



# Delimitations of rural areas in Europe using criteria of population density, remoteness and land cover

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## EXECUTIVE SUMMARY

Over the last twenty years, the European Commission has taken policy initiatives with ever greater emphasis on the territorial perspective. The Common Agricultural Policy (CAP) reform, in particular the rural development policy, foresees measures on territorial characteristics which implies the use of urban/rural definitions for the broad targeting of resources. The focus of the CAP has shifted from the previous dominance of sectoral market measures to a concern for a more integrated and sustainable agricultural and rural development policy. In the 'Future of Rural Society' Report (CEC 1988), the Commission had already identified different types of rural areas: rural areas under pressure of modern life, rural areas in decline and very marginal rural areas. However such a differentiation was not quantified. Accessibility was implicit in this urban-rural gradient.

In 1994, the Organization for Economic Co-operation and Development (OECD) developed a simple territorial scheme that identifies types of regions based on population density applied at two hierarchical levels. As there is no commonly agreed definition of rural areas at European level, the OECD typology is considered as an easy and acceptable approach for identifying rural areas. However, this typology used is exclusively based on population densities and is highly sensitive to the size of the geographic units and the classification thresholds.

Over the years, attempts have been made to review and improve the OECD approach and also alternative methodologies have been proposed. However, the current methods based merely on population distributions, do not allow for detailed and quantified geographical analysis and do not reflect two main characters differentiating rural from urban areas: the "natural" (non-artificial) land cover and the accessibility/remoteness.

A previous study (Jonard et al. (2007)) investigated the possibilities to improve the characterization of rural areas at commune level (Local Administrative Unit - LAU2) by introducing the criteria of accessibility/peripherality and "natural" (non-artificial) space in the OECD methodology. The assessment was carried out at LAU2 for three Member States (BE, FR and PL) using pan-European datasets.

In the current study, which is a continuation of Jonard et al. (2007), different thresholds of peripherality/accessibility and land cover have been tested for three additional countries (BE, CZ and IE) in order to fit as much as possible to the specificities (spatial and demographic) of the EU Member States.

In order to perform the upscale at European level a threshold of "45 minutes travel time to reach an urban centre with at least 50 000 inhabitants" has finally been selected to classify a commune as "remote" or "close to an urban centre". For the land cover criterion, the threshold of 75 % has been chosen: a commune is classified as an "open space" commune if at least 75 % of its area is covered by forest, agricultural or natural areas. Otherwise, the commune is characterized as "closed space".

The study demonstrates that the integration of a peripherality index and a land cover index improve the basic OECD classification by discriminating the original classes in two sub-classes in order to develop a new rural typology at LAU2 level. The proposed typology is then composed of 4 classes: rural peripheral, rural accessible, urban with open space and urban with closed space.

A classification at NUTS2 and NUTS3 level has been developed to maintain a backwards compatibility with the existing typologies and to compare the results with similar works. The regions have been classified in 6 classes: rural-peripheral, rural-accessible, intermediate open-space, intermediate closed-space, urban open-space and urban closed-space. The results obtained from this aggregation have been compared with three socio-economics indicators: population, gross value added (GVA) and employment.



## Table of contents

---

<b>1. CONTEXT AND OBJECTIVES OF THE STUDY</b> .....	<b>1</b>
1.1. CONTEXT .....	1
1.2. BACKGROUND .....	1
1.3. OBJECTIVES OF THE STUDY .....	2
<b>2. OECD CRITERION</b> .....	<b>3</b>
2.1. INTRODUCTION .....	3
2.2. METHODOLOGY .....	3
2.3. DATA SOURCES .....	4
2.4. MAIN RESULTS .....	4
<b>3. INTRODUCTION OF A PERIPHERALITY INDEX</b> .....	<b>9</b>
3.1. INTRODUCTION .....	9
3.2. METHODOLOGY .....	9
3.2.1. <i>First step</i> .....	9
3.2.2. <i>Second step</i> .....	10
3.3. DATA SOURCES .....	11
3.4. MAIN RESULTS .....	12
<b>4. INTRODUCTION OF A LAND COVER INDEX</b> .....	<b>16</b>
4.1. INTRODUCTION .....	16
4.2. METHODOLOGY .....	16
4.3. DATA SOURCES .....	17
4.4. MAIN RESULTS .....	17
<b>5. RURAL TYPOLOGY</b> .....	<b>20</b>
5.1. INTRODUCTION .....	20
5.2. RURAL TYPOLOGY AT LAU2 LEVEL .....	20
5.3. RURAL TYPOLOGY AT NUTS3 LEVEL AND NUTS2 LEVEL .....	21
5.3.1. <i>Aggregation to NUTS3 and NUTS2 levels</i> .....	21
5.3.2. <i>Validation with socio-economic indicators</i> .....	23
<b>6. CONCLUSION</b> .....	<b>30</b>
<b>BIBLIOGRAPHY</b> .....	<b>32</b>
<b>ANNEXES</b> .....	<b>34</b>
ANNEX 1. CORRESPONDENCE TABLE BETWEEN THE COUNTRY CODES AND THE COUNTRY NAMES .....	35
ANNEX 2. MAIN RESULTS OF THE INTERMEDIATE REPORT .....	36

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## List of maps

---

Map 1. Share of population density in Europe (2001).....	7
Map 2. Share of population density in Europe taking into account urban centres .....	8
<i>Map 3. Accessibility by roads to cities with at least 50 000 inhabitants in Europe (LAU2) .....</i>	<i>15</i>
Map 4. Percentage of open space area in Europe based on CORINE Land Cover 2000 (LAU2) .....	19
Map 5. Rural-Urban typology of LAU2 local units in Europe.....	27
Map 6. Rural-urban typology of NUTS3 regions in Europe.....	28
Map 7. Rural-urban typology of NUTS2 regions in Europe.....	29
Map 8. Accessibility by roads to cities with at least 50 000 inhabitants in BE (LAU2).....	37
Map 9. Accessibility by roads to cities with at least 100 000 inhabitants in BE (LAU2).....	37
Map 10. Accessibility by roads to cities with at least 50 000 inhabitants in IE (LAU2) .....	38
Map 11. Accessibility by roads to cities with at least 100 000 inhabitants in IE (LAU2) .....	38
Map 12. Accessibility by roads to cities with at least 50 000 inhabitants in CZ (LAU2).....	39
Map 13. Accessibility by roads to cities with at least 100 000 inhabitants in CZ (LAU2).....	39
Map 14. Percentage of open space area in BE based on CORINE Land Cover 2000 (LAU2) .....	41
Map 15. Percentage of open space area in IE based on CORINE Land Cover 2000 (LAU2).....	41
Map 16. Percentage of open space area in CZ based on CORINE Land Cover 2000 (LAU2) .....	42
Map 17. Rural-urban typology of LAU2 local units in BE .....	45
Map 18. Rural-urban typology of LAU2 local units in BE .....	45
Map 19. Rural-urban typology of LAU2 local units in IE.....	46
Map 20. Rural-urban typology of LAU2 local units in IE.....	46
Map 21. Rural-urban typology of LAU2 local units in CZ .....	47
Map 22. Rural-urban typology of LAU2 local units in CZ .....	47

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# 1. CONTEXT AND OBJECTIVES OF THE STUDY

---

## 1.1. CONTEXT

In 1994, the Organisation for Economic Co-operation and Development (OECD) developed a simple territorial scheme that identifies types of regions based on population density applied at two hierarchical levels (the local community level and the regional level). As there is no commonly agreed definition of rural areas at European level, the OECD typology is considered as an easy and acceptable approach for identifying rural areas. However, this typology is exclusively based on population densities and is highly sensitive to the size of the geographic units and the classification thresholds.

Over the years, attempts have been made to review and improve the OECD approach and also alternative methodologies have been proposed. However, the current methods based merely on population distributions, do not allow for detailed and quantified geographical analysis and do not reflect two main characters differentiating rural from urban areas: the “natural” (non-artificial) space and the accessibility/remoteness.

Since the reform of the Common Agricultural Policy, Rural Development is playing an increasingly important role in helping rural areas to meet the economic, social and environmental challenges of the 21st century. Farming and forestry remain crucial for land use and the management of natural resources in the EU's rural areas, and as a platform for economic diversification in rural communities.

In this context, there is a strong interest on the one hand to distinguish “rural” areas according to the accessibility for their economy to inputs (for labour market) and to outputs (transformation or consumption) and for their population to services and to labour market; on the other hand, there is an interest to distinguish “urban” areas according to the proportion of land use dedicated to non-artificial use that could help improving the classification in more densely populated countries.

## 1.2. BACKGROUND

The current study is the continuation of a recent study (Jonard et al., 2007) conducted by I-MAGE Consult and the Joint Research Centre of the European Commission. This previous study investigated the possibilities to improve the characterisation of rural areas at commune level (Local Administrative Unit - LAU2<sup>1</sup>) by introducing the criteria of accessibility/peripherality and “natural” (non-artificial) space in the OECD methodology. The assessment was carried out at LAU2 for three Member States (BE, FR and PL<sup>2</sup>) and by using pan-European datasets.

As an indicator of peripherality, the travel time by road network to urban centres has been selected, including speed limits for different road categories and two impedance factors: a congestion index and a slope index. The land cover criterion to assess the “natural” (non-artificial) character of a LAU2 was based on the methodology of Vard et al. (2005), classifying a commune as “rural” if at least 90 % of its area is covered by forest, agricultural or natural areas. Finally, the peripherality and the land cover indicators were integrated in the OECD methodology, creating four classes of LAU2 local units: “rural-peripheral”, “rural-accessible”, “urban-open space” and “urban-closed space”.

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<sup>1</sup> LAU2: Local Administrative Unit corresponding to communes, municipalities and similar.

<sup>2</sup> See in annex 1 a correspondence table between the country codes and the country names.



### 1.3. OBJECTIVES OF THE STUDY

The purpose of the study is to improve the rural typology that was developed in the previous study (Jonard et al., 2007) and to upscale the new typology at the whole Europe.

The typology has been improved by testing different thresholds for the peripherality criterion and the land cover criterion. Regarding the peripherality criterion, three thresholds for the travel time have been tested (30, 45 or 60 minutes) and two thresholds for the size of the urban centres (50 000 or 100 000 inhabitants). For the land cover criterion the thresholds tested were 90 %, 85 %, 80 % or 75 % of “natural” (non-artificial) area. The analyses have been carried out for three Member States (BE, IE and CZ) at LAU2 level and by using pan-European datasets.

The results of these analyses have already been presented in an intermediate report and discussed with the steering committee during the intermediate meeting (held in the EU premises the 25<sup>th</sup> of June 2008). In order to be synthetic and not to repeat details already developed in a previous report, main results are available in annex 2.

Thanks to the previous study (Jonard et al., 2007) and the results obtained in the first phase of the current study, a single threshold per criterion has been selected. On this basis, an “improved” typology has been developed. In a second stage, the “improved” rural typology has been applied for all Member States at LAU2 level. The results have been then aggregated to NUTS3 level and NUTS2 level<sup>3</sup> in order to compare them with socio-economic indicators (population, gross value added and employment).

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<sup>3</sup> NUTS: Nomenclature of Territorial Units for Statistics.

## 2. OECD CRITERION

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### 2.1. INTRODUCTION

The rural typology developed by the Organisation for Economic Co-operation and Development (OECD) is exclusively based on population density and is applied at two hierarchical levels: the local community level and the regional level.

At the first level (LAU2 level), communes with population densities lower than 150 inhabitants per km<sup>2</sup> are classified as rural otherwise, they are classified as urban (OECD, 1994).

At the second level (NUTS3 level or NUTS2 level), a region with more than 50 % of population living in rural communes is classified “predominantly rural”; if this share is between 50 and 15 it is classified “intermediate”; if lower than 15 % it is “predominantly urban” (OECD, 1994).

Recently, the OECD introduced changes in the second level of the methodology (OECD, 2005):

- if a region includes an urban centre of more than 200 000 inhabitants representing no less than 25 % of the regional population in a “predominantly rural” region, it is re-classified as “intermediate”.
- if a region includes an urban centre of more than 500 000 inhabitants representing no less than 25 % of the regional population in an “intermediate” region, it is re-classified as “predominantly urban”.

Similarly to the OECD typology, this chapter deals with the use of a population density criterion to distinguish rural from urban areas at LAU2 level. In a further step, this distinction will be improved by adding two new criteria, a peripherality criterion and a land cover criterion.

### 2.2. METHODOLOGY

The population density is used to classify the EU-27 LAU2 as rural or urban areas. The threshold used in this study is the same as the one used in the OECD typology: all LAU2 with population densities lower than 150 inhabitants per km<sup>2</sup> are classified as rural otherwise, they are classified as urban.

In a second step, minor changes are applied to this classification: all LAU2 located in urban centres are automatically classified as urban whatever their population densities. The purpose of the change is to take into account the existence of urban centres by including all communes located in urban centres in the urban class. The urban centres are derived from the Urban Audit (UA<sup>4</sup>) 2007 cities database completed with the UMZ similarly to the methodology developed by Dijkstra & Poelman (2008)<sup>5</sup>. Only urban centre with a population of more than 50 000 inhabitants are selected.

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<sup>4</sup> For more information on the Urban Audit and the criteria for the selection of cities see the web page: [www.urbanaudit.org](http://www.urbanaudit.org).

<sup>5</sup> The UMZ are used to complete the Urban Audit because this database does not contain all the European cities of more than 50 000 inhabitants.

### 2.3. DATA SOURCES

To conduct this analysis, two geographic datasets are used:

- (1) Administrative boundaries: NUTS2 level, NUTS3 level and LAU2 level boundaries from the EuroBoundaryMap (EBM 2001 Census) database (scale: 1/100 000). Source: EuroGeographics.
- (2) Demography: the total population per commune (2001) from the SIRE database. Source: Eurostat.
- (3) Urban centres: Urban Audit 2007 cities. Source: DG REGIO.

### 2.4. MAIN RESULTS

Map 1 displays the results of the population density analysis, whereas map 2 displays the population density classification using the threshold of 150 inhabitants per km<sup>2</sup> and upgraded with the identification of LAU2 located inside urban centres (see point 2.2).

Tables 1.1 to 1.3 show the percentage of LAU2, territory and population in low population density areas according to both approaches: the OECD approach (column a) and the OECD classification upgraded with urban centres (column b).

According to the OECD classification, table 1.1 shows that 76.3 % of the EU-27 LAU2 units is classified as rural. Table 1.1 depicts also the repartition between the 15 first Member States<sup>6</sup> (EU-15) and the 12 new Member States<sup>7</sup> (EU-12): 72.7 % of the EU-15 LAU2 is classified as rural, whereas 89.4 % of EU-12 LAU2 is classified as rural.

Table 1.2 shows that 87.6 % of the EU-27 territory (i.e. 86.3 % of the EU-15 territory and 91.5 % of the EU-12 territory) is located in rural communes, whereas table 1.3 shows that only 27 % of the EU-27 population (23.5 % of the EU-15 population and 41 % of the EU-12 population) is living in rural communes on the basis of the OECD classification.

Tables 1.1 to 1.3 allow also comparison of both approaches. In each table, the results obtained according both methods are very similar. The change applied to the OECD methodology in order to take into account the existence of urban centres does not modify in depth the repartition of the EU-27 LAU2 between rural and urban areas although it is useful to take it into consideration for some countries like SE and FR.

The outcome of the rural classification depends on the size of the local or regional level which varies highly between Member States. For instance, whether sparsely populated peri-urban areas are classified as rural depends on whether they form a separate commune, or are part of the urban commune (Schwarz, 2005).

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<sup>6</sup> 15 first Member States: BE, DK, DE, GR, ES, FR, IE, IT, LU, NL, AT, PT, FI, SE, UK.

<sup>7</sup> 12 new Member States: BG, CZ, EE, CY, LV, LT, HU, MT, PL, RO, SI and SK.

As observed in these tables, a small percentage of LAU2 in BG and LT are not classified whatever the approach considered. This is due to missing population data for these countries in the census 2001 table<sup>8</sup>.

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<sup>8</sup> Population data missing in the census 2001 table : 4 LAU2 in BG ([COMM\_ID] = BGKRZ0207898 ; BGPDV2683572 ; BGSFO2007960 ; BGSML0952413) and 7 LAU2 in LT ([COMM\_ID] = LT013801 ; LT021299 ; LT027205 ; LT069108 ; LT076308 ; LT076361 ; LT108615).

<b>Population densities in Europe (LAU2)</b>									
<b>Country</b>	<b>Table 1.1. % LAU2 in low population density areas 2001</b>			<b>Table 1.2. % Territory in low population density areas 2001</b>			<b>Table 1.3. % Population in low population density areas 2001</b>		
	<b>a<sup>9</sup></b>	<b>b<sup>10</sup></b>	<i>Not classified</i>	<b>a</b>	<b>b</b>	<i>Not classified</i>	<b>a</b>	<b>b</b>	<i>Not classified</i>
Belgium	25.1	25.1		40.5	40.5		8.5	8.5	
Bulgaria	95.8	95.8	0.1	93.1	93.1	0.1	n.a. <sup>11</sup>	n.a.	
Czech Republic	88.3	88.3		82.9	82.8		29.8	29.8	
Denmark	75.0	75.0		84.9	84.9		40.6	40.6	
Germany	71.6	71.6		64.7	64.7		19.0	19.0	
Estonia	81.0	81.0		98.5	98.5		32.0	32.0	
Ireland	81.5	81.4		96.9	96.9		44.2	44.2	
Greece	83.0	83.0		94.9	94.9		38.6	38.6	
Spain	88.7	88.6		92.3	91.7		27.4	26.6	
France	86.4	84.6		89.4	87.5		29.5	28.1	
Italy	61.2	61.2		70.9	70.7		20.8	20.7	
Cyprus	91.8	91.0		91.1	90.3		22.2	21.7	
Latvia	90.3	90.3		98.2	98.2		34.3	34.3	
Lithuania	87.1	87.1	1.3	96.1	96.1	0.8	n.a.	n.a.	
Luxembourg	68.6	68.6		75.5	75.5		28.0	28.0	
Hungary	92.4	92.4		87.7	87.7		43.2	43.2	
Malta	1.5			1.6			0.1		
Netherlands	15.5	15.5		31.9	31.9		7.4	7.4	
Austria	81.7	81.7		90.7	90.7		41.9	41.9	
Poland	79.6	79.6		90.5	90.5		40.3	40.3	
Portugal	64.4	63.3		87.5	86.4		26.0	25.0	
Romania	90.4	90.4		93.6	93.6		48.1	48.1	
Slovenia	82.3	82.3		87.9	87.9		55.3	55.3	
Slovakia	88.5	88.2		86.1	85.7		40.6	40.4	
Finland	92.4	92.4		98.6	98.6		56.2	56.2	
Sweden	89.3	86.9		99.1	96.2		69.4	59.1	
United Kingdom	25.2	24.0		81.7	79.0		12.3	11.5	
<b>EU27</b>	76.3	75.5		87.6	86.8		27.0	26.4	excl. BG, LT
<b>EU15</b>	72.7	71.8		86.3	85.3		23.5	22.8	
<b>EU12</b>	89.4	89.3		91.5	91.5		41.0	41.0	excl. BG, LT
<b>EU25</b>	75.0	74.3		87.1	86.2		25.9	25.3	excl. LT

Note: the total for:

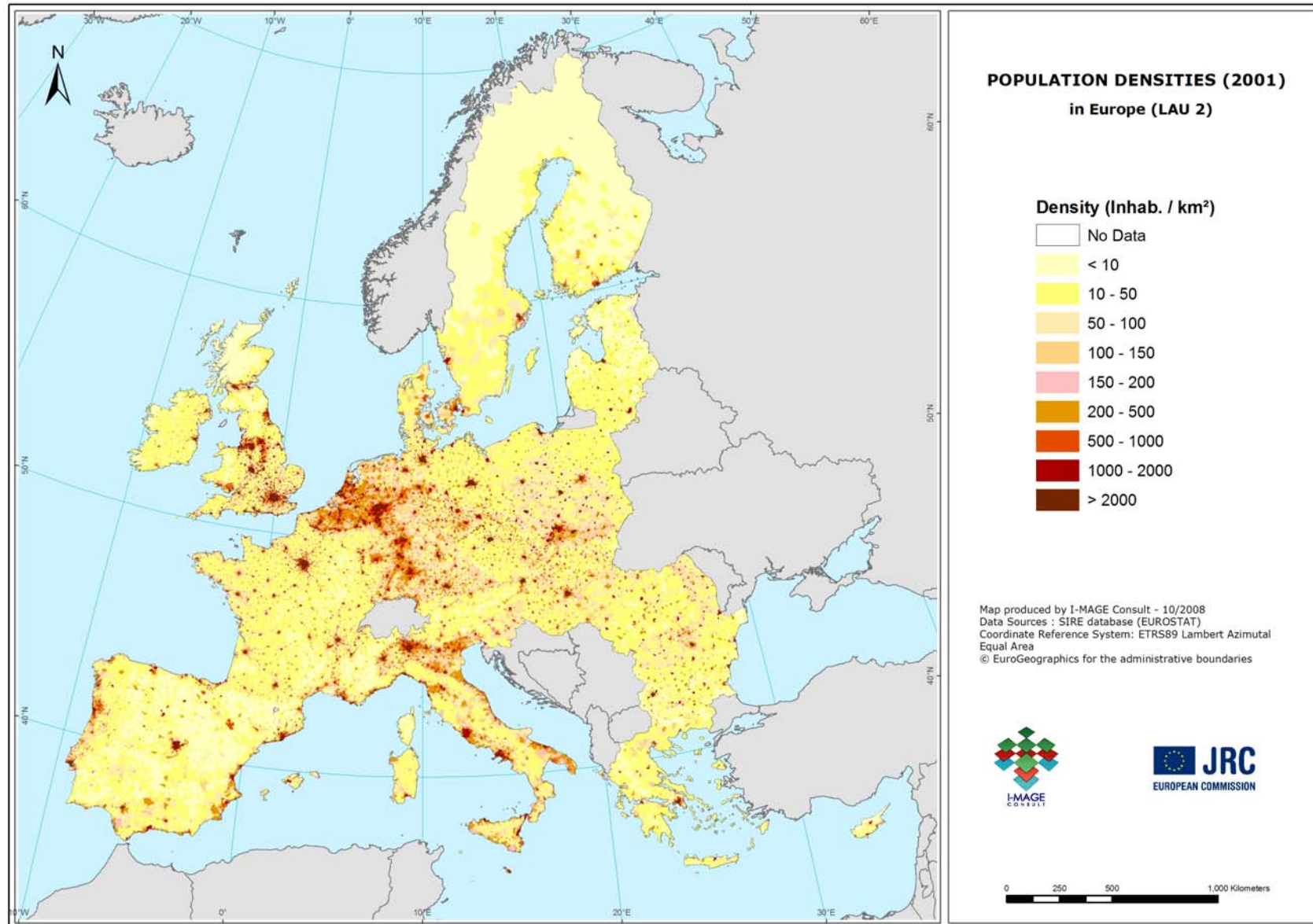
- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

<sup>9</sup> Column a: the selection of low population density areas is based on a population density threshold of 150 inh./km<sup>2</sup>.

