



Understanding Urban-Rural Accessibility in Metropolitan Areas: Data Collection with Household Travel Survey

Ok Stella Namkung/ Andrea Simone

Consultant, World Bank/ Professor, Université of Bologna

Road mobility projects in urban regions and their Impact on the environment

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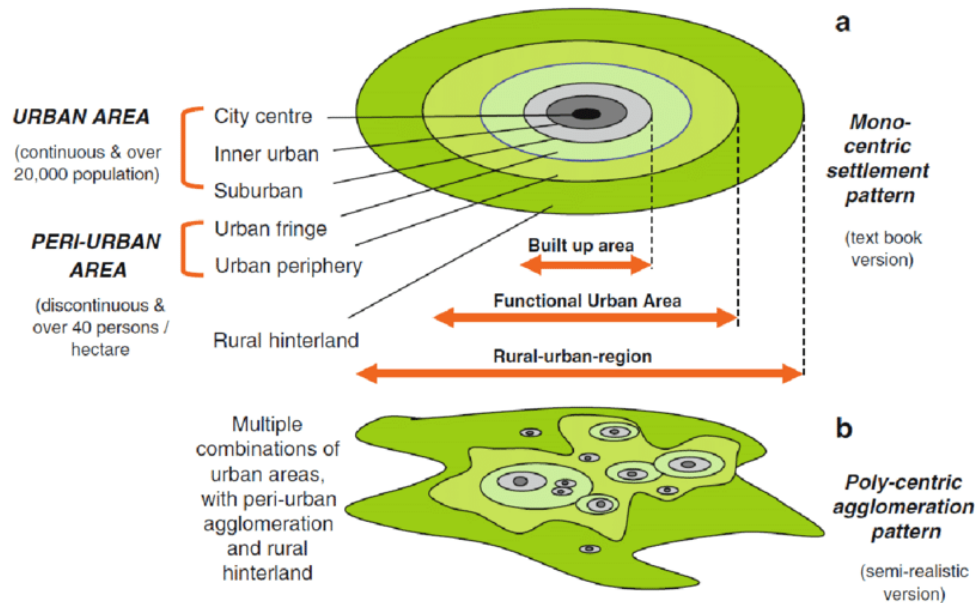
1. Background

- Preliminary attempt to diagnose the **accessibility and mobility** of the metropolitan inhabitants *on a quantitative and data-driven basis*
- Identify *Household Travel Surveys (NTS)* and transport database based on them for the metropolitan regions
- Diagnosis of the mobility and accessibility *in association with the land-use characteristics*

2. Methodologies

2) Urban-Rural Land-use Division

- Understanding the Concept of the Rural-Urban-Region



(Source: Piorr et al., 2011: 25)

- Match *Spatial Planning* or *Transport Fare Zone* with *Traffic Analysis Zones (TAZ)*

