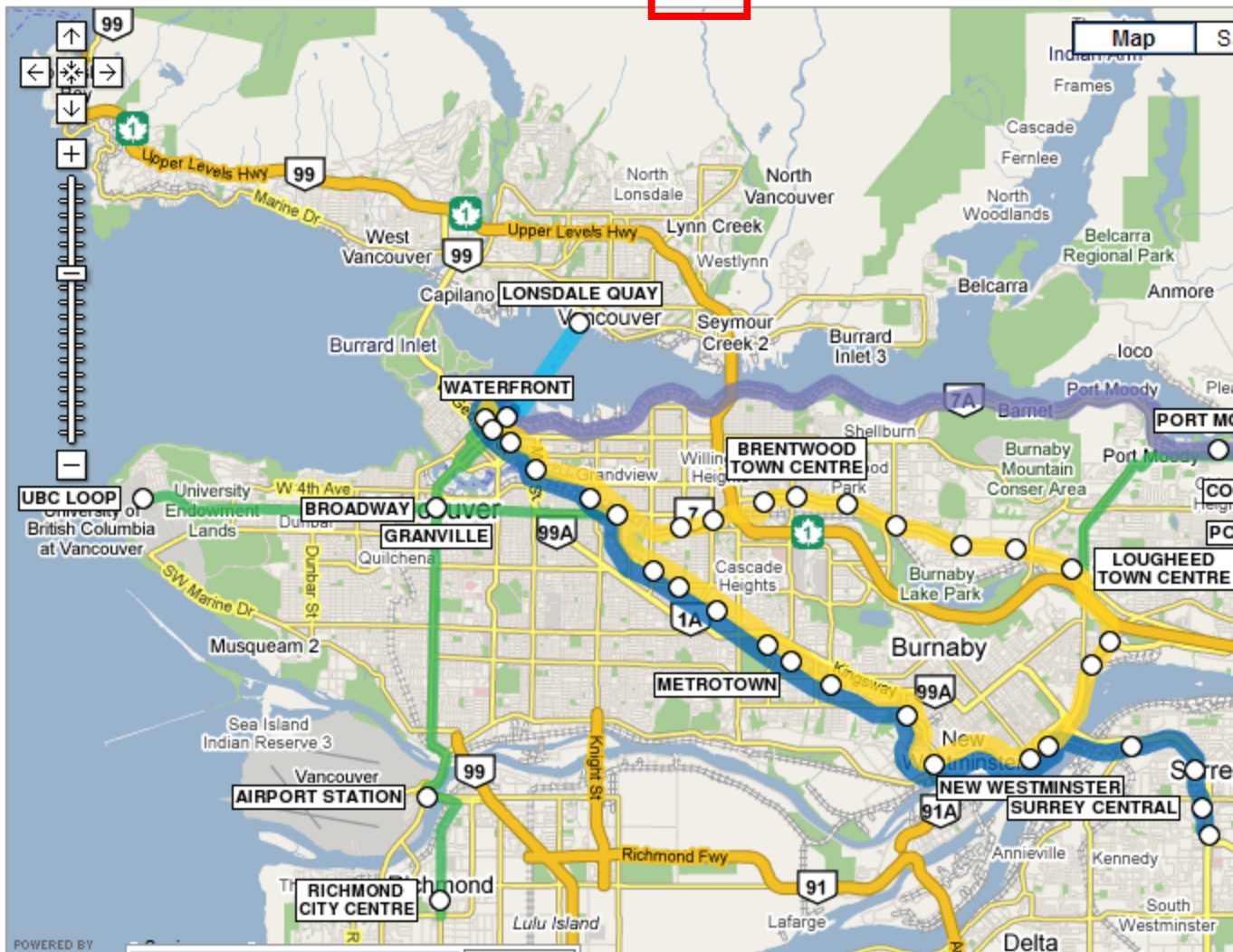
KML [today | future]

Link

© 2006-2007 [David Pritchard](#). [More information.](#)

- Expo Line (SkyTrain)
- Millenium Line (SkyTrain)
- Canada Line (SkyTrain, 2010)
- Evergreen Line (Light Rail, future)
- B-Line (Rapid Bus)
- SeaBus (Ferry)
- West Coast Express (Suburban Rail)
- Bus
- Bike Lockers
- Park and Ride

Bus routes may not be up-to-date. Visit [TransLink](#) for the real maps, schedules, etc.



