ITALIAN URBAN SYSTEMS: A DELIMITATION

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ABSTRACT: There are no administrative delimitations for the 'Built Areas' of Italian towns: this work tries to fill the gap by applying the work of the French INSEE to the Italian case. The choice of the French example is meant for harmonising the studies on towns at a European level, and comes out to be interesting because it studies not only the physical town but also the social and economic town. The main aim of the work is the creation of the 'Map of Urban Systems in Italy', done by studying the intersections between administrative boundaries and built areas, and by analysing the flows between urban entities.

KEY WORDS: urban systems, statistical perimeters, european methodology

1. Introduction

There is a missing concept in the Italian planning tradition: the delimitation of Urban Systems. The laws of the European countries all provide some kind of delimitation for the 'Built Areas', in Italy there are no official (administrative) boundaries for what it's built. This work tries to fill the gap by applying the work of the French INSEE to the Italian case. This choice is meant for harmonising the studies on towns or urban entities that all over Europe are split into several research groups.

The French methodology (that we choose also because of the proximity of the countries, that for us mean comparability) turns out to be interesting for its two-level strategy:

1) Physical town - we test if towns are urban 'continuum'.

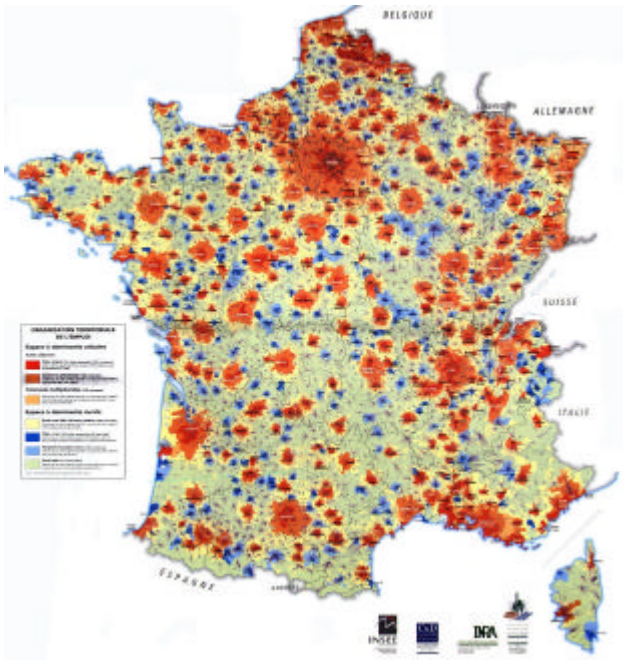
2) Social and Economic town – we test the interaction between core and periphery.

The main aim of the work is the creation of the 'Map of Urban Systems in Italy', done by studying the intersections between administrative boundaries and built areas, and by analysing the flows between urban entities. However the output of the work is not only the 'Map of Urban Systems', but also an analysis of the peculiarities of the Italian scenery (that can surely be used by planners of all administrative levels for their studies).

The next chapter will focus on the French work, chapter 3 will show the metodology of the work, while conclusions and a small bibliography will follow the analysis of the results.

2. The French 'model'

To create the 'Map of Urban Systems in Italy' we drew our inspiration from the 'TERRITOIRES VECUS' map, drawn up by the French Statistics Board (INSEE).



The French territory was classified in accordance with the peculiarities of every municipality[1]. This proposal comes out from the study of the urban-rural dichotomy, paying much attention to the interaction between 'built areas' and administrative boundaries. Once recognised the so-called 'urban units' (in order to aggregate the municipalities that are in the same 'built area'), the next step is the classification of the 'urban units' according to their interaction with urban (or rural) poles. This philosophy comes out from the French experience with the crisis of the ZPIU (Industrial and Urban Population Zones) idea, and the birth of multipolar phenomena.

The classification creates these 7 categories (they will be explained in detail in the Methodology chapter):

0. **Urban pole**
1. **Rural pole**
2. **Periurban belt**
3. **Multipolar municipality**
4. **Rural with mild urban influence**
5. **Rural periphery**
6. **Rural isolated**

[1] A municipality is a primarily urban political unit having corporate status and self-government. In France is called Municipalité, in Italy Comune

2.1 Key words

We introduce some key words that often will be used afterwards and must be understood:

MUNICIPALITY: smallest administrative entity in Italy.
MULTICOMMUNAL AGGLOMERATION: whole of adjacent municipalities (2 or more) that share the same built area (i.e. without holes of non-urbanised land amongst them). The municipalities must have at least 2000 inhabitants in the shared area (sum of all the inhabitants of the shared area); a municipality is considered in the 'agglomeration' only if the inhabitants in the shared area are more than 50% of all the municipality.
ISOLATED TOWN: a municipality that doesn't belong to any 'agglomeration'; it must have at least 2000 inhabitants in the most populated built area.
URBAN UNIT: every 'isolated town' or 'multicommunal agglomeration' is a 'urban unit'; it is a single municipality (when we find an 'isolated town') or an aggregation of municipalities (all the municipalities that belong to a multicommunal agglomeration).
BUILT AREA: any whole of buildings so as there is no more than 200 m between two of them. Land used for public purposes (such as parks and gardens, airports, roads, graveyards, public buildings, or used for industrial or commercial activities such as factories, warehouses, but also railway, parking places or rivers crossed by bridges) is not measured to determine distance between houses, and doesn't count for the 200m.
URBAN AREA: all 'urban units' that are classified (see above) 0 or 2 ('urban pole' and 'periurban belt') are in an urban area.
MULTIPOLAR URBAN SPACE: all 'urban units' that are classified (see above) 0, 2 or 3 ('urban pole', 'periurban belt' or 'multipolar municipality ') form a 'multipolar urban space'.

3. Methodology

In the next paragraph we will see the two phases of the work (recognition of the urban units and classification of the units) and after that we will describe the source of the data used for all elaborations. Finally we will show some peculiarities happened during the work.

3.1 Identification of ‘urban units’

First step is to identify 'urban units', that is to look for 'isolated towns' and 'multicommunal agglomerations '. Therefore we need to elaborate CORINE land cover data (satellite data that describe every pixel of land with a land use entry), in order to identify urbanised land in Italy, and match these boundaries with the administrative ones. To map the geographical data, a G.I.S. (ArcView by ESRI) has been used; it features the 'query' tool not only on vector maps, but also on dB sheets and it's very suitable for our purposes.