2. Methodologies

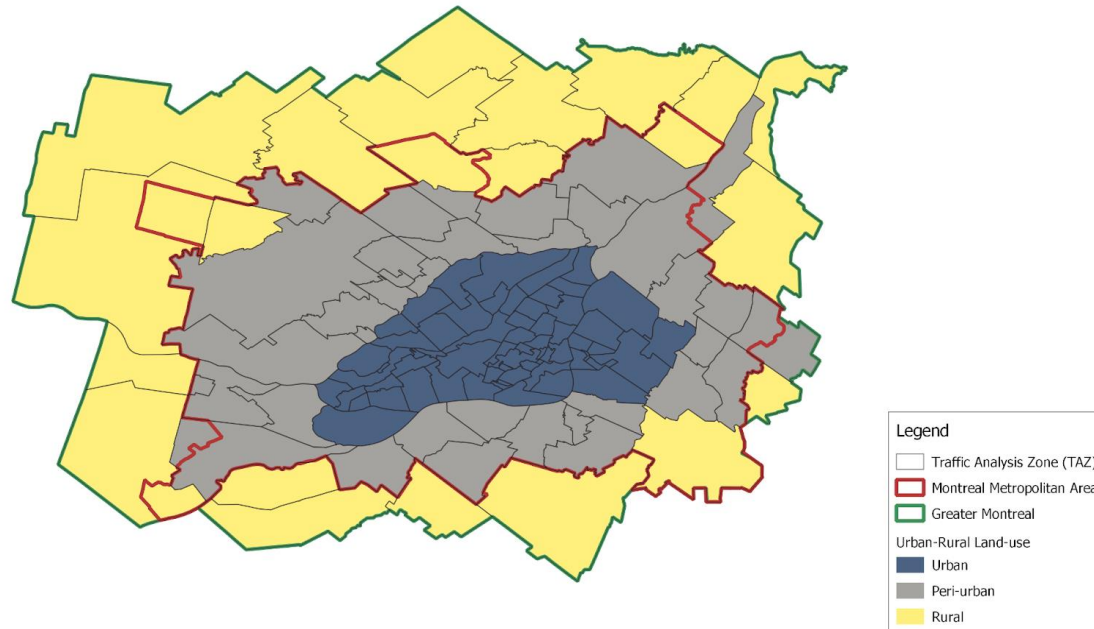
3) Comparative Analysis

- Comparison of the 5 HTS cases at the metropolitan level
 - a. Canada-Quebec: **Montreal** Metropolitan Area
 - b. Czech Republic: **Prague** Metropolitan Area
 - c. Italy: Metropolitan City of **Bologna**
 - d. South Africa: City of **Cape Town**
 - e. South Korea: **Seoul** Metropolitan Area
- In terms of area, population, and TAZ
 - a. Overview
 - b. Urban-Rural Land-use and TAZ
 - c. Survey Schedule
 - d. Sample Size
 - e. Survey Questions

3. Case Studies

1) Canada-Quebec: Montreal Metropolitan Area

- Urban-rural land-use pattern is referred to **Transport Fare Zones** of the ARTM's Public Transport Services



<Urban-Rural Land-Use of the Greater Montreal Area >

Division		Width (km ²) ¹	Population (persons) ²	TAZ ³
Urban	Agglomeration of Montreal	688.0 (7.0%)	1,849,665 (41.5%)	511 (49.4%)
	Agglomeration of Longueuil and Laval	595.9 (6.1%)	968,435 (21.7%)	201 (19.4%)
Peri-urban	North and South Rings	3,420.0 (34.8%)	1,134,215 (25.4%)	219 (21.2%)
Rural	Outside of ARTM Service Area	5,123.8 (52.1%)	507,175 (11.4%)	104 (10.0%)
Total		9,827.7 (100.0%)	4,459,490 (100.0%)	113 (100.0%)

Note ¹: QGIS measurement

Note ²: 2016 population by census tracts in the Greater Montreal (Source: Statistics Canada)

