11.943J/ESD.935
Urban Transportation, Land Use, and the Environment in Latin America: A Case Study Approach

Class 10:
The Santiago Metropolitan Area
The Santiago Metropolitan Area (SMA)

Latitude: 32°56’ – 34°17’ South
Longitude: 69°47’ – 71°43’ West
## The National Context

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Chile</th>
<th>LAC</th>
<th>Upper Middle-Income Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNI per capita (US$ 2000)</td>
<td>4,600</td>
<td>3,680</td>
<td>4,620</td>
</tr>
<tr>
<td>Urban Population</td>
<td>86</td>
<td>75</td>
<td>76</td>
</tr>
<tr>
<td>Life Expectancy at Birth</td>
<td>76</td>
<td>70</td>
<td>69</td>
</tr>
<tr>
<td>Infant Mortality (per 1000 births)</td>
<td>10</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Access to Improved Water</td>
<td>94%</td>
<td>85%</td>
<td>87%</td>
</tr>
<tr>
<td>Illiteracy (15+)</td>
<td>4</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Population AAGR (94-00)</td>
<td>1.4</td>
<td>1.6</td>
<td>1.3</td>
</tr>
</tbody>
</table>

The National-Regional Context

National Government
  - Executive Branch
    - Elected President – Majority of popular vote (run-off), one 6-year term
    - Appointed Ministers
  - Legislative Branch (Bi-camaral)
    - Elected Representatives (*diputados*) – 160 from 60 electoral districtos – directly elected 4-year terms
    - Elected (38), Appointed (9) and lifetime (2) Senators – directly elected serve 8-year terms

13 Regions, divided into Provinces
  - Executive: Presidentially-appointed governors & Regional Arms of National Ministries
  - Regional Councils, elected by Municipal Government Councils in form of Electoral College
  - Provinces, Governor, with little power
The Local Context - Decentralization

- The Municipality - government presiding over the comunas
- Formally established by law in 1991
  - Local municipal elections first held in June, 1992
  - 341 municipal governments across the country
- Directly elected Mayor and Council
- Some degree of financial and local planning/investment autonomy
## National-Regional-Local: T, LU & E

<table>
<thead>
<tr>
<th>Area of Intervention</th>
<th>Government Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National</td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>MINVU (SERVIU)</td>
</tr>
<tr>
<td>Construction &amp;</td>
<td>MOPTT</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>MINVU, MOPTT</td>
</tr>
<tr>
<td>SECTRA, MIDEPLAN</td>
<td>SERPLAC</td>
</tr>
<tr>
<td>Operations</td>
<td>MOPTT, METRO, EFE</td>
</tr>
<tr>
<td></td>
<td>UOCT</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>MINVU</td>
</tr>
<tr>
<td>MIDEPLAN</td>
<td>MOPPT</td>
</tr>
<tr>
<td></td>
<td>SERPLAC</td>
</tr>
<tr>
<td>Development</td>
<td>SERVIU</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>CONAMA</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Enforcement</td>
<td>CONAMA MOPTT, MINSALUD</td>
</tr>
</tbody>
</table>
The Regional Context: La Region Metropolitana (RM)
The RM

- Six Provinces, 52 Municipalities
- Smallest of the nation’s 13 regions in size, but home to 40% of population
- Province of Santiago (32 comunas), Greater Santiago (34 comunas), the SMA (?? comunas)
- 90% of RM population in the 34 comunas of Greater Santiago
The RM Topography and Meteorology

- 2,800 km² Basin – 500 m above sea level
  - 80 kms N-S by 30 kms E-W
  - surrounded on E by the Andes (pre-cordillera peaks of 3,200 m), on W by Coastal Range (cordillera de la Costa with peaks of 2,000 m), with smaller ranges to the North and South
  - Mapocho River runs directly through Santiago, the Maipo runs just south of the SMA.

- Mediterranean Climate
  - Warm, dry, breezy in summer; cold winter, with infrequent storms.