<sup>10</sup> Column b: the selection of low population density areas is based on a population density threshold of 150 inh./km<sup>2</sup> and the existence of urban centres (low population density areas = pop. dens. < 150 inh./km<sup>2</sup> and not located in an UC).

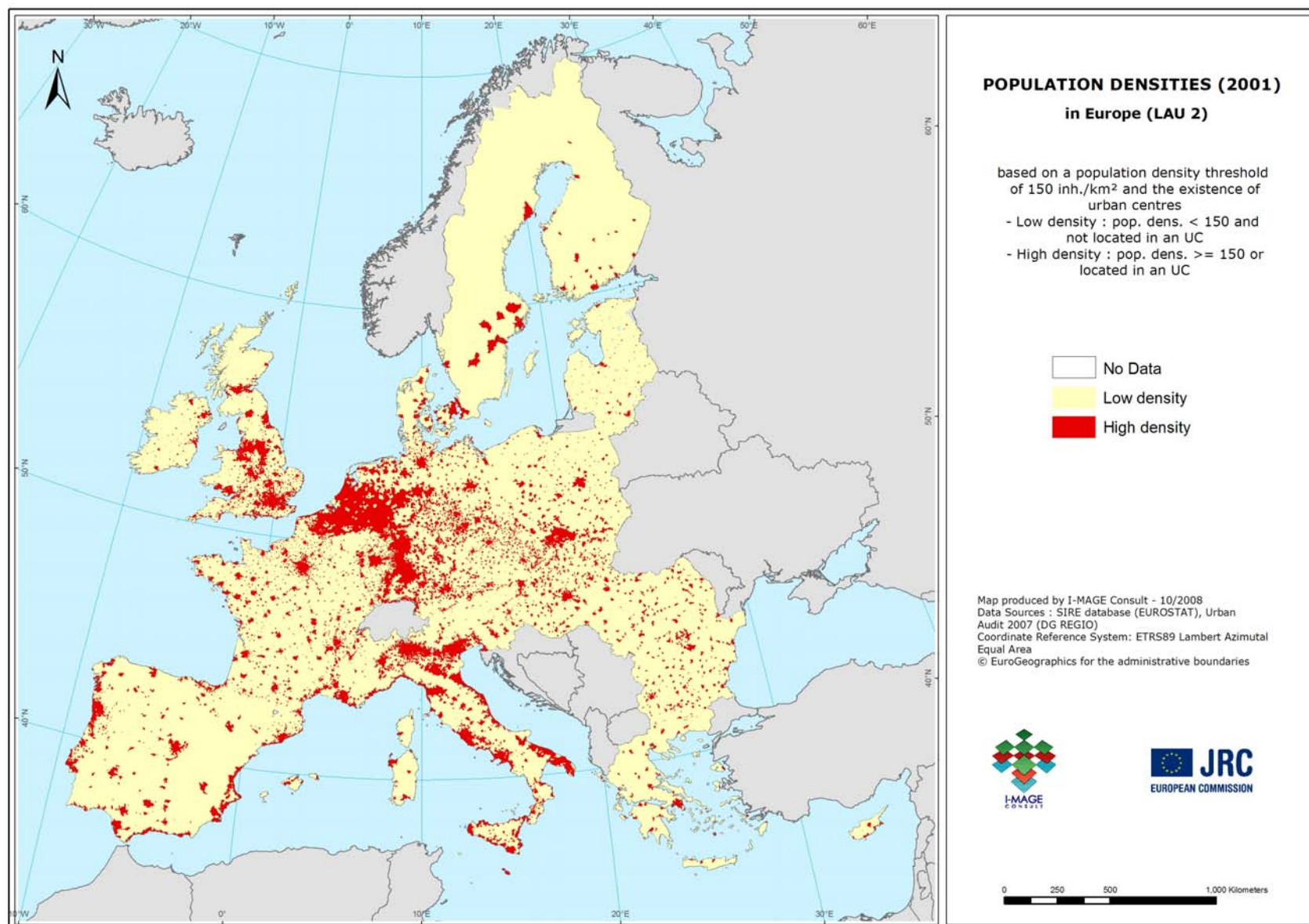
<sup>11</sup> n.a. : data not available

Map 1. Share of population density in Europe (2001)





Map 2. Share of population density in Europe taking into account urban centres



### 3. INTRODUCTION OF A PERIPHERALITY INDEX

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#### 3.1. INTRODUCTION

This chapter deals with the implementation of a peripherality index at LAU2 level and its integration in the OECD methodology as discriminating factor.

A peripheral region is defined as a region with low accessibility (Schürmann & Talaat, 2000). There are numerous definitions and concepts of accessibility (Spiekermann & Neubauer, 2002). The definition used in this study is “accessibility indicators describe the location of an area with respect to opportunities, activities or assets existing in other areas and the area itself, where “area” may be a region, a city or a corridor” (Wegener et al., 2002).

Examples of peripherality/accessibility indicators, which can be investigated, are total length of motorways, number of railway stations, travel time or travel cost to economic centres, etc.

#### 3.2. METHODOLOGY

In this study, the travel time by road network to urban centres is selected as indicator of accessibility. One of the main advantages of this indicator is the availability of data at LAU2 level for each European country. This indicator is also more realistic and accurate than indicators like “perceived distance” or “Euclidian distance”.

The ArcGIS 9.2 (ESRI) software extension “Network Analyst” is used to process the peripherality analysis. This extension allows network-based spatial analysis including “routing”, “origin-destination cost matrix” and “service area” analysis. The “Origin-Destination (OD) cost matrix” in particular enables users to generate a matrix of the costs (travel time for example) to connect each location to all destinations on a network. This tool is used here to compute the driving time (cost) needed to reach the closest city centres (destinations) from each European commune (origins).

##### 3.2.1. First step

The first step of this process is dedicated to create a “Network Dataset” (ND) with all necessary information to perform peripherality analysis. This ND is created from the EuroRegionalMap road network completed with attributes such as length and travel speed of each “edge” of road.

The travel speed is defined for each category of roads by using speed limits used as reference in several Member States:

- Motorway: 120 km/h
- Slip road : 70 km/h
- Primary road: 90 km/h
- Secondary road: 70 km/h
- Local road: 50 km/h



The willingness to consider slope and congestion in cities has required to calculate travel speed impedance which is expressed by using two indexes developed in the study of Dijkstra & Poelman (2008):

- In order to take into consideration the congestion traffic in cities, the travel time is affected by a Congestion Index when roads overlay with the Urban Morphological Zones (UMZ). The UMZ are defined as “A set of urban areas laying less than 200 m apart<sup>12</sup>” (EEA<sup>13</sup>). Those urban areas are defined by the CORINE Land Cover classes assumed to contribute to the urban tissue and function.

The congestion index has value 1 for roads outside the UMZ, value 1.5 for motorways inside the UMZ and value 2 for major roads and urban roads inside the UMZ.

- The travel time is also affected by the relief. A digital elevation model (DEM) has been used to derive information slope gradients on roads. The DEM used in this context is the NASA Shuttle Radar Topographic Mission (SRTM) - 90 m resampled at 100 m by the JRC. Given the considerable size of the SRTM - 100m data and the road network dataset, the processing of the Slope Index was not possible. The SRTM has therefore been resampled at 200 m resolution in order to reduce the size of the slope data and allow the calculation of the Slope Index.

The slope index has value 1 for roads with a slope between 0 and 5 %, value 1.2 for roads with a slope between 6 and 10 % and value 1.5 for roads with a slope of 11 % and more.

Taking into account these two indexes, the travel time will be calculated as below:

$$Travel\_Time = \frac{Shape\_length * Slope\_index * Congestion\_index}{Speed\_limit * \frac{1000}{60}}$$

where *shape\_length* is given in meters and *speed\_limit* in km/h.

### 3.2.2. Second step

The second main process is to generate, using this network dataset, an “OD cost matrix” by defining “origins” and “destinations”. “Origins” are the places from which the travel time will be computed while “destinations” are the places to reach in order to access to a wide range of services and opportunities.

- Origins are derived from centroids of local units LAU2<sup>14</sup>.
- Destinations are derived from centroids of urban centres.

In the previous study (Jonard et al., 2007), all local units LAU2 with a population of more than 50 000 or 100 000 inhabitants were considered as urban centres. Now, in this study, the urban centres are derived from the Urban Audit (UA) 2007 cities database completed with the UMZ similarly to the methodology developed by Dijkstra & Poelman (2008)<sup>15</sup>. The UA database has been used because the selection of the cities is independent of the size of administrative units.

<sup>12</sup> Methodology available at the web page: <http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=720>.

<sup>13</sup> EEA: European Environment Agency.

<sup>14</sup> The centroids of LAU2 have been calculated taking into account only the “land” areas excluding “inland waters”.

<sup>15</sup> The UMZ are used to complete the Urban Audit because this database does not contain all the European cities of more than 50 000 inhabitants.

For example in IE, no LAU2 has a population of more than 50 000 (because the urban centres are divided into very small local units) whereas this country contains four cities (Dublin, Cork, Galway, Limerick) with a population of more than 50 000 inhabitants. When using the previous methodology, no urban centre (i.e. destination) is selected while implementing the new methodology allows four urban centres to be considered. This last result better fits to the situation that prevails in IE.

Concerning the selection of urban centres, two thresholds have been considered in a first stage: 50 000 or 100 000 inhabitants. After having compared different scenarios (see intermediate report or annex 2), the threshold of 50 000 inhabitants seems to be the most appropriate for the upscaling of the methodology to all Europe because the threshold of 100 000 is too restrictive for several Member States and would lead to a high number of communes remote from the first urban centre.

Thanks to the OD cost matrix analysis, the minimum travel time to reach the nearest main city is then computed and the communes are classified as “remote” or “close” to a city. In the previous study (Jonard et al., 2007), two time breaks (30 min and 60 min travel time) have been investigated. In the current study, three time breaks have been investigated (30 min, 45 min or 60 min travel time) for three representative countries (BE, IE and CZ). On this basis, the threshold of 45 minutes has finally been selected for the upscaling of the methodology to all Europe. This threshold follows Dijkstra & Poelman (2008) recommendations and allows indeed a better discrimination of the rural areas.

The influence of the neighbour cities on the accessibility of the communes for a specific country has been demonstrated in the previous study. Southern BE for example is clearly influenced by foreign urban centres (Charleville-Mezieres and Luxembourg). The North West of BE is also influenced by Dutch urban centres (Roosendaal, Breda, Oosterhout and Eindhoven). The peripherality analysis has been implemented in this study considering the boundary between Member States totally open and all European cities potentially reachable from each EU-LAU2.

### **3.3. DATA SOURCES**

For this analysis, the following geodatabases are used:

- (1) Administrative boundaries: NUTS2 level, NUTS3 level and LAU2 level boundaries from the EuroBoundaryMap (EBM 2001 Census) database (scale: 1/100 000). Source: EuroGeographics.
- (2) Transport: a road network from the EuroRegionalMap (ERM v2.2) database (scale: 1/250 000). Source: EuroGeographics<sup>16</sup>.
- (3) Demography: the total population per commune (2001) from the SIRE database. Source: Eurostat.
- (4) Land Cover: the Urban Morphological Zones derived from CORINE Land Cover 2000 and the disaggregated map of population density. Source: EEA.
- (5) Urban centres: Urban Audit 2007 cities. Source: DG REGIO.

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<sup>16</sup> Data for Greece available in the ERM V2.2 database are not topologically correct (majority of roads not connected to each other). In this study, the road network data for Greece have therefore been taken from the previous version of the ERM database in which the data were not corrupted.

- (6) Digital elevation model: the original digital elevation model SRTM - 90 m is publicly available (NASA Shuttle Radar Topographic Mission). The SRTM - 100 m used here is the SRTM - 90 m resampled at 100 m by the JRC.

### 3.4. MAIN RESULTS

This section presents the results of the peripherality analysis applied to all Europe according to the methodology described above (see point 3.2).

Map 3 displays the results of the accessibility analysis for all Member States. The results are also detailed in different tables. Tables 2.1 to 2.3 show respectively for each country the percentage of LAU2, territory and population in remote areas.

In each table, BE, LU and NL present the lower percentage of remote areas while EE, IE, GR, LV, PT, FI and SE present the higher percentage of remote areas in term of LAU2, territory and population.

Considering the European Union as a whole (EU-27), 28.4 % of the EU-27 LAU2 is classified as remote at more than 45 minutes from the nearest urban centres with at least 50 000 inhabitants, 49.1 % of the EU-27 territory is located in remote areas and 12.4 % of the EU-27 population is living in remote areas. The remote areas account thus for almost half of the European territory but only for one-eighth of the European population.

Given that the objective of the integration of a peripherality index in the OECD methodology is to discriminate rural areas according to their accessibility to urban centres, tables 3.1 to 3.3 list for each country the percentage of LAU2, territory and population in remote areas taking into account only the rural LAU2 (i.e. LAU2 with a population density lower than 150 inhabitants/ km<sup>2</sup> and not located in an urban centre<sup>17</sup>). Predictably, the importance of remote areas is systematically higher in rural areas than in urban areas. It is also interesting to note from tables 3.2 and 3.3 that the average population density in remote rural communes is lower than half of the average population density in accessible rural communes<sup>1819</sup>.

The peripherality analysis has not been performed for BG because no data are available in the ERM database. A few communes in the other Member States have also not been classified. This is due to the detail level of the road network dataset ERM (numerous local roads are excluded in this dataset). It has been decided that an origin could not be located and thus its accessibility would not be computed if the centroid of this origin is located at more than 5 km from the nearest road. This limit is a compromise between, at one hand, the best accuracy in the computation of travel times (lowest distance) and, at the other hand, the importance to reduce to its minimum the number of LAU2 not classified (biggest distance). Both requirements could be however upgraded by using a more detailed road network dataset as the TeleAtlas database.

Regarding the population table, no percentage is available for BG and LT due to the fact that population data are missing in the census 2001 table (see point 2.4).

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<sup>17</sup> See chapter 2.

<sup>18</sup>  $[(\text{Pop-remote}) / (\text{Territory-remote})] / [(\text{Pop-accessible}) / (\text{Territory-accessible})] = (33.4/55.2)/(66.4/44.4) = 0.4$ .

<sup>19</sup> This trend has already been observed by Dijkstra & Poelman (2008).

<b>Accessibility by roads to cities with at least 50 000 inhabitants in Europe (LAU2)</b>									
<b>Country</b>	<b>Table 2.1. Share of LAU2 according to peripherality criterion (%) 2006</b>			<b>Table 2.2. Share of territory according to peripherality criterion (%) 2006</b>			<b>Table 2.3. Share of population according to peripherality criterion (%) 2001</b>		
	<i>Accessible</i>	<i>Remote</i>	<i>Not classified</i>	<i>Accessible</i>	<i>Remote</i>	<i>Not classified</i>	<i>Accessible</i>	<i>Remote</i>	<i>Not classified</i>
Belgium	96.9	3.1		93.3	6.7		99.0	1.0	
Bulgaria			100.0			100.0			100.0
Czech Republic	82.1	17.9		78.0	22.0		90.2	9.8	
Denmark	56.5	43.5		52.5	47.5		72.2	27.8	
Germany	86.9	13.0	0.1	87.3	12.6	0.1	95.5	4.5	< 0.1
Estonia	29.1	70.4	0.4	24.8	75.2	< 0.1	63.9	36.1	< 0.1
Ireland	37.9	61.2	0.9	29.9	68.5	1.7	62.3	37.4	0.3
Greece	34.2	65.6	0.2	23.9	76.1	0.1	63.2	36.7	0.2
Spain	50.0	49.6	0.4	40.5	59.0	0.5	84.5	15.0	0.5
France	73.4	26.6	< 0.1	66.4	33.6	< 0.1	90.0	10.0	< 0.1
Italy	71.6	28.2	0.2	62.1	37.7	0.2	86.9	13.0	0.1
Cyprus	77.8	22.2		76.7	23.3		97.4	2.6	
Latvia	21.3	78.7		19.5	80.5		61.7	38.3	
Lithuania	41.7	58.1	0.2	40.2	59.7	0.1	n.a.	n.a.	
Luxembourg	95.8	4.2		91.0	9.0		97.8	2.2	
Hungary	62.8	37.2		60.5	39.5		77.0	23.0	
Malta	79.4	20.6		78.2	21.8		92.2	7.8	
Netherlands	99.0		1.0	98.9		1.1	99.8		0.2
Austria	70.7	29.1	0.2	54.8	44.8	0.4	84.0	15.9	0.1
Poland	73.7	26.3	< 0.1	69.8	30.2	< 0.1	85.4	14.6	< 0.1
Portugal	35.9	64.1	< 0.1	17.7	82.3	< 0.1	69.0	31.0	< 0.1
Romania	67.2	31.6	1.2	58.4	38.0	3.6	79.8	19.7	0.6
Slovenia	65.1	34.9		60.2	39.8		77.8	22.2	
Slovakia	67.5	32.5		65.8	34.2		79.5	20.5	
Finland	30.8	67.4	1.8	14.4	85.3	0.3	58.7	41.2	0.1
Sweden	43.6	56.1	0.3	15.7	84.3	< 0.1	63.5	36.3	0.1
United Kingdom	91.8	8.2	0.1	65.1	34.7	0.2	96.4	3.6	< 0.1
<b>EU27</b>	71.5	28.4	excl. BG	50.6	49.1	excl. BG	87.5	12.4	excl. BG, LT
<b>EU15</b>	71.8	28.0		48.0	51.8		88.8	11.1	
<b>EU12</b>	70.0	29.9	excl. BG	59.1	40.0	excl. BG	82.4	17.5	excl. BG, LT
<b>EU25</b>	71.6	28.3		50.1	49.7		87.9	12.0	excl. LT

Note: the total for:

