

LECTURE 2\_16:

MAR. 1, 2014

# URBAN ENVIRONMENTAL MANAGEMENT

## SUSTAINABLE URBAN DEVELOPMENT I

Text Reference: Dearden and Mitchell (2012), Ch. 13, pp. 459-465.

# Outline

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## □ Upcoming Class Lectures:

*Source: Dearden and Mitchell (2012)*

- March 11 & 13 (Sustainable Urban Development I & II)
  - March 18 (Environmental Issues in Cities)
  - March 20 (Urban Sustainability and Best Practices in Urban Areas)
- ## □ Other lecture of interest
- Wednesday March 19<sup>th</sup>, 7 pm, RB 1022, “Mercury contamination in suspended pulp fibres in Thunder Bay harbour: a process for remediation and clean up” .. By Coal Engineering

# Preamble

State of cities and urbanization trends

Definitions:

- Urban forms (urban, suburban, exurban, rural)
- Housing types (single family, multi-family)
- Sustainability (broadly, goals of a sustainable community)

# Big Cities at the Beginning of the Century

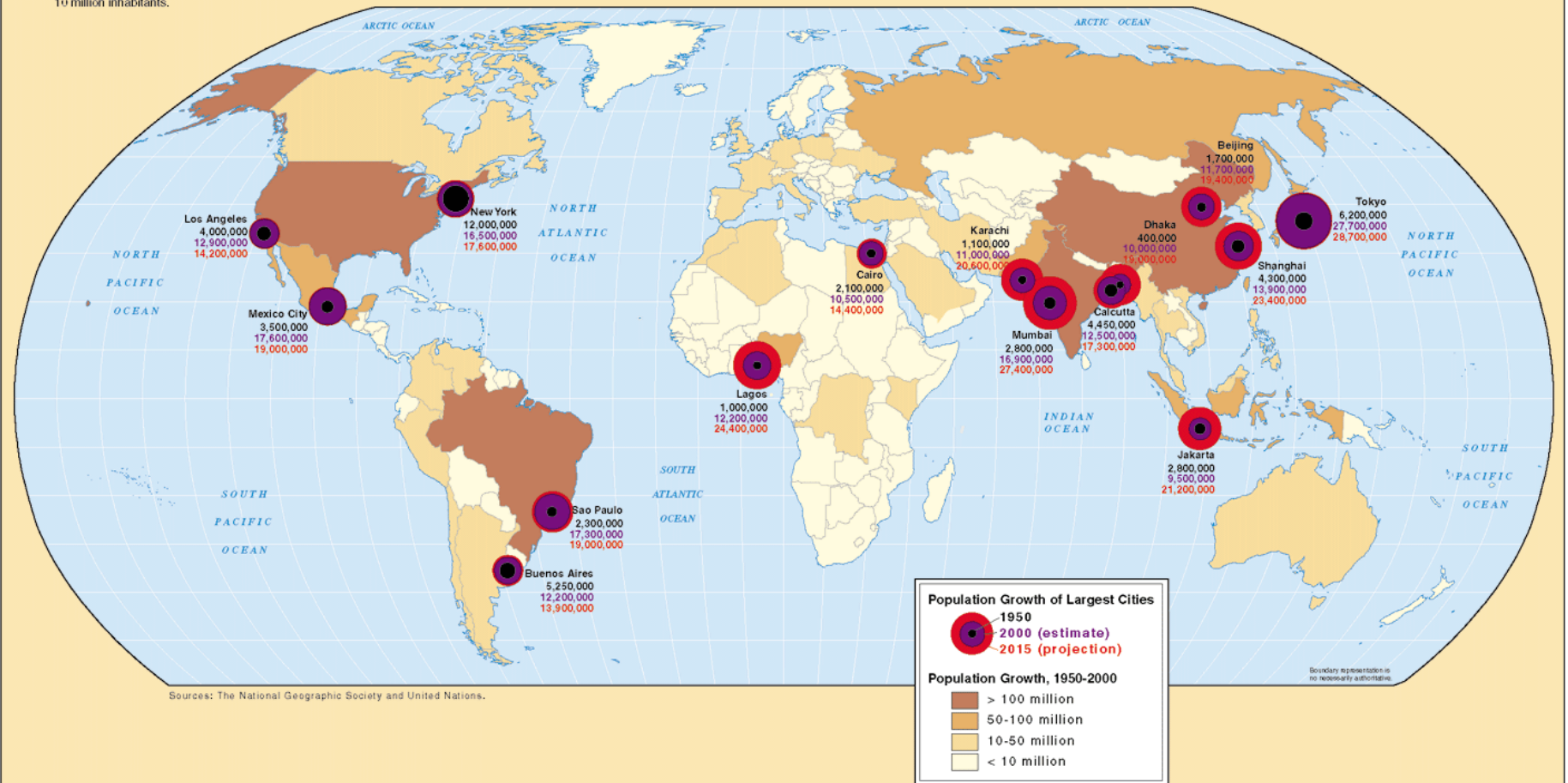


# Big Cities at the End of the Century



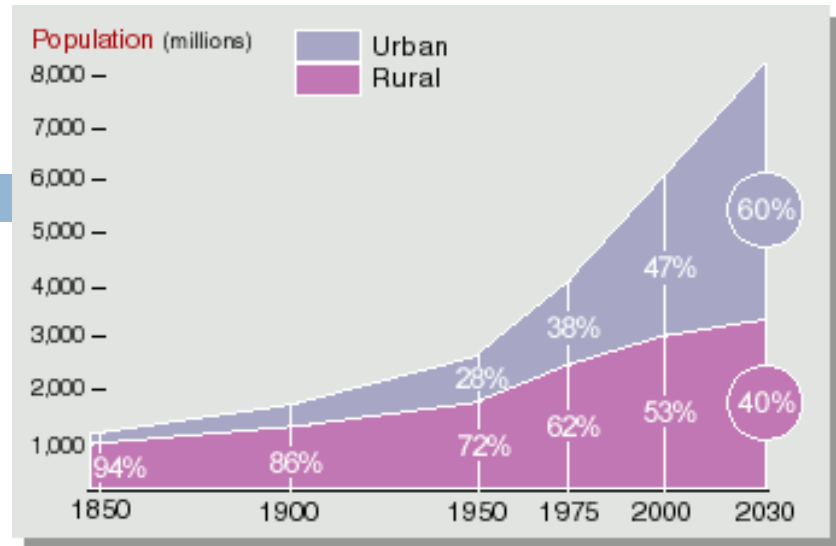
## Growth in Megacities<sup>a</sup>

<sup>a</sup>Cities containing more than 10 million inhabitants.



