ESPON

GROSEE
Growth Poles in South East Europe

Targeted Analysis 2013/2/19

Scientific Report | Version 28/02/2014

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This report presents the draft scientific results a Targeted Analysis conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

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This basic report exists only in an electronic version.

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1. Database, indicators and definition of the research area

1.1 Database collection, database, indicators, maps and typologies

The TPG has reviewed the existing indicators, data sources and data provision and has also taken into account the proposals of the ESPON CU and the Steering Committee in order to conclude to a list of appropriate indicators which have been used for the Final report (see ANNEX III).

The entire list is quite large as it was necessary to take into account a great number of aspects of the different issues studied in the project. The TPG has also produced a list of headline indicators which is mainly composed by indicators included in the respective list of Europe 2020 (EC 2010), EC 5th Cohesion Report (2010) and ESPON INTERCO (2012). Thus, our list of headline indicators includes indicators corresponding to the more important policy orientations of EU policy documents. Specifically, all the Europe 2020 indicators associated with quantitative “2020 targets” are included in the GROSEE list of headline indicators.

We should note that it was not possible to include all the indicators proposed by the SC because we should keep a balance on the use of indicators per issue i.e. we should keep only the indicators directly linked to the main questions arisen for the analysis and policy proposals of GROSEE; in case we keep the indicators corresponding to issues of secondary importance for GROSEE, we risk, among other, limiting the readability of the project’s reports.

We have used indicators in the Final Report for which there is Eurostat data or at least data for Large Urban Zone (LUZ) of Urban Audit. Data at LAU level have also been used at a limited extent. The main objective of the TPG for the Final Report was the data collection for different levels / zones of the three Metropolitan Regions. Specifically on the basis of the approximations of the CC, FMA and MR for the three capitals with NUTS2 and NUTS3 units (see ANNEX III) the TPG has collected data for the latter units for all indicators that were used. Evidently, data for other territorial levels has also been collected.

1.1.1 Introduction

GROSEE had to define an appropriate set of indicators to be used for analyses at various spatial levels (ESPON space, national, regional, metropolitan, core city, districts).

For this purpose we had first reviewed existing indicators which were relevant to the project (1) as well as the respective data sources / data providers (2). Then, we have discussed the Territorial scales / levels and the types / categories of datasets for the indicators (3).

Next, we have created a preliminary list of indicators per Sections and sub-themes of the project. As the availability of data is a very important criterion for the selection of indicators to be used finally in the project, we have checked the data availability per indicator in order to define which indicators of the preliminary list were “feasible” (4). Finally, we have discussed the design of the project database and the structure of metadata (5), the territorial typologies, the territorial statistical methods which could potentially be used in the project and the creation of maps (6).

1.1.2 Review of existing indicators

There are hundreds of territorial indicators, created by different organizations, which could be preliminarily considered appropriate for the comparative analysis of the three case studies as well as for the analysis of the entire SEE space.

In next, we will present the results of the review of existing indicators, the content of which is relevant to the different issues / sections of the project:

- Competitiveness and innovation
- Demographic and social structure, well being
- Accessibility and connectivity
- Environment and
- Territorial and urban structures and policies

This literature review (state of the art) refers to the ESPON projects and other sources of indicators as it has been further developed below.

The ESPON projects

We have reviewed the following three categories of ESPON projects: (a) projects referred to all territorial issues and policies (b) projects which refer to specific territorial

issues (c) projects which refer specifically to metropolitan regions which constitute the main territorial object of GROSEE.

(a) ESPON projects referred to all territorial issues and policies

At first, the ESPON 2006 projects 3.1 and 4.1.3 have contributed lists of ESPON territorial indicators as well as first overall approaches of indicators of the European territory. The respective indicators have been included in ESPON 2013 Database and INTERCO.

ESPON 2013 Database: The ESPON Database 2013 projects (1 and 2) include a wide list of indicators and respective data. Apart from the indicators produced by the project itself, it has integrated indicators produced by all the ESPON 2013 projects. In GROSEE: (a) We have used indicators and data of the ESPON Database concerning GROSEE, (b) We have used the specifications of metadata that have been produced by ESPON Database 2.

ESPON 2013 INTERCO / Indicators of Territorial Cohesion: It has studied in depth an important number of indicators from the scope of "territorial cohesion". It has examined more than 600 indicators classified per theme / issue and per EU policies' territorial objectives. It finally proposed **32 top indicators** corresponding to the following six "territorial objectives": Strong local economies ensuring global competitiveness, Innovative Territories, Fair access to services, market and jobs, Inclusion and quality of life, Attractive regions of high ecological values and strong territorial capital, Integrated polycentric territorial development. As the 32 top indicators of INTERCO are supposed to better express territorial cohesion, they have specifically been taken into account in the List of GROSEE indicators (see ANNEX III).

ESPON 2013 SIESTA / Spatial Indicators for a "Europe 2020 Strategy" Territorial Analysis: It shows how the "Europe 2020" Strategy, acts territorially, particularly on a regional scale and especially for composite indicators, some of the latter have been used in GROSEE.

(b) ESPON projects which refer to specific territorial issues

ESPON 2006 1.1.1 Polycentric Potentials: It studied polycentricity on the base of the potential of cities and the networking among them. It has created Polycentricity indicators which have been taken into account in GROSEE.

ESPON 2013 DEMIFER: The project focused on Demographic and Migratory Flows among European Regions and has produced appropriate indicators which have been integrated in the ESPON 2013 Database.

ESPON 2013 FOCI / Future Orientations of Cities: It includes analyses of cities, regarding competitiveness, social cohesion, environment and polycentricity. Some of its indicators have been used for the relevant GROSEE sections.

ESPON TRACC 2013: It has produced regional indicators of transport accessibility which have been taken into account in GROSEE Section on accessibility and connectivity to measure accessibility by road, air and rail.

ESPON 2013 TERCO: It has studied the degree and intensity of territorial cooperation. Some of the respective indicators have been used in INTERCO and could be used in the Section 5 of GROSEE.

ESPON 2013 Climate: It analyzes the territorial aspects of climate change. Some of its indicators will be used in the Climate change Section of GROSEE.

ESPON 2013 KIT: It has studied the territorial dimension of innovation and knowledge economy. Some of its indicators have been taken into account in GROSEE, notably for innovation and investments.

ESPON 2013 TEDI: It has produced a political and theoretical framework for turning diversity into strength as well as main territorial evidences. Some of its indicators have been taken into account for the respective sections of GROSEE.

ESPON 2013 TIPTAP: It has produced macro-criteria of territorial impact (territorial efficiency, quality and identity). Some of its indicators have been used in GROSEE.

ESPON 2013 ReRisk: It has produced an analysis of vulnerabilities in regards to access to energy and energy potential. Some of its indicators have been used in GROSEE (mainly indicators of renewable energy potential).

ESPON 2013 GEOSPECS: Development of the extension of the ESPON Database by additional indicators and data on specific types of territories and regions, useful for local and territorial analysis.

(c) ESPON projects which refer specifically to metropolitan regions

ESPON 2013 POLYCE: It focuses on the enhancement of the polycentric system in Central Europe as well as on strategies for strengthening the current position of the

five major cities as *metropolises*. In this frame, it proposes a number of indicators at metropolitan level which are useful for GROSEE.

ESPON 2013 METROBORDER It studied "cross-border polycentric metropolitan regions". Among others, it has produced and implemented a definition of the metropolitan areas using commuting data. It has been used in GROSEE for indicators concerning functional integration and institutional structures.

BEST METROPOLISES:

It has identified actors that determine specific development of metropolitan areas.

Other sources of indicators

Eurostat and other EU bodies:

(i) Indicators used in the 5th Cohesion Report, "Europe 2020" and "Regions 2020" indicators, structural indicators based on the renewed Lisbon Strategy in 2006. They have already been included in the preliminary list of indicators of GROSEE and

(ii) Indicators of the Reference Framework for Sustainable Cities as defined in 2010 by the Working Groups set up after Toledo Declaration, used to measure the metropolitan functions.

Other international organizations: ONU, OECD, World Bank etc, national organizations (Bulgaria, Greece, Romania).

Data sources / data providers

(i) "Central sources" / providers: A first part of the data will be taken from "central sources" for the three study areas and the entire SEE:

- Eurostat database (NUTS0 to NUTS3 levels), Eurostat / Urban Audit specific database on urban data – see in detail in next
- The ESPON 2013 Database, other ESPON projects
- DG REGIO database,
- Databases for specific themes

(ii) Data provided by the Project Partners: A second part of the data (and documents) referred to the three Capitals and respective countries will be collected per capital / country by the respective partner according to common specifications defined by

each sub-activity in order the final data to be fully harmonised. These data will be provided from the national Statistical Offices (NSO) of the three countries: data at NUTS3 level not included in the “central sources”, data at LAU1, 2 levels, specific surveys etc.

Territorial levels, types / categories of datasets

The data that has been used corresponds to different territorial levels:

- European / sub – European level: ESPON space, EU-27, SEE, Country level (the three countries) – NUTS0, Regional level: NUTS1, 2, 3.
- Core city level, Functional Metropolitan Area level: approximations of the three metropolitan areas (MA) using appropriate NUTS2 or NUTS3 units, approximations of the FMA using the Urban Audit LUZ (Larger Urban Zones), Metropolitan Region
- city-district level: LAU units, aggregates of LAU units, city-districts units of LUA.

The data used belong to different types / categories: Attribute data (datasets per different NUTS / LAU levels), Network data (reflecting the flows among different territorial entities, Grid data, Geometries etc.

Database design, metadata, other documentation

All kind of data (descriptive and cartographic data) have been included in the GROSEE database. We have used the design of datasheets produced by ESPON 2013 Database 2 project. After the first check of availability and quality, the data has been harmonised and inserted in the database. We then have used the metadata sheets produced by ESPON 2013 Database 2 project. The GROSEE database has included the starting indicators (from ESPON projects, Eurostat and other sources – see before) as well as the indicators that have been produced by the project.

Apart from the indicators and data, a wide range of documents have been used i.e. previous ESPON projects but also documents produced for the European Commission, for national governments and for other stakeholders.

Territorial typologies and statistical methods, creation of maps

We have produced territorial typologies where this was necessary. For example: (1) Inside the Metropolitan Regions: city core area / rest of areas of the Functional Metropolitan Area (FMA) / Outer Metropolitan Ring / OMR / industrial areas / service activities' areas, housing areas etc.

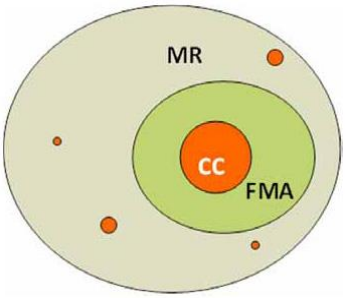
Different sets of specific statistical and other instruments and methods have been used in order to make comparative analyses, diagnoses and identification of current trends in spatial development: (a) Territorial statistics for the indicators: average, Stdev, coefficient of variation, k-means, Territorial analyses using GIS tools (spatial autocorrelation etc. – see in INTERCO), (b) SWOT analysis, (c) Fish-bone /Ishikawa diagram, problem tree or PEST (**P**olitical, **E**conomic, **S**ocial, and **T**echnological analysis) /PESTEL (previous + environmental and legal factors) etc.

A wide range of maps have been created at different territorial levels (MR, FMA, core city, SEE etc.) using the project' database and GIS tools.

1.2 The research area of the three capital city regions

In previous Reports, the TPG has analysed in depth the division of the three capitals on different levels: the **Core City (CC)**, the **Functional Metropolitan Area (FMA)** and the **Metropolitan Region (MR)**

Figure 1 Metropolitan Region and Metropolitan Area in GROSEE (having as model ESPON POLYCE)



MR (Metropolitan Region)
= FMA (Functional Metropolitan Area)
+ Outer Metropolitan Ring / OMR,
FMA = Core City (CC) + Outer FMA
Source: ESPON POLYCE 2012

It has been also defined necessary approximations of the CC, FMA and MR for the three capitals with NUTS2 and NUTS3 units. **Map 1** visualises the breakdown of the three case study areas into the different units of analysis.

In next we discuss methods of delimitation of these three zones (CC, FMA, OMR) of the MRs at a very low territorial level, close to the “real” metropolitan territories – as for example land plot using CLC or Urban Atlas 2007 as sources for comparable land use.

In the following, we refer to data on the Functional Metropolitan Areas (FMA) of the three capitals. Where we do not follow this general approach, we make reference to specific statistical units.