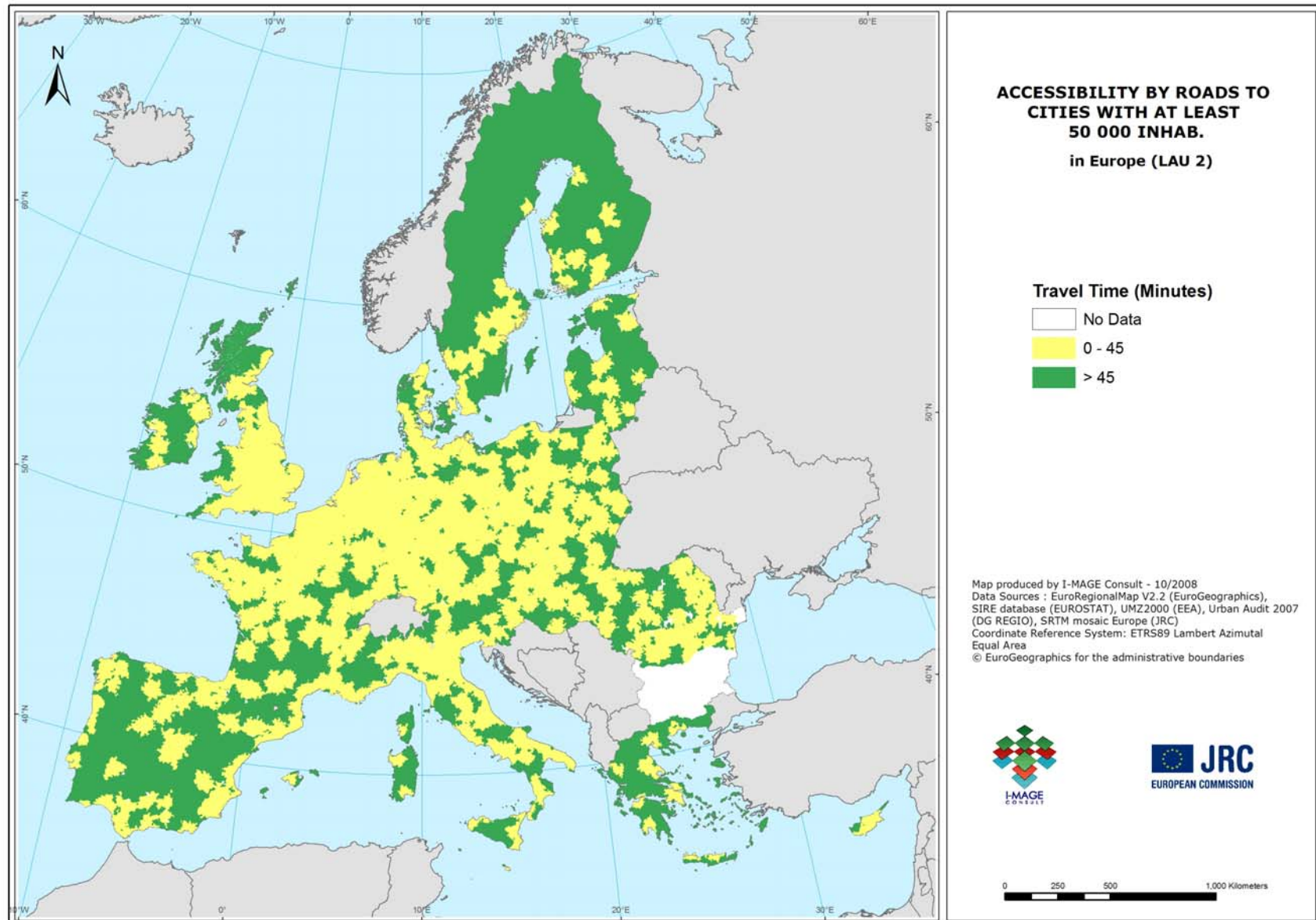
- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

Accessibility by roads to cities with at least 50 000 inhabitants in rural areas of Europe (LAU2)									
Country	Table 3.1. Share of LAU2 in rural areas according to peripherality criterion (%) 2006			Table 3.2. Share of territory in rural areas according to peripherality criterion (%) 2006			Table 3.3. Share of population in rural areas according to peripherality criterion (%) 2001		
	Accessible	Remote	Not classified	Accessible	Remote	Not classified	Accessible	Remote	Not classified
Belgium	88.5	11.5		83.7	16.3		90.1	9.9	
Bulgaria			100.0			100.0			100.0
Czech Republic	80.5	19.5		75.3	24.7		81.2	18.8	
Denmark	48.8	51.2		48.1	51.9		47.5	52.5	
Germany	83.6	16.2	0.1	82.6	17.2	0.2	85.8	14.0	0.2
Estonia	28.0	71.5	0.5	24.2	75.8	< 0.1	38.6	61.4	< 0.1
Ireland	28.1	70.8	1.1	28.5	69.8	1.7	36.9	62.4	0.7
Greece	26.0	73.9	0.1	22.5	77.4	0.1	29.9	70.0	0.1
Spain	44.6	55.0	0.4	36.0	63.5	0.5	52.9	46.7	0.4
France	70.0	29.9	< 0.1	63.2	36.8	< 0.1	76.5	23.5	< 0.1
Italy	59.9	39.8	0.3	51.4	48.3	0.3	62.6	37.2	0.2
Cyprus	76.0	24.0		74.3	25.7		89.0	11.0	
Latvia	19.8	80.2		18.6	81.4		30.3	69.7	
Lithuania	40.2	59.6	0.2	39.7	60.2	0.2	n.a.	n.a.	
Luxembourg	93.8	6.2		88.1	11.9		92.3	7.7	
Hungary	61.2	38.8		57.9	42.1		62.4	37.6	
Malta									
Netherlands	93.6		6.4	96.6		3.4	98.0		2
Austria	66.2	33.6	0.3	50.9	48.6	0.5	67.5	32.4	0.1
Poland	70.4	29.6	0.1	67.5	32.5	< 0.1	72.6	27.4	< 0.1
Portugal	12.4	87.5	< 0.1	9.1	90.9	< 0.1	21.9	78.0	< 0.1
Romania	65.4	33.3	1.3	56.9	39.2	3.9	68.1	30.7	1.1
Slovenia	62.0	38.0		56.5	43.5		67.5	32.5	
Slovakia	65.2	34.8		62.9	37.1		70.5	29.5	
Finland	29.5	68.6	1.9	13.8	85.9	0.3	41.8	58.0	0.2
Sweden	35.5	64.5		12.5	87.5		38.5	61.5	
United Kingdom	79.0	20.8	0.2	56.8	43.0	0.2	82.9	16.9	0.2
<b>EU27</b>	64.7	35.1	excl. BG	44.4	55.2	excl. BG	66.4	33.4	excl. BG, LT
<b>EU15</b>	63.8	36.0		40.4	59.3		65.1	34.7	
<b>EU12</b>	67.9	31.9	excl. BG	56.6	42.4	excl. BG	69.4	30.3	excl. BG, LT
<b>EU25</b>	64.7	35.2		43.6	56.2		66.3	33.6	excl. LT

Note: the total for:

- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

Map 3. Accessibility by roads to cities with at least 50 000 inhabitants in Europe (LAU2)





## 4. INTRODUCTION OF A LAND COVER INDEX

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### 4.1. INTRODUCTION

This chapter describes the methodology implemented using CORINE Land Cover (CLC2000) in order to assess the rural (versus urban) character of communes. The aim of this exercise is to calculate an indicator based on land cover area estimates at commune level (LAU2). In a further step, results of this analysis will be combined with the peripherality approach (chapter 4) in order to improve the OECD rural typology.

### 4.2. METHODOLOGY

All spatial analyses were conducted using the GIS software ArcGIS 9.2. Processes implemented in this frame are based on the methodology developed by Vard et al. (2005). As described hereunder, this methodology has been updated in order to use the upgraded version of CORINE Land Cover database 2000 (CLC 90 previously used).

The following procedure has been applied (Vard et al., 2005):

- Analysis of CORINE Land Cover information in order to evaluate the area distribution of the different land cover classes at commune level.

The 44 classes of the 3-level CORINE nomenclature are aggregated into 6 classes: forest, agricultural, natural, inland water, sea and artificial areas. “Rural” areas are defined as being either forest areas or agricultural areas or natural areas.

- Classification of each commune as “rural” or “non rural” based on the importance of the different land cover classes.

The rule proposed by Vard et al. (2005) is to classify a commune as “rural” if at least 90 % of its area is covered by forest, agricultural or natural areas. When communes contain inland water bodies, 50 % of the area of these water bodies is included in the “rural” area but the total area of the commune used to calculate the share of “rural” area is reduced by 50 % of the area of the inland water bodies.

$$Forest\_area + Agri.\_area + Nat.\_area + \frac{Inland\_wat.\_area}{2} \geq X\% * \left( Commune\_area - \frac{Inland\_wat.\_area}{2} \right)$$

where  $X$  is the threshold (i.e. percentage of forest, agricultural, natural and inland water areas used for the stratification rural/urban) selected.

In this study, four different thresholds have been considered: 90 %, 85 %, 80 % or 75 %. The results obtained for three Member States (BE, IE and CZ) are detailed in the intermediate report and may be found in annex 2. The lowest threshold (75 %) has finally been selected for the implementation of the land cover analysis to the whole Europe (EU-27). The term “rural” used by Vard et al. (2005) in the land cover analysis will be replaced in this study by the term “open space”<sup>20</sup>. A commune will be thus called an “open space” commune if at least 75 % of its area is covered by forest, agricultural or natural areas. Otherwise, the commune is called a “closed space” commune.

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<sup>20</sup> The term “rural” is already used in the population density analysis to characterize communes with population densities lower than 150 inhab. per km<sup>2</sup> (see chapter 2).

### 4.3. DATA SOURCES

To conduct this analysis, three geographic datasets are used:

- (1) Administrative boundaries: NUTS2 level, NUTS3 level and LAU2 level boundaries from the EuroBoundaryMap (EBM 2001 Census) database (scale: 1/100 000). Source: EuroGeographics.
- (2) Land cover: CORINE Land Cover 2000 raster version 8, 100x100 m. Source: EEA.
- (3) Demography: the total population per commune (2001) from the SIRE database. Source: Eurostat.

### 4.4. MAIN RESULTS

Tables 4.1 to 4.4 display the importance of the “open space” areas regarding respectively the number of LAU2 level, the population, the territory and finally the area of land cover classes.

As shown in table 4.2 (column a), only SI has more than 90 % of its population living in “open space” areas<sup>21</sup> and eight countries have less than 50 % of their population living in “open space” areas. In term of territory (table 4.3, column a), most of the Member States have more than 90 % of their territory located in “open space” areas (except MT, BE and NL).

Table 4.4 (column a) depicts the percentage of area of CLC classes considered as “open space”. These figures are independent of the size of the LAU2 level units. It is interesting to compare this table with table 4.3 (column a). The dispersion of the values in table 4.4 is less important than in table 4.3 (standard deviation smaller) and the EU-27 average is slightly lower.

In general, approximately half of the EU-27 population is living in “open space” areas which are accounting for more than 90 % of the total EU-27 territory.

The objective of the introduction of a land cover index in the OECD methodology is to distinguish urban areas according to their “open space” character. In order to better analyse the impact of this index, column b of tables 4.1 to 4.4 list for each country the percentage of LAU2, territory, population and area of CLC classes in “open space” areas taking into account only the urban LAU2 (i.e. LAU2 with a population density with at least 150 inhabitants/ km<sup>2</sup> or located in an urban centre<sup>22</sup>). Figures in column b of tables 4.2 and 4.3 show that 38.1 % of the EU-27 urban population is living in “open space” areas and that 77 % of the EU-27 urban territory is located in “open space” areas.

As already highlighted for the population density analysis (chapter 2), the size of the commune can influence the outcome of the land cover analysis. For example, large local units in SE (e.g. Jönköping) and FI (e.g. Tampere) including important urban nucleus but surrounded by forest, agricultural or natural areas are classified as open space. As proposed in Vard et al. (2005), it would be possible to upgrade the land cover classification by eliminating some clear outliers.

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<sup>21</sup> Two countries (BG and LT) have no percentage in table 4.2 due to population data unavailability (see chapter 2).

<sup>22</sup> See chapter 2.



Percentage of open space area in Europe based on CORINE Land Cover 2000 (LAU2)												
Country	Table 4.1. % LAU2 in open space areas 2000			Table 4.2. % Population in open space areas 2000			Table 4.3. % Territory in open space areas 2000			Table 4.4. % Area of "Land Cover Classes" considered as "open space" 2000		
	a <sup>23</sup>	b <sup>24</sup>	Not classified	a	b	Not classified	a	b	Not classified	a	b	Not classified
Belgium	55.0	39.9		29.4	22.8		68.9	47.8		79.4	70.6	
Bulgaria	99.1	84.8		n.a.	n.a.		98.5	79.9		95.0	82.9	
Czech Republic	97.8	85.0		62.0	46.1		95.7	77.2		93.9	81.8	
Denmark	87.7	53.6	0.4 (a) / 1.4 (b)	69.2	48.4	< 0.1 (a) / < 0.1 (b)	96.5	78.4	< 0.1 (a) / < 0.1 (b)	91.9	76.3	
Germany	95.4	85.3		57.8	48.0		92.8	80.5		91.7	82.9	
Estonia	81.0	2.1		31.7	0.1		98.4	0.3		97.8	41.3	
Ireland	82.5	10.0		52.3	15.7		97.4	53.9		97.2	64.6	
Greece	90.5	47.7		58.1	32.0		99.1	87.3		97.2	83.6	
Spain	96.9	73.4		60.9	46.8		98.7	85.1		98.2	87.1	
France	94.1	63.9		46.1	25.5		95.6	69.3		94.8	76.8	
Italy	92.1	80.2		65.6	56.8		95.8	87.5		94.7	87.1	
Cyprus	92.0	41.8		29.7	11.2		91.7	40.0		92.2	66.5	
Latvia	92.3	20.4		36.4	3.1		98.5	16.7		98.7	56.6	
Lithuania	90.2	18.3		n.a.	n.a.		98.1	41.1		96.7	67.0	
Luxembourg	91.5	73.0		57.0	40.3		93.1	71.7		91.3	77.2	
Hungary	98.5	82.0		75.1	56.3		98.2	85.9		94.3	82.7	
Malta	29.4	29.4		19.5	19.5		56.3	56.3		69.9	69.9	
Netherlands	74.6	70.0		45.9	41.6		85.6	78.9		86.6	82.6	
Austria	94.0	67.6		61.1	33.1		97.4	72.2		95.8	78.0	
Poland	91.6	58.8		56.3	26.8		97.0	68.7		96.6	80.8	
Portugal	88.8	70.0		52.2	36.7		96.4	77.8		93.3	77.3	
Romania	98.0	83.7		73.4	49.2		98.5	86.1		93.4	82.7	
Slovenia	100.0	100.0		100.0	100.0		100.0	100.0		97.3	89.7	
Slovakia	98.3	86.7		80.4	67.2		98.3	88.1		94.3	85.1	
Finland	95.8	44.1		68.9	28.9		99.4	56.5		98.4	70.4	
Sweden	93.8	52.6		76.4	42.3		99.7	90.7		98.5	89.8	
United Kingdom	42.1	23.9		26.5	17.0		92.0	62.3		92.2	69.9	
<b>EU27</b>	89.2	57.2		54.3	38.1	excl. BG, LT	96.7	77.0		95.5	81.0	
<b>EU15</b>	87.2	55.5		51.9	37.9		96.4	77.1		95.5	81.0	
<b>EU12</b>	96.8	73.2		64.1	39.3	excl. BG, LT	97.7	76.1		95.4	81.2	
<b>EU25</b>	88.6	56.7		53.4	37.7	excl. LT	96.6	76.7		95.6	81.0	

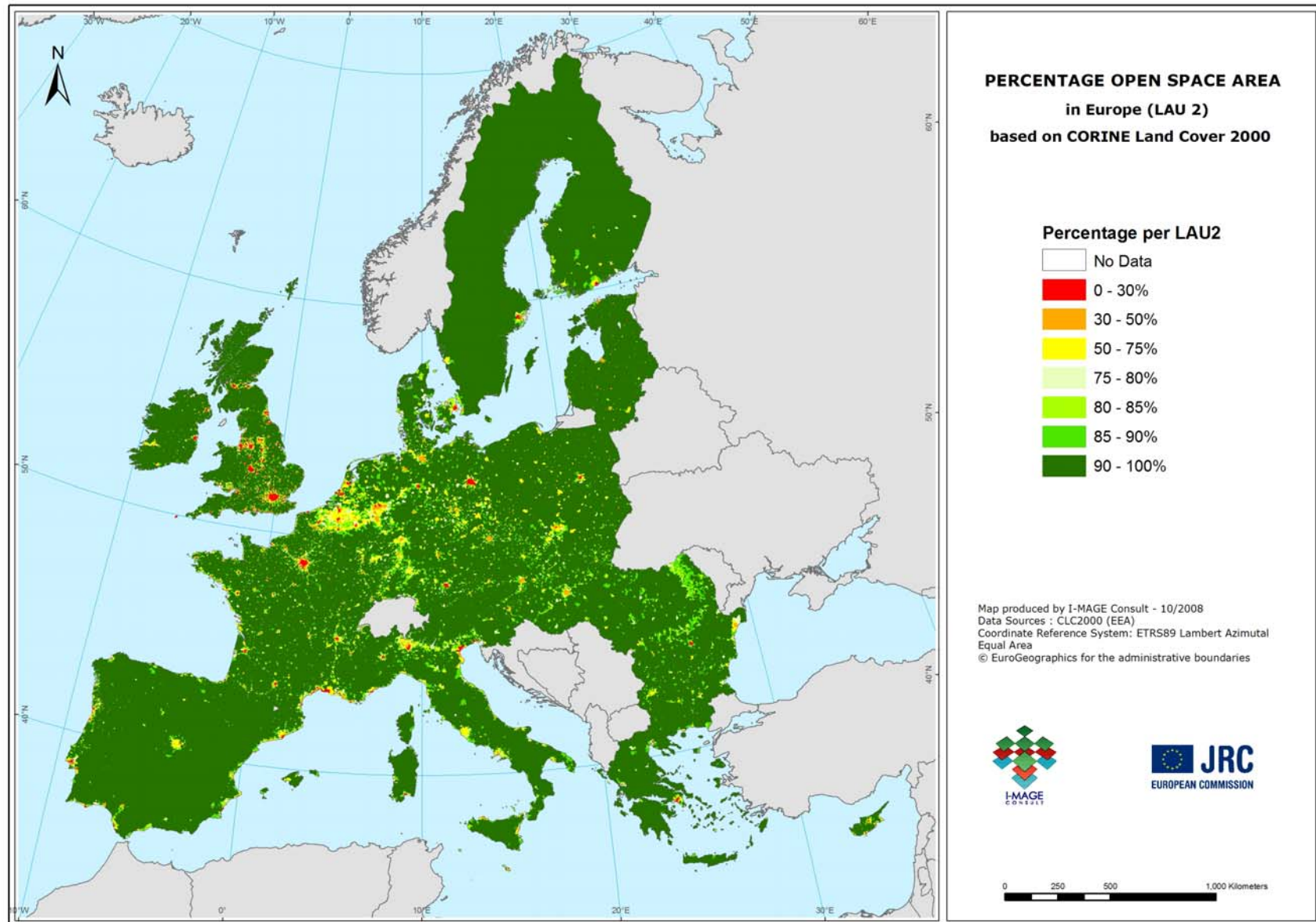
Note: the total for:

- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

<sup>23</sup> Column a: percentages are based on all LAU2 local units of each Member State.

<sup>24</sup> Column b: percentages are based on the urban LAU2 local units of each Member State.

Map 4. Percentage of open space area in Europe based on CORINE Land Cover 2000 (LAU2)



## 5. RURAL TYPOLOGY

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### 5.1. INTRODUCTION

The aim of this chapter is to develop a new rural typology based on three criteria: a population density criterion, a peripherality criterion and a land cover criterion.

The first step of this chapter is to develop a typology at LAU2 level for all Member States. The results will then be aggregated at NUTS3 level and NUTS2 level in order to allow comparison with statistical datasets available at regional level.

### 5.2. RURAL TYPOLOGY AT LAU2 LEVEL

Table 5 hereunder resumes the methodology developed in this study, based on the combination of three criteria: the OECD (population density) criterion, the peripherality criterion and the land cover criterion.

Based on the population density criterion, a commune is firstly classified as “**rural**” or “**urban**”. A commune is classified as “rural” if its population density is less than 150 inhab./km<sup>2</sup>. Otherwise, the commune is classified as “urban”. One restriction has been introduced: whatever its population density a commune located in an urban centre is classified as urban (chapter 3).

