

A scenario for the new French Urban Areas zoning

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- 1 The 2010 French Urban Areas Zoning - ZAU
- 2 Towards a new scenario : challenges and theory
- 3 Empirical method and first results

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Why define a Functional Zoning ?

- Define **economically coherent** areas in order to **better target public policies** - by lowering the risk of spillovers effects on non targeted areas
- Measure the extent of **city's influence on its neighbourhood**, beyond physical borders defined by the building continuity
- Analyse the **network of interacting firms and commuters** on a relevant geographic scale
- Compare the different forms of cities development by **distinguishing between center and periphery**.

Urban Units : the French morphological zoning

A morphological zoning aims at describing in detail the location of the variables that characterize the territory.

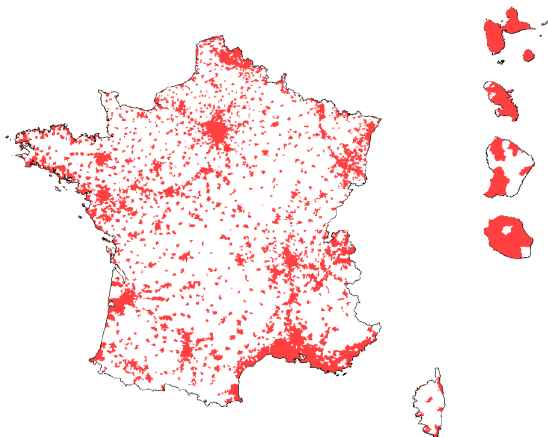
French administrative zoning

French Territorial Divisions (LAU2 level, municipalities) are among the smallest in Europe : 15 km² and 1600 inhabitants on average but half of them have less than 450 inhabitants

Urban Units - 1954 ... 2010

Municipalities which have more than 50 % of their inhabitants in an area of **building continuity** (less than 200 meters between buildings) which contains **more than 2 000 inhabitants**

Urban Units : the French morphological zoning



Red : Urban Units - White : rural *Insee - census 2008*

In 2010 : 2 233 Urban Units ; 22% of French territory ; 47.9 Million inhabitants - 77,5 % of the population

The French functional zoning : ZAU 2010

Centers

Urban units providing more than **10 000 workers** (big urban areas) ; **5 000 workers** (average urban areas) or **1 500 workers** (small urban areas).

Peripheries

Municipalities among which at least **40 % of employed resident population** works in the centre or in the municipalities attracted by this centre - *iterative algorithm*

Multi-polarized

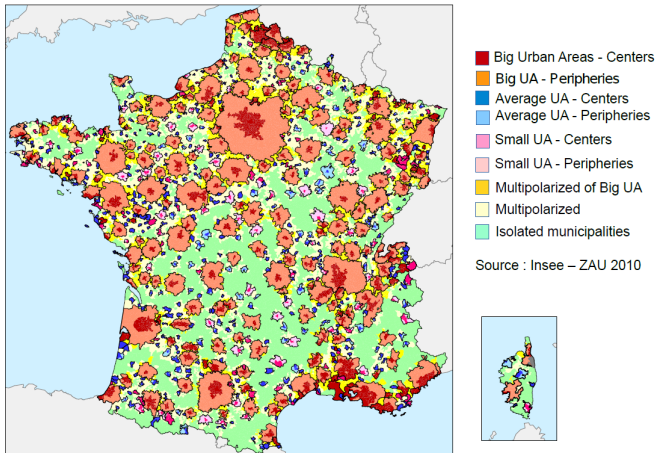
Municipalities among which at least 40 % of employed resident population works in at least two different urban areas, without reaching that threshold with one unique urban area.