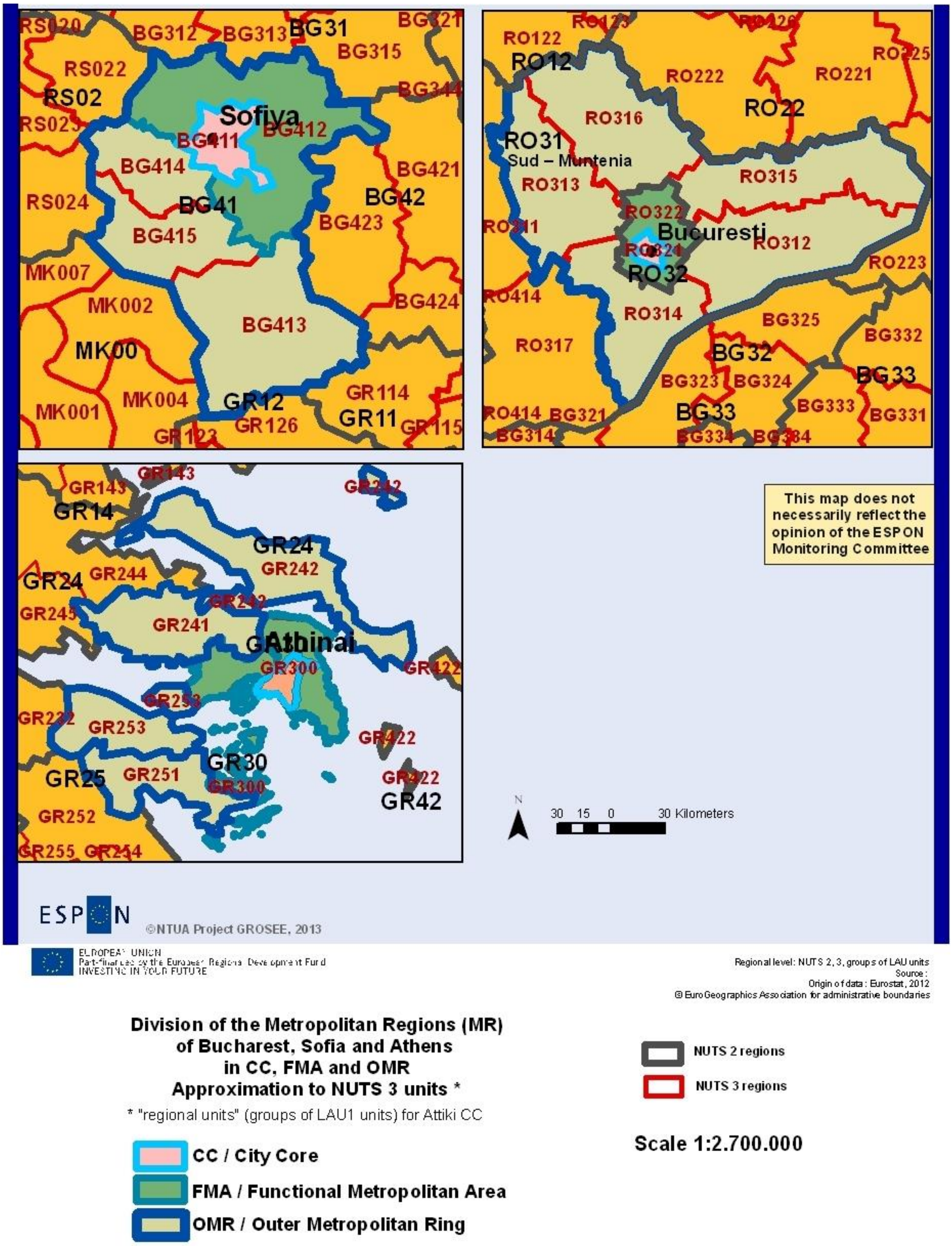
1.2.1 Introduction

Within ESPON GROSEE we had to make comparisons among the three capitals. In order these comparisons to be relevant, it should be based on common definitions of the metropolitan areas (and their surrounding areas) which will determine common rules for their delimitation. Several attempts have been made on cities / metropolises definition and delimitation in ESPON (projects 1.1.1, 1.1.2, 1.4.1, 1.4.3, FOCI etc.), in Eurostat in collaboration with Urban Audit and elsewhere. Our objective is to select the most appropriate of these methods in order to implement it in the case of the three study areas and, if needed, adapt it to their specific features.

As data for a great number of indicators to be used for the three Capitals exist only for NUTS / LAU units, we should necessarily define approximations of the “real” territories of the metropolises to these already set up divisions.

Approximations to LAU units (usually, municipalities) are closer to the “real” metropolitan territories while approximations to NUTS (even to NUTS 3) units differ considerably from the “real” territories. Therefore, in next we will discern the first (“real” territories / approximations to LAU) from the last (approximations to NUTS 3).

Map 1 Approximations of the CC (Core Cities), FMA (Functional Metropolitan Areas) and MR (Metropolitan Regions) for the three capitals with NUTS2 and NUTS3 units



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RO316
RO31
Sud – Muntenia
RO313
RO315
RO322
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This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
30 15 0 30 Kilometers
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Regional level: NUTS 2, 3, groups of LAU units
Source:
Origin of data: Eurostat, 2012
© EuroGeographics Association for administrative boundaries
Division of the Metropolitan Regions (MR) of Bucharest, Sofia and Athens in CC, FMA and OMR Approximation to NUTS 3 units *
* "regional units" (groups of LAU1 units) for Attiki CC
CC / City Core
FMA / Functional Metropolitan Area
OMR / Outer Metropolitan Ring
NUTS 2 regions
NUTS 3 regions
Scale 1:2.700.000

1.2.2 Definition / delimitation of core cities, metropolitan areas and metropolitan regions: the approach of GROSEE

The definition/delimitation of the city still remains complicated. At times, it is made in terms of administrative boundaries, and at time in terms of factors such as density or population size. The divergences in defining the notion of the city and delimitating the city itself have made it difficult to conduct comparative studies on urban areas across times and across borders. In a sense, then, the difficulties encountered in defining "the city" create barriers in understanding the phenomenon which takes place within it and finding solutions which refer to the urban environment (Paddison 2001).

There are also a great number of other methods of delineation of city areas which use different criteria (other than the density and the population). Employees commuting areas and areas defined on the basis of the time distance from the city centre are used the most because it is relatively easier to find appropriate data. Other methods as for example definition of the city area on the basis of the service provision are used more difficultly because they presuppose implementation of specific surveys to find necessary data.

We should also stress here that the magnitude of the economic and / or population potential of an urban area impact to some extent on the use of the criteria of delimitation. This is important for GROSEE as the population potential of Athens is much bigger than those of București and Sofia.

The definition/delimitation of the metropolitan areas is even more complicated. Here we should necessarily simplify this question. We could firstly note that a metropolis is a very big city. For metropolitan areas, as for smaller cities, there is an obvious difference among a densely populated part (the "core city") and a second, less densely populated part, containing activities and population functionally dependent to the "core city".

For smaller cities, the sum of the "core city" and the "functionally integrated periphery" could be named **"Functional Urban Area" / FUA**. Very often (see, among others, in ESPON 2013 Database and FOCI projects), the FUA is defined as the labour basin of the city and delimited according to the intensity of the daily commuting of workers who resides in peripheral areas and work in the "city core". In case the weight of these workers in the total of employed population of the peripheral local units (usually LAU2) surpasses a given threshold i.e. 20% or 15%, these units are included

in the FUA. Often the time – distance (in terms of isochronal distances from the core city) is also taken into account.

As a Metropolitan area is bigger in potential and territorial influence than the FUA of a smaller city, it could be named “Metropolitan FUA” or, simplifying, according to the ESPON POLYCE, it could be named **“Functional Metropolitan Area” / FMA.**

Metropolitan areas could be classified in categories according to their influence at different territorial levels. For example, in ESPON 1.1.1 project as well as in other ESPON projects, Metropolitan areas which have a considerable influence at European level have been named **Metropolitan European Growth Areas / MEGAs**.

Further on, it is well known that each FMA has a considerably high influence to a neighbouring “ring” which contains smaller settlements or even small and medium sized cities and their surrounding country-space. This zone could be named, as in ESPON POLYCE, **Outer Metropolitan Ring / OMR**. The total of the FMA and the OMR could be named **Metropolitan Region / MR** (Figure 1).

The MR could be defined, among others, on the basis of the networking of the FMA with its neighbour FUAs and smaller cities or, in other words, on the definition / delimitation of a “potential” urban system which could contribute to the formation of a **“Potential Integration Area” / PIA** (ESPON 1.1.1 project).

In next, we will examine:

(a) The implementation of specific criteria and methods to delineate the different levels / zones of the three metropolitan regions (both FMAs and MRs) in question.

It is well known that the administrative divisions of the different countries do not comply with the delimitation of the different zones of the metropolitan areas, as the administrative divisions correspond usually to older functional territorial realities. So, the use of the administrative divisions in this case is not appropriate. Furthermore, the backgrounds of the administrative divisions as well as the functional divisions of the three capitals differ considerably. Therefore, we had reviewed the literature on already established methods of implementation of criteria of definition / delimitation of the European cities and metropolises. We will firstly referred to the definitions used by Eurostat and other European bodies.

We have focused on definitions of cities which comply more or less with the definition of CC and FMAs: the administrative urban units, FUAs, the Urban Audit Larger Urban Zones (LUZs) and the UMZs defined on the basis of the CLC land uses.

We have also refer to the "technical" definition / delimitation of the Metropolitan Areas by Eurostat / DG Regio.

Also, we have further taken into account the wider literature on the use of the population density and of the urban and peri-urban land uses in the definition / delimitation of the three metropolitan areas.

(b) As the larger part of the existing data corresponds to NUTS2 / NUTS3 units, we have discussed methods of approximation of the above delineations of the three CCs / FMAs / MRs to NUTS3 units (or aggregates of NUTS3 units).

As the divisions in NUTS (and LAU) units should be seen in relation to the administrative system of each country and the given metropolitan area, we will start in next by the discussion of the administrative and NUTS / LAU division of the three countries and metropolitan areas.

1.2.3 Administrative and NUTS / LAU division of the three countries and metropolitan areas

Romania's administration is relatively centralized. Its territory is organized administratively into communes, towns and counties. At the county level Romania is divided into 41 counties, and București, which administratively is defined by a special status. At the town/commune level the country is divided into 103 cities (municipalities) and 211 towns (referring to urban areas), and 2827 communes (referring to rural areas). Romania, according to the NUTS scheme, is divided into: NUTS1 level: 4 macro-regions, NUTS2 level: 8 development regions, although not administrative divisions *per se*, NUTS3 level: 41 counties and the municipality of București.

București is the Romanian capital; it has a population of almost 2 million inhabitants (2010) and coordinates a large area in the Danube Plain. The city is divided into six administrative districts. The Municipality of București, together with the surrounding Ilfov county, forms the București development region, which is equivalent to NUTS2 (București–Ilfov RO32). The metropolitan area at NUTS2 level includes 2 NUTS3 level areas: București RO321 and Ilfov County RO322.

Bulgaria's administration is highly centralized. Its territory is divided into 28 provinces, which are further subdivided into 264 municipalities. Below municipalities' level, there are no further formal administrative subdivisions. Bulgaria, according to the NUTS scheme, is divided into: NUTS1 level: 2 Regions, NUTS2 level: 6 Planning regions, NUTS3 level: 28 Oblasts. Sofia is the Bulgarian capital. It should not to be confused with Sofia Province, which surrounds but does not include the city itself. The province does not include Sofia in its territories, but Sofia however remains its administrative centre. Besides the city proper, the 24 districts of Sofia encompass three other towns and 34 villages. The Municipality of Sofia, along with the surrounding areas, forms the Yugozapaden Planning region, which is equivalent to NUTS2 (BG41). The metropolitan area is included in a NUTS2 level unit which contains 5 NUTS3 level areas (Sofia City BG411, Sofia Province BG412 + 3 other provinces). However, it seems that only the NUTS3 BG411 could be approximated to Sofia metropolitan area (MA), while the NUTS3 BG412 (Sofia province) is the "surrounding region of the MA. The population of NUTS3 BG411 in 2009 amounted to 1248.4 thousands of inhabitants, while the population of BG412 was 253.6 thousands. The total population of BG411 and BG 412 was 1,502 thousands of inhabitants.

Greece's administration is decentralized and its territory is divided into 7 Decentralized administrations, which comprise two or three Regions (of which the authorities are elected). So there are 13 Regions in total (NUTS2 level), which are divided into regional units and 325 municipalities which are further subdivided into municipal units and finally into communities, in accordance with the Kallikratis plan. Greece, according to the NUTS scheme, is divided into: NUTS1 level: 3 Groups of development regions, NUTS2 level: 13 Regions, NUTS3 level: 51 former prefectures.

Athens is the Hellenic Capital with a population greater than 4 million inhabitants (2011 data). The Attica Region (NUTS2 and NUTS3 level) contains the larger part of the contiguous built up urban area of the Greek capital. However, the more densely populated part of the Region is contained in the Athens Basin - the "kernel" area of the division of the city by Urban Audit. The Attica Region contains 8 "new" regional units (five are located inside the Athens Basin) and 35 "new" municipalities (after 2011). It comprises the Athens metropolitan area and is equivalent to NUTS2 (GR30) but also to only 1 NUTS3 level unit (GR300). This unit contains four former prefectures: Athens Prefecture, East Attica Prefecture, Piraeus Prefecture, and West Attica.

1.2.4 Implementation of specific criteria and methods to delineate the different levels / zones of the three metropolitan regions

Eurostat and ESPON use three main methods of definition and delimitation (approximation) of *cities*: (i) the definition of Functional Urban Areas (FUAs) associated to Morphological Urban Areas (MUAs) provided by ESPON. (ii) The definition of Larger Urban Zones provided by Eurostat / Urban Audit. (iii) The definition of Urban Morphological Zones (UMZ) provided by EEA on the basis of Corine Land Cover (CLC) data and "normalized" in the frame of the ESPON 2013 Programme. Eurostat and DG Regio use a specific method of definition and delimitation of *metropolitan areas* which is based on the definition of the Urban Audit LUZs.

The definition of Functional Urban Areas (FUAs) and Morphological Urban Areas (MUAs) – the criteria of "commuting" and population density

The ESPON 2013 Database 1 project (2011, see the Technical Report: "The functional urban areas database), starting from the results of the previous ESPON projects has provided an update of the database of the Functional Urban Areas (FUAs) and Morphological Urban Areas (MUAs), as well as their inter-relations. It has been noted that "the Functional Urban Areas (FUAs) are now delineated for most of the European countries of the ESPON space at the LAU2 level".

In this project, the MUAs are defined as densely populated areas (including LAU2 units, with more than 650 inhab./km^2). FUAs are defined as labour basins of the MUAs (see also for this issue in ESPON 1.4.3 project). According to the ESPON Database, "all this is independent from any national, administrative or political definitions, but based instead on pure statistics". Moreover, this project has also produced a list of indicators for these FUAs. "Cities of tomorrow" (EU / Regional policy 2011) has also used the ESPON Database definitions of FUAs and MUAs.

According to a wider literature, the delimitation of the FUAs as labour basins of the MUAs, in other words on the basis of the daily commuting of workers who reside in peripheral municipalities to the MUA, is the most suitable criterion of definition / delimitation of a functional metropolitan area. However, FUAs have formerly been defined in ESPON on the basis of contiguous LAU2 units taking also into account the expertise of national correspondents (ESPON 1.1.1 project) or as proxies of

aggregates of NUTS3 units. In ESPON 1.1.1 the total number of FUAs identified in 29 European countries was 1595.

It is interesting to remark that the rates of the FUA population divided by the MUA population for the three GROSEE cities, which are referred to as “compactness” ratio in the ESPON 2013 Database project differ considerably.