So we choose which CORINE land cover categories fulfil our requests for built areas; here they are:
1.1.1. Continuous urban fabric
1.1.2. Discontinuous urban fabric
1.2.1. Industrial or commercial units
1.2.2. Road and rail networks and associated land

1.2.3. Port areas

1.2.4. Airports

1.3.3. Construction sites

1.4.1. Green urban areas

1.4.2. Sport and leisure facilities

In every Italian Region (Corine data are files available at the regional scale) we extract, using ArcView 'queries', the above coded areas and assemble them at a national scale. However it is necessary to edit manually the results in order to satisfy the 'continuum' definition provided by Insee; we must check if the linear features (rivers, roads or railway) are inside towns (that is they divide two built areas); in this case they count as 'urbanised' as well. Besides it's important to understand how to identify (automatically) the 200m threshold[§]

Set up this 'urbanised layer' we can compare it with administrative boundaries in order to determine which municipalities are 'connected' to each other (**multicommunal agglomerations**) and which are simply '**isolated towns**'

[§]**Note: the 200 m threshold**

Two buildings are in the same built area (for our purpose) if their distance is less than 200 m. We assumed that the CORINE class 1.1.2. definition ("1.1.2. Discontinuous urban fabric: Most of the land is covered by structures. Buildings, roads and artificially surfaced areas are associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces") fits our requests ; besides, the identification of very small polygons of 'urban fabric' < 10 hectares, less than the CORINE specification: "Area of the smallest mapping unit: 25 hectares") let us think that some of them result as different areas even if the distance between them is less than 200 m. To correct this problem, we used the 'buffering' feature, creating a buffer with radius 100 m around every polygon of 'urban fabric', in order to unify such polygons. Obviously this action increases the total amount of 'urbanised land'; we suppose that this doesn't affect much the validity of the procedure (considering that the rise of that value is very small). Note: the buffering is not considered if it falls on the sea surface.

3.2 Classification

Identified the 'urban units', we classify them. They can be suitable for '**rural pole**' or '**urban pole**'.If they are not, they are classified as:

Periurban belt

Multipolar municipality

Rural with mild urban influence

Rural periphery

Rural isolated

Urban poles and Rural poles

- We define '**urban pole**' (code **0**) an 'urban unit' with 5000 employees or more.

- We define **'rural pole'** (code **1**) an 'urban unit' with more than 2000 employees (but less than 5000), where there are more employees than working population.

To count the number of employees and the working population we aggregate such data at the 'urban unit' level, in order that 'multicommunal agglomerations' count the sum of employees (or working population) of the municipalities that constitute them. All other 'urban units' await for further classification.

Other classes

Other classes are for 'urban units' that don't fit the requests for 'urban pole' and 'rural pole'.

- **'periurban belt'** (code **2**): municipalities whose employees working in a defined urban pole (not the sum of employees that work in all 'urban poles') are at least 40% of the employees and municipalities with at least 40% of the employees working in the above defined 'urban area' (**0** + **2**).[2]
- **'multipolar municipality'** (code **3**): municipality whose employees working in 'urban poles' are at least 40% of the total number of employees (not reaching this threshold in just one 'urban area')[1]
- **'rural with mild urban influence'** (code **4**): municipality whose employees working in an 'urban area' are more than 20% of the total employees.
- **'rural periphery'** (code **5**): municipality whose employees working in a 'rural pole' are more than 20% of the employees.
- **'rurale isolated'** (code **6**): all the rest.

note: if a municipality has the peculiarities of two different classes, it is classified in the class with lower code.

3.3 Data-bases

All data processing for this work was done analysing omogeneous data (both for year of publication and geographical base) taken from various sources: Istat, Corine, Regional Maps (*carte tecniche regionali*).

- GEOSTAT (Istat 1991)

All Italian municipalities data come from Istat (Italian statistics board) ; we used 1991 census, processed by ESRI Italia (GeoStat project) that output data in a G.I.S. format. We used both their geograpical part and the database one, with shape files (.shp for ArcView GIS) mapping Italian municipalities (in a vector format) along with database files (.dbf).

- COMMUTERS FLOWS (Istat 1991)

Matrix of flows home-workplace, in which we define the commuters living in the municipality *i* and working in the municipality *j* . Data are listed in a 3 columns matrix (departure municipality, arrival municipality and flow) with 391266 rows: all *ij* combination with flow greater than 0 for the 8100 Italian municipalities (1991).