Focus on the actual zoning into Urban areas - 2010

Data bases

- IGN BD TOPO : areas with building continuity (for Urban Units)
- Fiscal Data 2010 : geolocalized fiscal population (for Urban Units)
- Insee Census 2008 : number of workers and inhabitants per municipality + number of commuters from one municipality to the other

Focus on the actual zoning into Urban areas - 2010



Focus on the actual zoning into Urban areas - 2010

Population in 2008

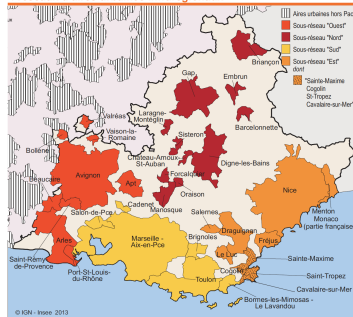
Type of Urban Area	Population	Population's share
Large (241 areas)	52 811 633	82.6 %
Average (131 areas)	2 273 713	3.6 %
Small (420 areas)	2 530 966	4 %

The uses of the actual zoning

Partnerships between Insee and Local Public Actors

- Territorial studies in partnership with local administration.
- Decision aid tool for local public policies.

Déplacements domicile-travail et transferts d'établissements :
4 réseaux d'aires urbaines infrarégionales



Source : Insee, recensement de la population 2009, répertoire des entreprises et des établissements 2009-2011

Sub-network of urban areas in the PACA region

The uses of the actual zoning

Urban Planning agencies : typologies

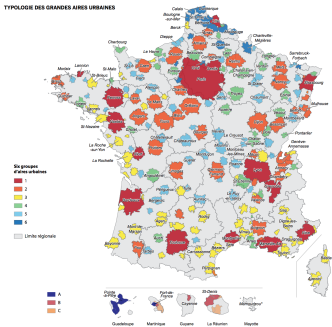
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FEDERATION NATIONALE DES AGENCES D'URBANISME



Les grandes aires urbaines françaises
Un essai de typologie

TYPLOGIE DES GRANDES AIRES URBAINES



The uses of the actual zoning

Academia : studies about the nature of rural and urban areas

- *Mora (2008) "New rural areas by 2030"*
- *Bretagnolle (2015) "The birth of the suburban area as a statistical category in France. An international perspective"*

Academia : reference zoning for territorial studies

- *Combes, Duranton, Gobillon, Puga, Roux (2012) The productivity advantages of large cities : distinguishing agglomeration from firm selection*
- *Combes, Duranton, Gobillon (2016) The Costs of Agglomeration : House and Land Prices in French Cities*
- *Cailly, Vanier (2010) France, an urban geography*

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Challenges faced by the actual zoning

Thresholds

- The 40% commuters threshold is often questioned...
- ... but above all, the distinction between small, average and large urban areas is criticized because of the great disparities between these three categories. Small urban areas are seldom used

Aggregation algorithm

The snowball effect of the iterative algorithm is misunderstood.

Rural areas

This zoning doesn't characterize rural areas which leads some to call Insee : "the rural gravedigger".

Towards a new French zoning in 2020

Timeline

- September 2017 - August 2018 : elaboration of an alternative scenario of functional zoning ; exchanges with experts and users
- November 2018 : **selection of a scenario between the new propositions and the 2010 method**
- 2020 : diffusion of the new zoning

Guidelines for a new functional area zoning

- Harmonize with **international standards** (Eurostat - OECD)
- Precisely and accurately describe **France's unique territorial characteristics**
- Maintain consistency with current zoning

Concrete issues

What is a city and how can we define its area of influence ?

Cores

How do we define cores ? Which variable do we use ?

Population, employment,...

Peripheries

How do we capture the city's influence area ? What are the mains advantages/drawbacks of commuting data ?

Polycentricity

Can a municipality be under the influence of more than one city ?

Urban economics theory gives us some insight.