At this point it is worthwhile to further examine the population densities per zones (“belts”) of the three functional metropolitan areas. As we have already noticed, in the respective literature, the urban areas are often distinguished from the not urban ones according to the population density. A commonly acceptable threshold for the definition of the urban area is a minimum of 150 inhabitants/km^2 density. The Maps below presents the density of LAU2 level areas (in 2006) for each of the three Capitals and the resulting configuration of the respective “urban areas”.

Further on, the threshold of population density of 650 inhab./km^2 could be used to define the “core city”; concept similar to that of the “Morphological Urban Area”. In general lines, the MUAs could be assimilated to the “Core city” of GROSEE. However, as data on MUAs are scarce, it is preferable to use for this purpose the “core areas” of Urban Audit, our proposal of delimitation of the CC, the FMA and the MR for the three capitals and their approximations with NUTS3 units.

As we have already mentioned, the most suitable definition/delimitation of the Functional Metropolitan Areas (FMA) of the three Capitals is on the basis of the commuting of workers of peripheral LAU units to the “core city”, the more densely populated part of each respective MA.

However, as we have already noted, there are also other criteria that could be used for the definition / delimitation of the three FMAs as for example the time-distance by transport means to the city centre or the time-distance to access some basic services etc.

The definition of Core areas and Larger Urban Zones (LUZs) provided by Urban Audit

Core areas or City Level and Larger Urban Zones (LUZ) are used in the case of the Urban Audit cities (Including București, Sofia and Athens).

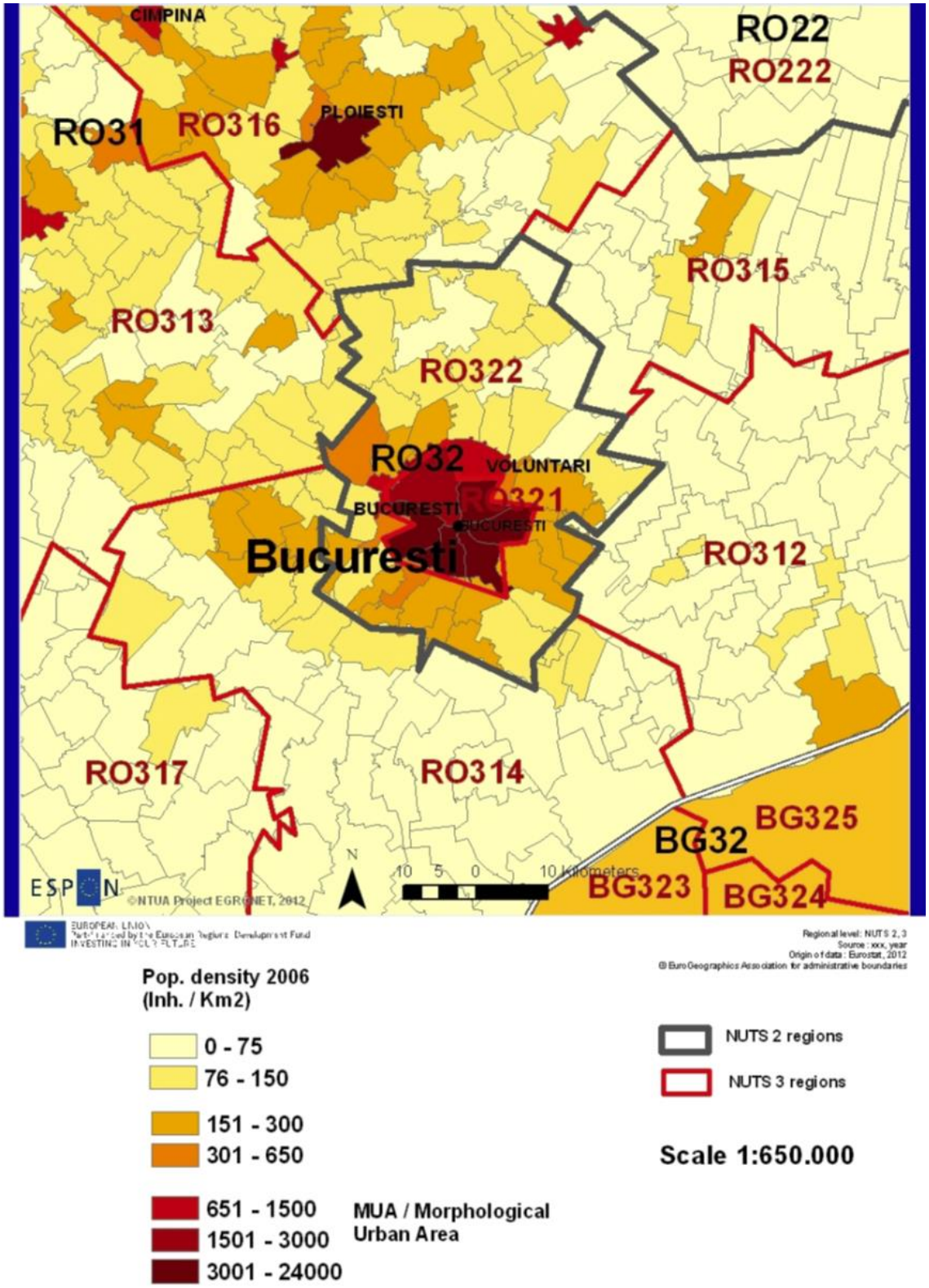
According to the Urban Audit Core areas or City Level corresponds to the general perception of the city. In many countries these “boundaries” are clearly established

and well- known. However, due to the extremely diverse nature of administrative boundaries, for some cities the administrative boundary does not correspond to the general perception of the city.

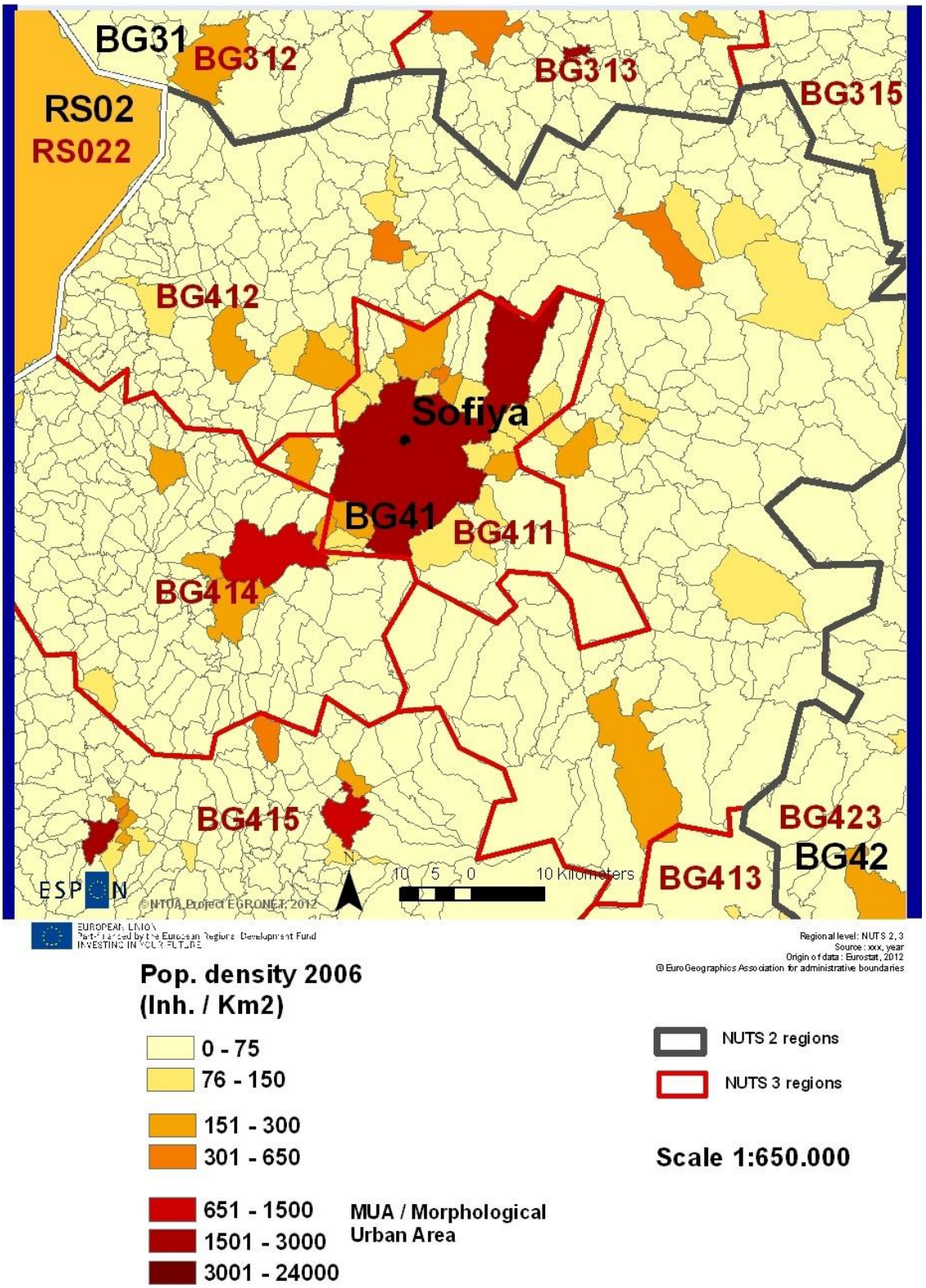
Administrative boundaries are approximate and apply in the definition of Larger Urban Zones. The Larger Urban Zones (LUZ) includes the city with its region and therefore may be compared. In this case, beyond the administrative boundaries it is implemented the concept of "functional urban region": the impact area from a significant share of the resident commute into the city.

Therefore, the definition of LUZ is preliminarily similar to the definition of the FUA; however different technical methods of implementation of the criterion of the commuting are used in the two cases.

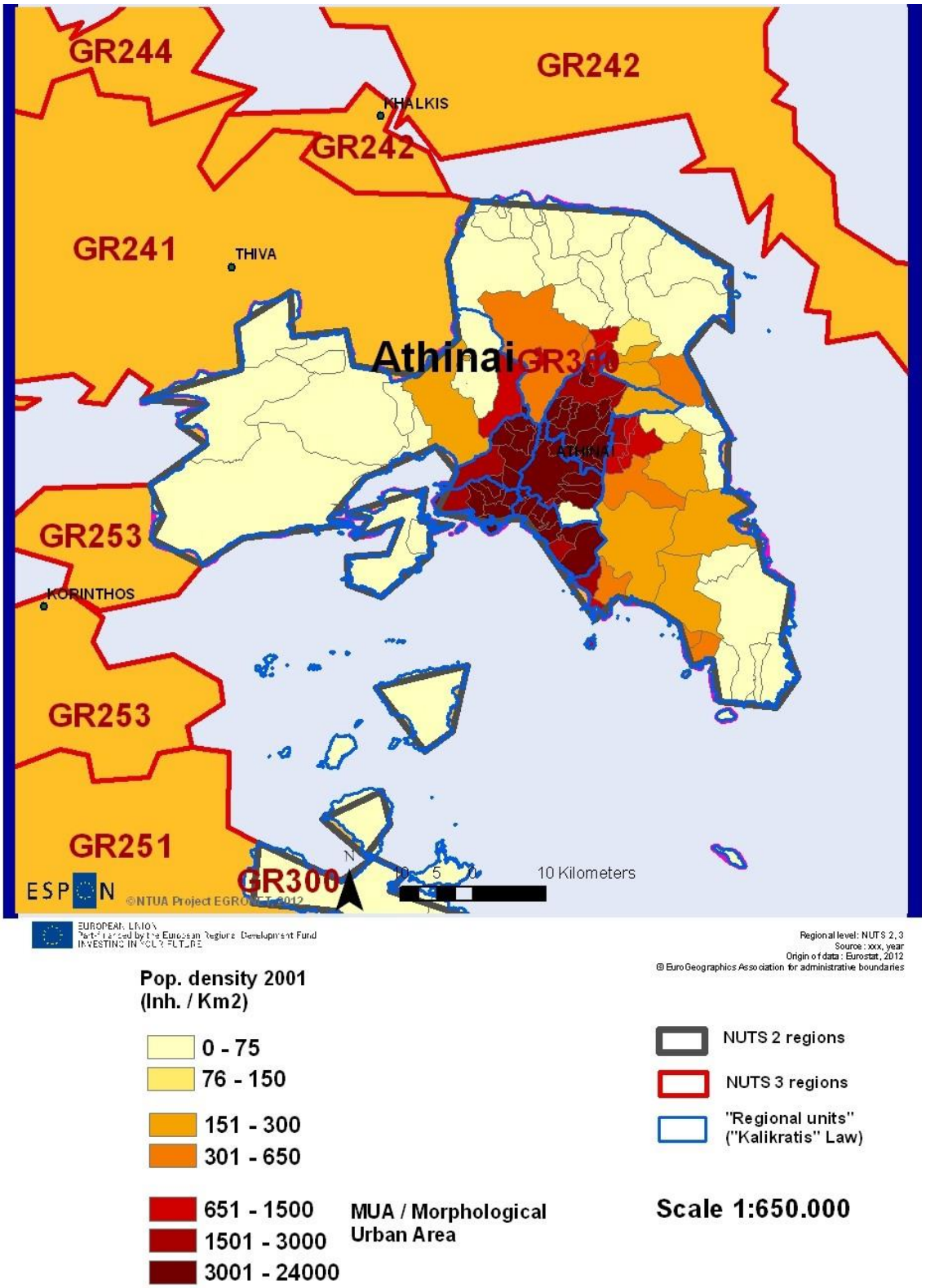
Map 2 Population's density of București at LAU-2 level, 2006