The “rural” communes are then discriminated on the basis of the Peripherality analysis. A “rural” commune is accordingly considered as “**peripheral**” if located at more than 45 minutes from the nearest city with at least 50 000 inhabitants. Otherwise, the commune is considered as “**accessible**” (chapter 4).

Finally, the “urban” communes are discriminated on the basis of the Land Cover analysis. An “urban” commune is characterized as an “**open space**” commune if at least 75 % of its area is covered by forest, agricultural or natural areas. Otherwise, the commune is characterized as a “**closed space**” commune (chapter 5).

Table 5. Rural typology at LAU2 level

N°	CRITERION 1	CRITERION 2	CRITERION 3	SUB-CATEGORIES	CODE
	<i>Population density</i>	<i>Land Cover</i>	<i>Peripherality</i>		
1	< 150 inhab./km <sup>2</sup>	— <sup>25</sup>	>= 45 minutes	Rural - peripheral	RP
2	< 150 inhab./km <sup>2</sup>	—	< 45 minutes	Rural - accessible	RA
3	>= 150 inhab./km <sup>2</sup>	>= 75 %	—	Urban - open space	UO
4	>= 150 inhab./km <sup>2</sup>	< 75 %	—	Urban - closed space	UC

According to this methodology, the typology developed in this study is based on four classes which are distributed from the most rural to the most urban:

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<sup>25</sup> — : Not Applicable.

- rural-peripheral,
- rural-accessible,
- urban-open space,
- urban-closed space.

This classification is limited to four classes by combining only two characteristics: (high) population density with land cover or (low) population density with accessibility as correlations exist between some categories of the three characteristics. Indeed, in communes with low population densities, the probability to find high share of open space areas is high and in the opposite the probability to find communes with high population density near urban centre is high.

This typology improved thus the OECD typology by discriminating rural areas according to the accessibility to urban centres and by discriminating urban areas according to the land cover.

Map 5 displays the new rural typology implemented at LAU2 level. All EU capitals are clearly visible in red (urban-closed space class). SE seems to show a higher share of dark green (rural-peripheral class) than the other Member States.

Tables 7.1 to 7.3 show the distribution between the four rural classes in term of percentage of LAU2, territory and population.

Table 7.1 shows that 26.2 % of the EU-27 LAU2 is classified as rural-peripheral. These rural-peripheral LAU2 count for 47.8 % of the EU-27 territory (table 7.2) but only 8.8 % of the EU-27 population is living in these LAU2 (table 7.3). In the opposite, 10.9 % of the EU-27 LAU2 is classified as urban-closed space. This class covers only 3.1 % of the EU-27 territory but contains 45.5 % of the EU-27 population.

Predictably, these results confirm that (rural-)peripheral areas are in general lower densely populated than (rural-)accessible areas, whereas (urban-)closed space areas are higher densely populated than (urban-)open space areas.

Differences between Member States can also be outlined : SE and FI have more than 80 % of their territory classified as rural-peripheral and less of 1 % classified as urban-closed space contrary to BE that have less than 10 % of their territory classified as rural-peripheral and more than 30 % of urban-closed space areas.

### **5.3. RURAL TYPOLOGY AT NUTS3 LEVEL AND NUTS2 LEVEL**

A classification at regional level has been developed in order to maintain a backwards compatibility with the existing typologies and to compare the results with previous works.

#### **5.3.1. Aggregation to NUTS3 and NUTS2 levels**

Table 6 detailed the methodology used to aggregate the results obtained at local level (LAU2) to the regional level (NUTS3 and NUTS2).

The regions (NUTS3 or NUTS2) are first classified in 3 classes on the basis of the share of population living in rural communes (communes with less than 150 inhab./km<sup>2</sup> or located in urban centres) as developed in the OECD methodology:

- Rural regions: more than 50 % of the population is living in a rural commune.

- Intermediate regions: between 15 and 50 % of the population is living in a rural commune.
- Urban regions: less than 15 % of the population is living in a rural commune.

However, if there is an urban centre<sup>26</sup> with a total population above 200.000 inhabitants representing no less than 25 % of the regional population in a “rural” region, this region is re-classified as “intermediate” and if there is an urban centre with a total population above 500.000 inhabitants representing no less than 25 % of the regional population in an “intermediate” region, the region is re-classified as “urban”.

The “rural” regions are then discriminated in 2 classes on the basis of the share of population living in *rural-peripheral* communes (*rural-peripheral regions* and *rural-accessible regions*). The “intermediate” regions are discriminated on the basis of the share of population living in *urban-open space* communes (*intermediate-open space regions* and *intermediate-closed space regions*) as well as the “urban” regions (*urban-open space regions* and *urban-closed space regions*).

According to this methodology, six classes of NUTS3 and NUTS2 regions have been created:

- rural-peripheral,
- rural-accessible,
- intermediate-open space,
- intermediate-closed space,
- urban-open space,
- urban-closed space.

Similarly to what was observed for the typology implemented at LAU2, the regional (NUTS3 and NUTS2) typology improves the OECD typology by discriminating each of the three OECD classes (rural, intermediate and urban) in two sub-classes according to the accessibility and to the land cover criteria.

Table 6. Rural typology at regional level (NUTS3 or NUTS2)

N°	CRITERION 1	CRITERION 2	CRITERION 3	SUB-CATEGORIES	CODE
	% of population living in rural communes	% of population living in rural-peripheral communes (class RP)	% of population living in urban-open space communes (class UO)		
1	>= 50 %	> 50 %	—	Rural - peripheral regions	RPR
2	>= 50 %	<= 50 %	—	Rural - accessible regions	RAR
3	>= 15 % and < 50 %	—	> 50 %	Intermediate - open space regions	IOR
4	>= 15 % and < 50 %	—	<= 50 %	Intermediate - closed space regions	ICR
5	< 15 %	—	> 50 %	Urban - open space regions	UOR
6	< 15 %	—	<= 50 %	Urban - closed space regions	UCR

<sup>26</sup> As in point 2.1, an “urban centre” is here defined as a local unit LAU2 with a population density above 150 inhabitants per km<sup>2</sup> and total population above 200 000 inhabitants. Contrary to the peripherality analysis, these urban centres are not derived from the Urban Audit database.

Map 6 displays the rural typology at NUTS3 level and map 7 displays the rural typology at NUTS2 level. Given the size of the NUTS2 units, map 7 does not provide a good picture of the rural character in Europe. For example in FR, majority of NUTS2 regions are classified as intermediate with closed space although at LAU2 level, most of the French communes are characterized as rural.

### 5.3.2. Validation with socio-economic indicators

The results obtained from the aggregation to NUTS3 and NUTS2 are compared with 3 socio-economic indicators: population, gross value added (GVA) and employment. This comparison is summarized in tables 8.1 to 8.4 for the NUTS3 level and table 9.1 to 9.4 for the NUTS2 level.

For example in BE, NUTS3 regions classified as rural-peripheral account for 3.4 % of the territory, 0.4 % of the Belgian population and 0.2 % of the GVA. At the opposite, the urban closed-space NUTS3 account for 43.4 % of the territory, 75.6 % of the population and 82.1 % of the GVA.

Analysing tables 8.1 to 9.4 shows that whatever the NUTS level considered:

- Rural peripheral regions have a similar share of EU-27 territory as rural accessible regions do but a lower share of the EU-27 population, GVA and employment than rural regions close to a city do.
- Intermediate open space regions have a significantly lower share of the EU-27 territory, population, GVA and employment than intermediate closed space regions do.
- Urban open space regions have also a significantly lower share of the EU-27 territory, population, GVA and employment than urban closed space regions do.

Figures in table 8.1 to 9.4 does not allow an easy analyse given the fact that the share of population is closely correlated to the share of GVA and employment. It could be interesting to compare the results obtained at regional level with other indicators like GDP<sup>27</sup> per head, growth of population, employment rate which could probably conduct to better analyse the different class distributions amongst the different countries.

The reader should note that the averages in tables 8.1 to 9.4 are based on the aggregation of EU-LAU2 classified in one of the four rural typology classes. Given that several EU-LAU2 units have not been classified due to missing data, some NUTS3 and NUTS2 averages are thus based on a fewer number of LAU2 that existing really as for example in the Netherlands<sup>28</sup>.

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<sup>27</sup> GDP : Gross Domestic Product.

<sup>28</sup> Regions not classified are regions which contain only LAU2 units not classified according to the new rural typology at LAU2.



### Importance of Rural Areas – LAU2

Country	Table 7.1. % LAU2 classified as rural/urban areas 2006					Table 7.2. % Territory in rural/urban areas 2006				
	RP	RA	UO	UC	Not classified	RP	RA	UO	UC	Not classified
Belgium	2.9	22.2	29.9	45.0		6.6	33.9	28.5	31.1	
Bulgaria					100.0					100.0
Czech Republic	17.2	71.1	9.9	1.8		20.5	62.4	13.3	3.9	
Denmark	38.4	36.6	13.4	11.2	0.4	44.1	40.8	11.8	3.3	< 0.1
Germany	11.6	59.9	24.2	4.2	0.1	11.1	53.4	28.4	6.9	0.1
Estonia	57.9	22.7	0.4	18.6	0.4	74.6	23.8	< 0.1	1.5	< 0.1
Ireland	57.6	22.8	1.9	16.7	0.9	67.6	27.6	1.7	1.4	1.7
Greece	61.3	21.6	8.1	8.8	0.2	73.5	21.4	4.4	0.6	0.1
Spain	48.8	39.5	8.3	3.0	0.4	58.3	33.0	7.0	1.2	0.5
France	25.3	59.3	9.8	5.6	< 0.1	32.2	55.3	8.7	3.9	< 0.1
Italy	24.3	36.6	31.1	7.7	0.2	34.2	36.4	25.6	3.7	0.2
Cyprus	21.9	69.2	3.8	5.2		23.2	67.0	3.9	5.8	
Latvia	72.4	17.9	2.0	7.7		79.9	18.2	0.3	1.5	
Lithuania	51.9	35.0	2.1	9.4	1.5	57.8	38.1	1.3	1.9	0.9
Luxembourg	4.2	64.4	22.9	8.5		9.0	66.5	17.6	6.9	
Hungary	35.9	56.5	6.3	1.4		36.9	50.8	10.6	1.7	
Malta			29.4	70.6				56.3	43.7	
Netherlands		14.5	59.1	25.4	1.0		30.8	53.7	14.4	1.1
Austria	27.4	54.0	12.4	5.9	0.2	44.1	46.2	6.7	2.6	0.4
Poland	23.5	56.0	12.0	8.4	< 0.1	29.4	61.1	6.5	3.0	< 0.1
Portugal	55.4	7.9	25.7	11.0	< 0.1	78.6	7.8	10.6	3.0	< 0.1
Romania	30.1	59.1	8.0	1.6	1.2	36.7	53.2	5.5	0.9	3.6
Slovenia	31.3	51.0	17.7			38.2	49.7	12.1		
Slovakia	30.7	57.5	10.2	1.6		31.8	53.9	12.6	1.7	
Finland	63.4	27.2	3.3	4.2	1.8	84.8	13.6	0.8	0.6	0.3
Sweden	56.1	30.8	6.9	5.9	0.3	84.3	12.0	3.4	0.3	< 0.1
United Kingdom	5.0	19.0	18.2	57.8	0.1	34.0	44.8	13.1	7.9	0.2
<b>EU27</b>	26.2	48.3	14.4	10.9	excl. BG	47.8	38.5	10.3	3.1	excl. BG
<b>EU15</b>	25.9	45.8	15.7	12.5		50.6	34.5	11.4	3.4	
<b>EU12</b>	28.0	59.7	8.8	3.4	excl. BG	38.7	51.7	6.6	2.1	excl. BG
<b>EU25</b>	26.1	48.0	14.6	11.1		48.5	37.6	10.5	3.2	

Country	Table 7.3. % Population in rural/urban areas 2001				
	RP	RA	UO	UC	Not classified
Belgium	0.8	7.7	20.8	70.6	
Bulgaria	n.a.	n.a.	n.a.	n.a.	
Czech Republic	5.6	24.2	32.3	37.9	
Denmark	21.3	19.3	28.7	30.7	< 0.1
Germany	2.7	16.3	38.9	42.1	< 0.1
Estonia	19.6	12.4	0.1	67.9	< 0.1
Ireland	27.5	16.3	8.8	47.1	0.3
Greece	27.0	11.5	19.7	41.6	0.2
Spain	12.4	14.1	34.2	38.7	0.5
France	6.6	21.5	18.3	53.5	< 0.1
Italy	7.7	13.0	45.0	34.2	0.1
Cyprus	2.4	19.3	8.8	69.5	
Latvia	23.9	10.4	2.1	63.6	
Lithuania	n.a.	n.a.	n.a.	n.a.	
Luxembourg	2.2	25.8	29.1	43.0	
Hungary	16.3	27.0	31.9	24.8	
Malta			19.5	80.5	
Netherlands		7.2	38.5	54.1	0.2
Austria	13.5	28.3	19.2	38.9	0.1
Poland	11.0	29.3	16.0	43.7	< 0.1
Portugal	19.5	5.5	27.5	47.5	< 0.1
Romania	14.8	32.8	25.5	26.4	0.6
Slovenia	18.0	37.3	44.7		
Slovakia	11.9	28.5	40.1	19.5	
Finland	32.6	23.5	12.7	31.1	0.1
Sweden	36.3	22.8	17.3	23.5	0.1
United Kingdom	1.9	9.5	15.0	73.5	< 0.1
<b>EU27</b>	8.8	17.5	28.0	45.5	excl. BG, LT
<b>EU15</b>	7.9	14.8	29.2	47.9	
<b>EU12</b>	12.4	28.5	23.2	35.8	excl. BG, LT
<b>EU25</b>	8.5	16.8	28.2	46.4	excl. LT

Note: the total for:

- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

### Importance of Rural Areas – NUTS3

Country	Table 8.1. % Territory in rural/urban areas 2006							Table 8.2. % Population in rural/urban areas 2001						
	RPR	RAR	IOR	ICR	UOR	UCR	Not classified	RPR	RAR	IOR	ICR	UOR	UCR	Not classified
Belgium	3.4	21.0	5.6	15.0	11.5	43.4		0.4	3.8	2.8	8.3	9.1	75.6	
Bulgaria							100.0							100.0
Czech Republic		8.7	5.0	85.7		0.6			5.0	5.8	77.8		11.4	
Denmark	33.1	38.8	13.6	10.0	3.3	1.2		19.2	24.0	14.4	13.0	8.0	21.4	
Germany	3.3	31.9	27.1	18.0	13.0	6.7		1.0	11.7	18.4	11.2	20.7	37.0	
Estonia	20.9			71.5		7.7		10.5			76.4		13.1	
Ireland	41.0	57.7				1.3		27.8	43.6				28.6	
Greece	58.7	15.3	10.8	12.4		2.9		29.1	8.4	9.6	17.3		35.5	
Spain	18.4	27.3	14.4	26.0	5.3	8.6		4.2	10.2	17.0	22.1	7.2	39.1	0.2
France	11.1	26.2	1.4	56.9		4.5		2.9	12.0	1.1	55.5		28.6	
Italy	11.1	15.6	34.8	14.4	14.1	10.0		3.3	6.1	25.4	13.2	20.3	31.7	
Cyprus				100.0							100.0			
Latvia	23.6	32.3		43.6		0.5		10.8	27.4		29.7		32.2	
Lithuania	13.6	19.6		52.0		14.9		8.9	10.7		55.2		25.2	
Luxembourg				100.0							100.0			
Hungary	25.3	32.7	17.4	24.1		0.6		15.9	25.7	14.9	26.1		17.4	
Malta						100.0							100.0	
Netherlands		5.3	17.8	19.5	25.0	32.5			1.9	8.0	9.5	23.4	57.3	
Austria	26.2	52.5	2.3	17.6		1.4		9.9	36.9	3.3	27.3		22.6	
Poland		70.8	2.9	23.8	0.8	1.7			44.6	5.0	27.6	2.7	20.1	
Portugal	69.5	2.6	4.9	15.0	1.4	6.6		20.6	2.3	8.1	17.4	5.2	46.5	
Romania	13.0	51.8	13.1	22.1		0.1		7.6	44.2	14.3	24.9		9.0	
Slovenia	9.8	60.6	29.6					7.4	50.3	42.3				
Slovakia		32.2	9.2	54.4		4.2			25.6	11.3	52.0		11.1	
Finland	56.9	36.4		4.7		2.0		20.2	42.4		12.2		25.2	
Sweden	71.6	12.0	5.9	8.9		1.6		23.2	15.9	10.8	29.4		20.6	
United Kingdom	15.6	8.5		52.1	0.2	23.5		0.8	1.3		25.7	0.5	71.7	
<b>EU27</b>	24.9	28.9	9.8	27.2	3.2	6.0	excl. BG	4.6	14.7	10.8	25.3	8.2	36.3	excl. BG
<b>EU15</b>	29.7	23.9	10.6	24.7	4.1	7.1		4.7	9.7	11.3	22.8	10.0	41.5	
<b>EU12</b>	9.2	45.5	7.2	35.6	0.2	2.3	excl. BG	4.3	34.5	8.9	35.1	1.1	16.0	excl. BG
<b>EU25</b>	25.6	27.5	9.6	27.5	3.4	6.3		4.5	13.3	10.6	25.4	8.5	37.6	

Country	Table 8.3. % GVA in rural/urban areas 2005							Table 8.4. % Employment in rural/urban areas 2005						
	RPR	RAR	IOR	ICR	UOR	UCR	Not classified	RPR	RAR	IOR	ICR	UOR	UCR	Not classified
Belgium	0.2	2.3	1.9	5.5	7.9	82.1		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Bulgaria							100.0							100.0
Czech Republic		4.2	4.7	67.1		24.0			4.6	5.3	73.3		16.8	
Denmark	16.2	21.9	13.4	10.7	6.8	30.9		17.2	23.3	14.7	11.3	6.4	27.0	
Germany	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Estonia	6.4			85.3		8.3		9.2			79.5		11.4	
Ireland	19.3	40.0				40.8		25.7	41.5				32.8	
Greece	22.4	5.7	7.2	15.8		48.8		26.5	7.9	10.1	18.1		37.4	
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
France	2.2	9.4	0.9	48.9		38.6		2.7	11.2	1.1	53.1		31.9	
Italy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Cyprus				100.0							100.0			
Latvia	6.2	18.1		18.3		57.4		10.0	28.5		25.8		35.7	
Lithuania	5.4	8.0		50.6		35.9		8.9	10.0		54.1		27.1	
Luxembourg				100.0							100.0			
Hungary	9.7	18.7	10.5	25.1		35.9		13.5	23.8	13.0	24.6		25.1	
Malta						100.0							100.0	
Netherlands		1.4	6.2	9.9	21.5	61.0			1.7	6.9	9.1	22.8	59.6	
Austria	6.9	27.9	3.7	30.6		30.9		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Poland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Portugal	15.5	1.9	5.7	15.9	3.9	57.0		19.5	2.2	7.9	17.9	5.3	47.2	
Romania	5.9	33.6	15.7	25.2		19.7		6.3	43.6	13.2	27.1		9.8	
Slovenia	5.7	42.9	51.4					6.3	47.5	46.1				
Slovakia		20.4	9.8	42.4		27.3			22.5	11.7	46.3		19.5	
Finland	15.2	37.4		11.7		35.6		17.8	39.5		11.9		30.8	
Sweden	20.2	13.4	9.3	28.0		29.0		21.4	14.8	10.1	29.6		24.1	
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
<b>EU27</b>	6.5	12.3	4.2	31.1	3.5	42.4	excl. BG,DE,ES,IT,PL,UK	8.6	16.8	6.6	35.7	2.5	29.8	excl. BE, BG, DE, ES, IT, AT, PL, UK
<b>EU15</b>	6.8	11.7	3.5	30.1	3.8	44.1	excl. DE, ES, IT, UK	9.9	12.2	4.6	33.5	3.7	36.1	excl. BE, DE, ES, IT, AT, UK
<b>EU12</b>	4.3	17.8	11.2	40.9		25.7	excl. BG, PL	5.9	26.4	10.8	40.4		16.6	excl. BG, PL
<b>EU25</b>	6.6	11.9	4.0	31.2	3.6	42.8	excl. DE, ES, IT, PL, UK	8.9	13.1	5.7	36.9	2.8	32.6	excl. BE, DE, ES, IT, AT, PL, UK

Note: the total for:

- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.