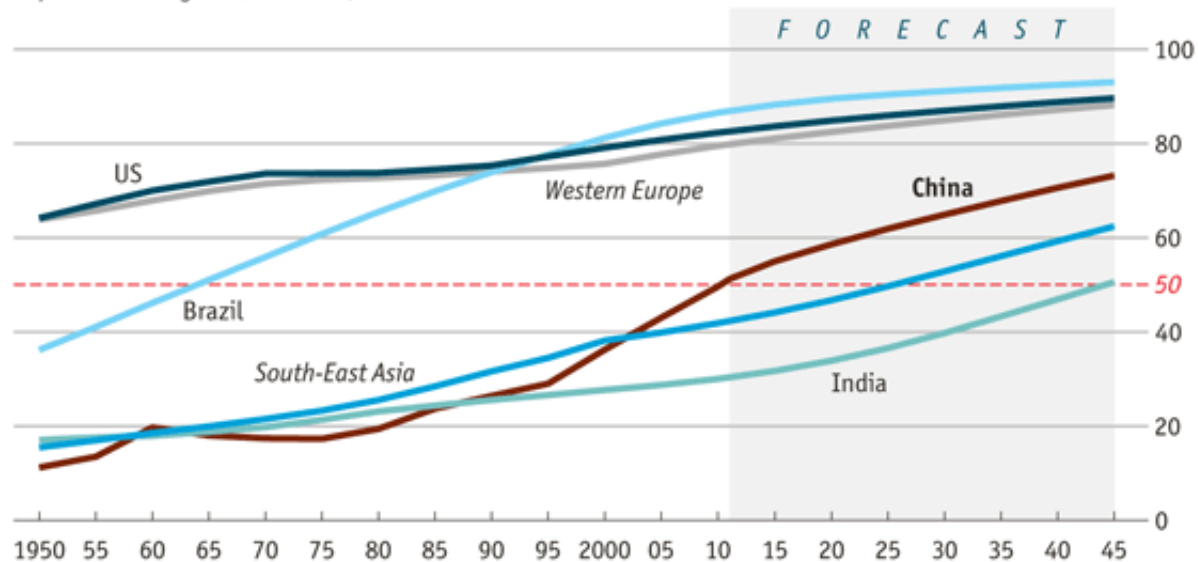
# Forecast: Urbanization Trends

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## Urbanisation

Population living in urban areas, % of total

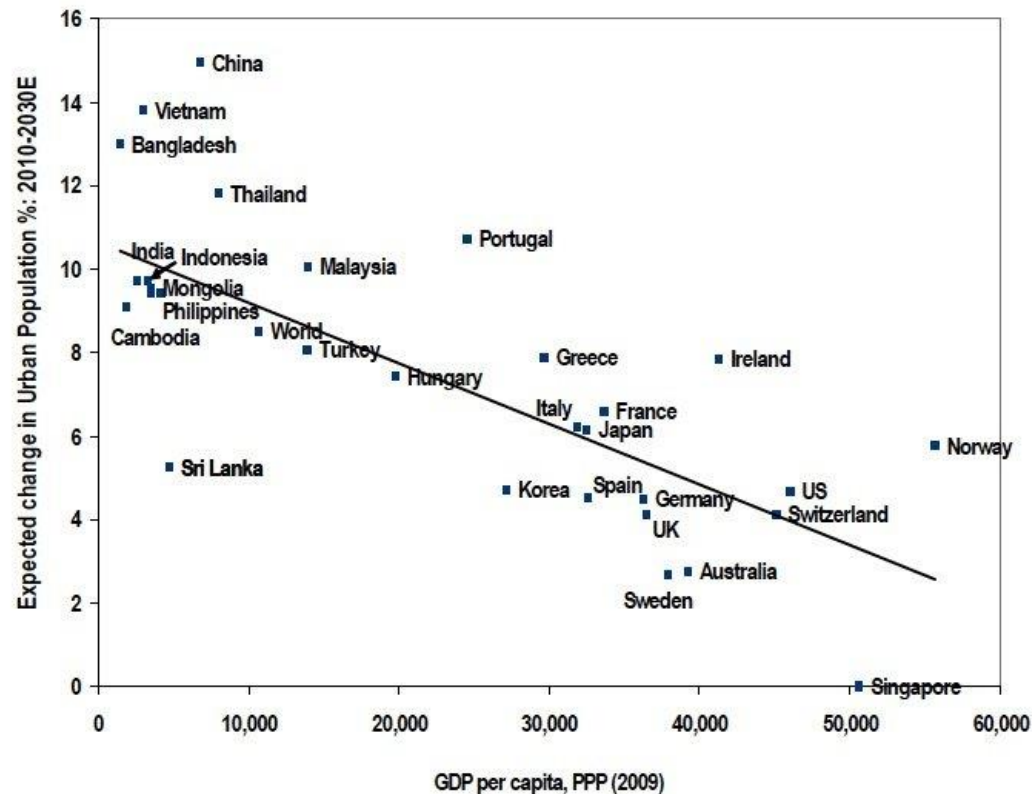


Sources: CEIC; UN Population Division; *The Economist*

# With urbanization also comes economic prosperity ... or at least that has been the historical trend

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Chart 2: Per capita wealth and urbanization trends



Source: World Urbanization Prospects 2009 revision, World Bank

**Urbanization boosts growth and equity market returns.... China, Vietnam and Bangladesh will lead the wave of urbanization ...**

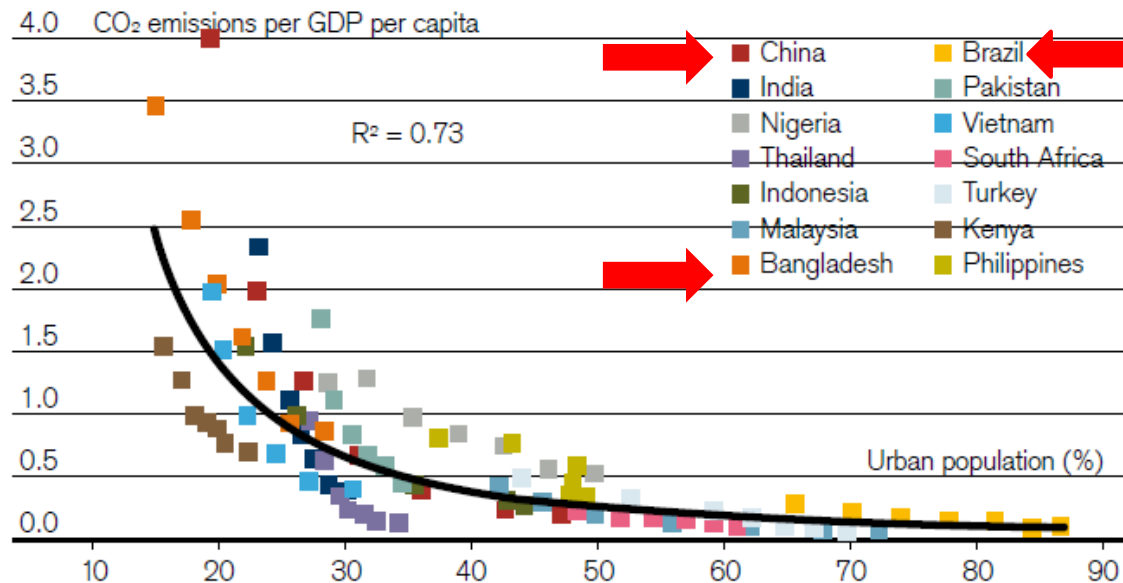
<http://www.businessinsider.com/asian-demographic-trends-2011-2?op=1#ixzz2vfhT2EOB>

# Why is urbanization “environmentally friendly”?

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## Total CO<sub>2</sub> emissions versus urban population rate in emerging markets (1980–2010, 5-year intervals)

Source: World Bank Development Indicators, Population Division of Department of the Economic and Social Affairs of the United Nations Secretariat, Credit Suisse



## CO<sub>2</sub> emissions per capita versus % urbanization ...

Two graphics from the recent [Credit Suisse report](#) on global urbanization trends shows how urbanization dramatically lowers carbon emissions from transportation. The **above graphic shows trends from across the emerging world...**



# What characteristics make urbanization “environmentally friendly”?

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1. Urban form
  - ▣ Density; Land use mix; Housing mix
2. Transportation choices
3. Per capita consumption of {land, energy, consumer goods}
4. Social mix
5. Others?