- Thermal Inversion
  - Persists throughout the year
  - Exacerbated in fall and winter
Topography of SMA
Thermal Inversion
Economy of the RM

- Fundamental, continuously growing role in Chile’s economy
  - Despite intentions over the years at decentralizing growth

1986-1996
- RM economy AAGR: 7.9%; Nation: 6.8%
- RM share of GDP: 42% ⇒ 47%
- RM share of industrial activity: 44% ⇒ 52%
- RM share of construction activity: 37% ⇒ 41%
- RM share of commercial activity: 65% ⇒ 68%

- All banks and 46 of 47 of major economic groups HQ’ed in RM
- National center of education (universities)
Composition of RM’s Economy

% Contribution to GDP

Source: Banco Central, 1999

Employment: Government/Social Services, 28% jobs; Industry, 23%; Commercial 20%
Since 1997 Asian crisis, etc. has cooled the national economy:
- 97-98: 3.4%; 1998-1999: -1.4%; 2000: ~5%
Greater Santiago unemployment: ~14% (2000)
Economy and Globalization

Certainly important, but….

- Exports account for just 13% of RM’s GDP (vs. 30% for nation)

RM’s Exports - 1999

- Pacto Andino 17%
- MERCOSUR 21%
- NAFTA 20%
- APEC 29%
- EU 13%
RM Population Evolution


- Nation
- Region Metropolitana

17% of nation
40% of nation
Population Growth & Demographics

- Early 1900s: Santiago as nation’s administrative center
- Mid 1940s: Import substitution policies led to industrial, financial commercial concentration in Santiago – trends that have continued...
- Recent Population Growth Trends (AAGR)

<table>
<thead>
<tr>
<th></th>
<th>RM</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-1982</td>
<td>2.62%</td>
<td>2.03%</td>
</tr>
<tr>
<td>1982-1992</td>
<td>1.97%</td>
<td>1.64%</td>
</tr>
</tbody>
</table>
Population: Regional Distribution

- 1970: 42% of RM’s population concentrated in the comuna of Santiago and 10 directly adjacent comunas
- 1992: These same comunas account for 26% of RM’s population
  - 3% population decline
- Major growth in West, South, Southeast
Population Dynamics

Note: Each ring is comprised of comunas within the following approximate radial distance from CBD (in km from rough geographic center of comuna) - 1st Ring, <5; 2nd Ring, 5<10; 3rd Ring, 10-15; 4th Ring, 25-45; 5th Ring, 50-100.

Influencing Factors

→ Low peripheral land prices (Public housing projects)
→ Middle and Upper Income suburbanization
→ Increasing commercial and service land uses in central areas
Population Dynamics: Densities

Note: Each ring is comprised of comunas within the following approximate radial distance from CBD (in km from rough geographic center of comuna) - 1st Ring, <5; 2nd Ring, 5<10; 3rd Ring, 10-15; 4th Ring, 25-45; 5th Ring, 50-100.
Population Dynamics – the Future?

- RM growth expected to continue to outpace nation
- By 2020
  - AAGR 1.75%: 8.8 million
  - AAGR 1%: 7.3 million

Where will that population reside?
- Will recent past growth trends hold true?
**Demographics: Ages & Households**

- **HH Size**
  - 1982: 4.82 persons
    - 3.5 to 5.7
  - 1992: 4.25 persons
    - 3 to 4.8
  - By 2010: 3.7
Socioeconomic Characteristics

Indigent: Annual HH Income
< $500 (US$1996)
Poor: Annual HH Income
< $1000 (US$1996)
The Segregated City-Region

REGION METROPOLITANA
Mapa 2

Pobreza Comunal
CASEN 98

Pobreza Comunal
(Porcentaje)

0 - 8.2
8.3 - 16.4
16.5 - 24.7
24.8 - 32.9
33.0 - 41.1

Clasificación de la pobreza
(Porcentaje)

Indigentes
Pobres No Indigentes

24
The Segregated City: “Cone of Wealth”

Eastward Migration
- 75% of Greater Santiago’s wealthiest residents reside in just 6 comunas
- Las Condes, Vitacura, Providencia account for 54%
- Low income “invasions” eliminated by govt. in 70s-80s
- “Tiebout sorting”, plus comunas multiplying in 1981
- Middle classes more dispersed, but tend to follow rich…
The Segregated City

Migration historically led to “invasions” and precarious housing
- *Poblaciones* > *ciudades callampas* > *campamentos* > “asentamientos precarios”
- Major efforts in recent years to supply public housing

Segregation exhibited through inequalities in: housing quality, education, municipal infrastructure provision, greenspace, etc.
The Segregated City
Urban Expansion – the SMA

1940: 100 km²
1995: 600 km²
Urban Expansion – Patterns, Influences

Overall Densities constant through 1950s
- though important shift in densities toward periphery