## Importance of Rural Areas – NUTS2

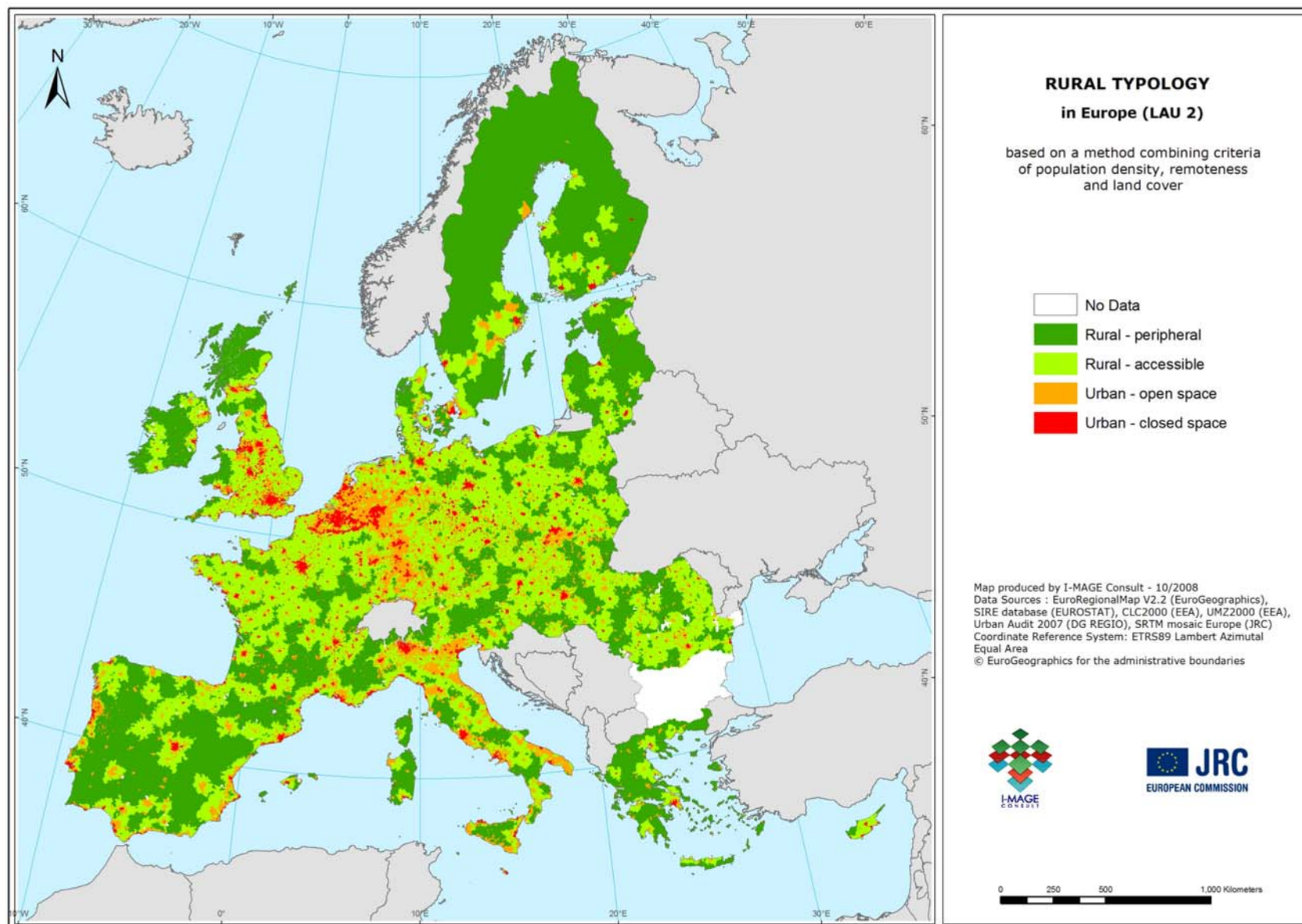
Country	Table 9.1. % Territory in rural/urban areas 2006							Table 9.2. % Population in rural/urban areas 2001						
	RPR	RAR	IOR	ICR	UOR	UCR	Not classified	RPR	RAR	IOR	ICR	UOR	UCR	Not classified
Belgium		14.5		24.6		60.9			2.4		14.3		83.3	
Bulgaria							100.0							100.0
Czech Republic				99.4		0.6					88.6		11.4	
Denmark		94.1				5.9			69.8				30.2	
Germany		7.0	11.2	57.2	10.6	14.0			3.4	9.9	36.5	16.2	34.0	
Estonia				100.0							100.0			
Ireland	47.2			52.8				26.4			73.6			
Greece	50.2	21.8		25.1		2.9		25.4	15.1		23.9		35.5	
Spain	8.4	16.0	5.4	46.5	15.6	8.1	< 0.1	2.7	4.5	6.5	36.9	19.0	30.2	0.2
France		7.8		87.7		4.5			4.0		70.4		25.5	
Italy	1.5	15.2	27.7	29.7	6.1	19.8		0.6	5.6	23.2	25.2	8.0	37.6	
Cyprus				100.0							100.0			
Latvia						100.0							100.0	
Lithuania				100.0							100.0			
Luxembourg				100.0							100.0			
Hungary		54.0		38.6		7.4			38.4		33.5		28.1	
Malta						100.0							100.0	
Netherlands			13.1	20.7	29.1	37.1				5.3	9.5	27.0	58.2	
Austria		73.6		25.9		0.5			52.8		27.9		19.3	
Poland		39.3		50.9		9.7			29.8		51.0		19.2	
Portugal				61.2		3.4					65.2		27.0	
Romania	35.5	57.8		41.4		0.8		7.9			33.5		10.3	
Slovenia		60.2	39.8						53.9	46.1				
Slovakia				95.8		4.2					88.9		11.1	
Finland	67.6	19.2		13.2				25.8	25.5		48.8			
Sweden	77.9	9.6		10.9		1.6		28.4	16.8		34.2		20.6	
United Kingdom	16.6			51.3		32.1		0.8			31.4		67.9	
<b>EU27</b>	19.0	18.0	3.9	45.9	3.4	9.7	excl. BG	2.2	10.9	5.4	40.6	6.3	34.5	excl. BG
<b>EU15</b>	24.7	13.6	4.8	43.1	4.5	9.3		2.7	6.1	6.6	37.8	7.9	38.9	
<b>EU12</b>		33.0	0.8	55.2		11.0	excl. BG		29.7	0.9	51.7		17.7	excl. BG
<b>EU25</b>	20.1	15.7	4.1	46.2	3.6	10.2		2.3	8.7	5.7	41.0	6.6	35.7	

Country	Table 9.3. % GVA in rural/urban areas 2005							Table 9.4. % Employment in rural/urban areas 2005						
	RPR	RAR	IOR	ICR	UOR	UCR	Not classified	RPR	RAR	IOR	ICR	UOR	UCR	Not classified
Belgium		1.7		10.3		88.0			2.1		12.1		85.8	
Bulgaria							100.0							100.0
Czech Republic				76.0		24.0					83.2		16.8	
Denmark		61.7				38.3			65.9				34.1	
Germany		3.3	9.6	30.3	17.0	39.9			3.4	9.8	33.8	16.7	36.3	
Estonia				100.0							100.0			
Ireland	18.3			81.7				24.7			75.3			
Greece	21.3	10.9		19.0		48.8		24.4	14.9		23.3		37.4	
Spain	1.7	3.6	5.7	31.1	19.8	38.0	0.1	2.1	4.0	5.9	32.5	19.7	35.5	0.2
France		3.3		62.9		33.8			3.8		68.3		27.9	
Italy	0.4	4.5	20.8	23.7	9.5	41.1		0.5	5.1	22.2	24.4	9.2	38.7	
Cyprus				100.0							100.0			
Latvia						100.0							100.0	
Lithuania				100.0							100.0			
Luxembourg				100.0							100.0			
Hungary		25.5		28.4		46.1			34.2		31.8		34.0	
Malta						100.0							100.0	
Netherlands			4.4	9.2	25.0	61.3				4.6	8.5	26.8	60.1	
Austria		44.7		27.9		27.4			52.4		28.7		18.9	
Poland		24.9		55.6		19.5			29.5		51.3		19.1	
Portugal				54.0		38.9					65.3		28.1	
Romania	7.1	45.0		33.4		21.6		6.5			31.9		10.8	
Slovenia		44.5	55.5						49.7	50.3				
Slovakia				72.7		27.3					80.5		19.5	
Finland	20.4	22.5		57.1				22.9	24.2		52.9			
Sweden	24.5	14.3		32.2		29.0		26.4	15.4		34.1		24.1	
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
<b>EU27</b>	2.2	7.5	6.6	36.2	9.0	38.4	excl. BG, UK	2.3	11.7	6.2	40.0	7.8	32.0	excl. BG, UK
<b>EU15</b>	2.4	6.6	6.9	35.0	9.7	39.5	excl. UK	2.9	7.1	7.5	37.2	9.9	35.4	excl. UK
<b>EU12</b>		20.4	2.4	52.7		24.5	excl. BG		29.0	1.2	50.6		19.2	excl. BG
<b>EU25</b>	2.3	7.2	6.7	36.2	9.1	38.6	excl. UK	2.4	9.2	6.5	40.5	8.3	33.1	excl. UK

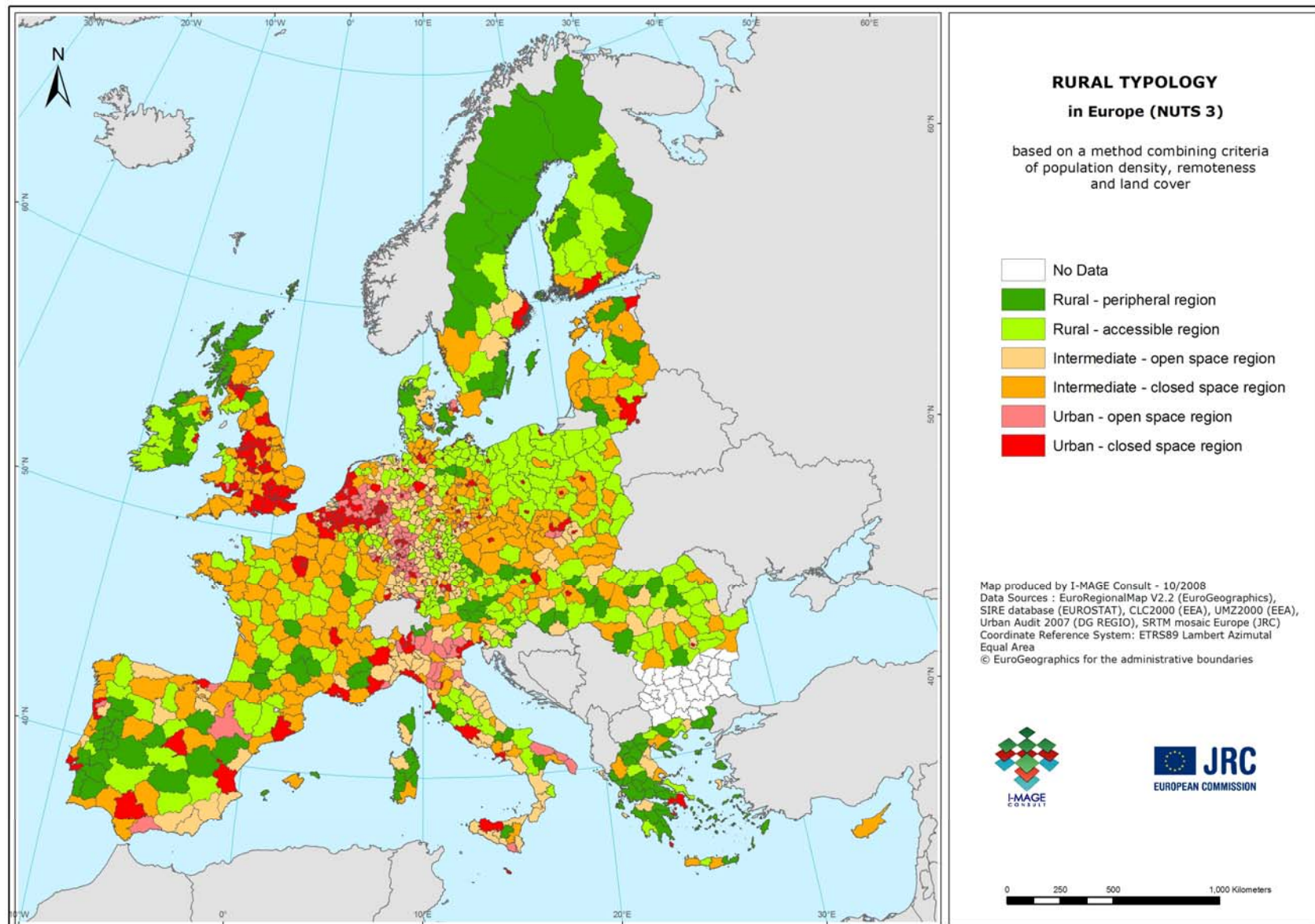
Note: the total for:

- Denmark (and therefore the European aggregates) does not include the Faeroe islands ;
- Spain (and therefore the European aggregates) does not include the Canaries ;
- France (and therefore the European aggregates) does not include the overseas departments and territories ;
- Portugal (and therefore the European aggregates) does not include the Azores and Madeira ;
- The United Kingdom (and therefore the European aggregates) does not include Gibraltar.

Map 5. Rural-Urban typology of LAU2 local units in Europe

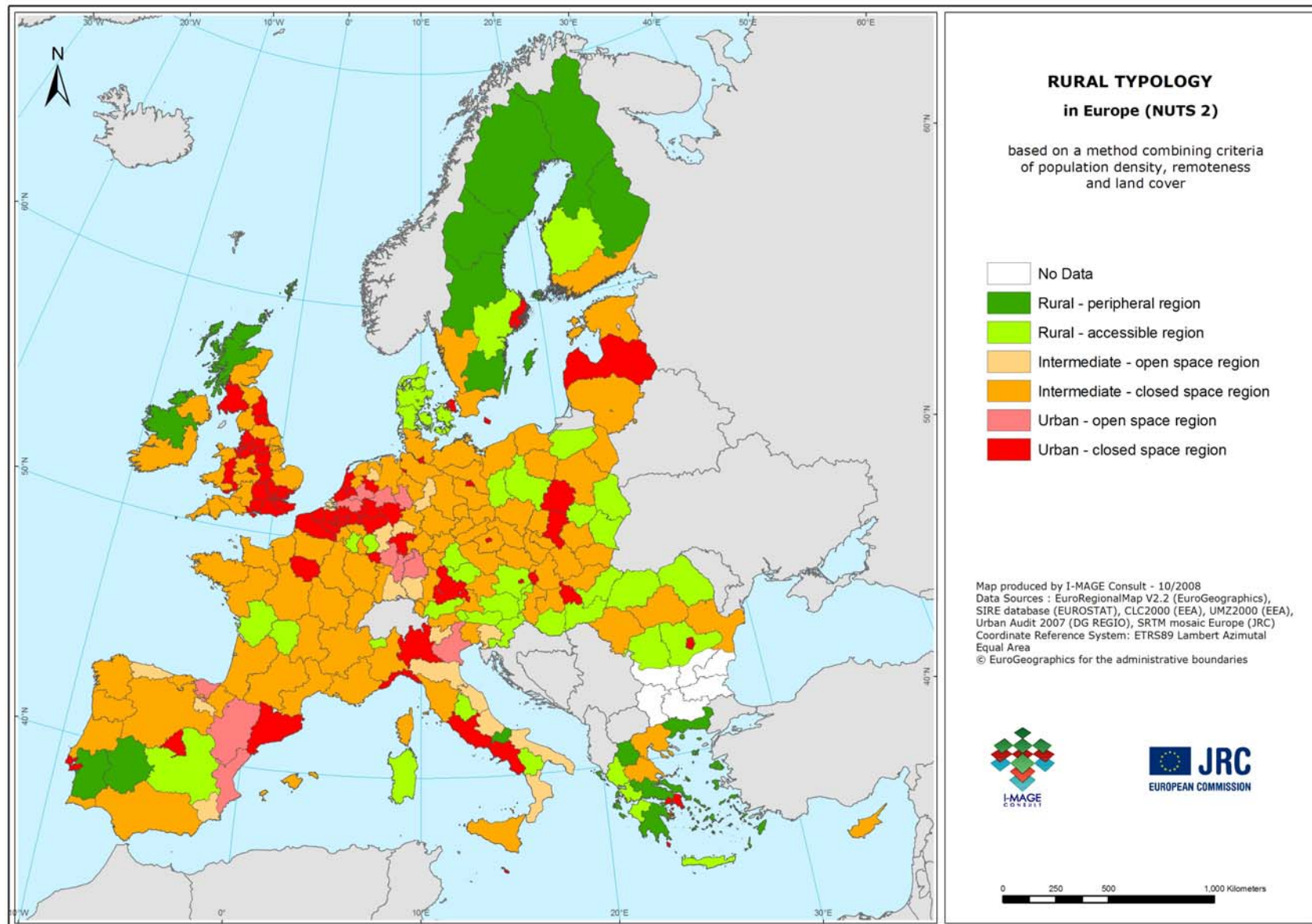


Map 6. Rural-urban typology of NUTS3 regions in Europe





Map 7. Rural-urban typology of NUTS2 regions in Europe



## 6. CONCLUSION

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In the context of the Common Agricultural Policy (CAP) reform and in particular for the rural development policy, the definition of rural/urban areas is a requisite for the broad targeting of resources. However, currently, there is no commonly agreed definition of the rural areas at European level: the European Commission still uses the typology which was developed in 1994 by the Organisation for Economic Co-operation and Development (OECD, 1994) and which represents a simple territorial scheme that classifies a region as rural based only on its population density.

The overall objective of this study was to propose a methodology to improve current delimitations of rural areas in Europe at commune level (Local Administrative Unit 2) by developing a 'simple' classification namely a categorisation which is straightforward and applicable both at Member State level and at European level. Simple queries were applied with standard procedures using Pan-European homogeneous datasets which allow for upscaling of assessment at European level.

This report is focused on the implementation of a peripherality index and a land cover index and their integration in the OECD classification in order to improve the characterisation of rural areas at commune level. As an indicator of peripherality, the travel time by road network to urban centres has been used, including speed limits for different road categories and two impedance factors (a congestion index and a slope index). The land cover index to assess the "natural" (non-artificial) character of a LAU2 was based on Corinne Land Cover (2000) information as developed in the study conducted by Vard et al. (2005).

Different thresholds of peripherality/accessibility and land cover have been tested for three selected countries (BE, CZ and IE) in order to fit as much as possible to the particularities (spatial and demographic) of the EU Member States (see Annex 2). Concerning the accessibility, a threshold of "45 minutes travel time to reach an urban centre with at least 50 000 inhabitants" has finally been selected to classify a commune as "remote" or "close to an urban centre". For the land cover criterion, the threshold of 75 % has been chosen: a commune is classified as an "open space" commune if at least 75 % of its area is covered by forest, agricultural or natural areas. Otherwise, the commune is characterised as "closed space".

Both indicators have then been integrated in the OECD classification in order to develop a new rural typology at LAU2 level. The proposed typology is composed of 4 classes: *rural peripheral*, *rural accessible*, *urban with open space* and *urban with closed space*.

The study demonstrates that the introduction of a peripherality index and a land cover index improve the basic OECD typology by discriminating the original rural class in 2 sub-classes, *rural peripheral* and *rural accessible*, and the urban class in *urban with open space* and *urban with closed space*. These distinctions are highly policy relevant and should be validated with socio-economic indicators. Unfortunately, relevant socio-economic indicators are not available at local level.

A classification at regional level (NUTS3 and NUTS2) has been conducted in order to allow comparison with similar works and with regional statistics on socio-economic indicators (population, GVA and employment).

The methodology developed in this report is flexible and the thresholds of accessibility or land cover implemented in this study can easily be modified to better fit to specific needs of the user or local conditions found in given countries.

Moreover, some improvements can be made on the proposed methodology:

- A lot of time has been devoted during this work to the harmonisation of the data. The lack of homogeneity/update and the numerous errors found in the datasets prevent a real efficiency in conducting such analyses.
- The results of the peripherality analysis are highly depending upon the quality of the network dataset (roads). A more detailed dataset could certainly leads to a more precise classification.
- Topography has been taken into account in the peripherality analysis by using a digital elevation model (SRTM - 200 m). Local road slope information (e.g. measured in the field and only in hilly areas) should be collected and used in order to reduce the GIS processing time and enhance the accuracy.
- The impact of boundaries on transborder movements could be assessed and integrated in the peripherality analysis.
- Results of the population density analysis and land cover analysis are bound to the size of the local administrative units which is highly variable between EU-27 countries. Improvements should be tested in order to eliminate this dependence (e.g. by working at raster cell level which would allow to be independent from the country administrative boundaries).