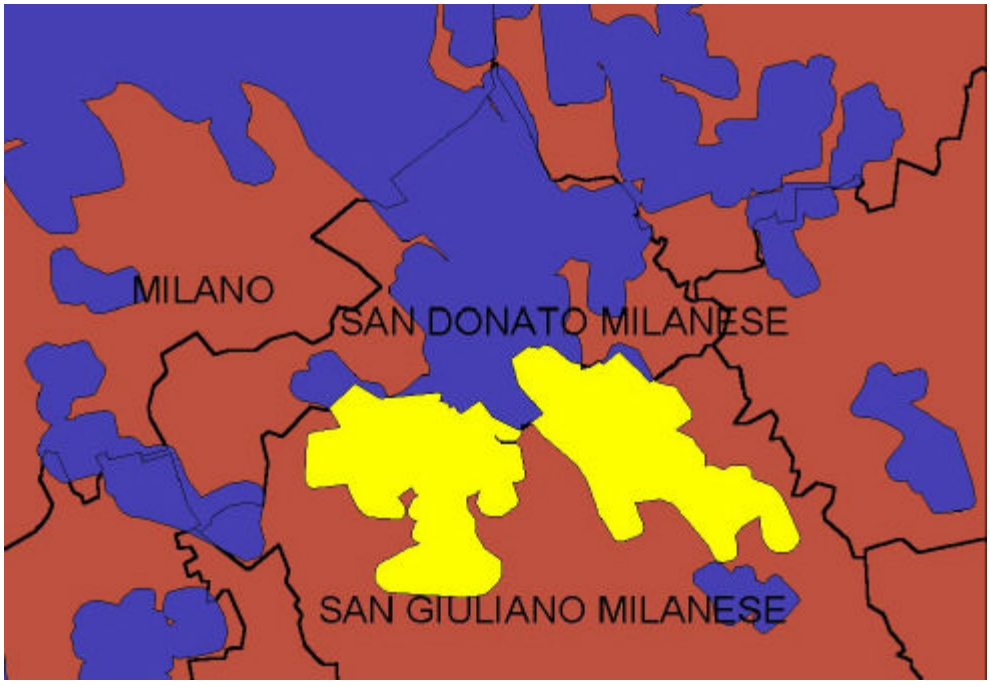
- CORINE LAND COVER

Italian land cover data taken by the European Union project known as CORINE: from this data we identified the 'built areas' all over the country. It's available in ARC/INFO EXPORT (.e00) files, that can be imported in ArcView (obviously they are in vector format); each area is associated with a coded land cover description.
CORINE project (COoRdination of INformation on the Environment) is an information system born between 1985 and 1990, in order to promote coordination among UE countries in terms of environmental data.

3.4 Peculiarities

During the data processing we found some peculiarities to be noted, here are two examples:

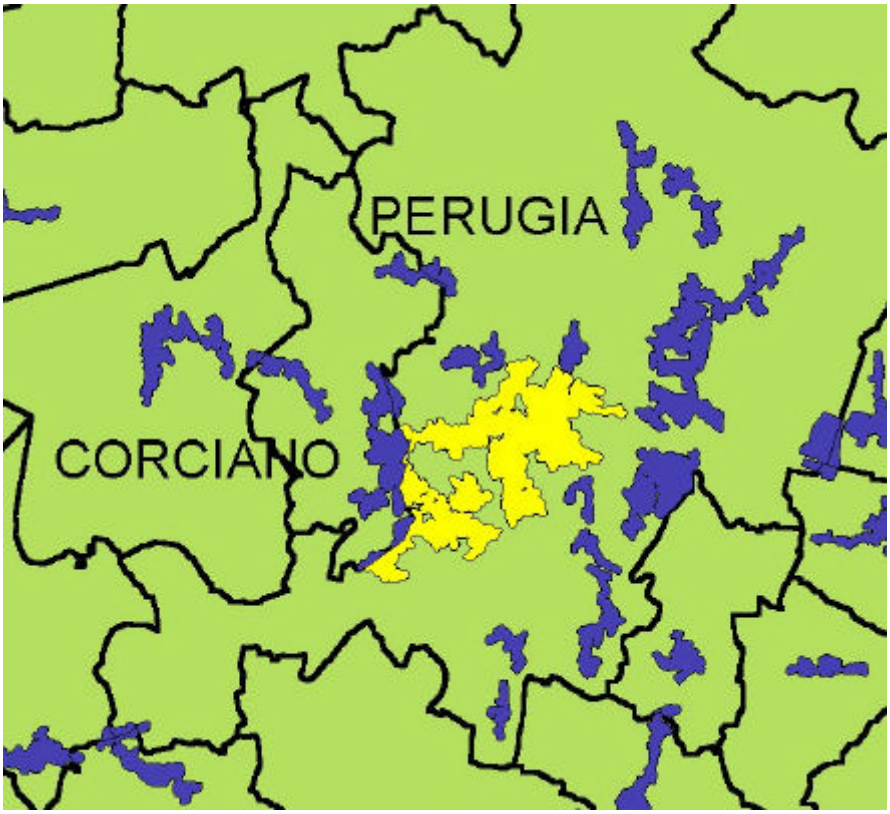
Example 1: yellow areas are two polygons of 'urbanised land' belonging to the San Giuliano Milanese municipality. They don't reach 50 % of the population (circa 40% each) but it would be incorrect not to put San Giuliano in the Milan-San Donato agglomeration! (blue area). The two polygons are not contiguous but both touch the agglomeration. So for all the data we recognised such cases, and we joined in one entity (just for the count of the threshold of population) the polygons with such carachters.



Example 2: The yellow area is a polygon of 'urbanised land' belonging to the Perugia municipality; it cannot form a 'multicommunal agglomeration' with the Corciano municipality because it doesn't contain

[2] Municipalities with code 2 or 3 must be contiguous to a municipality belonging to the 'urban area'. Otherwise they

half of the population of Perugia (just 37%). Anyway, both Perugia and Corciano are considered 'isolated towns' as their most populated polygon of 'urban land' counts respectively 54000 e 6000 inhabitans (>2000).



4. Results

We are going to show two kind of results:

1. A study about 'multicommunal agglomerations' and 'isolated towns': how Italian administrative boundaries interact with urbanised land; we are here defining whether they coincide or administrative boundaries are not suitable to describe the urbanised; we will focus agglomerations more than isolated towns.
2. An analisys of the Map of Italian urban systems, at a national scale and then at a regional scale studying in detail one local example.

4.1 Agglomerations

Italian peninsula counts 507 multicommunal agglomerations; they are in all Italian Regions with predominance for Northern Italy (Lombardy 127, Veneto 69, Piedmont 52, Trentino Alto-Adige 33, Friuli-Venice Giulia 25) and a minor presence in almost all Southern Regions (in particular Molise 2, Basilicata 2, Sardinia 3, Umbria 5 and Abruzzi 6); exception to this rule: Campania, Calabria and Sicily (Southern Italy) are at the top of the table, while Valle d'Aosta (Northern Italy, completely in the Alps) is obviously at the bottom.