Densities decline during 1960s
By early 1970s, urbanization approaches growth boundary
- densities start rising

First Metropolitan Land Use Regulatory Plan
- includes urban growth boundary
- first major transport investments
- city begins losing “compact traits”

Urban Growth Boundary Lifted
- after 1981-82 economic crisis city begins expanding 70% faster than population
- densities decline at most rapid rate in history

Note: Land Area for 1995 is projection; Population for 1985 and 95 are based on interpolations (with AAGR from 1982-92 and 1982-98)
Growth Patterns – Influencing Factors

Lifting the Growth Boundary in 1979

In More Recent Years
- Reinvigorated road construction
- Low density suburban subdivisions
- Distant public housing projects and “invasiones”
- Industries on southeastern & northern fringes and in West near Airport on Ring Road
- Demographics – middle class “boom”: From 1992-97, 60% of urbanization in 4 “middle class” comunas
Urban Growth Forms

The “Colonial city”

- Neighborhoods dating primarily to colonial Chile
  - Associated with old, historical city center and surrounding areas

- Spanish colonial quadrangular street grid, “Plaza de Armas”
  - Continuous façade buildings
  - Predominated through the 19th Century
The Colonial City

Plaza de Armas
The Colonial City
The Colonial City
Urban Growth Forms

The “front yard” city

- First appears in late 19th Century
  - Desire to “privatize” space
  - Predominant form of city in first rapid wealthy eastward expansions
    - Agricultural subdivisions of today’s Providencia, Las Condes, Ñuñoa

- Highly profitable real estate model
- Continues today in megaprojects and individual subdivisions
- As much a status symbol as a residence
The Front Yard City
The Front Yard City
The Front Yard City
Urban Growth Forms

The “Park City”
- Multi-story apartment buildings
- Densely placed, surrounded by continuous greenspaces
- Latter half of 20th Century
- Densification of previous “front yard” neighborhoods
  - Lot consolidation and densification
The Park City
Urban Growth Forms

The Marginal City

- Public housing, low income housing
- Dense, multi-story buildings
- Minimal amenities & related infrastructure
- Vast expanses on urban periphery
The Marginal City
An Emerging Urban Growth Form

The “Renovated City”

- Product of government efforts to revitalize existing urban areas
  - Residential subsidies for apartment purchases in specified areas
  - Since 1990
  - (more details in next week’s lecture)
The Renovated City
Urban Growth Forms

- The Colonial City
  - No longer being developed, has left no legacy influencing today’s urban developments
    - i.e., no “neo-colonial” development – narrow street networks, diverse building facades, mixed uses, public spaces

- The Park City and Front Yard City
  - Design preferences, socio-economic choices

- The Marginal City
  - Response to immediate needs and conditions of poor

- The Renovated City
  - Direct public policy influence on consumer preferences

Influencing factors in each: public investments, norms & plans in time, real estate market and its evolution (more next week).
Despite expansion, non-residential land uses remain highly concentrated

- Comuna of Santiago (CBD) accounts for 27% of Greater Santiago’s commercial land uses, 30% of educational land uses, 43% of office space, 21% of health facilities, 15% of industrial land
Land Uses
(% share of Greater Santiago’s Land Use)

<table>
<thead>
<tr>
<th>Location</th>
<th>Health</th>
<th>Offices</th>
<th>Industrial</th>
<th>Residential</th>
<th>Education</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independencia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitacura</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerrillos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qta. Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macul</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Joaquin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quilicura</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maipu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puente Alto</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Miguel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Florida</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nunoa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recoleta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providencia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Las Condes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santiago</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Santiago’s CBD
The CBD Moves East - Providencia
The CBD Moves East – Las Condes
Future “Non-C”BDs
Transport System: Brief History

- Horse trams and steam trains (to San Bernardo and Puente Alto) by turn of Century
- By 1930s, city has one of most extensive electric tram networks in South America
  - 220 kms, 210 passengers/year
  - Dismantling begun in 1945
- By 1960s (first land regulatory plan)
  - Plans also laid for Metro system
  - Construction begun on ring road (Vespucio), Avenida Kennedy (East to Las Condes) and the PanAmerican Highway
Major Infrastructure
Next Time

- Transportation - Continued
- Environment
- Instruments, Interventions to date
- The Real Estate Market