The monocentric city model

Alonso (1964), Mills (1967), Muth (1969), Brueckner (1987), Duranton and Puga (2014)

Hypothesis

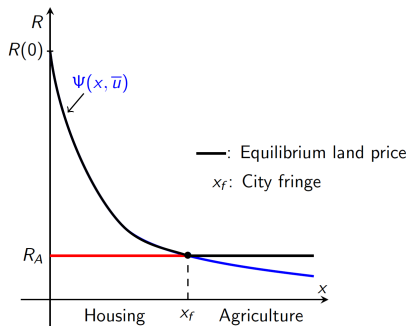
- Employment is exogenously located at the city center (CBD).
- Workers/Consumers choose their location at distance x from the CBD.
- Working at the CBD provide the individual with a wage w .
- Commuting to the CBD from residence at distance x from it implies a commuting cost $\tau(x)$.

The monocentric city model - first steps

- Consumer maximize their utility $U(z, h)$ where h is housing consumption and z the composite good consumption. $R(x)$ is the housing price.
- At the spatial equilibrium, no worker wants to change location, the utility is the same at any point of the city.
- Budget constraint : $w - \tau(x) = R(x)h + z$

The monocentric city model - further developments

- Land can also be used as an input to an activity that does not require commuting to the CBD, agriculture for instance.
- Landlords allocate land to the highest bidders : $\Psi(x, \bar{u})$ is the highest price people are ready to pay for housing.



City fringe according to land price - Combes (2017)

Predictions of the model

City fringe x_f

- x_f decreases with commuting cost per unit of distance $\tau'(x)$
- x_f increases with the share of housing in consumers' preferences
- x_f increases with the wage at the CBD

Population density

Population density decreases when going further away from the center.

Predictions of the model

Population of the city

$$N = \frac{\Psi(0, \bar{u}) - R_A}{\tau}$$

Population increases with the land-rend differential between the CBD and the city fringe, and decreases with commuting costs.

Secondary centers

In case of employment decentralisation, secondary centers can emerge.

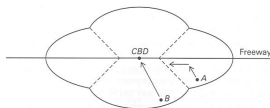
Predictions of the model

- Amenities attract people so that cities expand in their direction (Combes 2017)



City with amenity

- If commuting costs are lower in a direction thanks to a transport amenity such as a highway, the city will extend in this direction.



[Source: Brueckner, 2011, figure 3.2]

City boundary with transport amenity

Concrete implications for the Urban Areas zoning

- The shape of the city is not only determined by distance to an employment center : distance to amenities matters as well, and the nature of amenities is very diverse and difficult to assess.
⇒ **population density** is a key parameter, easy to measure and **maximum at the locations which are the most attractive for residents**.
- **Total population** reflects the **local economic configuration** and allows to distinguish between **different categories of cities**.

Cores

A combination of population density and total population allows to delineate **cores : areas which attract residents**.

Concrete implications for the Urban Areas zoning

- **Commuting costs** have an impact over **land prices**, which impact the **location** of both workers and non-workers and thus which impact directly the **city fringe**.
- Commuters might make one part of their **expenses** in the core, which has an impact over the economy of their residence municipality.

Peripheries

- The **share of residents which commute to the core** determines municipalities which are under the influence of the core.
- In order to avoid spillover effects difficult to measure, the **commuting has to be to the core itself** (hierarchical algorithm)

Concrete implications for the Urban Areas zoning

Nested zoning

People can live in a secondary center rich in amenities and work in an employment center.

⇒ a nested zoning allows to capture this phenomenon

Polycentric city

Polycentric cities can also consist in two employment centers that exchange a high number of commuters.

⇒ two connected cores can be part of the same city.

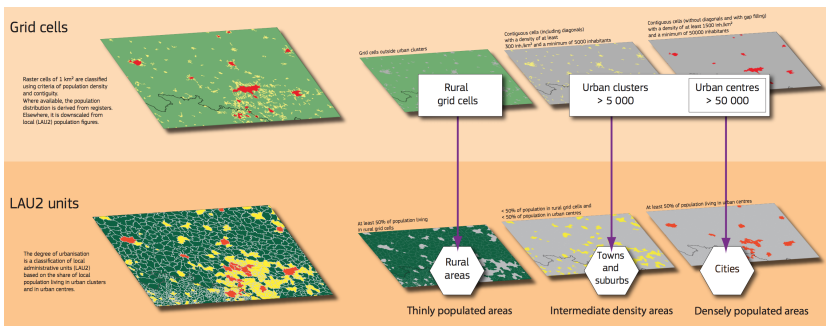
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Method

Cores

Define cores with Eurostat's **Degree of Urbanisation** : a consensual zoning, the use of which is expected to spread over the next few years.