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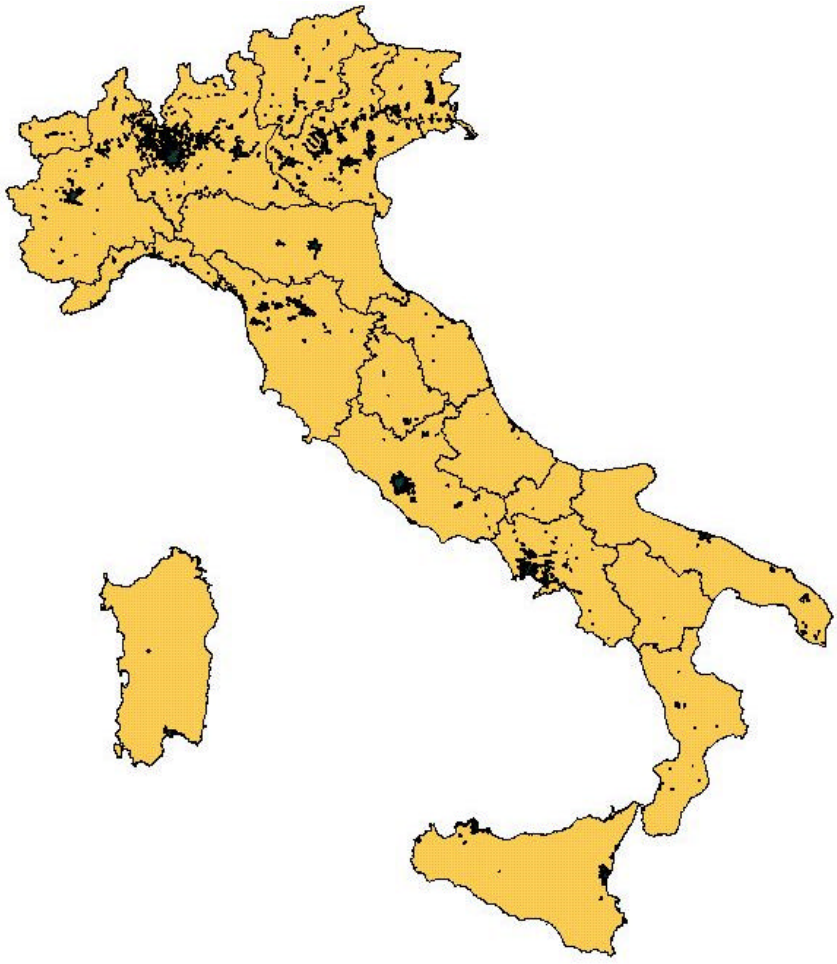
are classified 'rural with mild urban influence')

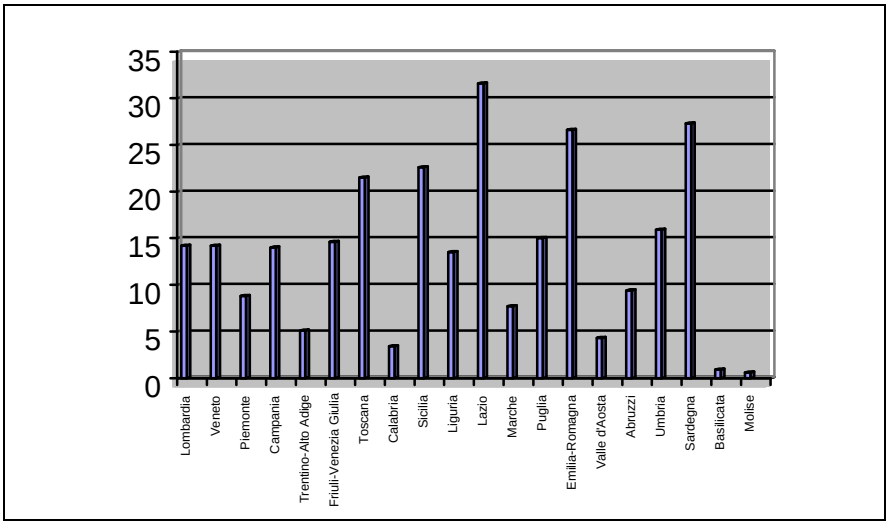
Region	Number of agglomerations	Total area of agglomerations (km^2)	Mean area of agglomerations (km^2)
Lombardy	127	1797.5	14.2
Veneto	69	979.2	14.2
Piedmont	52	455.6	8.8
Campania	45	629.3	14.0
Trentino-A.A.	33	168.1	5.1
Friuli-Venice G.	25	365.1	14.6
Tuscany	24	514.8	21.5
Calabria	22	74.8	3.4
Sicily	18	405.9	22.6
Liguria	16	216.1	13.5
Latium	15	473.6	31.6
Marche	13	99.7	7.7
Apulia	13	195.3	15.0
Emilia-Romagna	9	239.4	26.6
Valle d'Aosta	8	34.6	4.3
Abruzzo	6	56.6	9.4
Umbria	5	79.5	15.9
Sardinia	3	81.7	27.3
Basilicata	2	1.7	0.9
Molise	2	1.1	0.6

Amongst Regions with few agglomerations we find Emilia-Romagna (just 9 agglomerations), even though it is a very populated Region (8th place in the table of population, but 14th place in the number of agglomerations).[3]



[3] The Emilian situation can be explained with the presence of very large municipalities (especially in the Adriatic Riviera) whose urbanised core doesn't reach neighbouring municipalities. This comes out by the peculiar morphology of the region: huge plains; this morphology caused a isotrope development of the poles, that in fact are very far one from each other (see also picture 2: in Emilia-Romagna there are few municipalities with less than 3000 inhabitants, while in Italy 58% of the municipalities have less than 3000 inhabitants).

We can notice that some regions have few agglomerations but their mean area (mean area, at a regional scale, of agglomerations[4]) very high. This is true for Umbria but mainly for Sardinia and Emilia Romagna (just 9 agglomerations, but large and important ones); this situation is caused either by wide territories with agglomerations far from each other and isotropic development of the poles (Emilia), or by different situations with transport difficulties (because of mountains, rivers, valleys) where just few agglomerations could spread in the territory (Umbria and Sardinia). Generally speaking, mean area of agglomerations is 15 km^2 (Lombardy, Veneto, Campania, Friuli, Liguria, Apulia and Umbria), with just some exeptions with higher values: Emilia, Umbria e Sardinia as we said before, Latium (with 31.6 km^2, where the Rome area, 339 km^2, surely varies the mean value), Sicily (22.6 km^2) and Tuscany (21.5 km^2).