Vancouver Transit with Google Maps

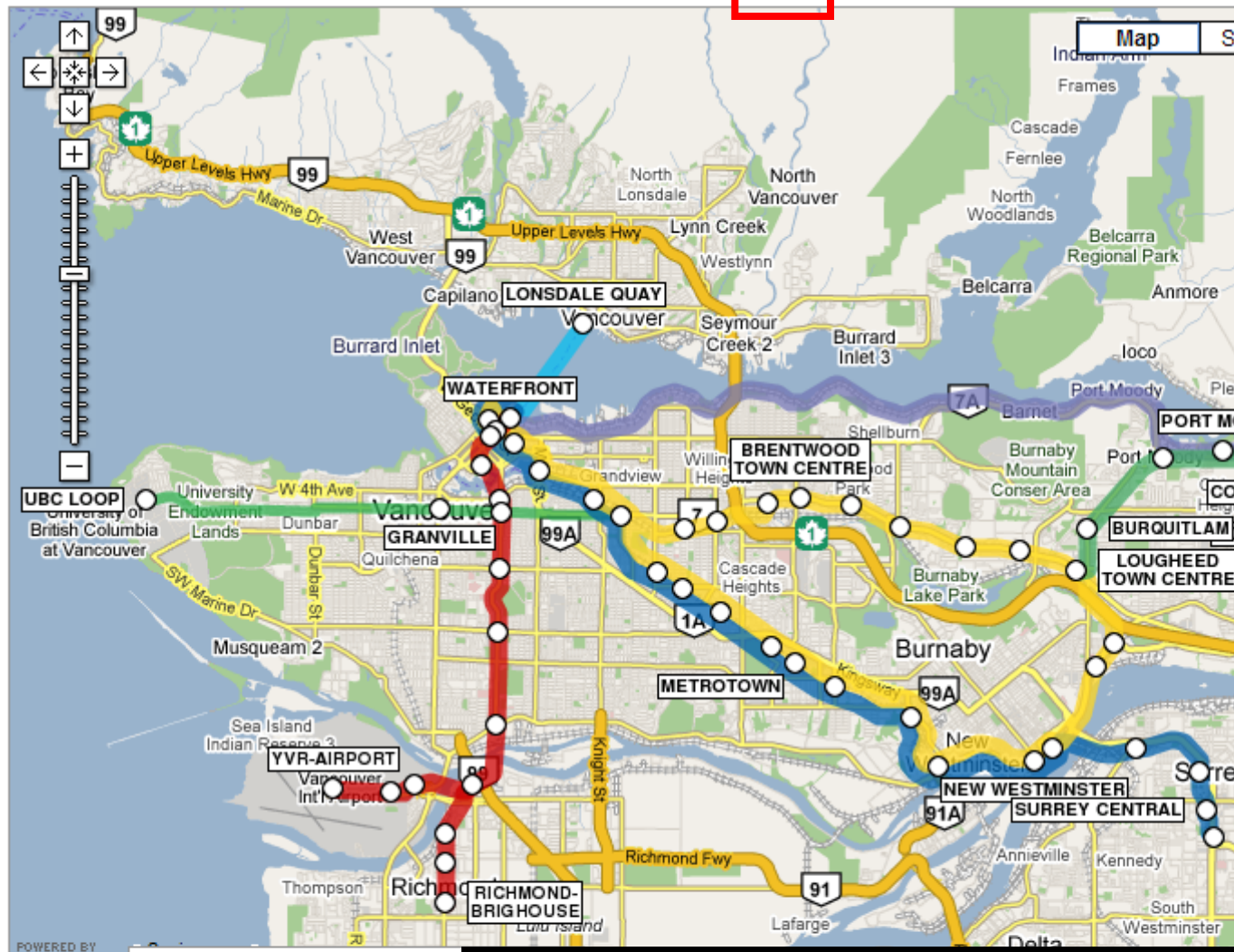
Routes [today] **future**

KML [today | future] [Link](#)

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- Expo Line (SkyTrain)
- Millenium Line (SkyTrain)
- Canada Line (SkyTrain, 2010)
- Evergreen Line (Light Rail, future)
- B-Line (Rapid Bus)
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- West Coast Express (Suburban Rail)
- Bus
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- Park and Ride