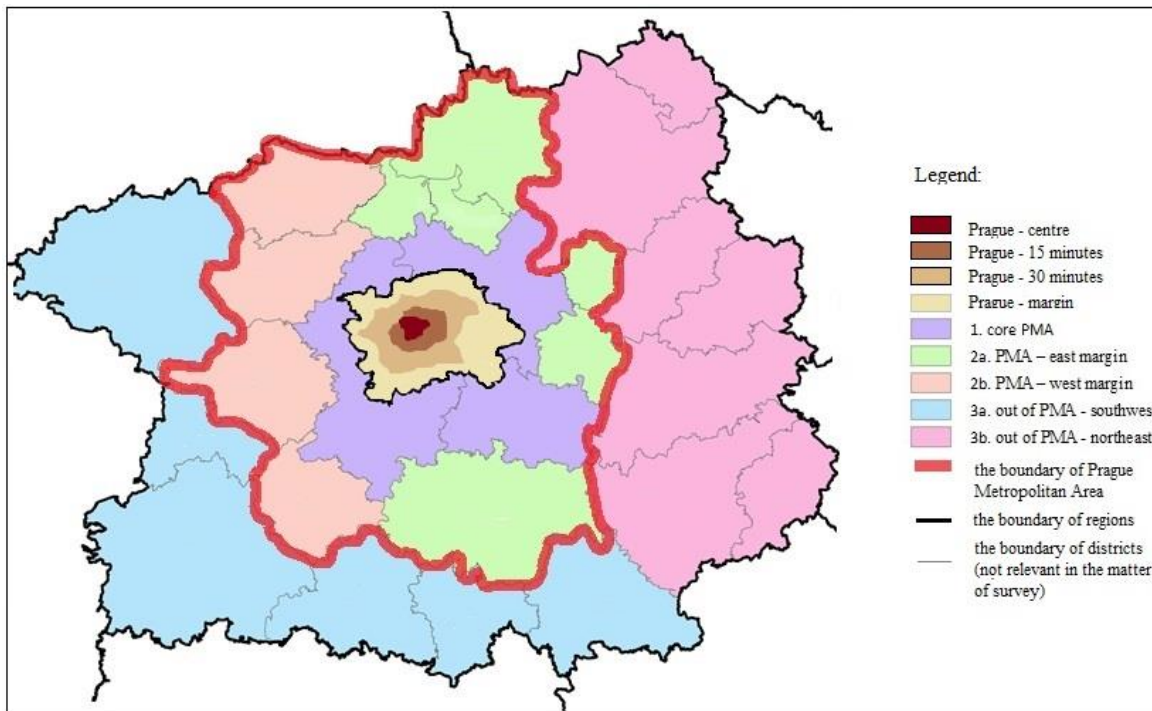
Note ³: Municipal sectors for the 2013 OD survey (Source: ARTM)

<Land-use of TAZ for the Greater Montréal Area>

3. Case Studies

2) Czech Republic: Prague Metropolitan Area

- Urban-rural land-use pattern is referred to **Administrative Boundaries**



<Urban-Rural Land use of the Prague Metropolitan Area (PMA) >

Division		Width (km ²)	Population (persons)	TAZ
Urban	Urban center and inner urban ¹	173 (3.6%)	1,073,832 (57.6%)	643 (47.3%)
Peri-urban	Margin ²	323 (6.7%)	117,152 (6.3%)	273 (20.1%)
Rural	Core PMA	4,326 (89.7%)	672,803 (36.1%)	443 (32.6%)
	East PMA			
	West PMA			
Total		4,822 (100.0%)	1,863,787 (100.0%)	1,359 (100.0%)

Note 1: The zones within 30-minute access from the city center

Note 2: The zones beyond 30-minute access from the city center to the edge of Prague

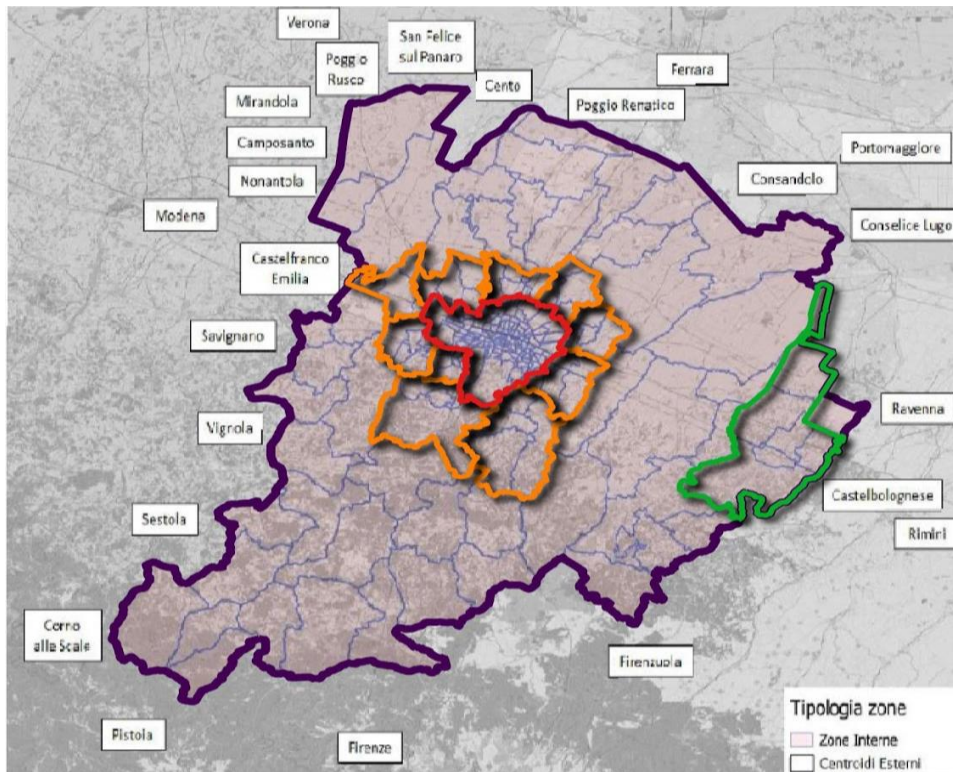
Source: 2015-2016 Traffic Behavior Survey