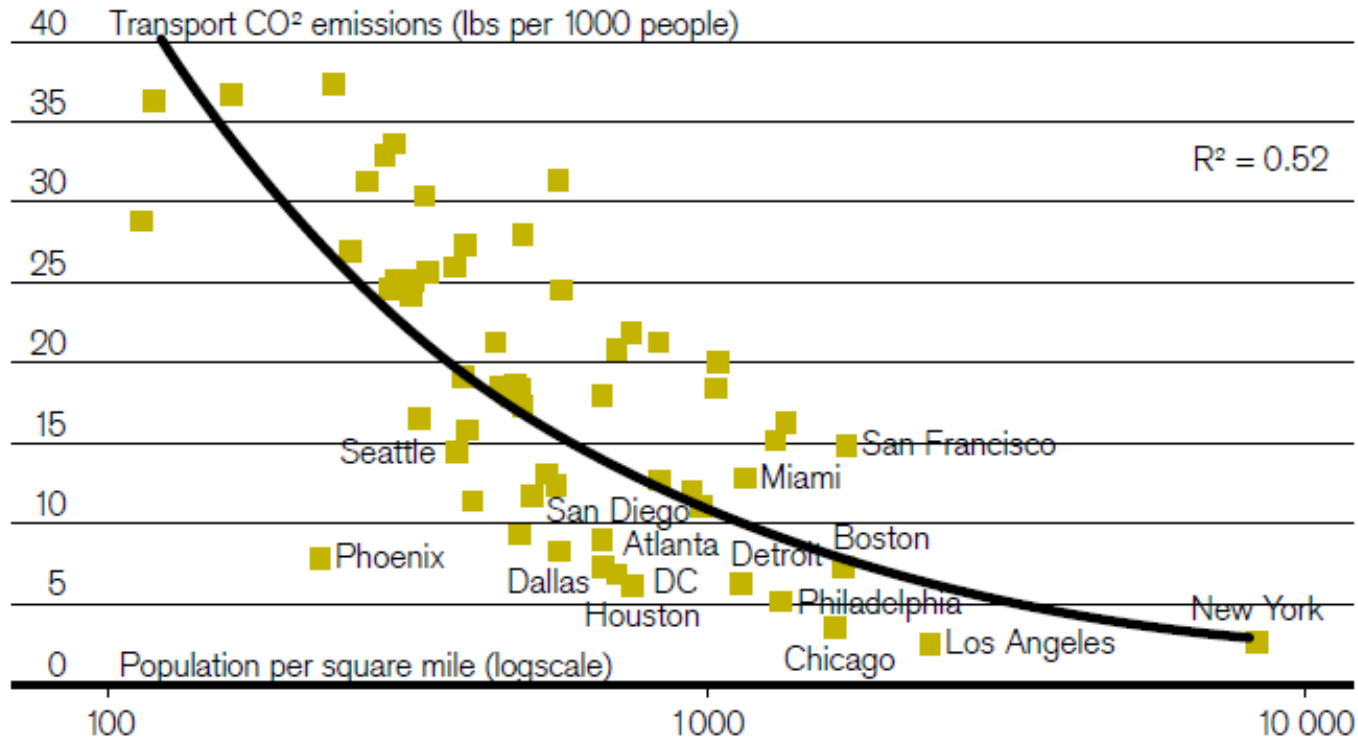


photo credits: TR, Nov 2011



# Emissions from transportation (public and private) versus population density for US metropolitan statistical areas

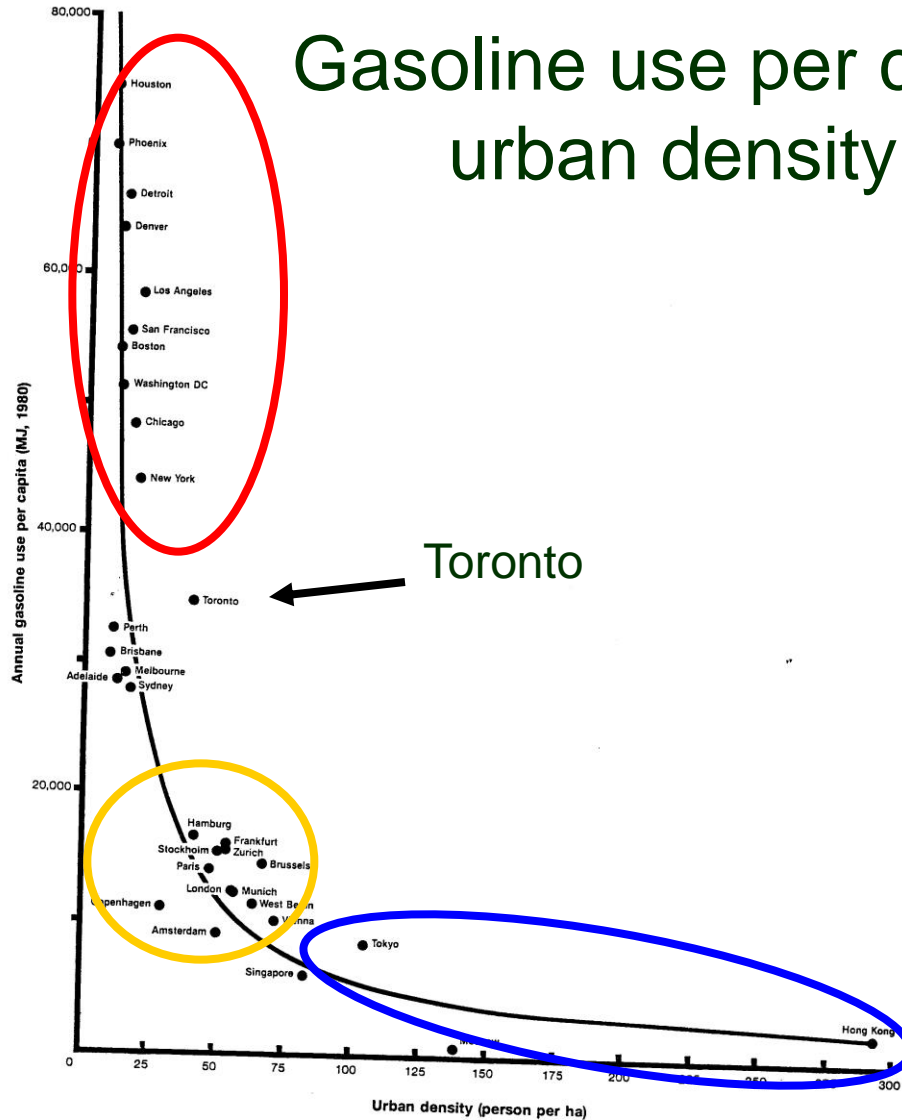
Source: US Census Bureau 2000 Census, Credit Suisse



... similar trend among US metropolitan areas (to emerging cities shown earlier).