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Vancouver's Regional Town Centres (RTCs)

4. *seek to balance jobs and housing in each part of the GVRD*

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Sources: GVRD (1991, 1993a, 1993b).

50%
in
CBD

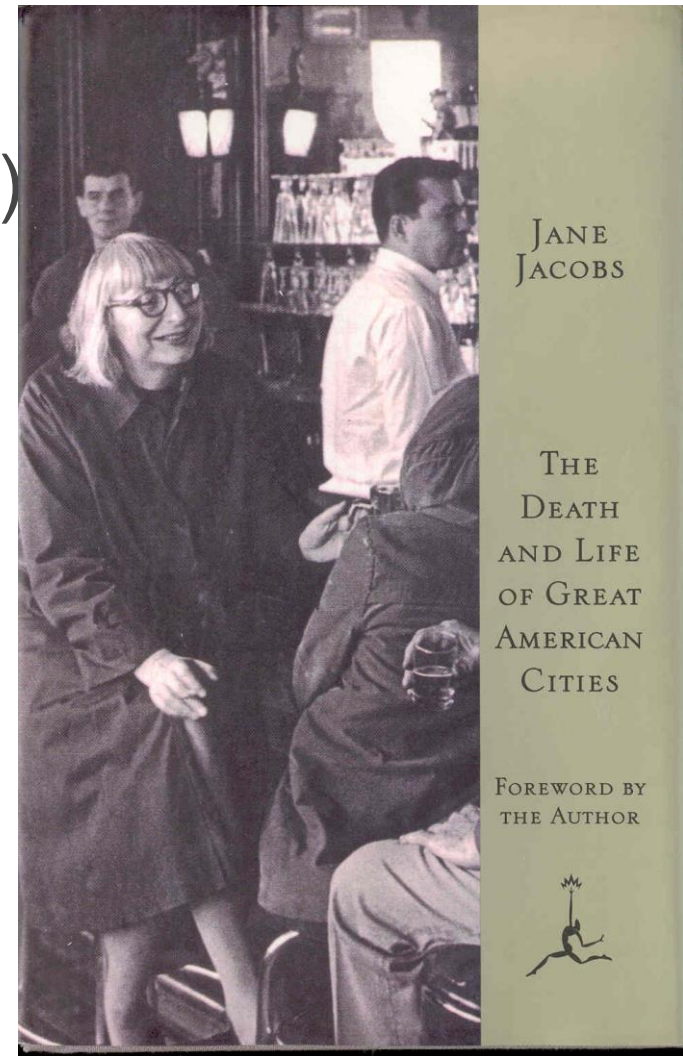
40%
in
CBD

From: Gad and Matthews (2000)



Exuberant Diversity (J. Jacobs)

- Aged buildings, small blocks, mix of uses (all characteristics of traditional urbanism)