<Land-use of TAZ for the Prague Metropolitan Area>

3. Case Studies

3) Italy: Metropolitan City of Bologna

- Urban-rural land-use pattern is referred to the **sustainable urban mobility plan (SUMP)**



<Urban-Rural Land-use of the Metropolitan City of Bologna >
(Source: SUMP, 2019)

Division		Width (km ²)	Population (persons)	TAZ ¹
Urban	Municipality of Bologna	140.9 (3.8%)	389,300 (38.2%)	116 (52.7%)
Peri-urban	11 municipalities bordering with the municipality of Bologna	449.9 (12.2%)	181,222 (17.8%)	55 (25.0%)
Rural	43 municipalities being apart from the municipality of Bologna	2,906.0 (78.5%)	380,478 (37.3%)	43 (19.5%)
Total		3,701.8 (100.0%)	1,020,000 (100.0%)	251 (100.0%)

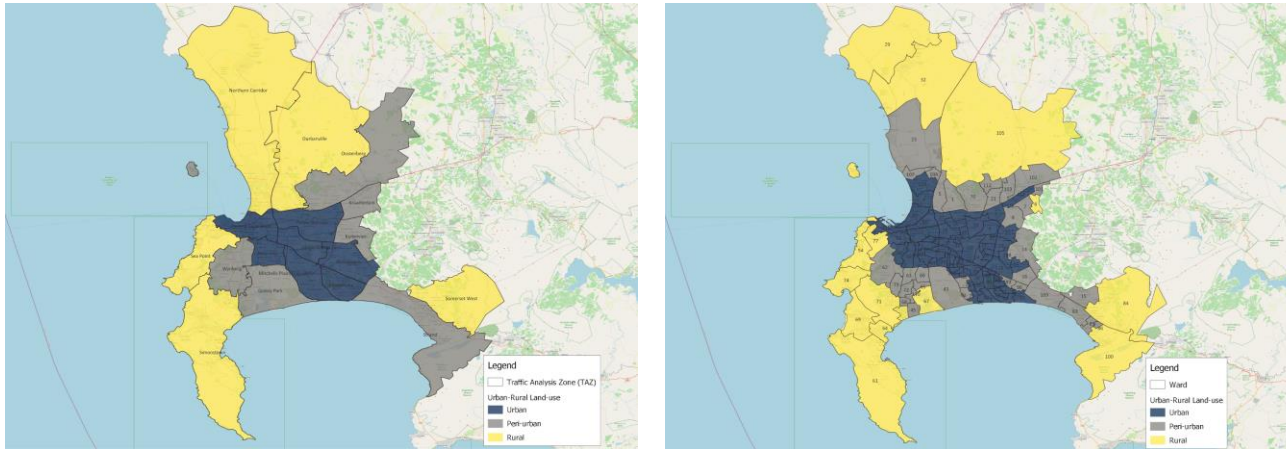
Note 1: The TAZ system has 31 external zones outside the metropolitan city of Bologna to examine high flows from those zones to the Metropolitan City of Bologna.