- How do US (and North American) cities compare with Global Cities?

# Gasoline use per capita versus urban density in 1980



- US (low density)
- European (medium density)
- Asian (high density)
- Canadian (limited sample)

Figure 3.1 Gasoline use per capita versus urban density (1980).

Source: Newman and Kenworthy (1989)

# Gasoline use per capita versus urban density in 1990

$$(R^2 = 0.8594)$$

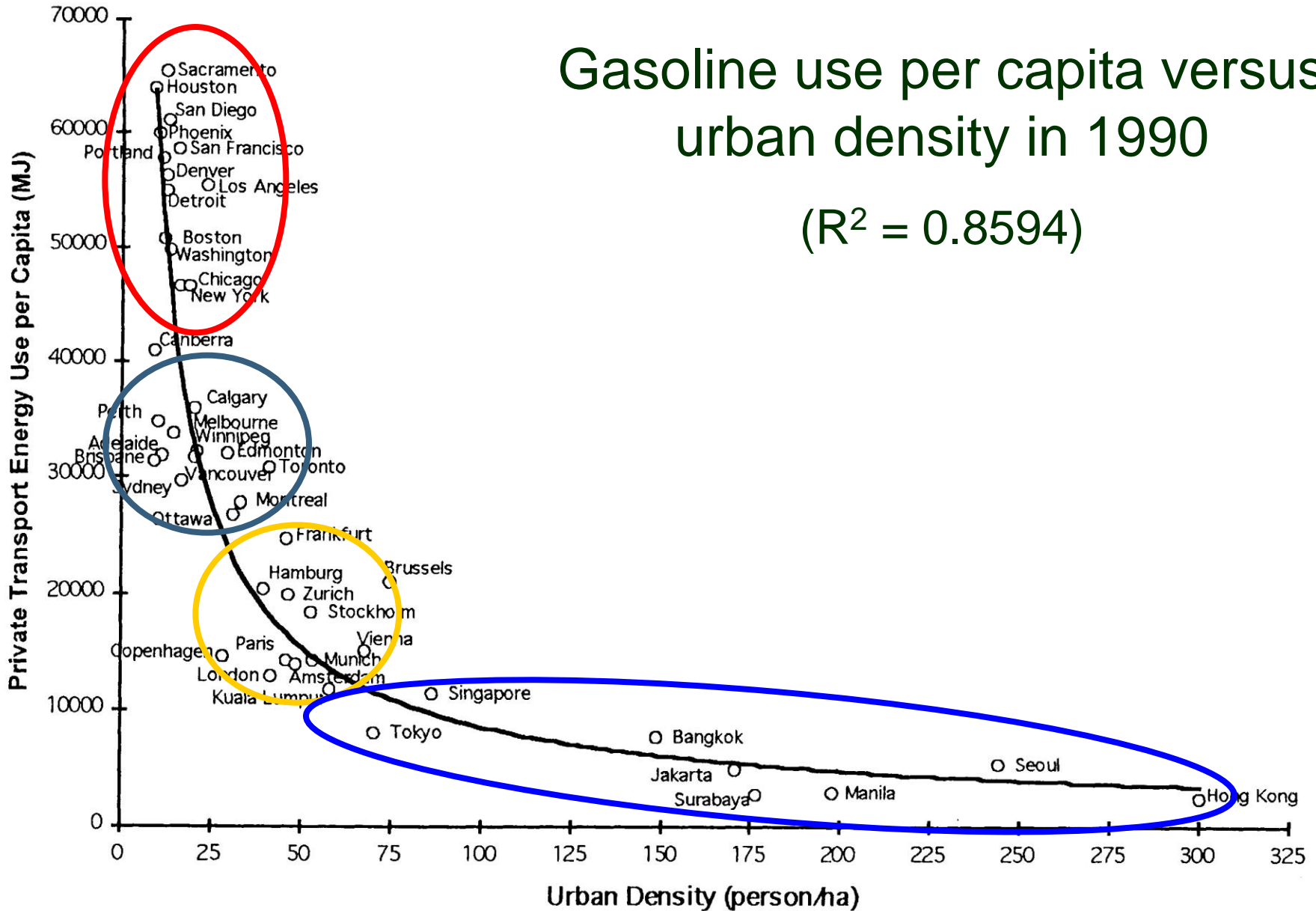


Figure 3.2. Energy use per capita in private passenger travel versus urban density in global cities, 1990.