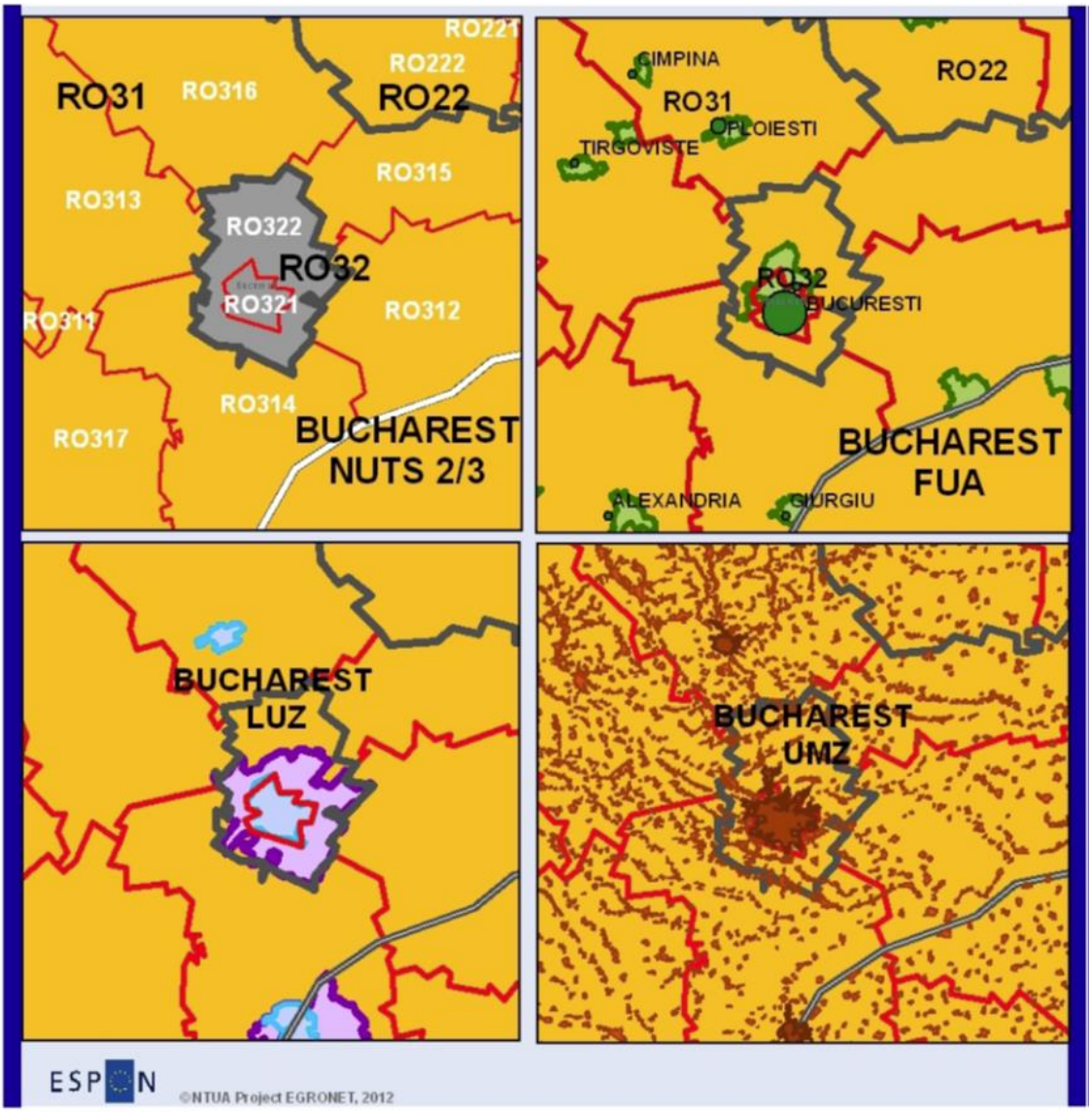
Map 3 Population's density of Sofia at LAU-2 level, 2006



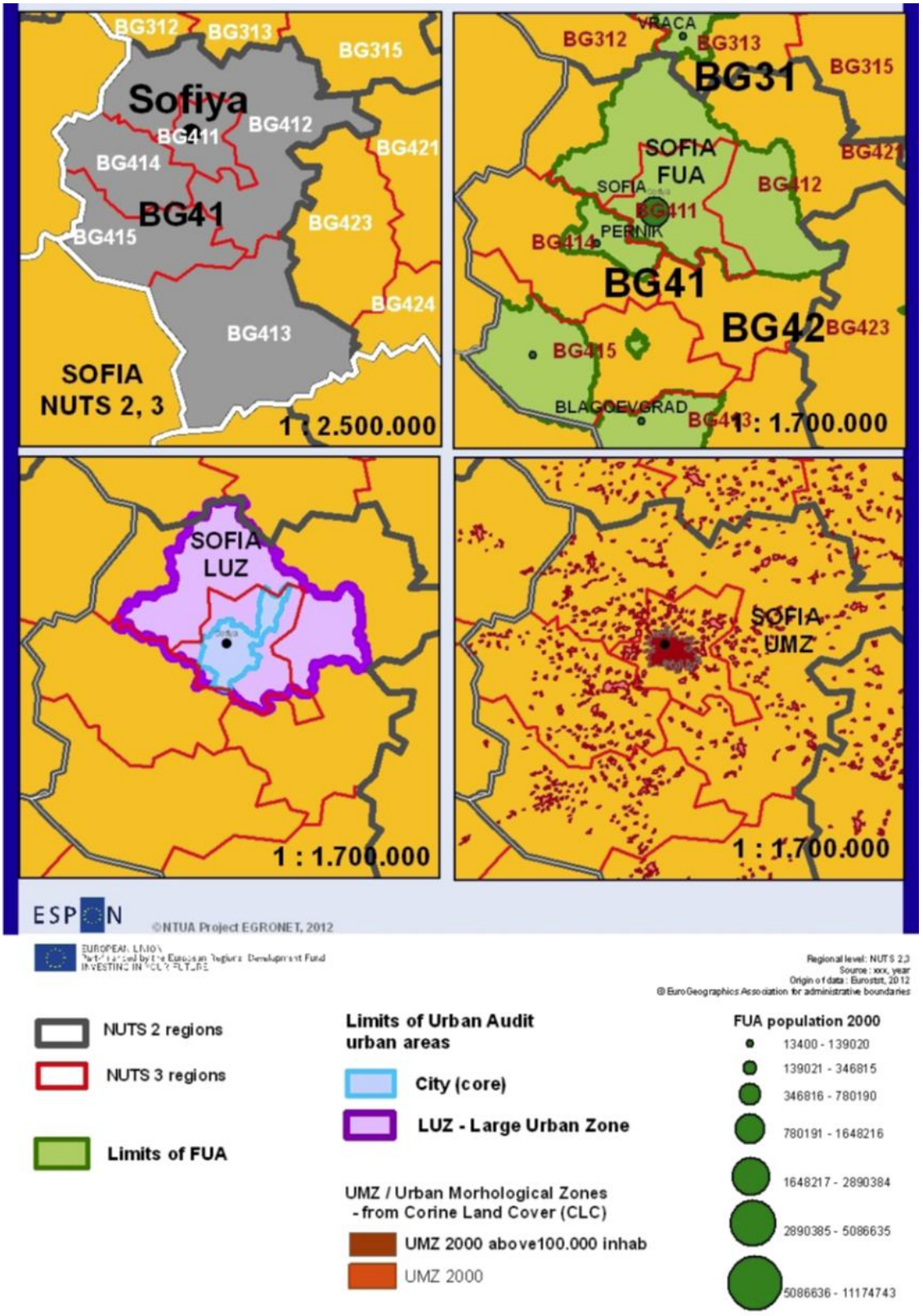
Map 4 Population's density of Athens at LAU-2 level, 2001



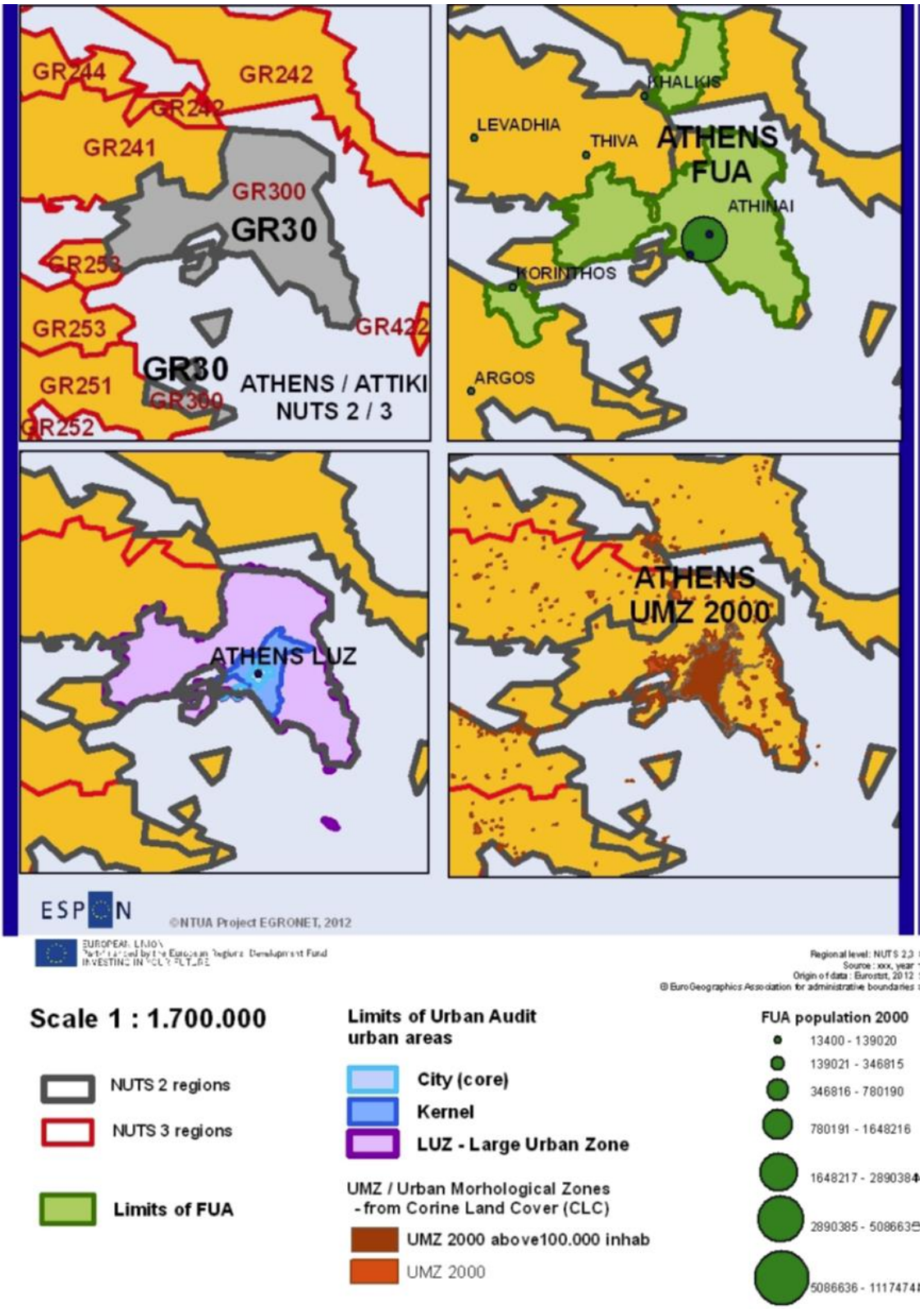
Map 5 NUTS 2 and NUTS 3 units, FUA, LUZ and UMZ delimitation of București



Map 6 NUTS 2 and NUTS 3 units, FUA, LUZ and UMZ delimitation of Sofia



Map 7 NUTS 2 and NUTS 3 units, FUA, LUZ and UMZ delimitation of Athens



The definition of Urban Morphological Zones (UMZ) on the basis of CLC data

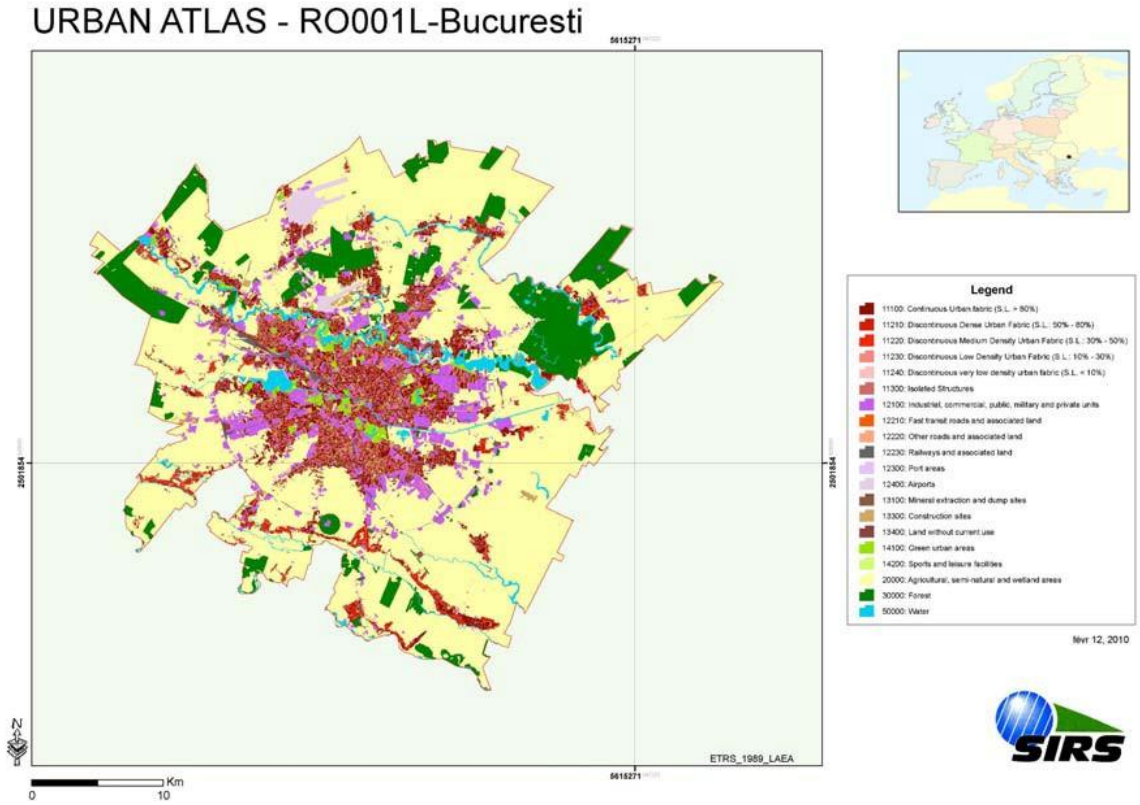
There are three projects of delineation of land uses for the European countries: (a) Corine Land Cover (CLC) for the years 1990, 2006 and 2006; (b) Urban Atlas for 2007 which refer to the LUZ of 300 Urban Audit cities; (c) LUCAS Eurostat (http://epp.eurostat.ec.europa.eu/portal/page/portal/lucas/introduction).