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## **ANNEXES**

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**Annex 1. CORRESPONDENCE TABLE BETWEEN THE COUNTRY CODES AND THE COUNTRY NAMES**

<b>COUNTRY CODE</b>	<b>COUNTRY NAME</b>	<b>COUNTRY ENGLISH NAME</b>
<b>BE</b>	Belgique/België	Belgium
<b>BG</b>	Bългария	Bulgaria
<b>CZ</b>	Česká Republika	Czech Republic
<b>DK</b>	Danmark	Denmark
<b>DE</b>	Deutschland	Germany
<b>EE</b>	Eesti	Estonia
<b>GR</b>	Ελλάδα	Greece
<b>ES</b>	España	Spain
<b>FR</b>	France	France
<b>IE</b>	Ireland	Ireland
<b>IT</b>	Italia	Italy
<b>CY</b>	Kypros	Cyprus
<b>LV</b>	Latvija	Latvia
<b>LT</b>	Lietuva	Lithuania
<b>LU</b>	Luxembourg	Luxembourg
<b>HU</b>	Magyarország	Hungary
<b>MT</b>	Malta	Malta
<b>NL</b>	Nederland	Netherlands
<b>AT</b>	Österreich	Austria
<b>PL</b>	Polska	Poland
<b>PT</b>	Portugal	Portugal
<b>RO</b>	România	Romania
<b>SI</b>	Slovenija	Slovenia
<b>SK</b>	Slovenská Republika	Slovakia
<b>FI</b>	Suomi/Finland	Finland
<b>SE</b>	Sverige	Sweden
<b>UK</b>	United Kingdom	United Kingdom
<b>EU-27</b>		European Union (27 countries)
<b>EU-15</b>		European Union (15 countries)
<b>EU-12</b>		New Member States (CZ, BG, EE, CY, LV, LT, HU, MT, PL, RO, SI, SK)
<b>EU-25</b>		European Union (25 countries) without BG & RO

Source : Rural Development in the European Union. Statistical and Economic Information. Report 2007.

## Annex 2. MAIN RESULTS OF THE INTERMEDIATE REPORT

This annex resumes the main results developed in the intermediate report in order to improve the typology by testing different thresholds for the peripherality index and the land cover index. Results presented in the tables hereafter do not allow a direct comparison with results presented in this final report. Indeed, improvements have been requested during the intermediate meeting that led to modifications of the approach used previously.

### A. PERIPHERLITY ANALYSIS

*Table 10. Number of Belgian remote communes located at more than 30, 45 or 60 minutes from the nearest cities with at least 50 000 or 100 000 inhabitants*

	TRAVEL TIME		
URBAN CENTRES	30 minutes	45 minutes	60 minutes
50 000 inhabitants	197 (33.4%) Pop : 19.9%	53 (9.0%) Pop : 3%	25 (4.2%) Pop : 1.3%
100 000 inhabitants	226 (38.4%) Pop : 25%	65 (11.0%) Pop : 5.1%	25 (4.2%) Pop : 1.3%

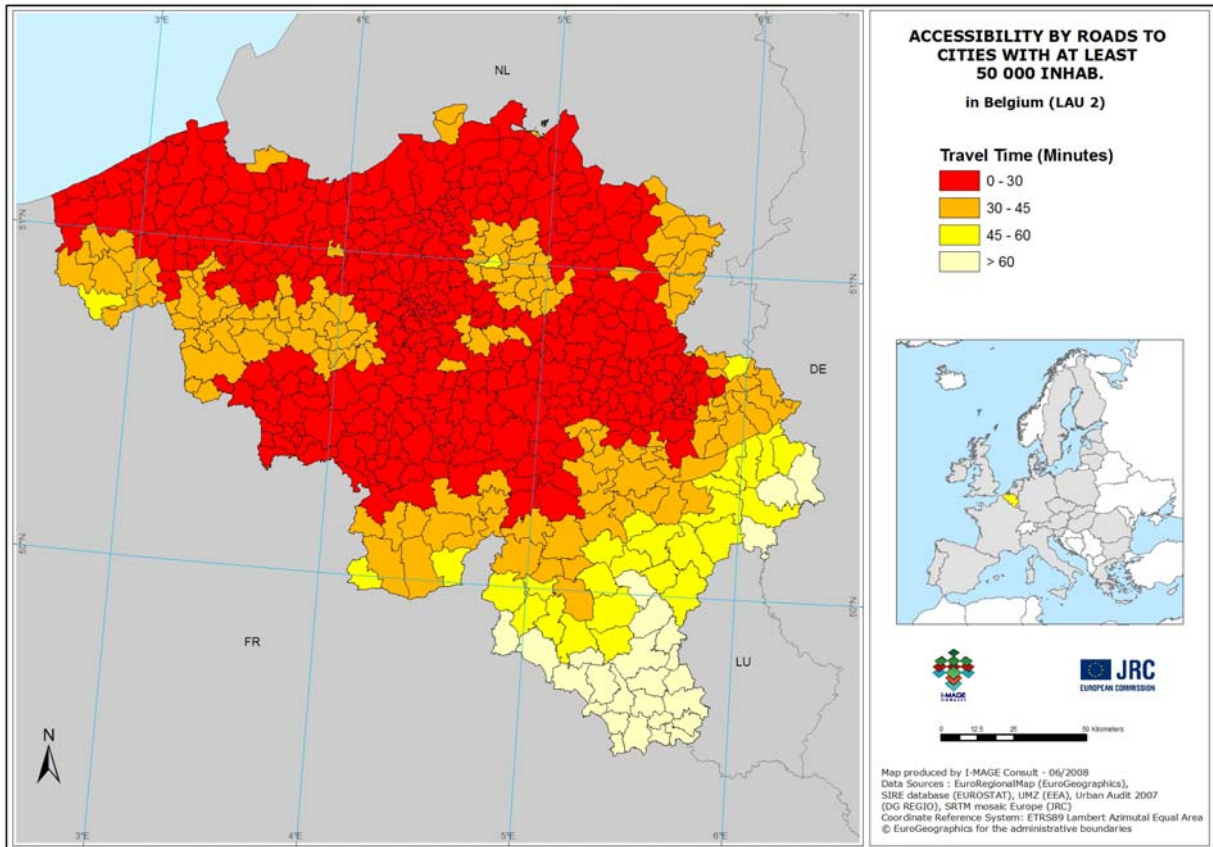
*Table 11. Number of Irish remote communes located at more than 30, 45 or 60 minutes from the nearest cities with at least 50 000 or 100 000 inhabitants*

	TRAVEL TIME		
URBAN CENTRES	30 minutes	45 minutes	60 minutes
50 000 inhabitants	2613 (76.0%) Pop : 49.8%	2069 (60.1%) Pop : 38.3%	1400 (40.7%) Pop : 24.8%
100 000 inhabitants	2915 (84.7%) Pop : 59.6%	2670 (77.6%) Pop : 52.0%	2291 (66.6%) Pop : 43.6%

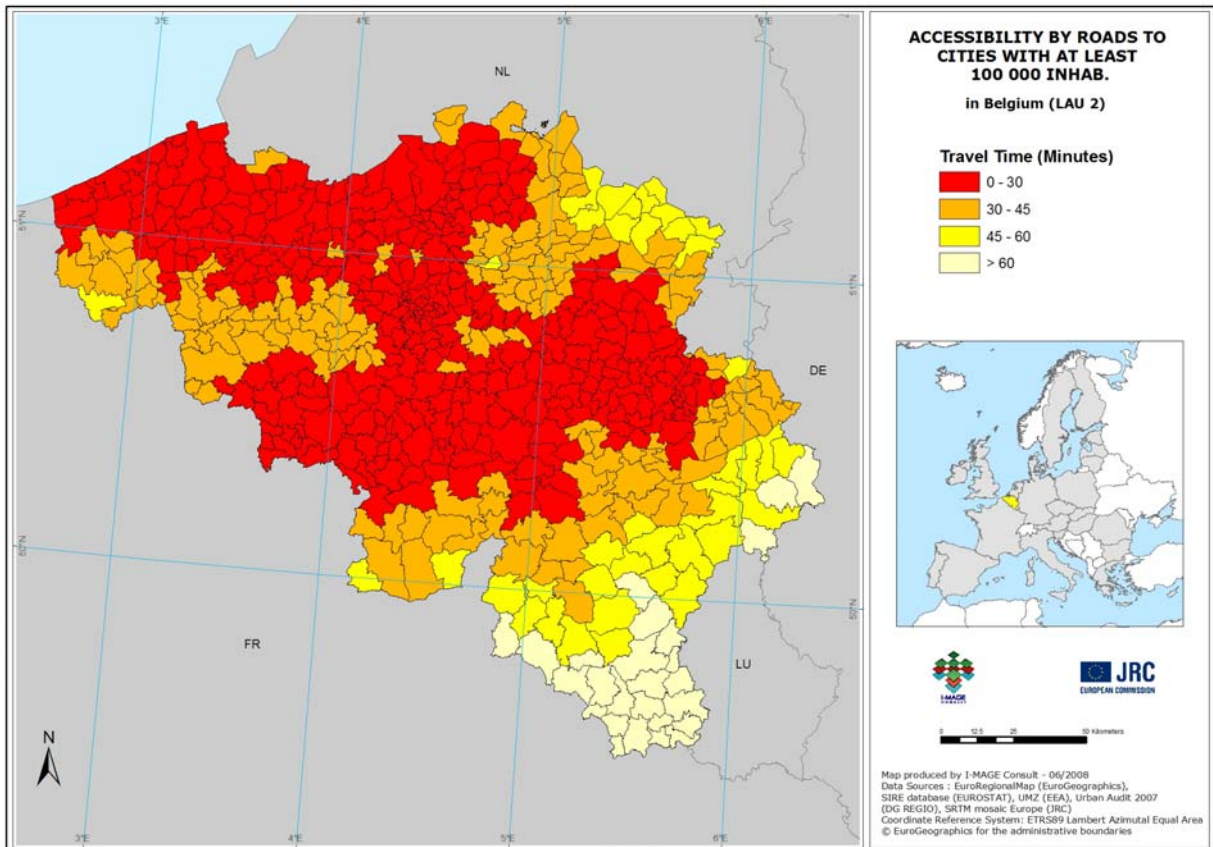
*Table 12. Number of remote Czech communes located at more than 30, 45 or 60 minutes from the nearest cities with at least 50 000 or 100 000 inhabitants*

	TRAVEL TIME		
URBAN CENTRES	30 minutes	45 minutes	60 minutes
50 000 inhabitants	3898 (62.3%) Pop : 38.3%	1511 (24.1%) Pop : 13.8%	290 (4.6%) Pop : 2.6%
100 000 inhabitants	5370 (85.8%) Pop : 63.7%	4091 (65.4%) Pop : 50.1%	2802 (44.8%) Pop : 34.5%

Map 8. Accessibility by roads to cities with at least 50 000 inhabitants in BE (LAU2)

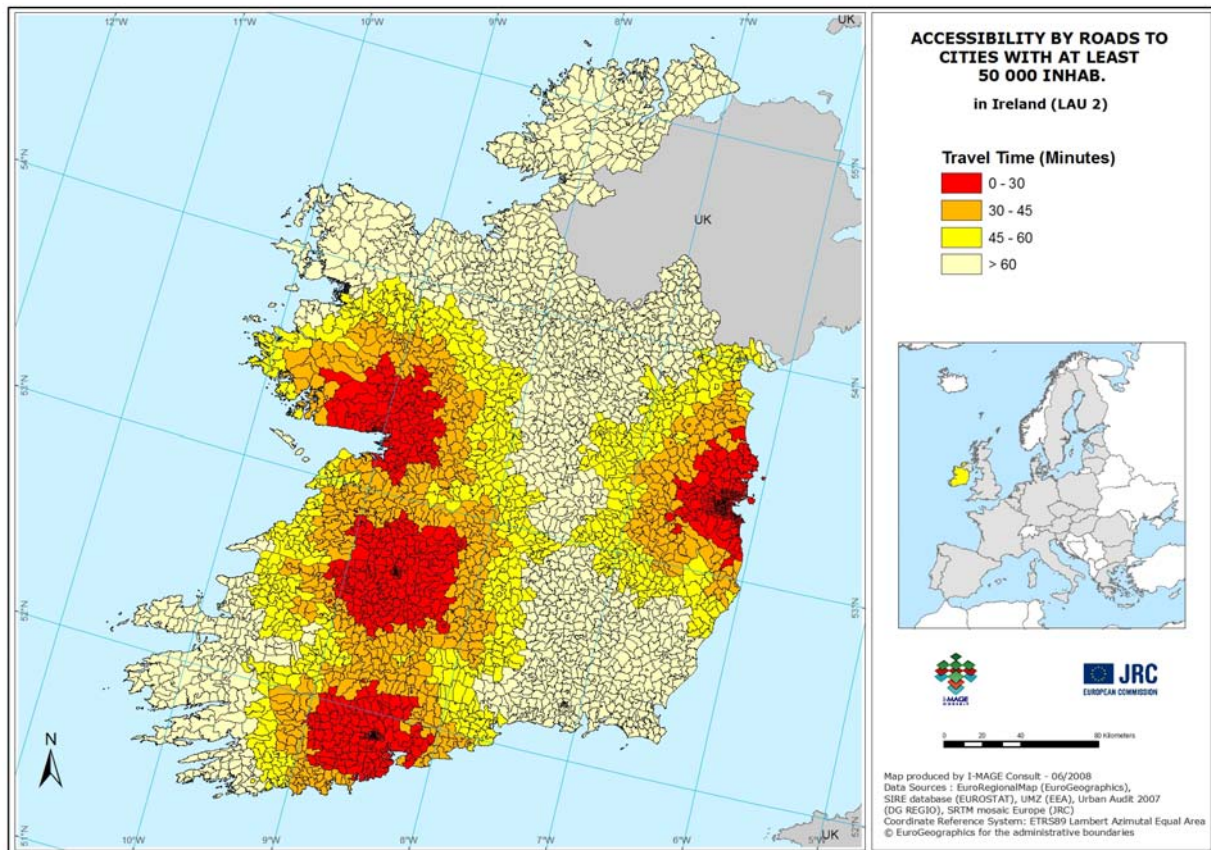


Map 9. Accessibility by roads to cities with at least 100 000 inhabitants in BE (LAU2)

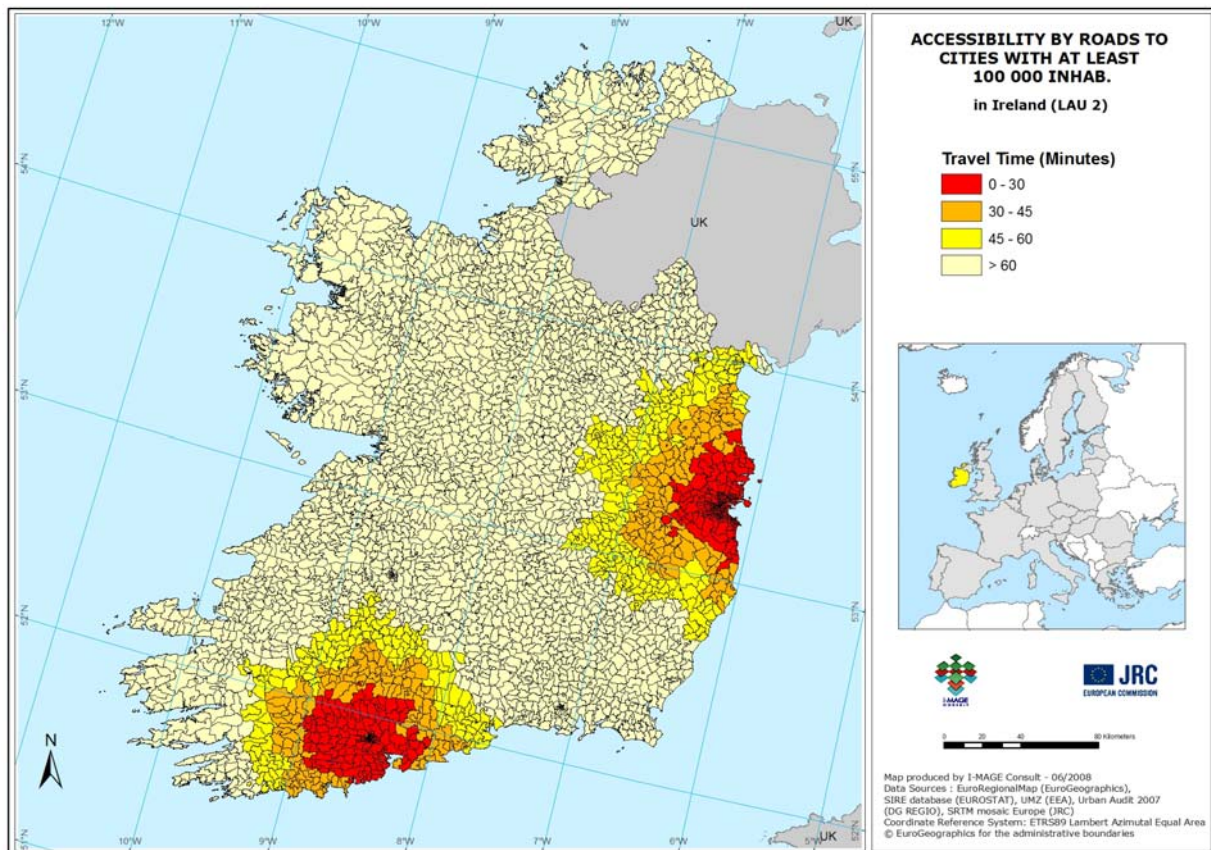




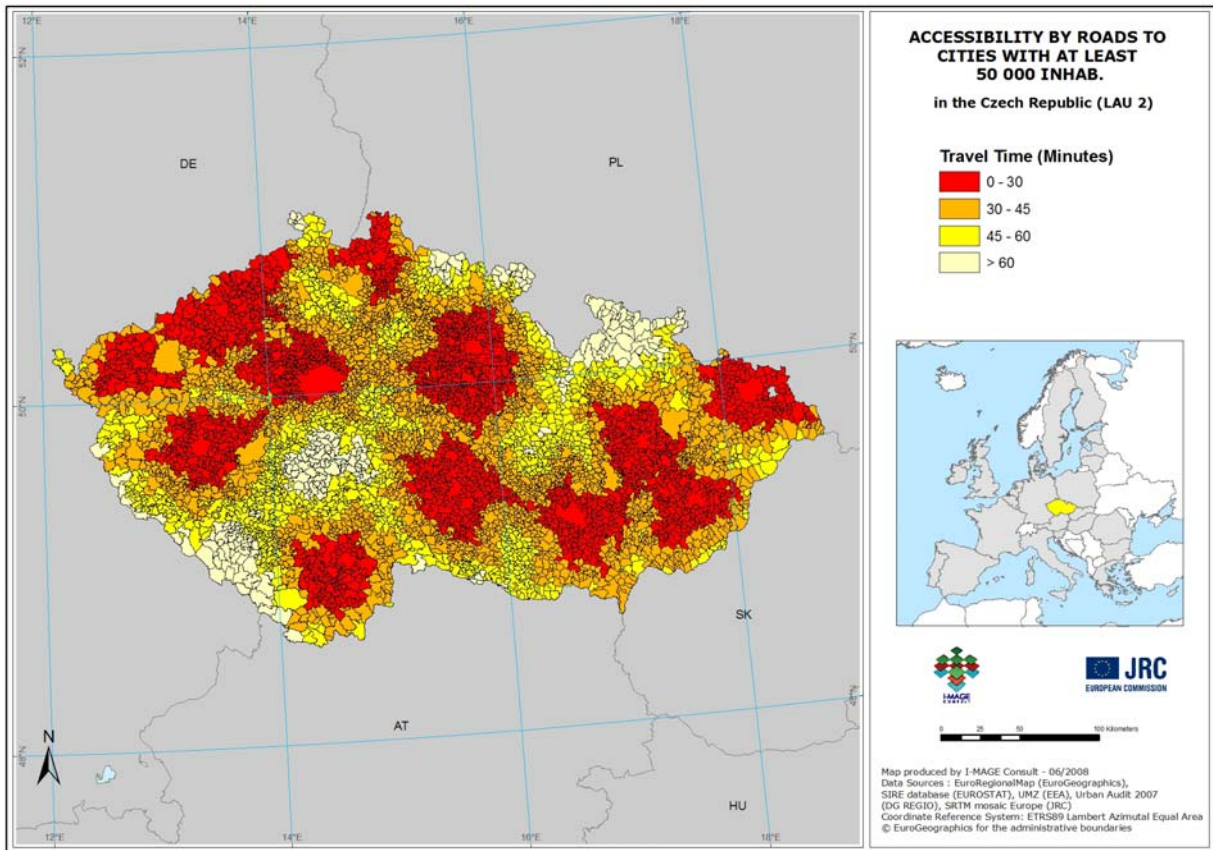
Map 10. Accessibility by roads to cities with at least 50 000 inhabitants in IE (LAU2)