Source: Newman and Kenworthy (1999)

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# Urban Forms

Urban

Suburban

Exurban

Rural

# S. Ontario's "Greater Golden Horseshoe"

- Transect from 'urban core' to rural communities;
- 20<sup>th</sup> Century trend of 'urbanization'



# Traditional urbanism (early 20<sup>th</sup> Century, pre-auto, ped-scaled urbanism)





Horsecar along Simpson Street (Ft. William, ON)  
– *circa early 20<sup>th</sup> Century*



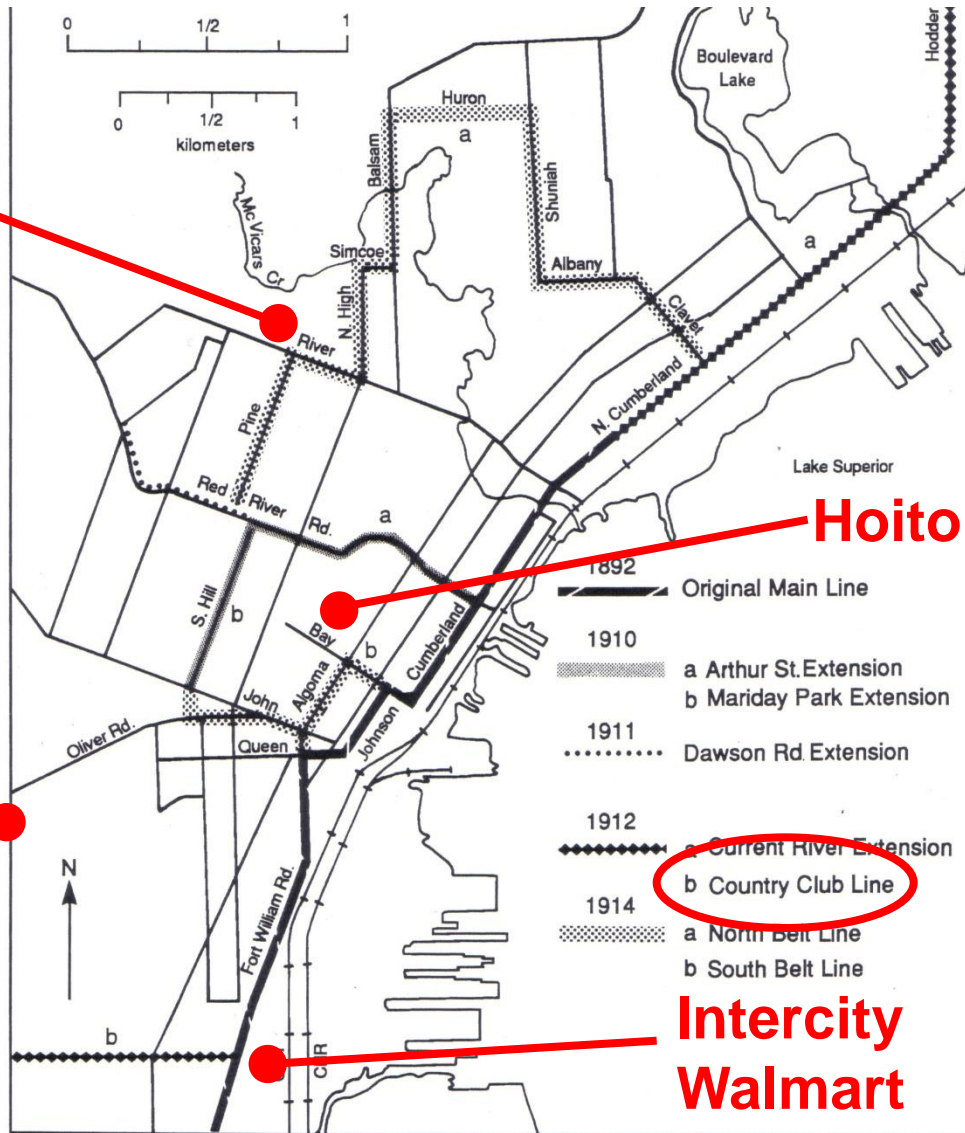
# Street Railway Network – Pt. Arthur (northward Thunder Bay, 1892-1914)

**Grandview  
Metro**

**LU**

**Hoito**

**Intercity  
Walmart**



Source: Lorch and Jordan (1995)



- **traditional urbanism:**  
a concentrated urban form,  
typical of older patterns  
found in European cities.