Mean area of aglomerations (km^2; regional scale)

Analysing single agglomerations, we have 39 of them with more than 100000 inhabitants. Starting from top we find Milan, Rome and Naples (more than 2000000 inhabitants and 200 km^2 each), followed by other regional capital cities agglomerations: Turin, Palermo, Florence, Genoa, Bologna, Bari, Venice, Cagliari, Trieste and provincial capital cities (Catania, Bergamo, Padua, Brescia, Caserta, Verona, Como, Pescara, Vicenza, Salerno, Lucca, Treviso, Pisa, Cosenza, Udine, Pordenone, Lecce, La Spezia, Terni and Savona). First agglomeration not being provincial capital city is Castellammare di Stabia (NA), 8th Italian agglomeration (557000 inhabitants). The new Provinces (created in 1991) aren't very urban: just Rimini and Biella have more than 100000 inhabitants in their agglomerations, while the agglomeration of Carrara (MC) has more inhabitants than its capital city Massa.

Agglomeration	**Population**	**Area (m^2)**	**Region**
MILAN	3752152	849582093	Lombardy
ROME	2843838	339500035	Latium
NAPLESS	2189392	244098702	Campania
TURIN	1301964	172902961	Piedmont
PALERMO	818631	113610725	Sicily
FLORENCE	791505	162215545	Tuscany
GENOA	703931	73956125	Liguria
CASTELLAMMARE DI STABIA	557194	106253823	Campania

[4] Area of the built area of the agglomerations, not total area of the municipalities

CATANIA	533493	147855213	Sicily
BOLOGNA	522603	106912363	Emilia-Romagna
BARI	482765	91085245	Apulia
BERGAMO	396696	137742760	Lombardy
VENICE	378334	85132507	Veneto
PADUA	345408	110494514	Veneto
BRESCIA	319421	99521458	Lombardy
CAGLIARI	318239	75270900	Sardinia
CASERTA	279188	82077645	Campania
VERONA	275956	56476604	Veneto
TRIESTE	237056	39387191	Friuli-Venice G
COMO	214675	83888089	Lombardy
PESCARA	210431	48446694	Abruzzi
RIMINI	197433	55029346	Emilia-Romagna
CARRARA	189131	73663221	Tuscany
AVERSA	181962	36297478	Campania
VICENZA	173720	72982828	Veneto
SALERNO	167504	22740604	Campania
LUCCA	137801	57729909	Tuscany
TREVISO	136650	60103221	Veneto
PISA	135229	49419145	Tuscany
COSENZA	133322	16926663	Calabria
UDINE	131783	62372913	Friuli-Venice G
PORDENONE	113891	74857744	Friuli-Venice G
LECCE	110198	27014796	Apulia
TRENTO	109795	34548947	Trentino-Alto Ad
LA SPEZIA	109000	21454809	Liguria
TERNI	108248	31828593	Umbria
BIELLA	103225	44889576	Piedmont
BASSANO DEL GRAPPA	101991	44767507	Veneto
SAVONA	101436	22980605	Liguria

le agglomerazioni italiane con più di 100000 abitanti (ordinate per numero di abitanti)

Comparing this with what the Italian Law says in terms of multicommunal agglomerations (law 142/90 about '*ordinamento delle autonomie locali*', a sort of local governement law), we can notice that the 8 'metropolitan areas' (as defined by the law) , that are Turin, Milan, Venice, Genoa, Bologna, Florence, Rome, Bari, Naples (but also Cagliari, mentioned in the law, but left at the discretion of Regional authorities in Sardinia) are at first rank of the table (ordered by population) for good, even if sometimes are overtaken by some exception. In fact we find at top places (in the table of inhabitants per agglomeration) towns not present in the law: Palermo and Catania (municipalities of the Autonomous Region Sicily) or Castellammare (near Naples), Bergamo (near Milan), Padua and Brescia (in the very populated Po area), important spots, but close to even larger agglomerations that influnce their urban attitude.

4.2 Isolated towns

The Italian Peninsula counts 2570 isolated towns (municipalities not belonging to any agglomerations, with at least 2000 inhabitants), present in all regions but in particular concentrated in Lombardy, Sicily, Veneto, Emilia-Romagna, Piedmont, Apulia, Latium, Sardinia and Tuscany; Valle d'Aosta has just 2 isolated towns, while other regions host less than 80 each.

Region	**Number of Isolated towns**
Lombardy	299
Sicily	242
Veneto	234
Emilia-Romagna	203
Piedmont	193
Apulia	189
Calabria	175
Campania	175
Latium	154
Sardinia	140
Tuscany	136
Marche	82
Abruzzi	74
Basilicata	60
Trentino-Alto Adige	54
Umbria	49
Friuli-Venice Giulia	45
Liguria	35
Molise	29
Valle d'Aosta	2

Urbanised areas of isolated towns in Italy

Thinking about the importance of isolated towns, we can notice some regions that are more into isolated towns than into multicommunal agglomerations: Emilia-Romagna, Apulia, Sicily, Sardinia and Basilicata all of them lay much higher (5, 7 or 8 places up, see table below) than in the table of multicommunal agglomerations. The opposite for Liguria, Trentino and Friuli (maybe Valle d'Aosta too) that are more in to agglomerations, as they lost places in the ranking of the number of isolated towns. These data carachterize regions with similar features: Apulia and Emilia with their large plains suitable for urban poles to stay apart; Sicily and Sardinia, the islands, often mountainous and developed in small centers; all of them isolated town oriented. On the other hand there are some regions (Trentino and Friuli) more eager to cross administrative boundaries with their built areas even if they are in the mountains and count small population.

Emilia-Romagna	**+10**	Calabria	+1	Campania	-4
Sardinia	**+8**	Umbria	+1	Tuscany	-4
Sicily	**+7**	Molise	+1	**Valle d'Aosta**	**-5**
Apulia	**+7**	Lombardy	0	**Liguria**	**-8**
Basilicata	**+5**	Marche	0	**Trentino-Alto Adige**	**-10**
Abruzzi	+3	Veneto	-1	**Friuli-Venice Giulia**	**-11**
Latium	+2	Piedmont	-2		

Differences of regional ranking in the number of isolated towns vs. number of multicommunal agglomerations (+ means more isolated towns)

Taking a look at the most important (more populated) isolated towns in Italy (see below) we find Taranto, Messina, Reggio Calabria, Modena and Parma, confirming their regional trend (Sicily, Apulia and Emilia-Romagna) together with Foggia, Ferrara, Ravenna, Reggio Emilia, Siracusa and Forlì inside position 15. Andria, Barletta, Marsala, Pozzuoli, Gela, Lamezia Terme, Imola, Carpi, Giugliano in Calabria, Manfredonia and Altamura (between 60000 and 80000 inhabitants) are the first towns in the table not being capital cities, (most of them being in Sicily, Calabria and Emilia).