(a) Corine Land Cover (CLC) has defined Urban Morphological Zones (UMZ) as a set of urban areas laying less than 200 m apart. Those urban areas are defined from land cover classes contributing to the urban tissue and function. Details for the method used to build the Urban Morphological Zone dataset can be found in respective CLC documents.

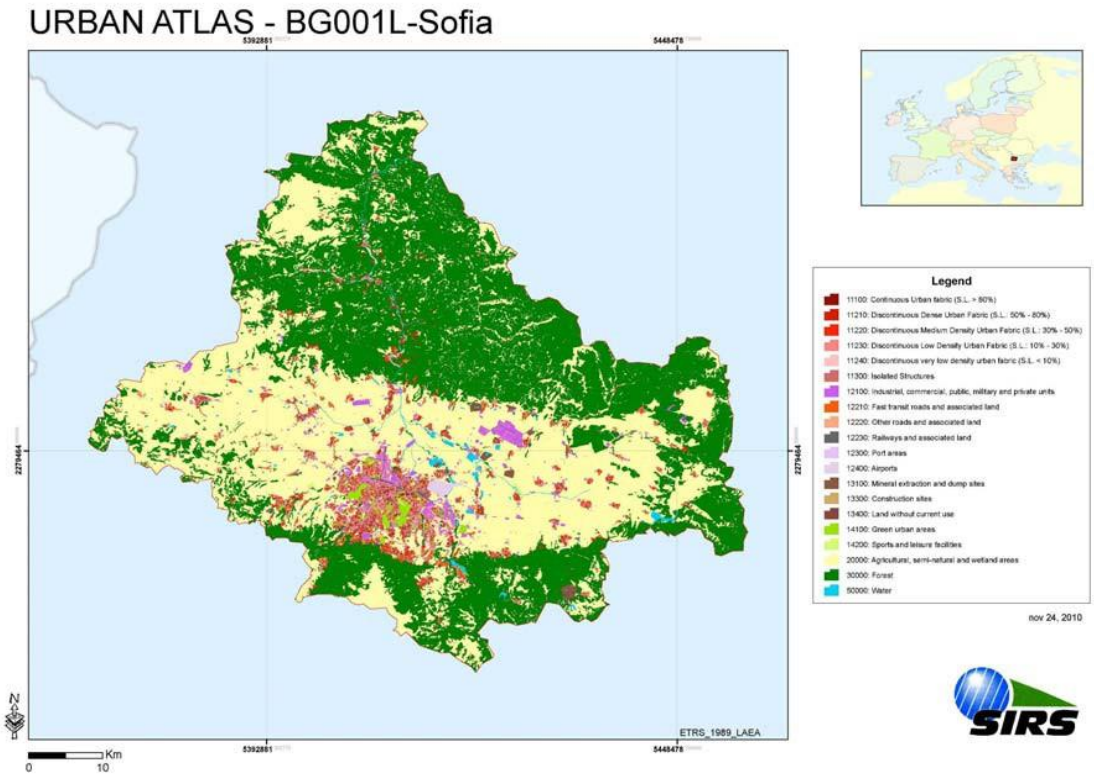
We should note that while CLC 2000 covers all three GROSEE countries, CLC 2006 covers Romania and Bulgaria; it does not cover Greece, as will be presented below.

We have included in Maps 8, 9 and 10, layers of UMZ on the basis of CLC 2000 for the three metropolitan areas. Conclusions drawn from the spatial distribution of the three UMZ are more or less similar to those drawn from the spatial distribution of the population densities.

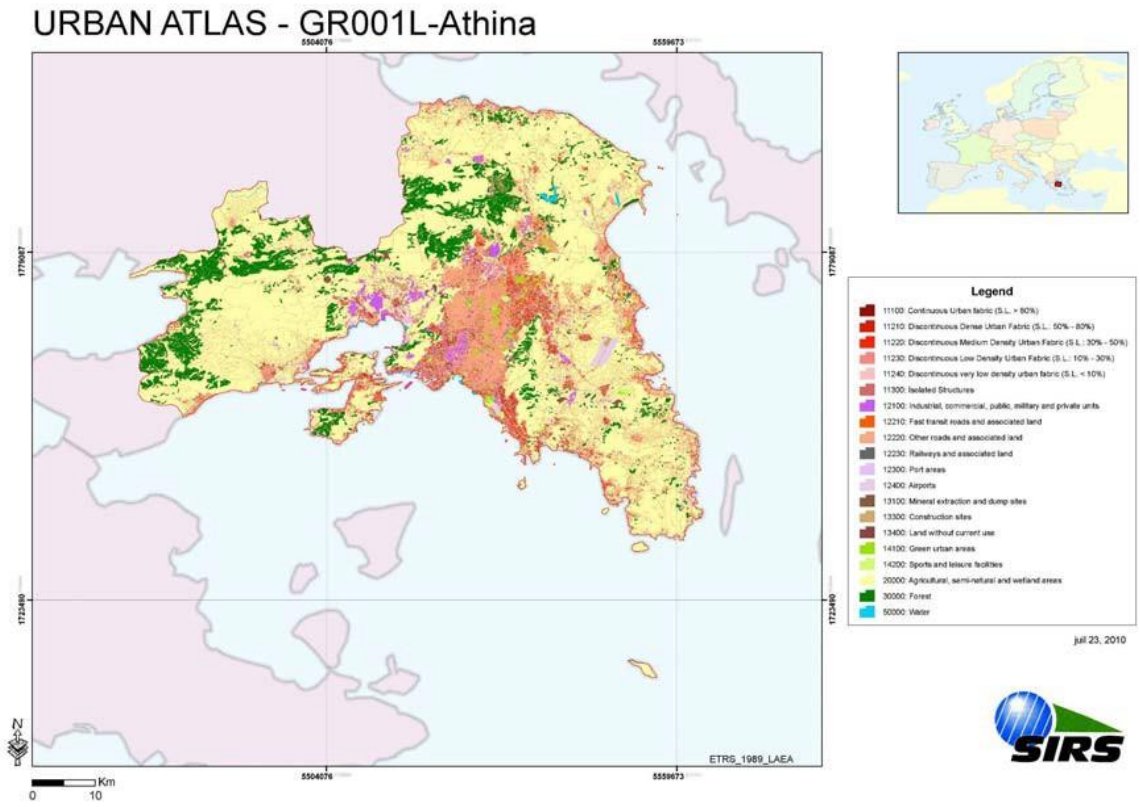
Map 8 Urban land use of București on the base of Urban Atlas 2007



Map 9 Urban land use of Sofia on the base of Urban Atlas



Map 10 Urban land use of Athens on the base of Urban Atlas 2007



Comparison of the urban land use distribution of Urban Atlas in the three metropolitan areas

As we have noted, there are not data from the most recent CLC of 2006 for the case of Greece. There are such data only for 2000. Therefore, we have decided to use the Urban Atlas data for 2007 (which cover all three Capitals) for commenting in more detail the land uses spatial distribution in the three Capitals.

In addition, Urban Atlas has an advantage, in comparison with CLC, regarding to our work. Urban land plots in Urban Atlas are divided in a greater number of classes (6), than in CLC (only 2):

> In more detail: "… The CORINE Land Cover database first developed in 1990 and updated for 2000 and 2006 was until recently the most comprehensive land cover database for European cities. However, with the focus being on agricultural, forests and wetlands out of the 44 land cover classes there are information for only two classes related to the urban fabric areas (…) Urban Atlas classification scheme identifies 20 different land use classes of which 17 van be considered built/artificial/urban classes… (Prastacos et al 2012).

Table 1 shows the land use classes of Urban Atlas and their correspondence with the land use classes of CLC. While in map 8, 9 and 10 (see above) the spatial distribution of the urban land use classes for the three cities from Urban Atlas are presented. The classes in the legends of the maps are more clearly presented in the 2nd column of Table 1.

Table 1 Land use classes in CORINE LC and in Urban Atlas

Corine	Class code	Urban Atlas land use class
Continuous Urban Fabric	11100	Continuous Urban Fabric (Sealing Degree > 80%)
Discontinuous Urban	11210	Discontinuous Dense Urban Fabric (Sealing Degree 50% -80%)
Fabric	11220	Discontinuous Medium Density Urban Fabric (S. D. 30% -50%)
	11230	Discontinuous Low Density Urban Fabric (S. D. 10% -30%)
	11240	Discontinuous Very Low Density Urban Fabric (S. D. < 10%)
	11300	Isolated Structures
Industrial, commercial	12100	Industrial, commercial, public, military and private units
Roads and Railroad	12210	Fast transit roads and associated land
	12220	Other roads and associated land
	12230	Railways and associated land
Ports	12300	Port areas
Airports	12400	Airports
Mineral extraction	13100	Mineral extraction and dump sites
Dump sites		
Construction sites	13300	Construction sites
	13400	Land without current use
Green urban areas	14100	Green urban areas
Sports and leisure facili-ties	14200	Sports and leisure facilities
	20000	Agricultural + Semi-natural areas + Wetlands
	30000	Forests
	50000	Water bodies
		Source: Prastakos et al, 2012

The analysis of the land use distribution could valid or invalid the results of the previous attempts to delineate the metropolitan areas of the three Capitals, because it highlights the interrelations of the urban (and non-urban) functions in these cases.

From the comparison of the three cities, we conclude the following:

In the case of **București** the dense urban land uses exceed slowly the NUTS3 RO321. So CC of București could be approximated to this NUTS3 unit.

Less dense urban land uses correspond satisfactorily (and does not exceed) the limits of the FUA and LUZ. They cover a significant part of the NUTS3 RO322. The area that corresponds to NUTS2 unit RO32 (RO321 + RO322) is significantly bigger of the FUA. The UMZ and the LUZ cover approximately 2/3 of the area that forms the NUTS2 unit RO32. So FMA of București could be relatively satisfactorily approximated to NUTS2 RO32.

In the case of **Sofia** the limits of FUA and LUZ include the dense urban land uses (Urban Atlas) of the city of Sofia and those limits don't seem to be exceeded at any point. CC of Sofia could be valuably approximated to the NUTS3 unit BG 411.

On the contrary, FUA and LUZ contain a significant part of forest and agricultural areas. Less dense urban land uses cover a small part of BG412 (this distribution corresponds to the UMZ). So FMA of Sofia could be difficultly approximated to NUTS3 BG411 + BG 412.

The FUA and LUZ of Sofia are much smaller from the area that corresponds to NUTS2 unit BG41 (BG411, BG412, BG413, BG414, BG415).

Finally, in the case of **Athens** the very dense urban land uses (Urban Atlas) correspond more or less to the Athens "kernel" of Urban Audit including four regional units according to the "Kallikratis" administrative division. So these 4 regional units could be approximated to the CC. The limits of FUA and LUZ include less dense urban land uses of the NUTS3 GR300 (which is identical with NUTS2 GR30). So, the FMA of Athens could be relatively satisfactorily approximated to NUTS3 GR300, which is identical with NUTS2.

The definition of the metropolitan areas by Eurostat and DG Regio

According to Eurostat and DG Regio, "Metropolitan regions are NUTS3 regions or a combination of NUTS3 regions which represent all agglomerations of at least 250 000 inhabitants. These agglomerations were identified using the Urban Audit's Larger Urban Zones (LUZ). Each agglomeration is represented by *at least one* NUTS3 region. If in an adjacent NUTS3 region more than 50% of the population also lives within this agglomeration, it is included in the "metro". These zones correspond to a considerable

degree to FMAs of GROSEE, except from the case of Sofia, approximated by Eurostat to BG411 NUTS3 unit while other approximations include also BG412 in the Sofia FMA.

The use of the MRs in spatial planning and the role of the political authorities

The delimitation of the MRs (and their subdivision in CC and FMA) in spatial analysis could differ from their delimitation when they are used in spatial planning because in the latter case the political will of the national / regional / local authorities counts. In some cases, national authorities could decide decrease the area of a “planning metropolitan region” in order to increase the support to the development of the urban centres of the regions neighbouring the MR. This is often the result of demands of the latter regions which want maintain their power vis-à-vis a very powerful metropolitan region.

Also, some municipalities situated at the edge of a MR (delimited on the basis of a scientific analysis) do not want cooperate with their neighbours situated inside the MR; in other cases, municipalities situated nearby the MR prefer be integrated to the MR.

These political / governance aspects of the delimitation of the MRs in GROSEE should also be taken into account.

1.2.5 Approximation of the zones of the MRs to LAU units, using specific methods to each MR (only for București and Athens)

In this section we have included the implementation of methods of delimitation of the zones of the MRs of București and Athens on the basis of LAU units. Just because the results refer to very small territorial units, they are close to the respective “real” metropolitan territories.

On the other hand, the implementation of these methods has profited from specific researches for appropriate data for each one of the two capitals. So, it is not easy to reproduce the method used for București for the two other capitals; the same apply for the method used for Athens.

The results provided in the two cases do not differ very much from those provided from the use of the criterion of the population density. Thus, the results are indirectly comparable to some extent.

The TPG did not have results for the delimitation of Sofia on the basis of LAU level data because of the late insertion of the BUA in the project. We could point out that for the case of Sofia results at LAU level on the basis of population density.

1.2.6 The specific method used at LAU level for the case of București

For the cases of București and Sofia it is useful define the "real" metropolitan territory which could be used as "guide" for new administrative divisions in these two cases. For the case of Attiki, there is no such a need because the administrative reform of "Kallikratis" is very recent (2011).

Since in practice, the metropolitan area of București doesn't have a clear delimitation on the basis of some criteria or laws recognised at a national level, and this is why it was tried to establish the spatial extension using a multi-criteria basis. This involves a series of criteria and indicators, selected from various domains, considered to be relevant and that reflect in practice an evident functionality for the metropolitan area of București.