Method

Density thresholds for the cores : problems

- DEGURBA level 1 : > 1500 residents/km² and > 50 000 inhabitants \Rightarrow ok for cities and FUAs but **too few urban areas** in comparison with previous zoning
- DEGURBA level 2 : > 300 resident/km² and > 5000 inhabitants \Rightarrow leads to **very large areas** along the coastlines and the borders
- DEGURBA extended (Dijkstra 2017) : adds a level : > **1500 residents/km² and between 5000 and 50 000 inhabitants** \Rightarrow **good compromise**

Method

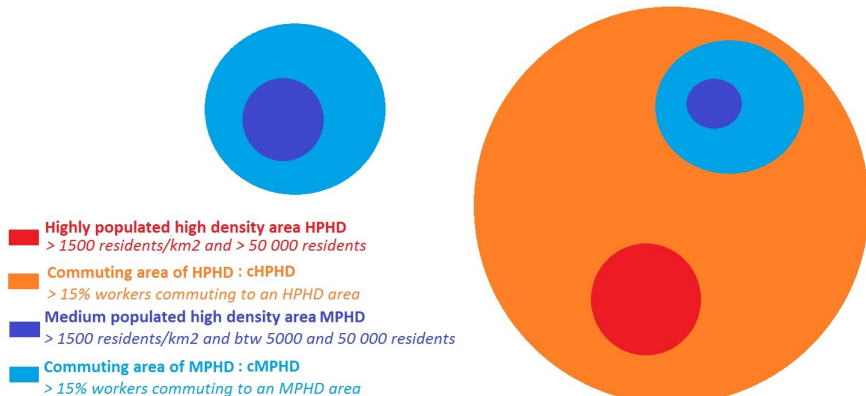
Peripheries

- Use a **hierarchical aggregation algorithm** with a threshold of 15 % commuters (harmonized with Eurostat-OECD's Functional Urban Areas).
- If a municipality could be aggregated with more than one core, it is aggregated to the one to which it sends the highest percent of commuters.

Nomenclature

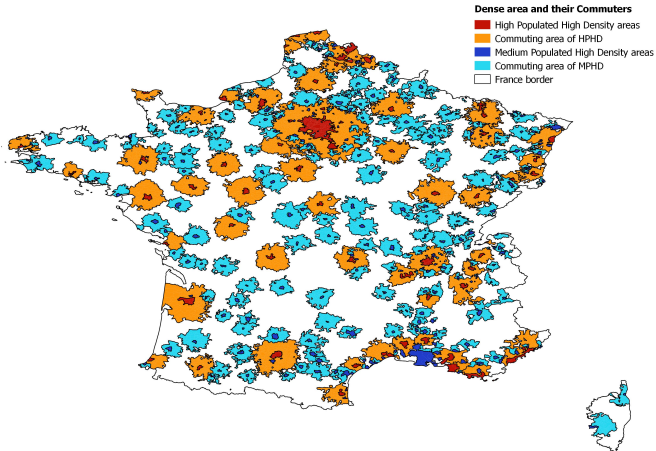
In order to avoid any risk of over-interpretation, the names are not from the common language : areas are **named after their statistical definition**.