- Madrid and Granada





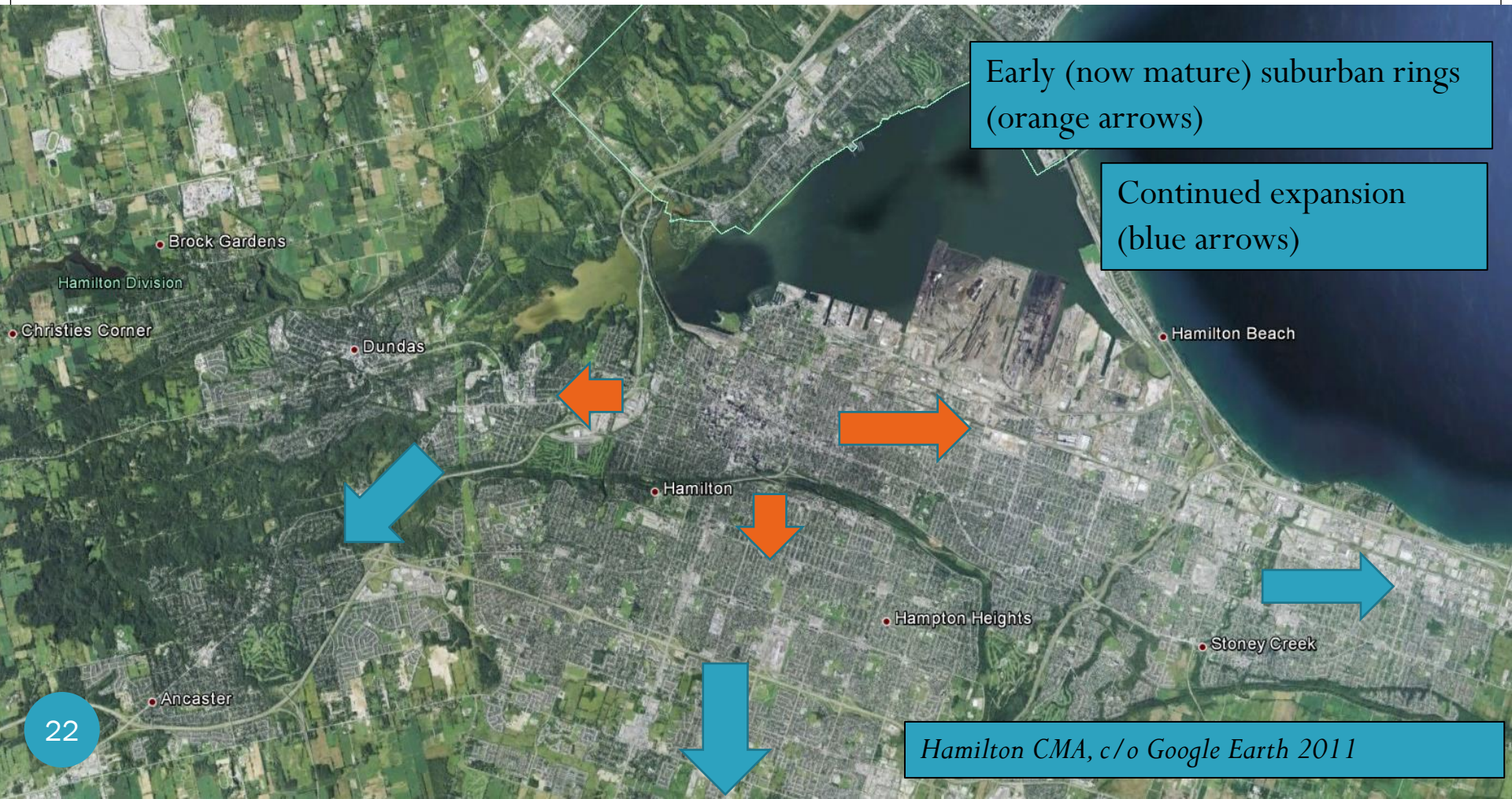
**Traditional Urbanism:** front porches (enclosed due to climate), garages added later (where space permitted)



**Traditional Urbanism:** Modest-scaled apartment buildings (3-4 story walk-ups), attention to architectural details

# Conventional Suburban Development / Postwar Sprawl

(post-1940's; rise of the automobile; segregation of land uses; land consumption)



- Auto-centric infrastructure (freeways, parking lots, double garages)
- Low density housing forms (neighbourhood centre); higher density forms, transit routes and non-residential functions (neighbourhood periphery)





- **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



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

← *Near Winnipeg, photo credit: T.Randall*

# Suburbanization of rural Ontario

New subdivisions to small agriculture cross-roads, since 2005 (blue arrows)



*Binbrook SE of Hamilton, c/o Google Earth 2011*

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# Housing Types

Single family

Multi-family

# Single Family Housed (detached)

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# Duplex (semi-detached)

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# Multi-family housing (rowhouse/townhouse)

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# Multi-family housing (apartment/condo)

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# Sustainable Urban Development

- Definition of SUD, Sustainability ...
- Required attention to at least 4 factors to achieve it ... (**next class**)



# Definition of Sustainable Development



“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987, p.8)

- Evolution / broadening of term during the 1990s to “**sustainability**”

**Table 5.1 The Eco-Footprints and Biocapacities of Selected Nations**

| Country        | Per Capita Eco-Footprint (global ha) | Per Capita Domestic Biocapacity (gha) | Overshoot Factor |
|----------------|--------------------------------------|---------------------------------------|------------------|
| World          | 2.7                                  | 2.1                                   | 1.3              |
| United States  | 9.4                                  | 4.9                                   | 1.9              |
| Australia      | 7.8                                  | 15.4                                  | 0.5              |
| Canada         | 7.1                                  | 20.0                                  | 0.4              |
| Greece         | 5.9                                  | 1.7                                   | 3.5              |
| United Kingdom | 5.3                                  | 1.6                                   | 3.3              |
| France         | 4.9                                  | 3.0                                   | 1.6              |
| Japan          | 4.9                                  | 0.6                                   | 8.2              |
| Germany        | 4.2                                  | 1.9                                   | 2.2              |
| Netherlands    | 4.0                                  | 1.1                                   | 3.6              |
| Hungary        | 3.5                                  | 2.8                                   | 1.3              |
| Mexico         | 3.4                                  | 3.3                                   | 1.0              |
| Malaysia       | 2.4                                  | 2.7                                   | 0.9              |
| Brazil         | 2.4                                  | 7.3                                   |                  |
| China          | 2.1                                  | 0.9                                   |                  |
| Thailand       | 2.1                                  | 0.8                                   |                  |
| Peru           | 1.6                                  | 4.0                                   |                  |
| Ethiopia       | 1.4                                  | 1.0                                   | 1.4              |
| Nigeria        | 1.3                                  | 1.0                                   | 1.3              |
| Indonesia      | 0.9                                  | 1.4                                   | 0.6              |
| India          | 0.9                                  | 0.4                                   | 2.3              |
| Bangladesh     | 0.6                                  | 0.3                                   | 2.0              |
| Malawi         | 0.5                                  | 0.5                                   | 1.0              |

Source: WWF (2008).