Therefore, the delimitation of the metropolitan area of București is based on economic, social, historic, but also cultural and natural considerations. They have been analysed from a qualitative and quantitative point of view. A considerable part of these criteria have been considered of main importance, but also some secondary criteria were added in order to clarify the final metropolitan area (Pintilii et al., 2008).

The basic criteria have a direct connection to the territorial functionality between the metropolis and its adjacent polarised area and the secondary ones belong and characterise directly the polarised space. Among the most important criteria, used in the spatial delimitation of the metropolitan area, the next ones can be considered (Pintilii R.D., 2008):

The transports systems criterion – in practice it has been proved that it is the most efficient criterion in delimiting the relationships between the city and the surrounding towns. As main convergence nodes of the transport networks, the main urban metropolises establish relationships with the surrounding areas through mass and energy flows. These flows take into account the analysis of the passengers transport on two categories of terrestrial transport. In the general configuration of the terrestrial transport system, the most important have been the road transport because they facilitate the connection between the metropolis and its adjacent area. The railway transport has also been taken into account which can reflect in an objective way the flows between the big cities and the towns surrounding them although they are influenced by the existence of a certain infrastructure. The indicators that have been used for this criterion concern road and railway transports, calculated as the number of pair trips for small buses or the number of pair trains between the main cities that are close to the big metropolis.

In the spatial delimitation of a metropolitan area, the other transport categories (by air or by sea) are less important and in most of the cases they are ignores when establishing the flows

between the metropolis and the surrounding space. This is due to the necessity of a specific infrastructure that proved to be less accessible.

Economic criterion –reflects an influence based on the relationship between the agricultural and industrial sector and its necessary through the production located in the adjacent area of an urban centre. Concerning the development of the industrial activities at the outskirts of the city, in most of the cases they were aimed at the decongest of the city through delocalisation processes that were determined by advantages concerning production, environment and labour force costs or the optimal valorisation of the raw material in the adjacent space of the city.

The economic indicators take into account the industrial delocalisation or other phenomena, the local contribution of the commodities as suppliers for the city (especially raw material supply), the number of investments coming from the big metropolis to the adjacent space (it can be represented through the number of SMEs/1000 inhabitants).

The decentralisation and delocalisation process is represented by the number of employees in the urban centre that work in the subsidiaries of the enterprises opened on the territories of the surrounding towns, but have the registered office in the metropolis.

$$D = {N_s}/{N_t}\ x100$$

D = decentralisation index,

N_s = number of employees from the city that work in the town of reference

Nt = total number of employees of the company;

Non-agricultural activities, they are calculated as a proportion between employed population in non-agricultural activities and the entire agricultural population, having as an equation:

$$I_{an} = {P_{na}}/{P_a}\ x100$$

where P_{na} = non-agricultural population ; P_a = total agricultural population.

Share of vegetable surfaces, fodder and industrial plants areas (including other crops for the city) from the total arable land.

Share of vegetables and animal production for the city in the total production of goods in the area.

The commercial influence follows the commercial relations between the urban centre and the surrounding towns, respectively points that supply the goods and the frequency of the connections between the sales centres in the rural areas. The commercial influence can also be reflected through the area of origin of the traders in the markets in the metropolis area.

The demographic criterion – the demographic relationships take place as complex flows through intensity and frequency. In most of the cases, the city influences the socio-professional structure of the inhabitants in the adjacent space. The daily territorial mobility between the metropolis and its adjacent space comes from a deficit of labor force in terms of the first one, but also from the bedroom character that have the new residential areas outside it *(*Iordan I., 1973).

The demographic influence, determined by the commuting index, is calculated through the formula:

$$I_n = {}^{N_v}\!/_{P_a}\, x100$$

Where N_v = commuters number, and P_a = total active population, this is a quantitative index and also a qualitative one. Another index taken into account is the chain migration (final displacements). Other indirect indexes that might help in the delimitation of the demographic influence area are

Share of the occupied population, as a proportion between the occupied population (P_o) and the total of the population (P)

$$P_{op} = {}^{P_o}\!/_{P}\, x100$$

- *Share of the number of employees (E)*, as a proportion between the number of employees (S) and the total active population (P_a)

$$E = {}^{S}\!/_{P_a}\, x100$$

Socio-cultural criterion – defined by the attraction that the big metropolis is playing over the surrounding area through socio-cultural activities: health services (even specialised ones), education services (high schools, universities), and financial, social and legal services. An important aspect for this criterion is represented by the commercial attraction driven by the commercial areas through the purchase of sustainable goods.

Medical services, expressed by the attractiveness of city's medical centres on the rural localities represent another indicator. Accordingly, it can be established the provenance of the people from the rural areas that use the medical services in that city.

Social, legal, financial services are expressed by dividing the number of people in a town to the population that uses this type of services in the polarising city.

Life standard criterion – reflected through the facilities of private homes, the level of the new housing, the number of private cars etc. As main indicators, the proportion of

dwellings with private bathroom/ total housing and the proportion of new dwellings (after 1990)/total housing have been taken into consideration.

Infrastructure criterion – as defined by the development degree of the infrastructure in the adjacent area of the great metropolis, both from a quantitative and qualitative point of view. This infrastructure is reflected through the share of networks concerning sewage, natural gases, electricity, cable and television subscriptions, and internet.

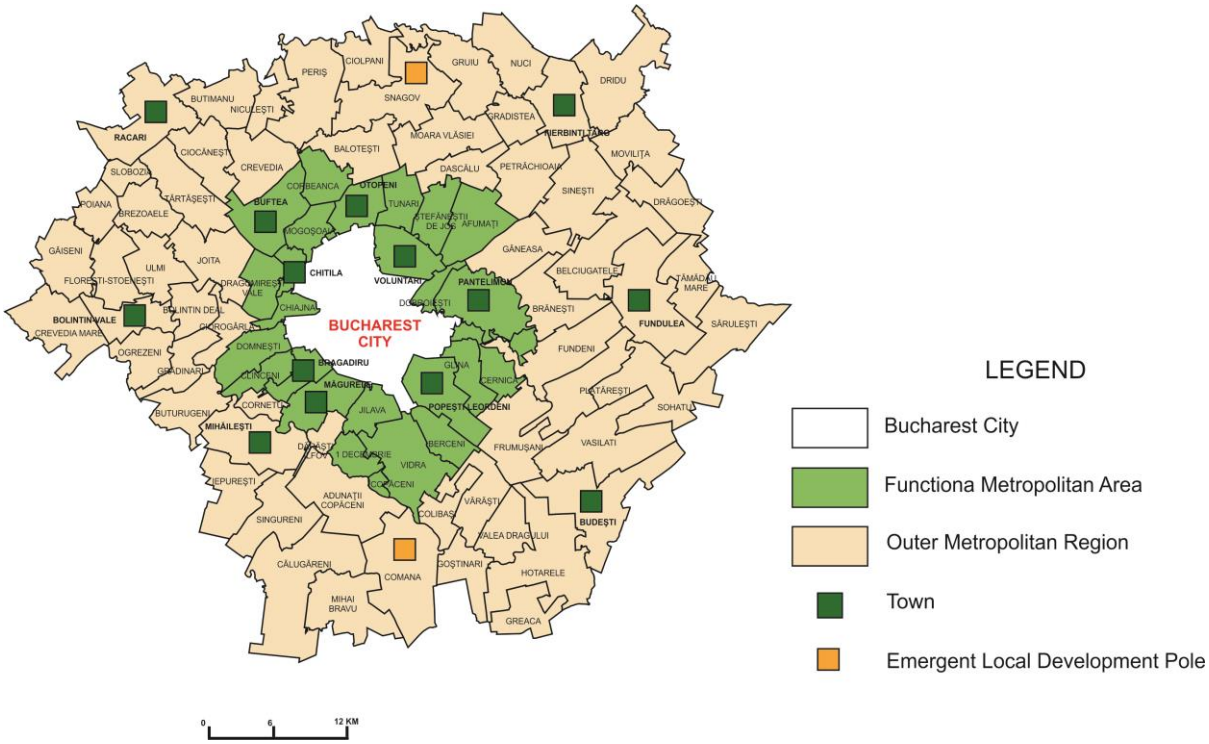
Concerning the infrastructure in delimiting the metropolitan area, a series of indicators have been taken into account:

- Renewal of the buildings index, calculated based on the total weight of the new building in the total number of buildings.
- Share of personal cars/ 1000 inhabitants.
- Share of housing connect to cable and television/ 1000 inhabitants
- Share of Internet subscriptions/ 1000 inhabitants
- Share of housing having access to the natural gases network/ 1000 inhabitants
- Share of housing connected to the sewerage system/1000 inhabitants
- Share of housing with private bedrooms/ 1000 inhabitants

Such infrastructure indicators, even if they have a secondary importance in delimiting the metropolitan area of București, are really useful and help eliminate some distortions in the analysis, managing to convey a unified vision of the entire space.

The infrastructure indicators are related to the environment/ the internal potential of the human communities that constitute the metropolitan area. These indicators are considered as an own contribution (which shows a certain level of internal development of the localities in the metropolitan area) that the towns in the metropolitan area are using together to draw the limits of this area.

Map 11 Delimitation of the Metropolitan area at LAU level



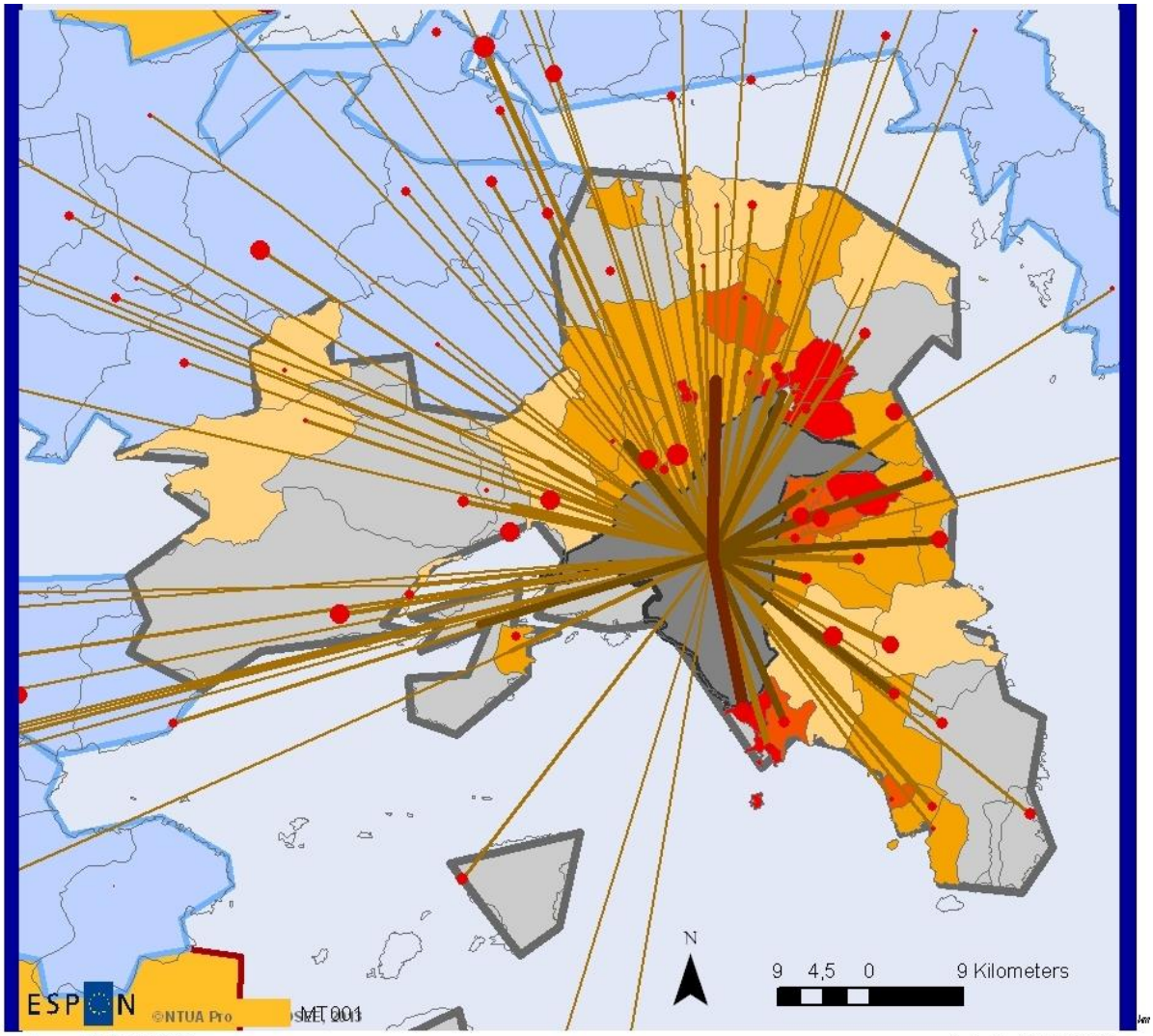
The specific method used at LAU level for the case of Athens

For the delimitation of the MR of Athens on the basis of LAU2 data, the NTUA team has defined the concept of commuting area of the employees which reside in peripheral LAU2 units and travel daily to work at LAU-2 units of the different parts of the Athens FMA (Functional Metropolitan Area).

Specifically, we have first defined the Outer Metropolitan Ring (OMR) of Athens as the impact area from a significant share of the resident employees commute into the Core City / CC (the Athens "kernel"). Next, we have defined the rest of the MR as the impact area from a significant share of the resident employees from peripheral LAU2 commute into the Athens FMA (CC + OMR).

We have used appropriate data of Eurostat which has been created from data of the Greek population census 2001. See Map 12 for the method used and Map 13 for the final result.