<Land-use of TAZ for the Metropolitan City of Bologna >
(Source: Città Metropolitana di Bologna, 2019)

3. Case Studies

4) South Africa: City of Cape Town

- Urban-rural land-use pattern is referred to the Cape Town City council (2018)'s 5-year municipal spatial development framework (MSDF)



<Urban-Rural Land-use of the City of Cape Town >

(Left: TAZ based division, Right: Ward based division)

(Source: Cape Town City, 2018; Government of South Africa, 2021; Visualized by the authors)

Mismatch in between census tracts and TAZs!

Division		Width (km ²) ¹	Population (persons, 2011) ²	TAZ
Urban	UIC account for higher than 50% of the ward or TAZ	404.4 (16.5%)	2,225,960 (59.8%)	7 (38.9%)
Peri-urban	IGA account for higher than 50% of the ward or TAZ	545.0 (22.2%)	1,028,734 (27.7%)	6 (33.3%)
Rural	DGA and/or CNA account for higher than 50% of the ward or TAZ	1501.1 (61.3%)	465,657 (12.5%)	5 (27.8%)
Total		2,450.5 (100.0%)	3,720,351 (100.0%)	18 (100.0%)

Note 1 : Measured by the ward-based division

Note 2: Measured by the ward-based division using 2011 census

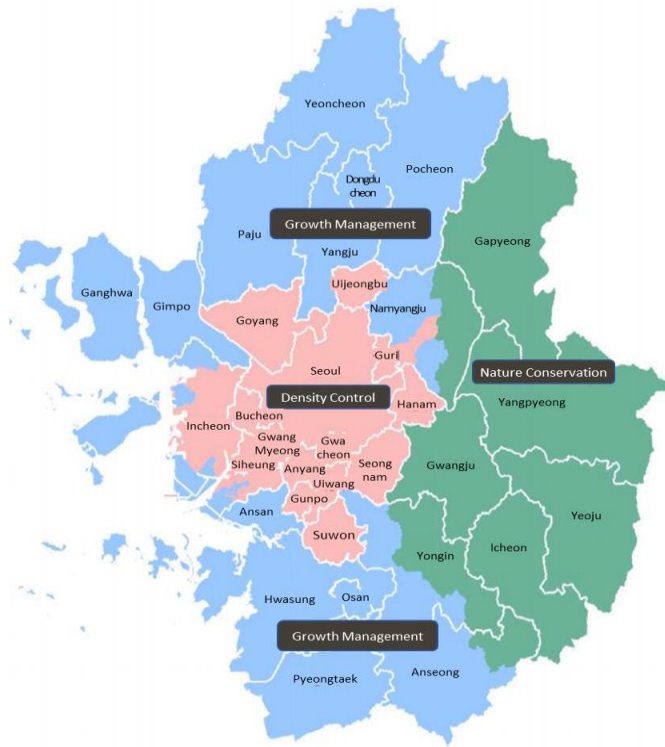
Note 3: UIC (Urban Inner Core), IGA (Incremental Growth and Consolidation Area), DGA (Discouraged Growth Area), CAN (Critical Natural Asset Area)

<Land-use of TAZ for the City of Cape Town >

3. Case Studies

5) South Korea: Seoul Metropolitan Area

- Urban-rural land-use pattern is referred to the MOLIT's 4th **SMA readjustment plan for population growth control**



<Urban-Rural Land-use of the Seoul Metropolitan Area>

Division		Width (km ²)	Population (persons, 2019)	TAZ
Urban	Density Control Area (16 cities)	2,020 (17.0%)	19,012,000 (73.3%)	833 (73.4%)
Peri-urban	Growth Management Area (14 cities, 1 county)	6,010 (50.7%)	5,683,000 (21.9%)	235 (20.7%)
Rural	Nature Conservation Area (6 cities, 2 counties)	3,830 (32.3%)	1,230,000 (4.7%)	67 (5.9%)
Total		11,860 (100.0%)	25,925,000 (100.0%)	1,135 (100.0%)