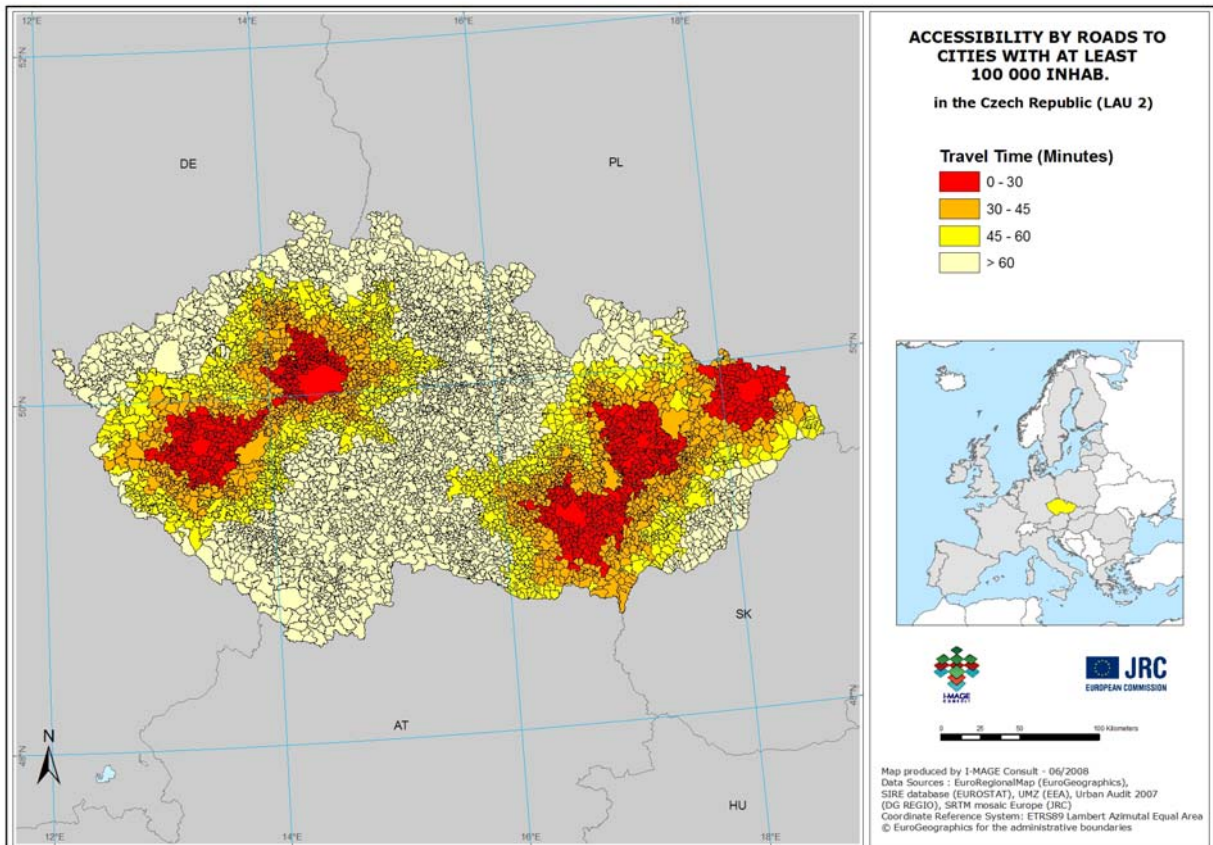
Map 11. Accessibility by roads to cities with at least 100 000 inhabitants in IE (LAU2)



Map 12. Accessibility by roads to cities with at least 50 000 inhabitants in CZ (LAU2)



Map 13. Accessibility by roads to cities with at least 100 000 inhabitants in CZ (LAU2)





## B. LAND COVER ANALYSIS

Table 13. Number of “rural” communes with the Land Cover approach and with the population density method

	LAND COVER APPROACH				POPULATION DENSITY METHOD (OECD)
	90 %	85 %	80 %	75 %	
Belgium	98 (16.6%)	172 (29.2%)	251 (42.6%)	324 (55.0%)	150 (25.5%)
Ireland	2753 (80.0%)	2788 (81.0%)	2815 (81.8%)	2838 (82.5%)	2805 (81.5%)
Czech Republic	5409 (86.4%)	5868 (93.8%)	6046 (96.6%)	6121 (97.8%)	5539 (88.5%)

Table 14. Share of area of “rural” communes with the Land Cover approach

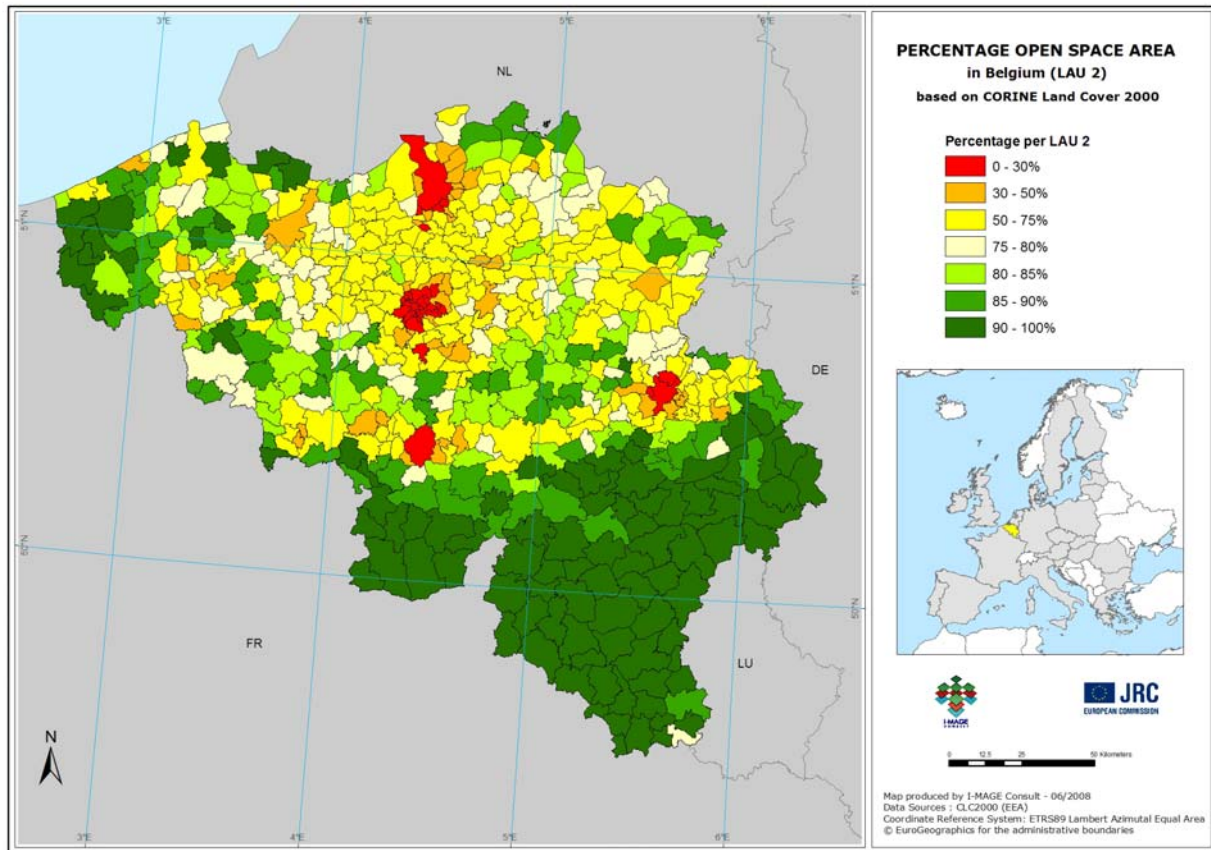
	LAND COVER APPROACH CURRENT STUDY				LAND COVER APPROACH VARD ET AL.
	90 %	85 %	80 %	75 %	
Belgium	30.5 %	45.3 %	57.8 %	68.9 %	59.1 %
Ireland	95.2 %	96.1 %	96.9 %	97.4 %	96.2 %
Czech Republic	84.4 %	91.6 %	94.5 %	95.7 %	83.8 %

Table 15. Share of area of “Land Cover Classes” considered as “rural”

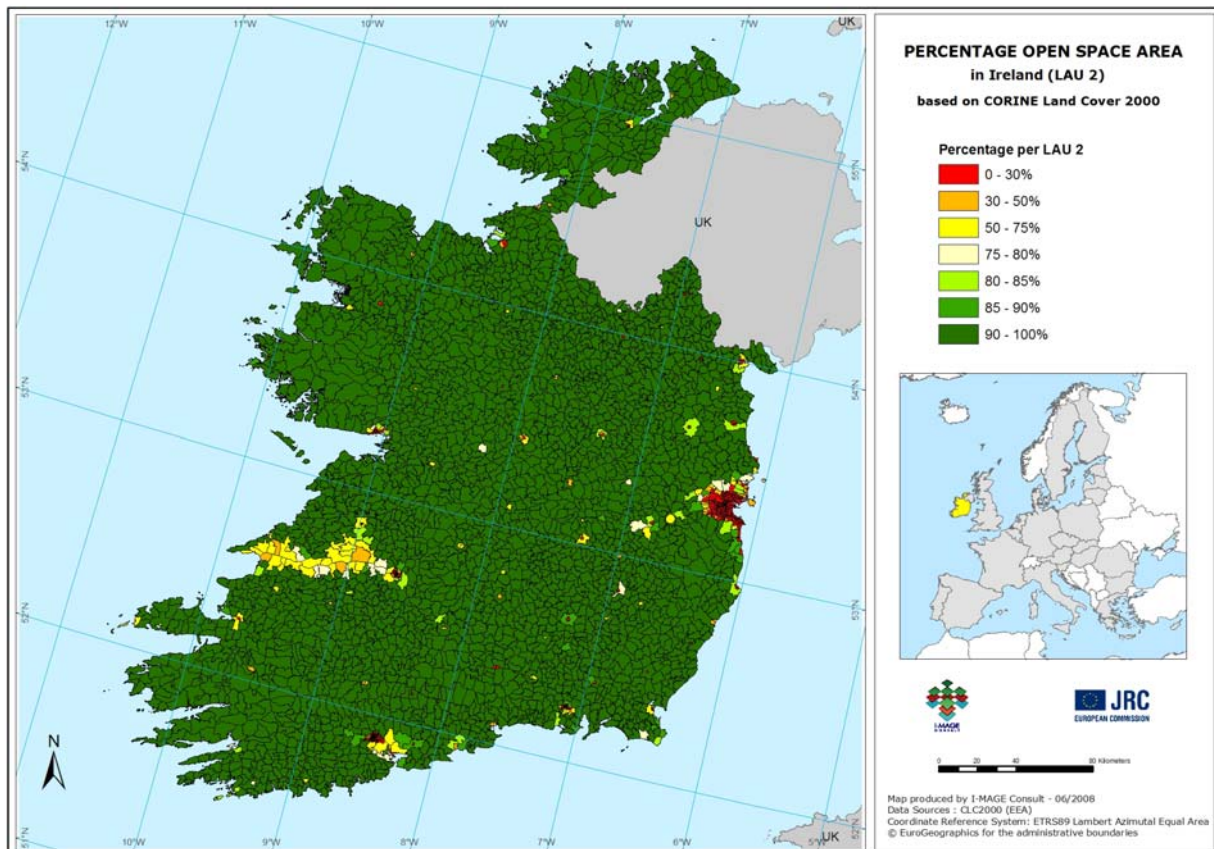
	LAND COVER APPROACH	
	Current study	Vard et al.
Belgium	79.4 %	79.6 %
Ireland	97.2 %	97.0 %
Czech Republic	93.9 %	93.8 %



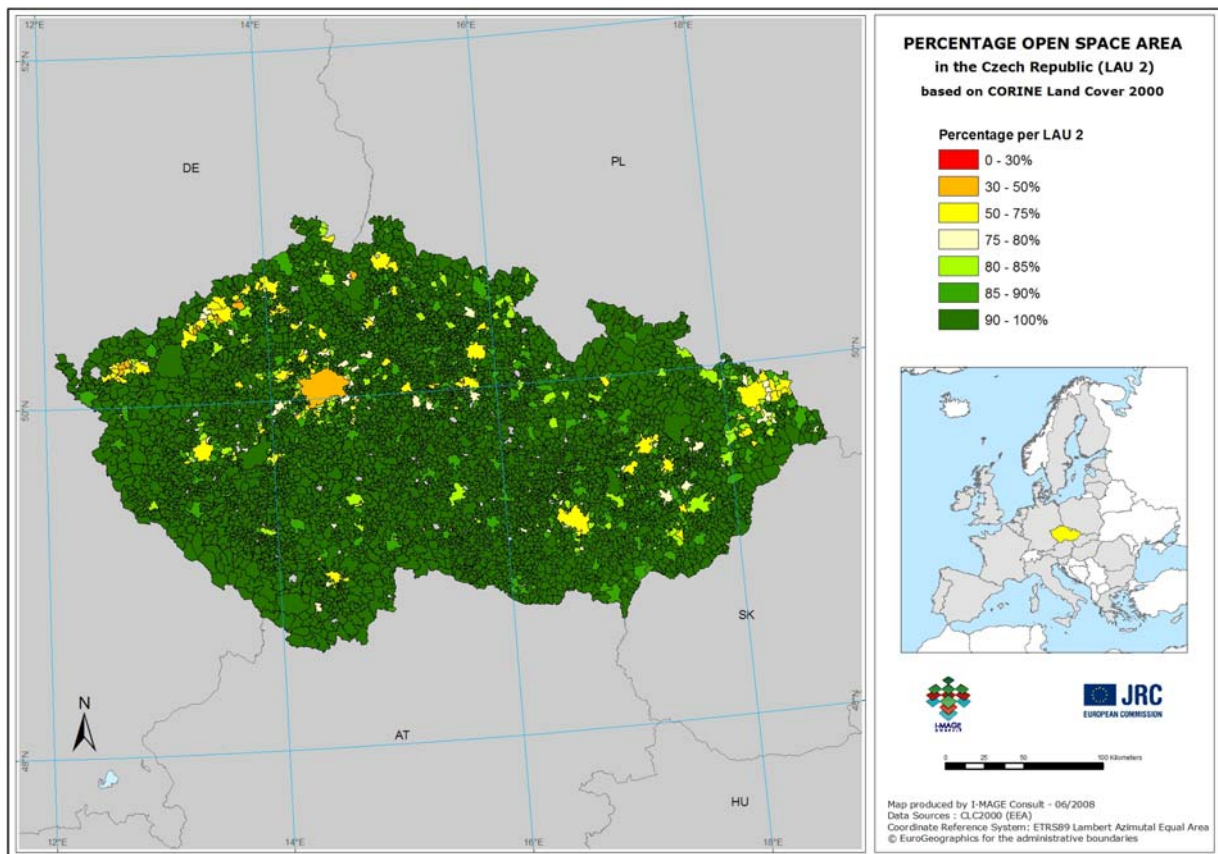
Map 14. Percentage of open space area in BE based on CORINE Land Cover 2000 (LAU2)



Map 15. Percentage of open space area in IE based on CORINE Land Cover 2000 (LAU2)



Map 16. Percentage of open space area in CZ based on CORINE Land Cover 2000 (LAU2)



## C. RURAL TYPOLOGY (LAU2)

Table 16. Number of Belgian communes per class and for each threshold

CLASSES	RURAL-PERIPHERAL	RURAL-ACCESSIBLE	URBAN-OPEN SPACE	URBAN-CLOSED SPACE
THRESHOLDS FOR PERIPHERALITY ANALYSIS				
50000 inh – 30 minutes	100 (17.0 %)	48 (8.1 %)		
50000 inh – 45 minutes	49 (8.3 %)	99 (16.8 %)		
50000 inh – 60 minutes	23 (3.9 %)	125 (21.2 %)		
100000 inh – 30 minutes	102 (17.3 %)	46 (7.8 %)		
100000 inh – 45 minutes	50 (8.5 %)	98 (16.6 %)		
100000 inh – 60 minutes	23 (3.9 %)	125 (21.2 %)		
THRESHOLDS FOR CLC ANALYSIS				
90 %			6 (1.0 %)	435 (73.9 %)
85 %			41 (7.0 %)	400 (67.9 %)
80 %			103 (17.5 %)	338 (57.4 %)
75 %			176 (29.9 %)	265 (45.0 %)

Table 17. Number of Irish communes per class and for each threshold

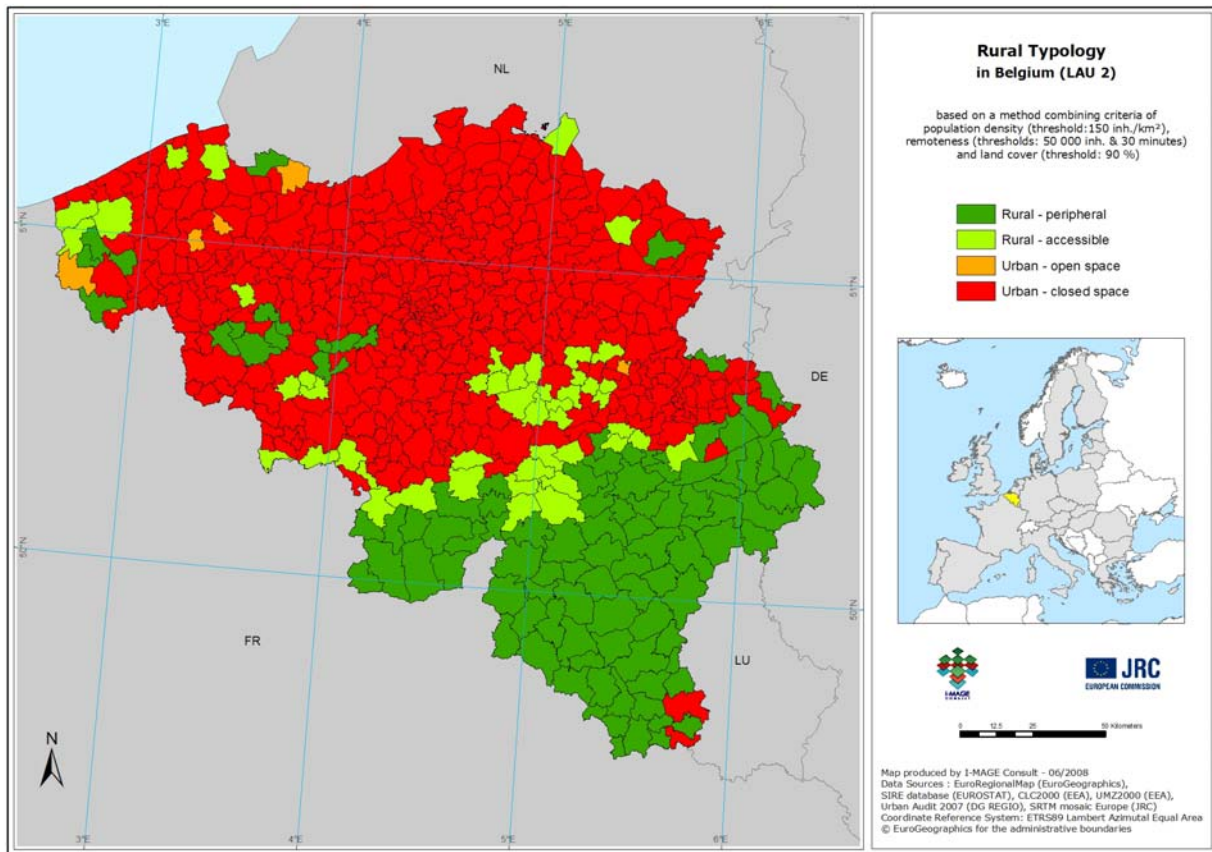
CLASSES	RURAL-PERIPHERAL	RURAL-ACCESSIBLE	URBAN-OPEN SPACE	URBAN-CLOSED SPACE
THRESHOLDS FOR PERIPHERALITY ANALYSIS				
50000 inh – 30 minutes	2468 (71.7 %)	337 (9.8 %)		
50000 inh – 45 minutes	1944 (56.5 %)	861 (25.0 %)		
50000 inh – 60 minutes	1315 (38.2 %)	1490 (43.3 %)		
100000 inh – 30 minutes	2691 (78.2 %)	114 (3.3 %)		
100000 inh – 45 minutes	2463 (71.6 %)	342 (9.9 %)		
100000 inh – 60 minutes	2111 (61.4 %)	694 (20.2 %)		
THRESHOLDS FOR CLC ANALYSIS				
90 %			22 (0.6 %)	613 (17.8 %)
85 %			34 (1.0 %)	601 (17.5 %)
80 %			49 (1.4 %)	586 (17.0 %)
75 %			61 (1.8 %)	574 (16.7 %)