Map 12 Delimitation of the CC, MA and MR of Athens to LAU units using commuting data: the method used



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Regional level: NUTS 2, 3, LAU1
Source : ELSTAT, 2001
Origin of data : Eurostat, 2012
© EuroGeographics Association for administrative boundaries

Core city / CC ("Kernel' of Urban Audit)

Metropolitan Area / MA (Approx. FUA, Approx. LUZ, NUTS3)

Metropolitan Region / MR

Share of employees 2001 commuting daily from peripheral LAU1 to the Athens core city (LUZ kernel) in the total number of employees resident in the given LAU1 (%)*

- 10,28 - 15,13
- 15,14 - 25,68
- 25,69 - 37,11
- 37,12 - 58,18

Population 2001 of the LAU2 of the Athens Merop.Region (except from Athens core city / LUZ kernel)

- 0 - 2252
- 2253 - 4553
- 4554 - 7329
- 7330 - 11205
- 11206 - 17232
- 17233 - 36991
- 36992 - 77679

Nr of employees 2001 commuting daily from peripheral LAU1to the Athens core city (LUZ kernel)

- 30 - 120
- 121 - 283
- 284 - 636
- 637 - 1059
- 1060 - 1594
- 1595 - 2534

* only shares > 15% and LAU1 of Attiki have been taken into account

Map 13 Delimitation of the CC, MA and MR of Athens to LAU units

1.3 Using common methods for the three MRs

As we have already remarked, we should take into account that the large majority of the indicators to be used only exist at NUTS2 or NUTS3 level. Therefore, we need approximations of the CCs, the FMAs and the MRs to appropriate NUTS2 or NUTS3 units. Evidently, from the scope of GROSEE project, the use of NUTS2 approximations of the above areas could lead to considerable deformations of the real development processes in the three capitals. Therefore, it is urgent to select the most suitable approximations of the different levels of the three MRs to NUTS3 units. We could name in next these as "NUTS3 approximations".

(1) Definition of the three "Core Cities" as Morphological Urban Areas (MUAs) on the base of LAUs with population density greater than 650 inhabitants per km^2.

As it results from the respective Maps, in the case of Athens, the MUA corresponds to the Athens Basin, which does not correspond to an aggregate of NUTS3 units; it contains four of the six new "regional units" of Athens. This administrative division is very recent and it is possible that the Greek Statistical Authority will not publish data for a considerable number of indicators. Although, the "Core city' of Athens could be assimilated to the "kernel" of Urban Audit. The MUA of Sofia corresponds satisfactorily to BG411; the same is true for the approximation of București MUA to RO321.

Concluding, comparisons at this territorial level will be difficult due to lack of data for the case of Athens.

(2) A first hypothesis of approximation of the three FMAs to NUTS3 units consists in approximating the three MAs the same way as Eurostat / DG REGIO: Sofia MA to BG411, București MA to RO321 + RO322, Athens MA to GR300. As we have already noted, it is preferable, in our opinion, to approximate the FMA of Sofia to BG411 + BG412 NUTS3 units.

(3) As there are data for a considerable number of indicators at the LUZ level (Urban Audit), we need approximation of LUZs to NUTS3 units for the three cities.

As we have remarked, LUZs are defined in most cases similarly to FUAs. However, as the local authorities of each country have implemented the respective criteria, the LUZs are not exactly the same with FUAs.

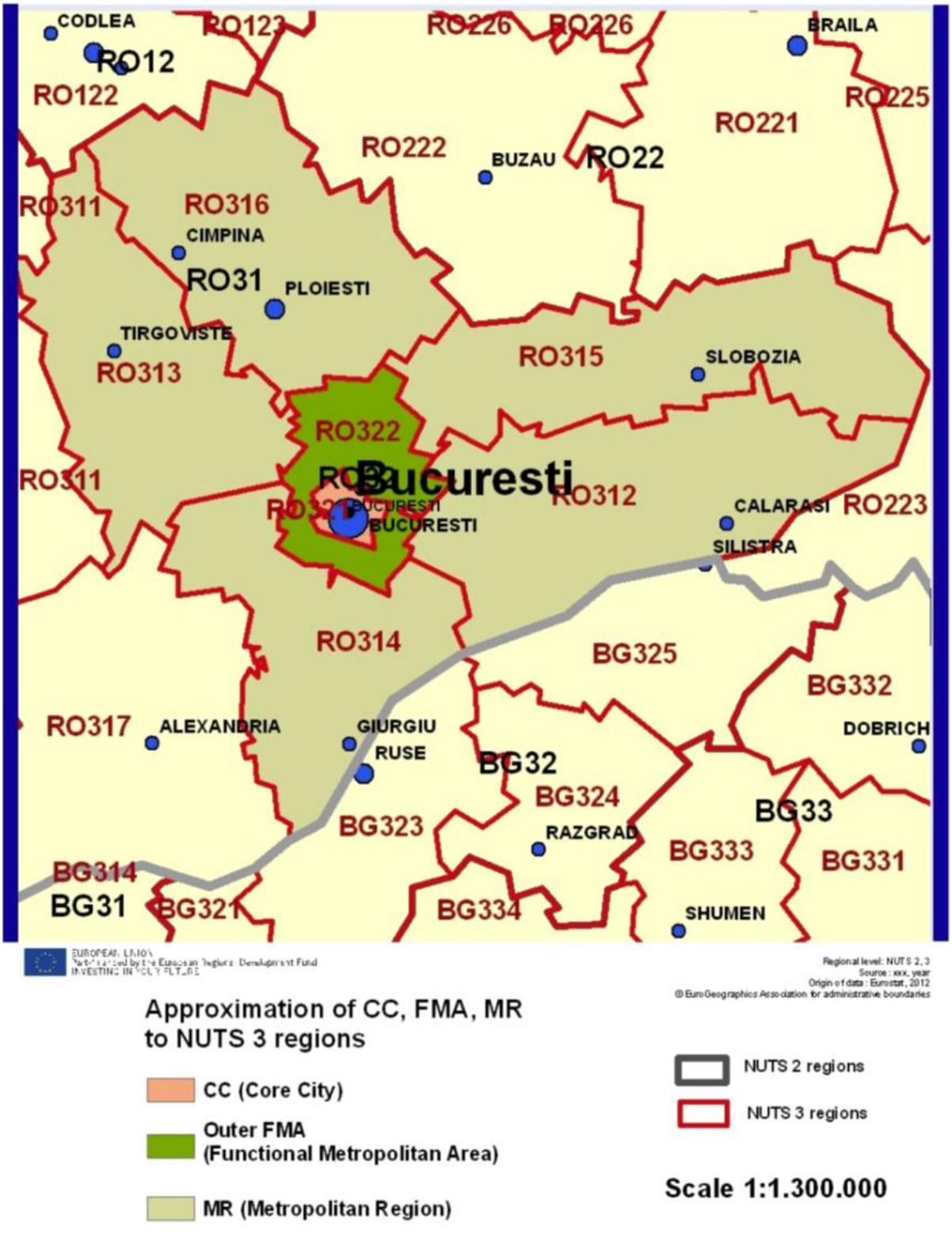
For example, the LUZ of Sofia could neither be appropriately approximated to BG411 nor to the aggregate BG411 + BG412, because the LUZ is quite larger than the first and quite smaller than the second. The same is true for București. Inversely, GR300 NUTS3 unit could be satisfactorily approximated to the Athens LUZ.

Besides, it seems that data for the LUZs of București, Sofia and Athens could valuably be compared to each other. We present the conclusions of this work in the Table 2 and the Maps 14, 15 and 16. Especially for the definition of the parts of the three MRs which are not included in the FMAs: In the cases of București and Athens we have taken into account the respective analyses at LAU level and the national expertise. The selection made could be valuably used actually for the work on data. However, we should recall here the importance of the role of the political will of the national / regional/ local authorities in the definition of the MRs to be used in the implementation of spatial planning.

Table 2 Approximations of the CC, the FMA and the MR for the three capitals with NUTS and LAU units

Capital	CC (Core City)	Population 2011 CC	FMA (Functional Metropolitan Area)	Population 2011 FMA	MR (Metropolitan Region)	**Population 2011 MR**
Approximations with NUTS2						
Athens	GR30 (Attiki)	3.825.000	GR30 (Attiki)	3.825.000	GR30, GR24 (Sterea Ellada), GR25	**4.970.000**
Sofia	BG41 (Yugozapade	2.110.000	BG41 (Yugozapaden	2.110.000	BG41	**2.110.000**
București	RO32 (București-Ilfov)	2.265.000	RO32 (București–Ilfov)	2.265.000	RO32, RO31 (Sud–Muntenia)	**5.520.000**
Approximations with NUTS3						
Athens	GR300 (Attiki)	3.825.000	GR300 (Attiki)	3.825.000	GR300, 241 (Voiotia), 242 (Evvoia), 253 (Korinthia), 251 (Argolida)	**4.405.000**
Sofia	BG411 / Sofia (stolitsa)	1.255.000	BG411 / Sofia (stolitsa) , BG412 / Sofia	1.505.000	BG411, 412, 413 (Blagoevgrad)	**2.110.000**
București	RO321 / București	1.900.000	RO321 / București, RO322 / Ilfov	2.055.000	RO321, 322, 312 (Calarasi), 313 (Dâmbovita), 314 (Giurgiu), 315 (Ialomita)	**4.485.000**
Approximations with lower than NUTS units						
Attiki	**6 "regional units" (aggregates of LAU1)**	**3.090.000**				

Map 14 Approximation of the București study area to NUTS 3 units



Map 15 Approximation of the Athens study area to NUTS 3 units

Map 16 Approximation of the Sofia study area to NUTS 3 units

2. Analysis of the case study areas

2.1 The metropolitan region of București and its role in the European polycentric network

The cities that perform as capital cities represent those territorial entities that reflect their whole political, economic, cultural and administrative political power in the administrative-territorial limits of the states they represent. Their international role comes from the fact that they are true symbols of the state's identity and sovereignty.

In this way, the three Eastern European Capitals of EU (București, Sofia and Athens), with a metropolis function, have an important role for the States that they represent. Their importance can be observed at an individual level (the role of each capital in its own national urban settlements system), as well as at an associative level (metropolitan axis București-Sofia- Athens). The last level could be appropriate and functional through the opportunity of creating partnerships for a balanced development in order to increase territorial cohesion both at South-Eastern European level and at the entire continent level, as an older objective of the European Union.

The aspects linked to the evolution and the structure of the three South-Eastern European capitals, considered as urban systems, are practically less known in the international literature, especially if we relate it South-to the existence of the documents, scientific papers that analyze and offer solutions for the three metropolis seen in a common manner. The lack of studies shows that information regarding the urban systems in the other countries is limited only to a few national studies, except some analysis in Greece (Petrakos et al, 2005). This fact is considered to be due to the missing of relevant and accurate statistical data.

Inside the South-Eastern European urban system, as a settlement over-system, the three European capitals create a network of development poles, each of them with a main role in the national hierarchy. This characteristic is given by their political-administrative importance on the internal level, as well as on the external one.

The metropolises represent the most dynamic centres for economic exchanges in an urban system. At the level of the three European capitals, București, Sofia and Athens represent the most important microsystems in the entire national urban system of settlements. Their importance is justified on one side by the context in which they have evolved through history and on the other side, the role that each of them had by coordinating their national urban systems.

A more detailed analysis of the entire Romanian settlements system, considers București as a main centre in the entire national hierarchy. Its evolution through time, in a centralized economic system, but also the advantages of its political-administrative power next to its functional complexity, place the municipality of București on top of the Romanian settlements system pyramid (makes almost a quarter of the national GDP and concentrates 10% of the country's total population).

In comparison to the second city in the national urban hierarchy, the municipality of București is an overdeveloped city. The Romanian urban system has also other five cities with more than 240 000 inhabitants, the biggest ones being Cluj-Napoca and Timișoara. Other cities on an inferior level have over 100 000 inhabitants and represent the main development poles in the national settlements hierarchy. The imbalances between București and the other big cities could be reduced by adopting some coherent policies at the central level, policies for a balanced territorial development through the development of national polycentric network.

From the short analysis, we can see that the three metropolises in South-Eastern Europe have various common elements concerning their evolution and their development. The fact that these elements are not so different from one metropolis to another could facilitate the creation of some inter-metropolitan partnerships, both at the first level (between the three metropolises) and at the second level (between the metropolis and the other cities from the national settlements network).

The development of the connections with other European metropolises (especially with the western ones), but also with the non-European ones, especially with the rest of the Balkanian (especially Istanbul) ones could be achieved through the creation of a functional axis of inter-metropolitan cooperation in South-Eastern Europe.

2.1.1 Competitiveness and innovation

General approach

Competitiveness measures the capacity of a territory to impose itself from an economic, social and cultural point of view at a larger scale than the one it represents. This requires the existence of some economic branches and an extremely capable management that would imply a "dash" of that community at a national, continental or global level. Under a veiled form, competitiveness is the capacity to win a competition that goes from a local scale to a global one.

To be competitive you need to have enough resources in order to invest in research and innovation and to be reflected in the efficient and convenient production and services from an

economic point of view. The relations between opportunities, traditions, natural and human resources capitalisation will be reflected in what competitiveness means.

What type of competitiveness might be induced by the cities, being in a profound economic crisis, such as the one in South-Eastern Europe? Aren't we discussing about taking into account the favourable characteristics and not the real competitiveness genesis? The analysis lead to the idea that this EU space can be developed only through cooperation with developed countries in the European core. In other words, the competitiveness concept in this area, as well as EU-wide, has to be refined by adding the cooperation concept. Namely, the only solution to mitigate disparities at a macro-scale is to achieve competitiveness through cooperation, functional and structural complementarities, and synergies.

Competitiveness conceptualised at a territorial level has its origins in a more complex idea that means how to survive in a new global competition. If initially EU discussed the competitiveness delay towards USA and Japan, the concept would transfer later to the regions and cities level, being a main tool in abolishing regional disparities and having a crucial role in achieving social cohesion (Gardiner et al, 2004). Starting from the conceptual frame proposed by Porter (1998), various studies concerning competitiveness tried to individualise criteria and indicators for a realistic assessment of the competitiveness growth process. Whether it concerns national or regional competitiveness, the GDP/inhabitant is most often used as an indicator to measure it (Budd and Hirmis, 2004). Competitiveness for big metropolises is mainly related to changes that occurred through time-space compression (Harvey, 1989), through the new forms of globalisation, through the new dimension of the superior tertiary, by changing the general rules of economic competition. In the new context, an increasingly important role is assigned to the image of the metropolis and the cities in the metropolitan areas (Vanolo, 2008). From this point of view, the cities undergo the phenomenon of path-dependency, and in this context the current economic level, the dimension of the faced crisis is understood.