<Land-use of TAZ for the Seoul Metropolitan Area >

4. Comparative Analysis

Category	Canada	Czech Republic	Italy	South Africa	South Korea
Name	Montréal Origin Destination (OD) Survey	Traffic behavior Survey in Prague and the Central Bohemian Region	Permanent Census of Population and Housing	National Household Travel Survey (NHTS)	National Household Travel Survey (NHTS)
Authority	ARTM	City of Prague	ISTAT	Stats SA and NDoT	MOLIT
Implementing Organization	ARTM	City of Prague	ISTAT	Stats SA	KTDB
Initial year	1970	2005	2018	2003	1996
Latest year	2018	2021	2019	2020	2021
Time Interval	5 years	5 years	1 year	5 years	5 years
Spatial Scope	Metro Area	Metro Area	Nationwide	Nationwide	Nationwide
Sample Rate	3.89% of the households	0.4% of the population	5.3% of the population	0.1% of the national population	1.41% of the population
Interview Method	CATI and CAWI	CATI and CAWI	CAWI	FTF	FTF and Mobile Interview
Legal Basis	None	None	Law no. 221 of 17 December 2012	Statistics Act (Act No. 6 of 1999)	National Transport System Efficiency Act
Microdata Availability	Open to the public (Approval Basis)	Closed to the Public	Open to the public (Approval Basis)	Open to the public	Open to the public (Approval Basis)

4. Comparative Analysis

Category		Canada	Czech Republic	Italy	South Africa	South Korea
Divider of the Urban-Rural Land-use		Tariff Zones for the ARTM's Public Transport Services	Population Density based Zoning and Travel Time to the City Center	Sustainable Urban Mobility Plan (SUMP)	Municipal Spatial Development Framework (MSDF)	The 4th SMA Readjustment Plan
Width (km²)	Urban	1,788.6 (18.2%)	173 (3.6%)	795.8 (9.3%)	404.4 (16.5%)	2020 (17.0%)
	Peri-urban	3,420.0 (34.8%)	323 (6.7%)	449.9 (12.2%)	545.0 (22.2%)	6,010 (50.7%)
	Rural	5,123.8 (52.1%)	4,326 (89.7%)	2,906 (78.5%)	1501.1 (61.3%)	3,830 (32.3%)
Population (persons)	Urban	3,185,625 (71.4%)	1,073,832 (57.6%)	458,300 (44.9%)	2,2225,960 (59.8%)	19,012,000 (73.3%)
	Peri-urban	1,134,215 (25.4%)	117,152 (6.3%)	181,222 (17.8%)	1,028,734 (27.7%)	5,683,000 (21.9%)
	Rural	507,175 (11.4%)	672,803 (36.1%)	380,478 (37.3%)	465,657 (12.5%)	1,230,000 (4.7%)
Traffic Analysis Zones (TAZ)	Urban	68 (60.2%)	643 (47.3%)	122 (55.5%)	7 (38.9%)	833 (73.4%)
	Peri-urban	219 (21.2%)	273 (20.1%)	55 (25.0%)	6 (33.3%)	235 (20.7%)
	Rural	104 (10.0%)	443 (32.6%)	43 (19.5%)	5 (27.8%)	67 (5.9%)

5. Key Takeaways

1) For Decision Makers

- ✓ Pressure to **Expand the Survey Coverage** into the Wider Area
- ✓ **Legal Framework** to Support **Interoperability and Persistency** of the Household Travel Survey
- ✓ **Consistency of TAZ with Census Tracts**
- ✓ Compliance with the **Transportation Paradigm Change** in Time Series Surveys and Analyses
- ✓ The Impact of the **Survey Technique Advancement** on the Household Travel Survey Implementation

5. Key Takeaways

2) For PIARC

- ✓ **Transport Data Collection and Archiving**
- ✓ Establishing the **Criteria and Indicators** to Compare the Household Travel Survey

Thank you for your attention!



Ok Stella Namkung
Consultant, World Bank
ok.namkung@gmail.com



Andrea Simone
Professor, University of Bologna
andrea.simone@unibo.it



@PIARC_Roads



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