Table 18. Number of Czech communes per class and for each threshold

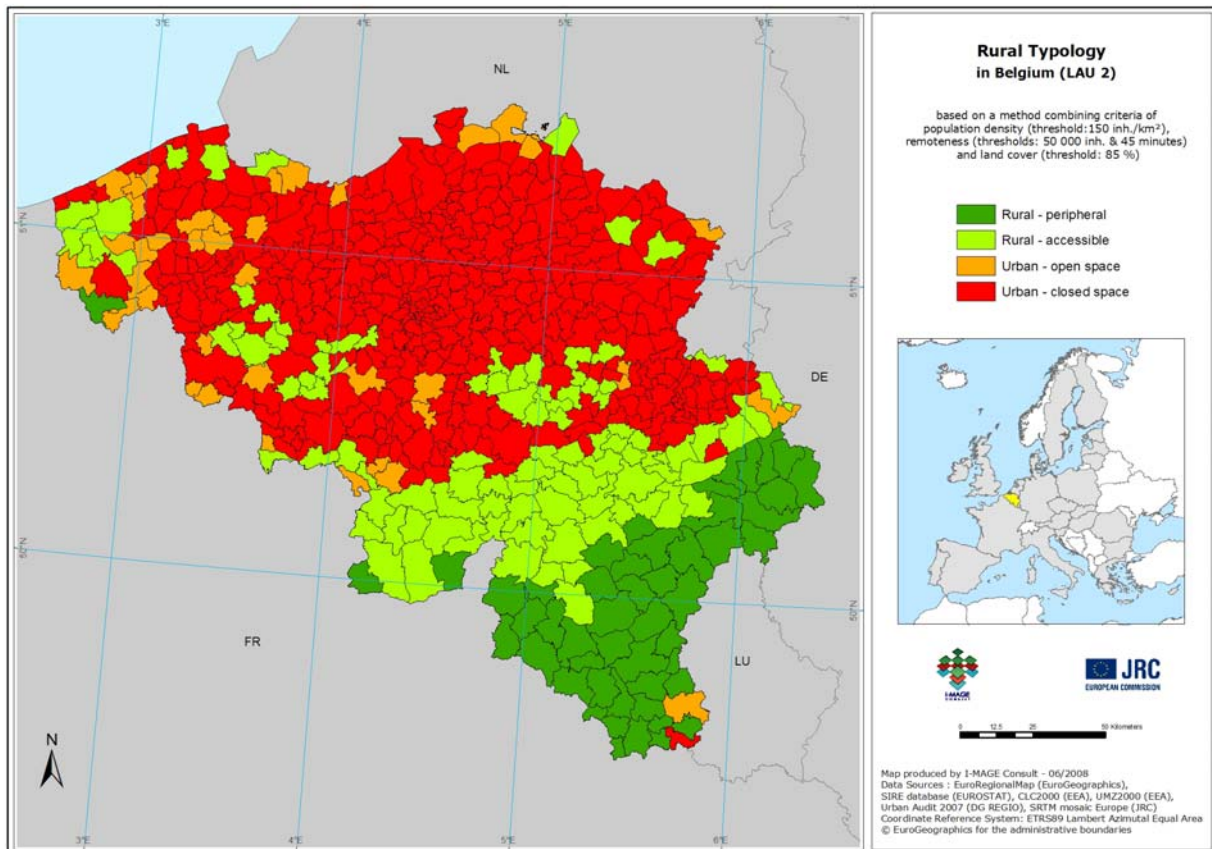
CLASSES	RURAL-PERIPHERAL	RURAL-ACCESSIBLE	URBAN-OPEN SPACE	URBAN-CLOSED SPACE
THRESHOLDS FOR PERIPHERALITY ANALYSIS				
50000 inh – 30 minutes	3616 (57.8 %)	1912 (30.6 %)		
50000 inh – 45 minutes	1428 (22.8 %)	4100 (65.5 %)		
50000 inh – 60 minutes	279 (4.5 %)	5249 (83.9 %)		
100000 inh – 30 minutes	4878 (77.9 %)	650 (10.4 %)		
100000 inh – 45 minutes	3742 (59.8 %)	1786 (28.5 %)		
100000 inh – 60 minutes	2574 (41.1 %)	2954 (47.2 %)		
THRESHOLDS FOR CLC ANALYSIS				
90 %			196 (3.1 %)	534 (8.5 %)
85 %			428 (6.8 %)	302 (4.8 %)
80 %			561 (9.0 %)	169 (2.7 %)
75 %			620 (9.9 %)	110 (1.8 %)



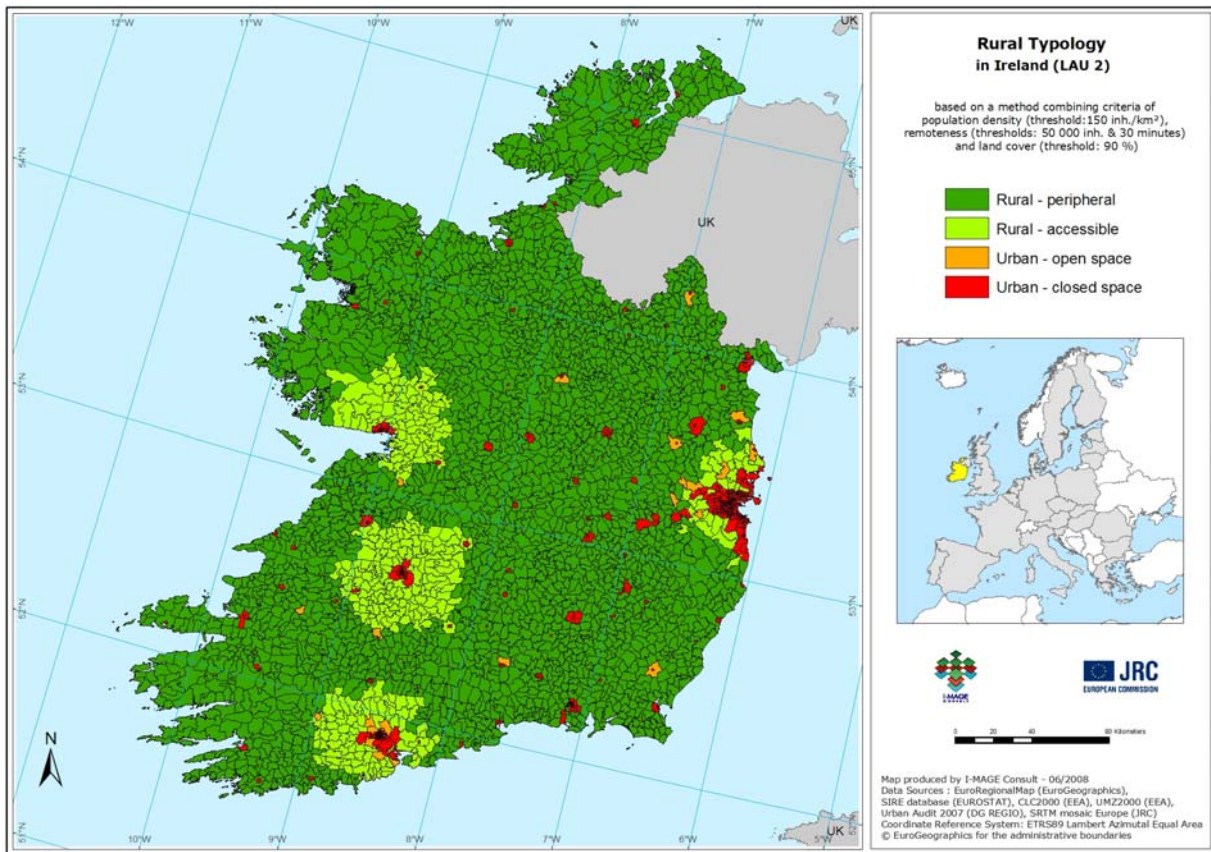
Map 17. Rural-urban typology of LAU2 local units in BE



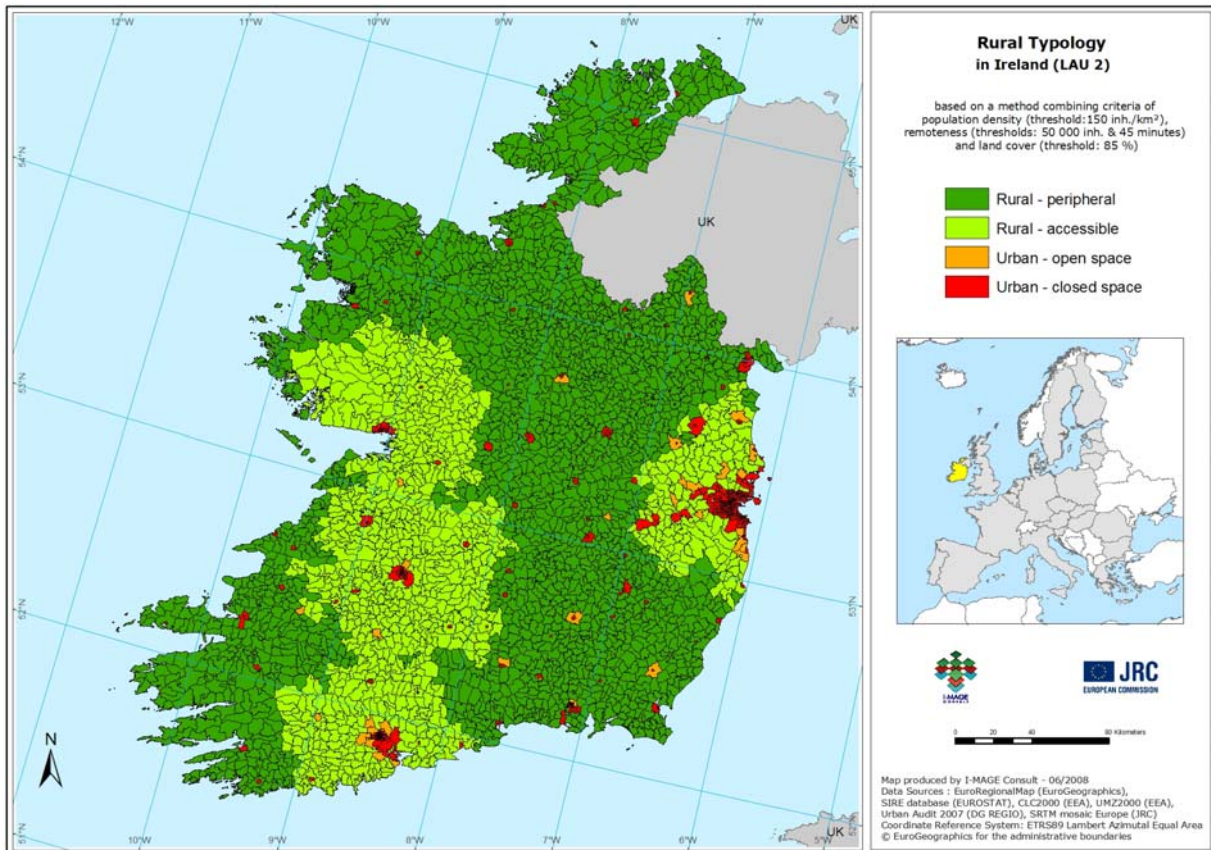
Map 18. Rural-urban typology of LAU2 local units in BE



Map 19. Rural-urban typology of LAU2 local units in IE

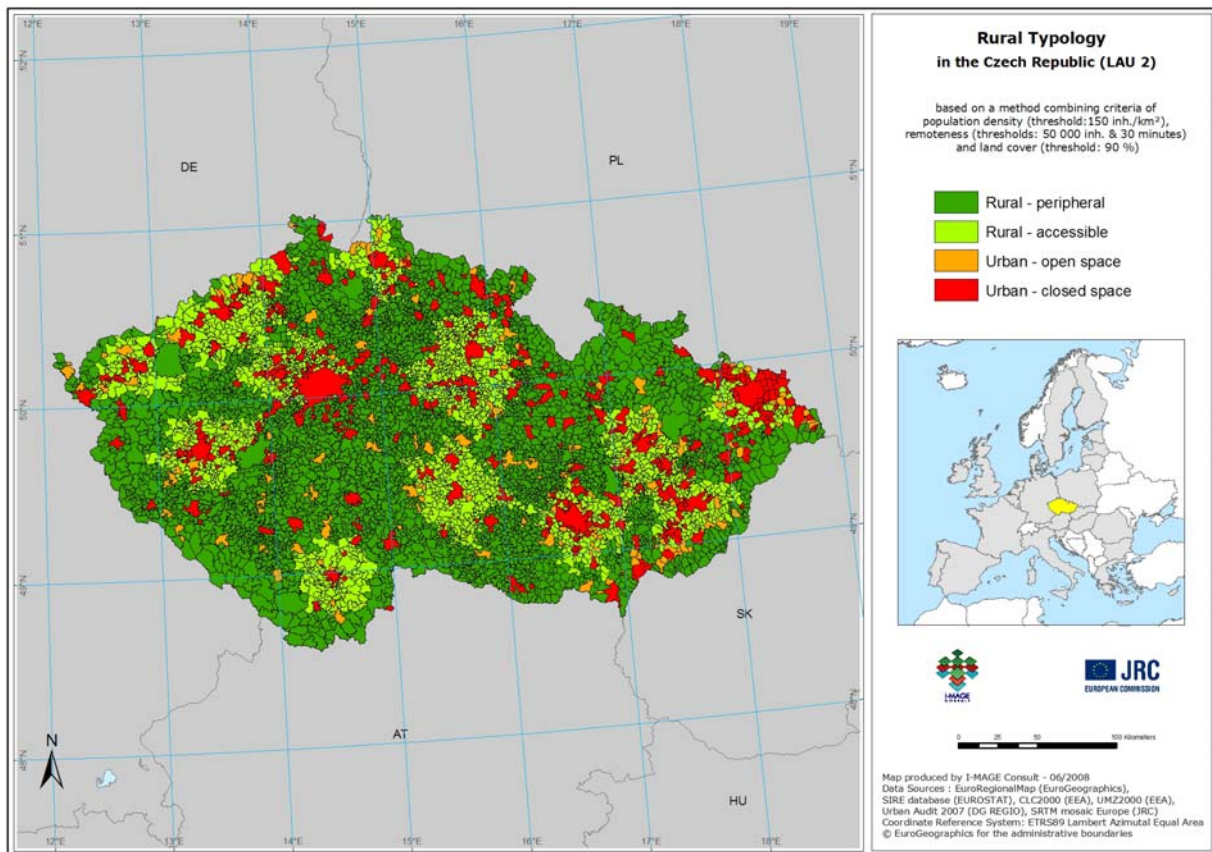


Map 20. Rural-urban typology of LAU2 local units in IE

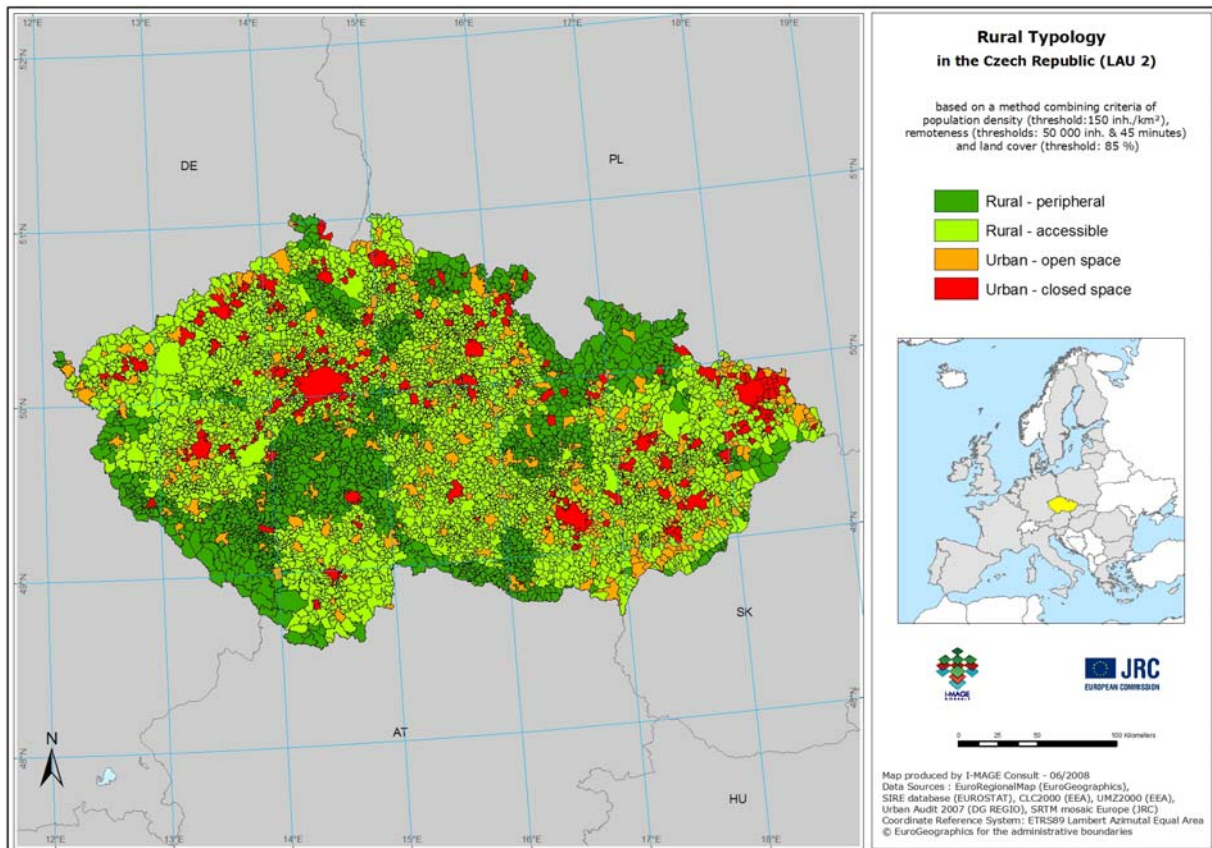




Map 21. Rural-urban typology of LAU2 local units in CZ



Map 22. Rural-urban typology of LAU2 local units in CZ





European Commission

**EUR 23757 EN – Joint Research Centre – Institute for Environment and Sustainability**

Title: Delimitations of rural areas in Europe using criteria of population density, remoteness and land cover

Author(s): F. Jonard, M. Lambotte, F. Ramos, J-M. Terres, C. Bamps.

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**Abstract**

This report aims to improve current delimitations of rural areas in Europe as a support to statistical descriptions by introducing the criteria of peripherality/remoteness and 'natural (non-artificial) area' in the Organisation for Economic Co-operation and Development (OECD) typology. In 1994, the OECD developed an easy concept to identify rural and urban areas based on the population density of a geographical unit. This scheme proved to be highly sensitive to the size of the geographical area and the classification of the thresholds. Over the years, endeavours have been made to review and improve the OECD approach and also alternative methodologies have been proposed. The current methods based solely on population distributions, do not allow for detailed and quantified geographical analysis and do not reflect two main characters differentiating rural from urban areas: the "natural" (non-artificial) surface and the accessibility/remoteness.

In this study, a new rural typology has been developed by integrating the peripherality index and the land cover indicator in the OECD methodology. The analyses were carried out at Local Administrative Unit (LAU 2) level for EU-27 and then aggregated at NUTS3 and NUTS2. The methodology applied is flexible and the thresholds of accessibility or land cover implemented can easily be modified to fit-for-purpose.

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