Summary of the method

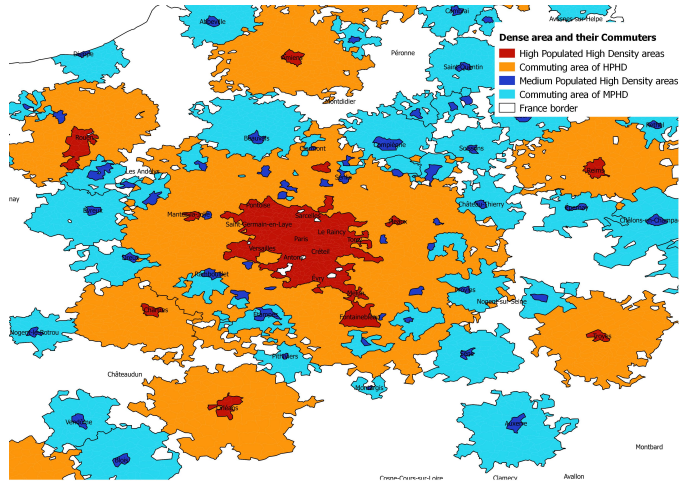


Nested zoning : MPD and cMPD can be included in cHPD

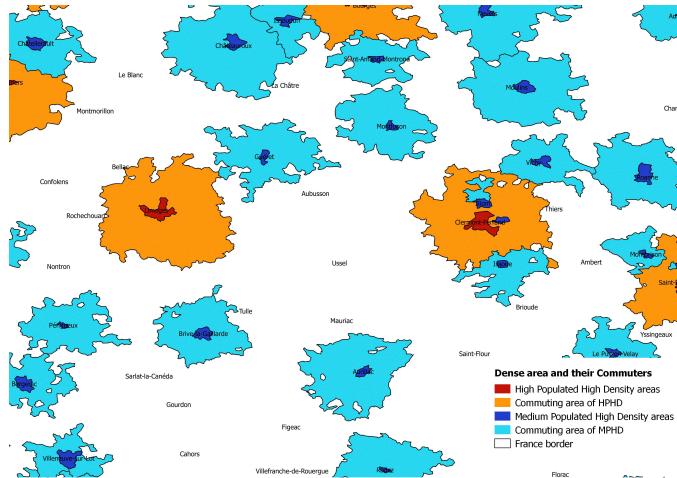
Map France



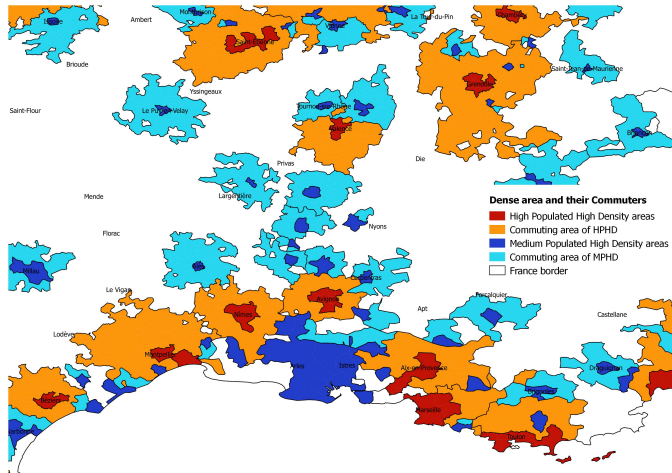
Map Paris area



Map center of France



Map south of France



Some numbers

Descriptive statistics in 2010

Type of Area	Population	share pop	share surf
HP + cHP (62 areas)	39 013 361	62 %	25 %
MP + cMP (280 areas)	14 162 669	23 %	24 %

Synthesis of this scenario

- Microfounded method : based on urban economics' essentials
- Simple method : high density core and its commuters, only four categories.
- International harmonization : uses as cores Eurostat's refined Degurba + hierarchical aggregation algorithm with a 15% threshold \Rightarrow coherent with Degurba, cities and FUAs
- Accurate description of french specificities : covers 81 % of french population and 46 % of its territory.

Further steps

Explore the different options in this scenario

- Enclaves and exclaves ; municipalitites that could be aggregated with more than one core
- Robustness checks

Analyse the consequences of this scenario

- Retropolation, number and nature of concerned municipalities
- Study of the intra-urban coherence
- Impact on the measure of the cities extension

Collect feedbacks

- French users, OECD, Eurostat,...

Thank you for your attention.

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