Isolated Town	**Population**	**Region**
TARANTO	232334	Apulia
MESSINA	231693	Sicily
REGGIO DI CALABRIA	177580	Calabria
MODENA	176990	Emilia-Romagna
PARMA	170520	Emilia-Romagna
LIVORNO	167512	Tuscany
FOGGIA	156268	Apulia
PERUGIA	144732	Umbria
FERRARA	138015	Emilia-Romagna
RAVENNA	135844	Emilia-Romagna
REGGIO NELL'EMILIA	132030	Emilia-Romagna
SIRACUSA	125941	Sicily
SASSARI	122339	Sardinia
FORLI'	109541	Emilia-Romagna
LATINA	106203	Latium
PIACENZA	102268	Emilia-Romagna
ANCONA	101285	Marche
NOVARA	101112	Piedmont
BOLZANO	98158	Trentino-Alto Adige
CATANZARO	96614	Calabria
BRINDISI	95383	Apulia
AREZZO	91626	Tuscany
ALESSANDRIA	90753	Piedmont
ANDRIA	90063	Apulia
BARLETTA	89527	Apulia
PESARO	88713	Marche
CESENA	88487	Emilia-Romagna
MARSALA	80177	Sicily
PAVIA	76962	Lombardy
POZZUOLI	75142	Campania

CREMONA	74113	Lombardy
ASTI	73557	Piedmont
GELA	72535	Sicily
GROSSETO	71257	Tuscany
LAMEZIA TERME	70114	Calabria
RAGUSA	67535	Sicily
L'AQUILA	66813	Abruzzi
POTENZA	65714	Basilicata
IMOLA	62567	Emilia-Romagna
BENEVENTO	62561	Campania
CALTANISSETTA	61319	Sicily
CARPI	60715	Emilia-Romagna
VIGEVANO	60384	Lombardy
GIUGLIANO IN CAMPANIA	60096	Campania

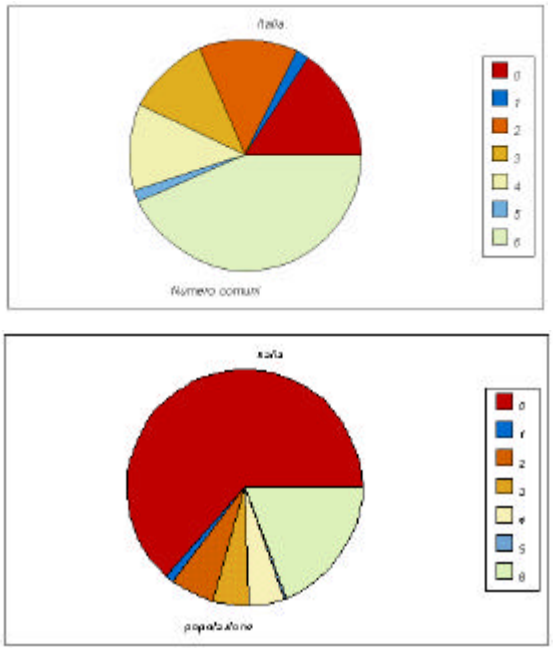
Italian isolated towns with more than 60000 inhabitants (ordered by population)

4.3 Classification

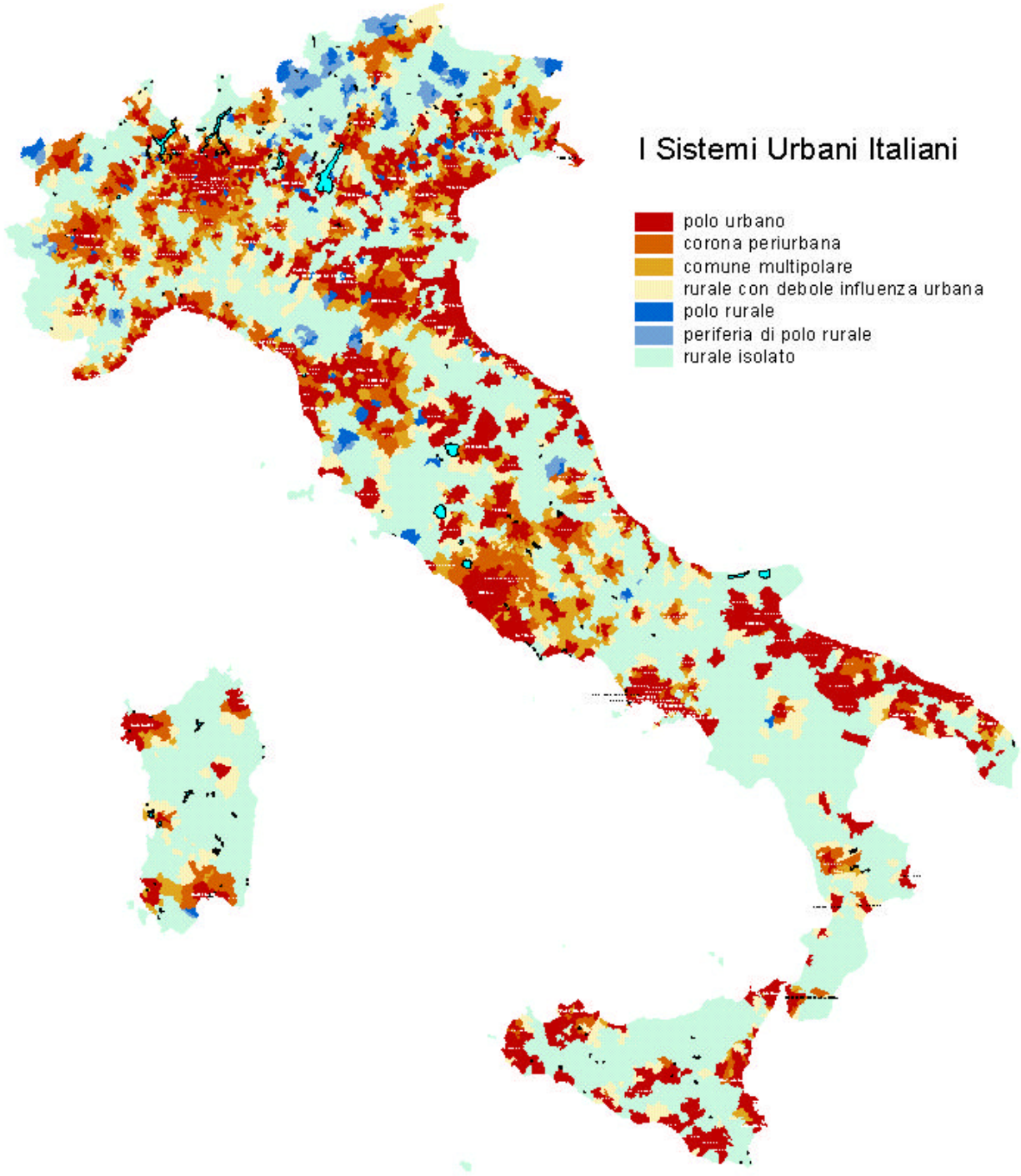
After the classification, this is the picture of all Italian municipalities (8100 municipalities):