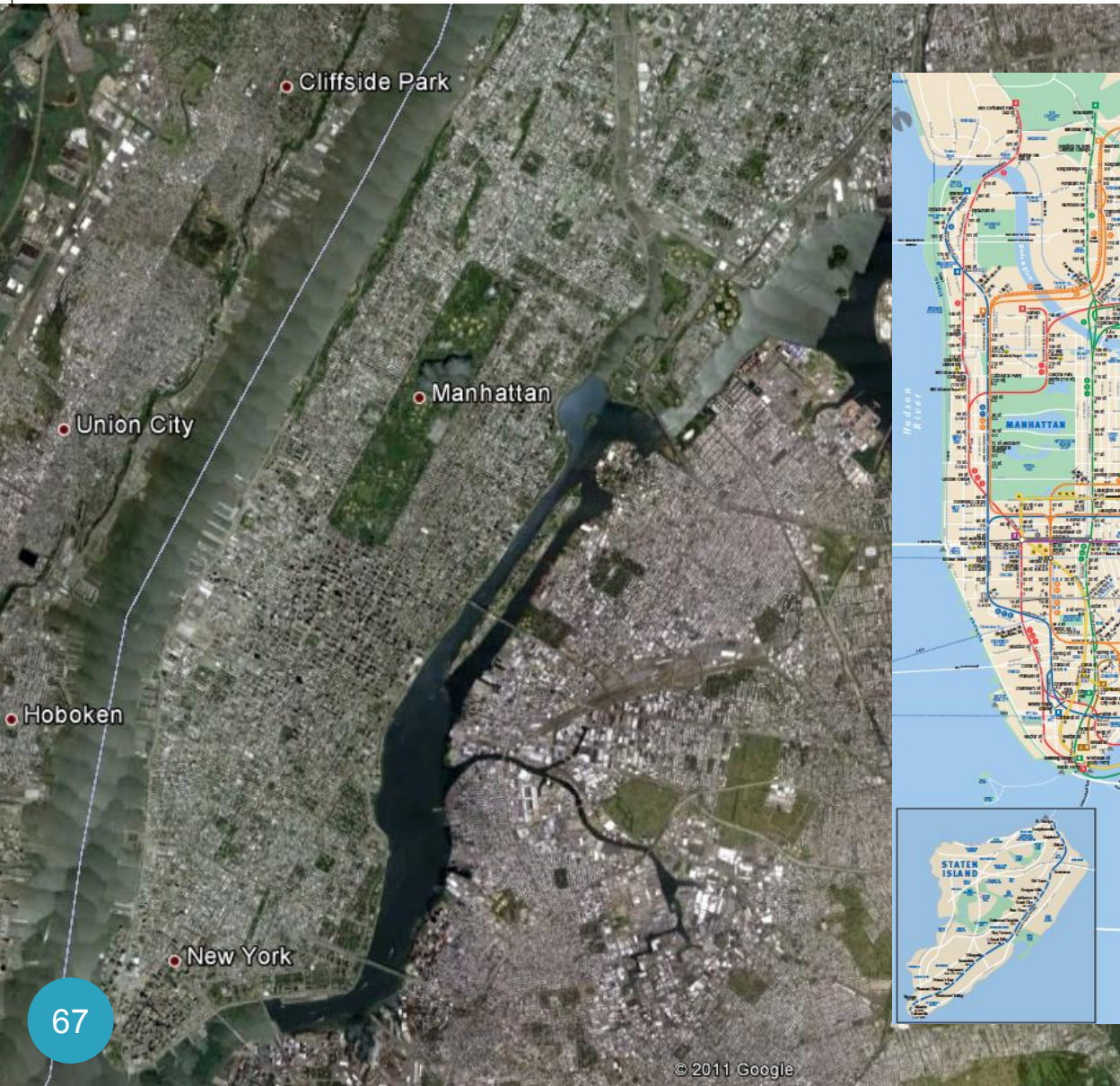


Jane Jacobs (1961)

**The Death and Life of
Great American Cities**



Urban Form (urban) – NYC's Manhattan



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