*Wackernagel and Rees (1996)*

**Ecological Footprint:**  
a measure of sustainability

Source: Rees (2010)

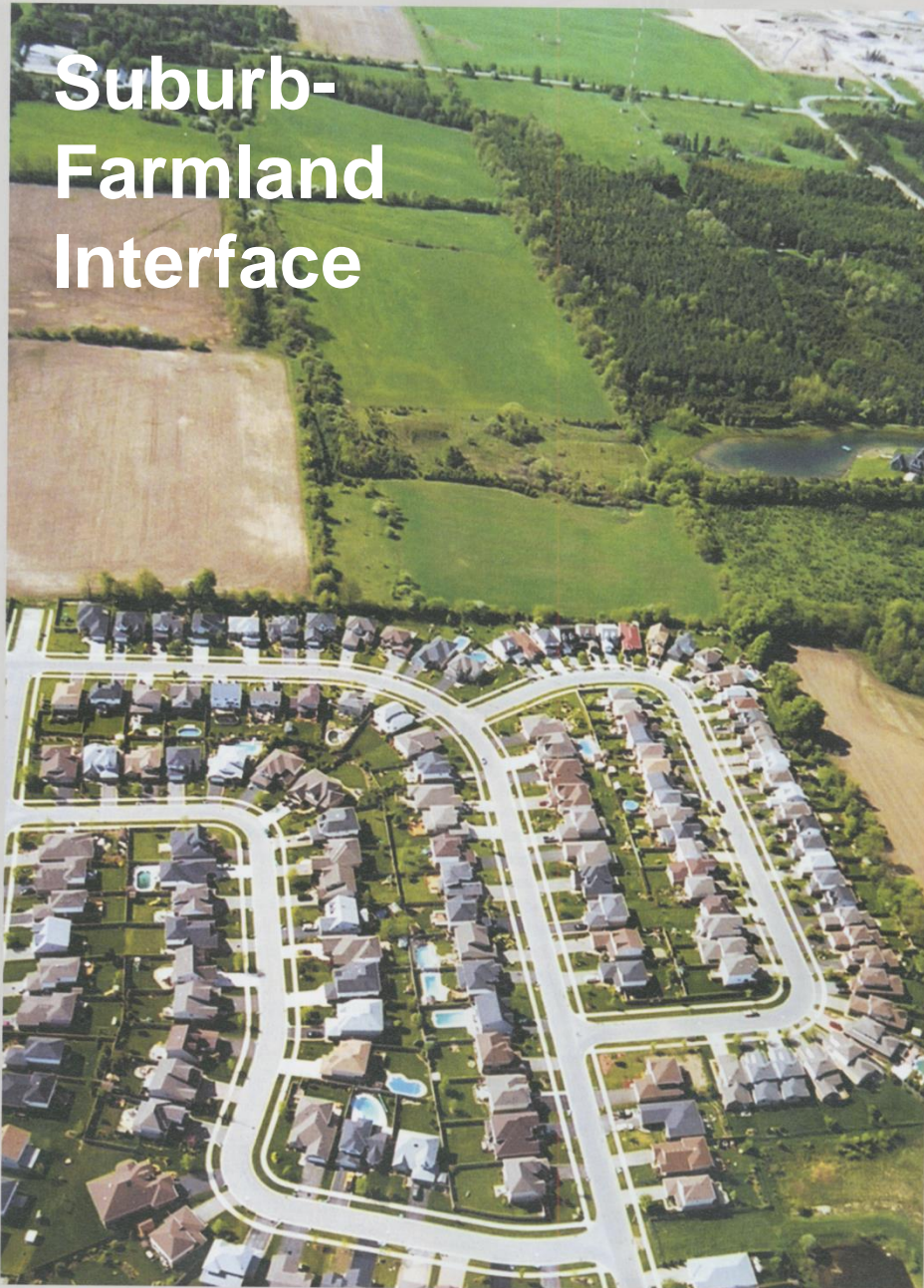
# Sustainability

- Like an ecosystem, the planet has a finite **carrying capacity**;
- As stewards of the planet, we are responsible to **strike a balance** between our activities and environmental preservation
- Sustainability is viewed as this balance between the **Environment**, the **Economy** and **Societal Well-Being**
- Reduced consumption of **energy, raw materials** and **land**;
- Achieved in the 'built environment' 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)



*Image credit: Government of Manitoba*

# Suburb- Farmland Interface



University of Guelph

1954



1963



1976



2008

South Richmond, BC

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

## Looking Ahead to the next lectures

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# References

- Dearden, P and Mitchell, B. 2012. *Environmental Change and Challenge*, Fourth Edition, Don Mills, Ontario: Oxford University Press {Chapter 13: 'Urban Environmental Management'}
- [https://infocus.credit-suisse.com/data/\\_product\\_documents/\\_shop/344677/opportunities\\_in\\_an\\_urbanizing\\_world.pdf](https://infocus.credit-suisse.com/data/_product_documents/_shop/344677/opportunities_in_an_urbanizing_world.pdf) . Two graphs used sourced to Credit Suisse (March 2014), although this link did not work (noted by TR).
- Newman P. and Kenworthy J. 1989. Gasoline consumption in cities: a comparison of US cities with a global survey, *Journal of American Planning Association*. 55: 24-37