Class	Denomination	Number of municipalities	Population
0	Urban pole	1286	35991679
1	Rural pole	147	658768
2	Periurban belt	1107	3426227
3	Multipolar municipality	934	2782684
4	Rural with mild urban influence	978	2829342
5	Rural periphery	126	149233
6	Rural isolated	3522	10940098

Studying the number of municipalities , we find that 3522 municipalities (43.5% of the total number of municipalities) are classified as 'rural isolated', while the four classes 'urban pole', 'periurban belt', 'multipolar municipality' and 'rural with mild urban influence' are equally distributed (all between 11 and 16%); 'rural poles' and their 'periphery' represent just the 2% of Italian municipalities. If we look at classes from a population point of view, it's obvious to find that most of the Italian population (almost 63%) live in 'urban poles' (36 million people), and if we put together class 0, 2 and 3 (all urban areas) we can surely say that Italy is an urban Nation (3/4 of the population live in the above defined 'multipolar urban space'), even if 'rural isolated' is still important (11 million inhabitants).

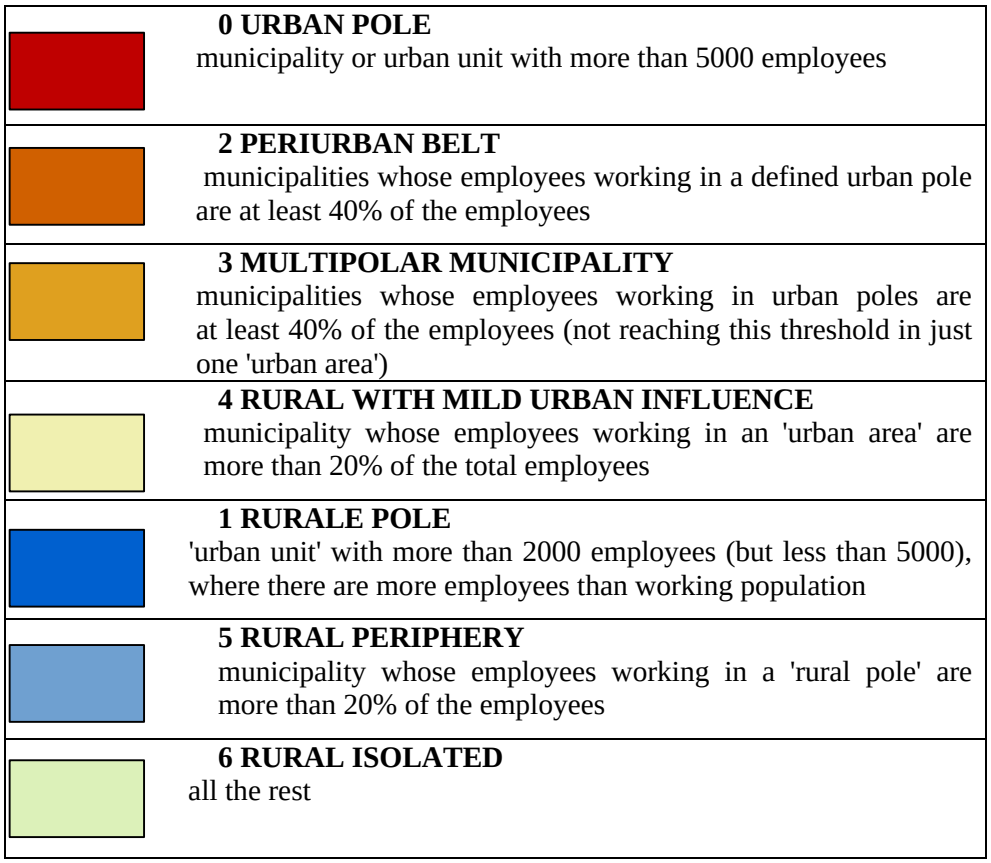


The Map of Italian Urban Systems



Analysing the geographical distribution of classes we can surely notice, as we expect, the presence of 'urban poles' surrounded by their 'periurban belt' spreading in a circular shape to reach 'rrural with mild urban influence' and finally 'rural isolated'. The main urban system is surely the one that gravitates around Milan, followed by the Rome agglomeration. It's easy to identify the urban systems of Turin, Bologna, Florence and Naples, while in Veneto there is a blurred situation, without poles and well defined belts, but with a discontinuous pattern. We can also notice the two coasts (Adriatic and Tirrenic), where the urban poles

follow one another, peculiar example in all the country of inter-regional agglomerations (Emilia-Romagna and Marche, Liguria and Tuscany).



In Apulia and Emilia-Romagna (especially on the coastal municipalities) there is a similar situation: their large and important municipalities are often classified as urban poles, giving a distorted picture of the territory: they are in fact all isolated town and the urbanised land is just the core of the municipality while the map must show them all 'red'. Almost the same situation in Sicily, while in other regions there is a prevalence of rural isolated.

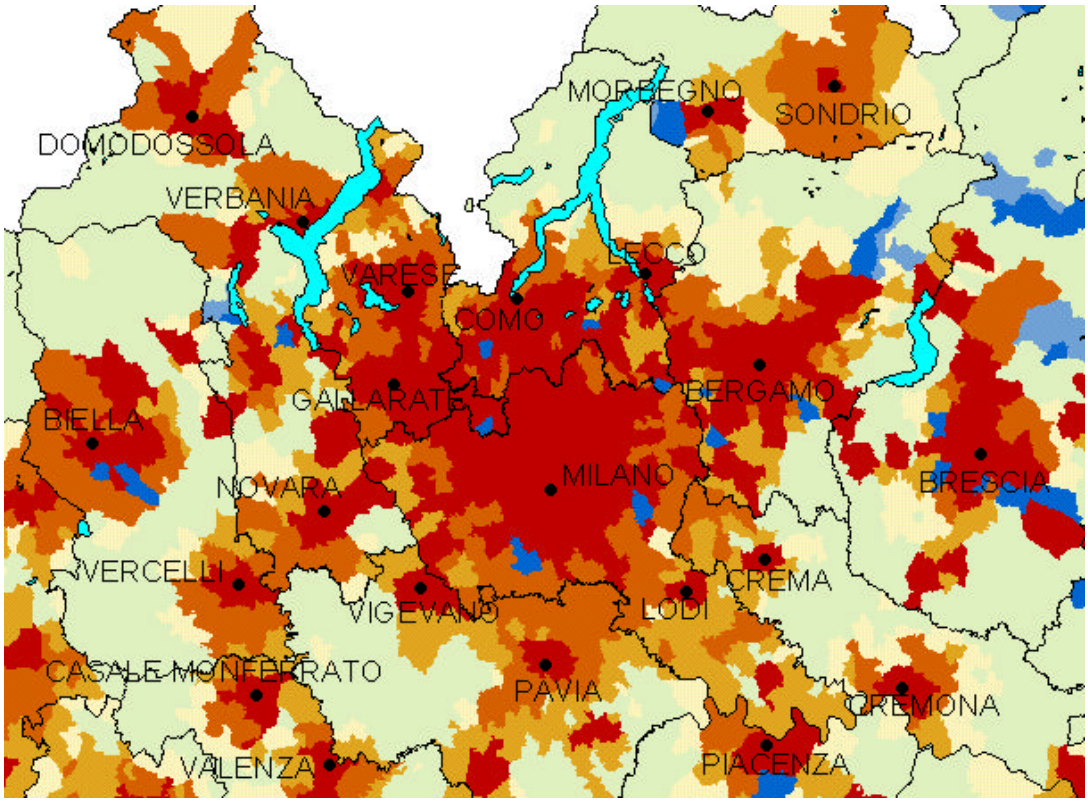
4.3.1 An example: Milan Urban System

The most important urban system in Italy is constituted not only by the Milan urban pole (which host the town of Varese as well), but also by the Como pole, and some other 'single municipalities' or small agglomerations, being urban poles, that join together with Milan and Como (from South-East around Milan anti-clockwise we find Melegnano, Melzo, Agrate, Carnate, Missaglia, Magenta and Abbiategrasso).

This large urban system touches other quite far poles (Lodi, Crema, Bergamo, Lecco, Novara, Vigevano e Pavia) with irregular pattern of 'periurban belt' and multipolar municipalities', showing the complety of the area (we don't recognise in this case the typical concentrical shape).

Surely to note a sort of link between the Milanese system and the Piedmont ones (Novara, Vercelli and Casale Monferrato), that seem more linked to Lombardy than to their regional capital city (Turin). A sort of

buffering zone constituted by the rice fields (*risaie*) between Vercelli and Turin, between Novara and Biella keep separated the Milan system from the Turin one.



Same situation for the Brescia system (that stays apart from the Milan one) constituted by some small poles on the way (Rovato, Chiari, Palazzolo sull'Oglio) that cannot fill the gap.

Very interesting the Lomellina zone (completely classified as 'rural isolated'), where the provincial boundary between Pavia and other provinces is a real border between rural villages and urban poles. This happens not only when the boundary lays on a river (river Sesia in this case), but also where this limit runs through countryside (between Pavia and Novara).

South of Milan we find several municipalities that, besides their rural attitude (many fields throughout the communal territory) have a lot of commuters (more than 40% of the working population go towards milan) and are classified 'periurban belt' (they are a sort of satellite towns, but with a lot of nature and better quality of life).

5. Conclusions

The study of results proved the peculiarity of Italian scenario and we must be careful comparing such results with the french ones:

- The area of administrative units (municipalities) is very different (in France it's very small, and anyway smaller than in all European countries) and in Italy varies from Region to another. For example in Apulia municipalities are very large indeed.

We also noticed that for areas with touristic attitude and no commuters flows, together with microurbanization (for example the Gulf of Gaeta), the model provides a 'rural isolated' class. This is obviously far from reality, but instead of introducing a new made-up class, we can accept the results just as global trend, without caring of peculiarities like this.

Our analysis highlighted the lack of delimitations of built areas in Italy, proposing a real boundary for what is urbanised, and aggregating in new administrative entities municipalities sharing the same built area. The next step was to define urban poles, rural poles etc. etc. even if this meant to still use communal boundaries. (this could be a limit).

The tools we proposed are anyway the starting point not just for surveys on the territory (this work could be helpful for local administrators to identify the built areas in order to include the law about metropolitan cities), but also for future studies. A development of the work could be relative to three different targets:

1. A new reading of the classes
2. About commuters
3. About modeling or simulation

1)It could be possible to add socio-economical data to develop the analysis about classes (urban and rural poles, periurban belt etc. etc.) or use other studies (‘*bacini locali del lavoro*’, that is local working systems) in order to compare our results with other delimitations.

2)It would be possible to study how commuters flows interact with our work, in order to fill the gap of contiguity and look for up-to-date relationships (not only commuters flow, but also information or internet flows).

3)Finally it is possible to improve this work using it in association with modeling tools.We could study the evolution of the system varying something inside of it: for example we could simulate the system as there were an urban grow (simulation with cellular automata) or as there were migrations, verifying at the end how the situation would change (also in order to a sustainable development of urban systems).

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