The ESPON projects offer an extremely rich material both as data basis and as means of interpreting some really dynamic realities for the urban spaces and of the role the cities play in the territorial development at various levels.

Competitiveness in the European Union's vision represents the main objective for the spatial development policies next to the economic and social cohesion and to the conservation and management of the natural resources and cultural heritage (ESDP, 1999). In the same time, a balanced development of all European regions is due to the high polycentric development, through the competitive growth (ESPON 1.1.1 project). More than that, a stronger integration

of the European regions in the global economy is desirable. (ESDP, 1999; ESPON, 1.1.1; EU2020S).

The economic factors are the basis for the competitiveness analysis, providing important information linked to the performance, to the labour force market, the human capital, the technological development and so on. The indicators are analysed at different territorial levels.

Specificities of the case study area in terms of competitiveness and innovation

The competition stays a main force for innovation and creativity (Efficient Metropolitan Governance Functioning Urban-Rural Relations, 2011), which ranks the cities and establishes relations of cooperation with the spaces around them.

Metropolitan areas are seen as drivers of economic development and important for EU's global competitiveness (Efficient Metropolitan Governance Functioning Urban-Rural Relations, 14 April 2011). As it was defined in the Inception Report, the Metropolitan Region / MR represents the total of the city core (CC), FMA (Functional Metropolitan Areas) and the OMR (Outer Metropolitan Ring). For more relevant results, the analysis should be focused on a comparative interpretation between two development regions: București-Ilfov and Sud-Muntenia Development Region.

From the competitiveness and innovation point of view, there are many differences between the capital and Ilfov department which surrounds București and much less between the departments from the Sud-Muntenia Development Region. In the last case, it is more about the differences in the oil patch development as we move away from the city, due to the diminution of investments direct proportional with the increase in distance from the metropolis.

The București-Ilfov Development Region records in the last years the highest rate of growth in different economic sectors, like constructions, real estate and more recently in industry (as the București`s industry is crossing a continuous process of decentralization and delocalization of its production activities). In general, it is proved that globalization contributes to phenomena like industrial delocalization relying on different factors, as competitiveness and innovation.

Taking into account that București-Ilfov Development Region receives annually more than 50% from the FDI values on national level, it proves that local economical advantages can play an important role, considered in some cases decisive in creating some competitive economic poles. It is well known that the indicator of competitiveness is important in the

classification of functional areas from European Union level together with accessibility and knowledge base (Espon 1.1.1).

From a total of 55 industrial parks in Romania, 21 are located inside the study case area. These industrial parks, developed starting with 2002, are distributed on counties as follows: 3 in București, 2 in Giurgiu, 5 in Dâmbovița, 9 in Prahova, 1 in Ialomița and 1 in Argeș.

Table 3 Distribution of Industrial Parks in the study case area

Industrial Parks	Localization and area (ha)	Type
București Industrial Park	Bolintin Deal (Giurgiu counties); 42 ha	Operational
Moreni Industrial Park	Moreni (Dambovita counties); 24,71 ha	Operational
Mija Industrial Park	I. L. Caragiale (Dambovita counties); 82,62 ha	Operational
Prahova Industrial Park	Valenii de Munte (Prahova counties); 23,47 ha	Operational
Fetesti Industrial Park	Fetesti (Ialomita counties); 20 ha	Greenfield
Metav Industrial Park	București; 16,576 ha	Operational
Ploiesti Industrial Park	Ploiesti (Prahova counties); 146,27 ha	Operational
Pitesti-Bradu Industrial Park	Bradu (Arges counties); 14,0771 ha	In development
Giurgiu Nord Technological and Industrial Park	Giurgiu (Giurgiu counties); 13,4 ha	Operational
Sema Industrial Park	București; 16,928 ha	Operational
Brazi Industrial Park	Brazi (Prahova counties); 46,114 ha	Operational
Racari Industrial Park	Racari (Dambovita counties); 23,686 ha	Operational
Corbii Mari Industrial Park	Corbii Mari (Dambovita counties); 22,22 ha	Greenfield
Mizil Industrial Park	Mizil (Prahova counties); 30 ha	Greenfield
Urlati Industrial Park	Urlati (Prahova counties); 35,06 ha	Operational
Aricesti Allianso Business Industrial Park	Aricestii Rahtivani (Prahova counties); 219 ha	In development
WDP Aricestii Rahtivani Industrial Park	Aricestii Rahtivani (Prahova counties); 25 ha	Greenfield
Ciorani Industrial Park	Ciorani (Prahova counties); 45 ha	Greenfield
Plopeni Industrial Park	Plopeni (Prahova counties); 36,47 ha	Operational
Priboiu Industrial Park	Branesti (Dambovita counties); 31,92 ha	In development
Faur Industrial Park	București; 68 ha	Operational

The industrial policy of Romania for the period 2005-2008 was focused on the horizontal factors which determine the competitiveness of industrial activities as human capital, research, innovation, entrepreneurship or respect for the environment conditions. The transition from an economic system to another was based on efficiency and competitiveness which remove or resize certain industrial activities.

New industrial activities appeared in areas far from the core-city, being encouraged by the existence of the ancient industrial infrastructure (brown field investments) or relying on

different advantages: low price of land, more developed road infrastructure, proximity to other services etc.

GDP change per capita in PPS or Euro, and per economic sectors

GDP per capita often refers to the standard of living, with higher per capita GDP being interpreted as having a higher standard of living. Cities are perceived as the main driving force of economic, social and cultural development in the world. For these reasons, growth of GDP per capita in PPS in urban areas may contribute to the improvement of living standards and prosperity not only of the residents of a city itself, but it determines the level of development of the whole region. Improving the attractiveness of cities to businesses and residents was also one of the most important aims of the EU's Strategic Guidelines for Cohesion Policy for the years 2007-2013. The document stresses the need to focus on improving competitiveness and achieving more balanced development between the economically strongest cities and the rest of the region.

High population density and concentration level of services and economic activities make București-Ilfov Development Region the biggest consumer market from Romania and one of the biggest in South-Eastern Europe. București functions as a developing engine for economic growth and jobs creation in the region including the neighbour counties due to capital role which intensified economic, financial, administrative, politic, educational and cultural development. Regional job market is characterized by the services sector and by the workforce mobility.

The main indicator of economic growth - regional GDP evaluation registered a continuous increase in 2000-2010. Table 4 gives us a picture about the regional differences of the GDP per capita. In 2000 București-Ilfov registered a value of GDP per capita two times higher than the Sud-Muntenia region. The gap increased in the following period, recording 13.800 Euro per capita for București-Ilfov in 2009 and a value which is three times lower in the Sud-Muntenia Region (4.800 Euro per capita) (Table 4).

At regional level, as opposite to the general, national convergence, we have two opposite trends. First, one region, București-Ilfov had a considerable growth rate of the GDP per capita, reaching the 115% of the EU level. It is still far behind the “richest regions” of the Blue Banana zone, like Inner-London, Luxembourg, Brussels, or Ile de France. But on the other hand, this region is the main source of the increasing inter-regional disparities in Romania. This analysis helped us to identify some aspects related to state and operation of regional economy. The picture is characterized by an economic gap based on regional competitiveness growth which represents a generating factor of production and efficiency.

Table 4 GDP change per capita Euro											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Romania	1.800	2.000	2.200	2.400	2.800	3.700	4.500	5.800	6.500	5.500	5.800
Sud - Muntenia	1.500	1.600	1.800	1.900	2.300	3.100	3.800	4.700	5.400	4.700	4.800
București - Ilfov	3.900	4.100	4.500	4.800	5.600	8.100	9.900	12.900	16.200	13.000	13.800
Source: EUROSTAT Database											

Sud-Muntenia Region generates approximately 13% of national GDP. From a structural point of view, agriculture has a big contribution in regional GDP (11.2% in 2006) due to favourable natural conditions and soil quality for agriculture development (agricultural area of 2,448.5 thousand ha represents 71.1% of total regional area). In 2006, industry produces 36.9% in regional GDP representing one of the highest contributions if we take into account that the national average is 25%. The diversity of economic activity contents a high range: petrol, natural gases, coal, limestone, argyle, sandstone and salt extractions and processing; agro aliments products processing, textile manufacturing, woodworking, machinery and transport equipment, refrigerators production, automobile production (Dacia), energy production etc. Constructions represent 5 percent in the regional GDP.

The growing inequalities in income and wealth can be observed in Table 5. The rapid growth of București-Ilfov shows that it is outside of the eligibility threshold for the cohesion policy (Benedek and Veress, 2013).

Table 5 Euro per inhabitant in percentage of the EU average										
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Sud–Muntenia	8	8	9	9	11	14	16	19	21	20
București–Ilfov	21	21	22	23	26	36	42	52	65	55
Source: EUROSTAT Database										

The structural developments in the GDP recorded significant differences between the two regions. The development in each economic sector recorded significant growth in 2005-2008 followed by a moderate decrease or increase due to the economic crisis. The comparative analysis of the regional gross domestic product (GDP) in 2009, at the economic sector, shows significant differences due to regional specificities. Thus, in the Sud-Muntenia Development Region the highest values are recorded in mining, manufacturing, production and supply of electricity, gas, water supply, waste remediation activities or waste management.

In the București-Ilfov Region, the highest values of regional GDP are recorded in wholesale and retail trade, transport and storage of goods, hotels and restaurants.

The lowest level of GDP per capita can be associated with a high share of agriculture, forestry and fishing in the economic structure and a high proportion of early leavers among young people. We can say that economic growth is largely the result of social development (mainly the level of education of the population and whether they have broadband internet access) and the level of industrial development (however this primarily concerns the high-tech industry).

Privat company dynamics

The evolution of the number of companies between 2000 and 2010 is similar to the national profile that increased between 2000 and 2008, and registered a reduction in growth after 2008 due to the economic crisis. The highest concentration of companies is in București, where in the analyzed period of time the number of companies almost doubled. Spectacular developments have been recorded in Ilfov and Prahova County where the presence of the capital city offers many competitive advantages.

The spectacular dynamics of the number of firms in Dâmbovița county and Argeș county is determined by the concentration of economic activities of national importance, which involve complementary economic activities.

The lowest concentration of firms is found in Călărași, county where the lack in terms of basic infrastructure is a major restriction in business development since many years. (Table 6)

Table 6 Investment stokes at the end of the year

County	Nr. of companies				thousand $ SUA			
	2000	***2005***	***2008***	***2010***	***2000***	***2005***	***2008***	***2010***
Argeș	632	1047	1656	1855	103120,2	952790,7	1157533,5	940434,5
Călărași	136	300	427	472	11582,0	69274,6	305438,5	382639,1
Dâmbovița	324	591	973	1080	6866,7	159345,8	212875,8	210811,9
Giurgiu	157	346	541	682	4252,8	14809,9	44743,3	167375,6
Ialomița	133	287	431	483	8809,0	13194,0	36844,1	53240,1
Prahova	1060	1955	2808	3098	217606,5	401774,8	521585,6	716116,0
Teleorman	105	255	374	418	3115,2	52067,3	46205,0	83183,9
București	41783	61687	76903	79323	2360219,3	8734993,5	15260484,1	20257135,6
Ilfov	1678	2820	4570	5727	238068,6	1255925,1	2526068,8	2646840,5

Source: The National Trade Register Office, Romania

Real Growth Rate of regional GVA

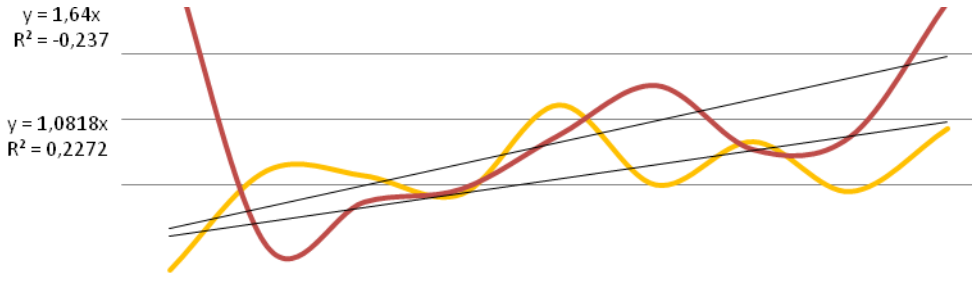
Economic output at a regional level is estimated using the Gross Value Added. The comparative analysis of the Real Growth Rate of Regional GVA, at the two development

regions level, has the same tendency as the one registered at a national level, with a series of specificities determined by the context of each region.

At the level of the Sud-Muntenia Development Region, the evolution of the GVA is similar to that of the national trend with a growth tendency after 2000, once the structural reforms have encouraged the development of the SME sector. The most important growth value is being observed at the level of 2000-2001 when the region acquired more advantages in terms of competitiveness, passing from -1.5% to 6.1% (a total of 7.6 unities). In 2004, there is another important growth, from 4.3% to 11.1%, fact that can be also correlated to the launch of the Dacia Logan production in Argeș County and the increase in terms of attractiveness of the region. Also in 2004-2005, the region had the biggest increase in comparison to the other regions in terms of GVA in the industry sector (8%) due to the dynamics of the industrial production. (Figure 2)

At the București-Ilfov Development Region level, there is a more accentuated growth tendency thanks to the competitive advantages offered by the presence of the most important growth pole in Romania, the municipality of București. The decline of the growth rate between 2000 and 2001 (21.5 unities) is explained by the reduction of number of companies that until 2000 preferred this region for its competitive advantages. After 2001, the investments are attracted by other growth poles, where there is a growth tendency of the GVA. Other important growth points are in 2005 (from 8.8 to 12.6) and in 2008 (from 8.7 to 19.0) also due to the implantation of new firms in the Region.

Figure 2 Real Growth Rate of Regional GVA



	2000	2001	2002	2003	2004	2005	2006	2007	2008
South - Muntenia	-1,5	6,1	5,7	4,3	11,1	5,0	8,3	4,5	9,3
Bucharest - Ilfov	22,8	0,3	3,7	4,7	8,8	12,6	7,7	8,7	19,0

(Source: CICADIT Processed data)

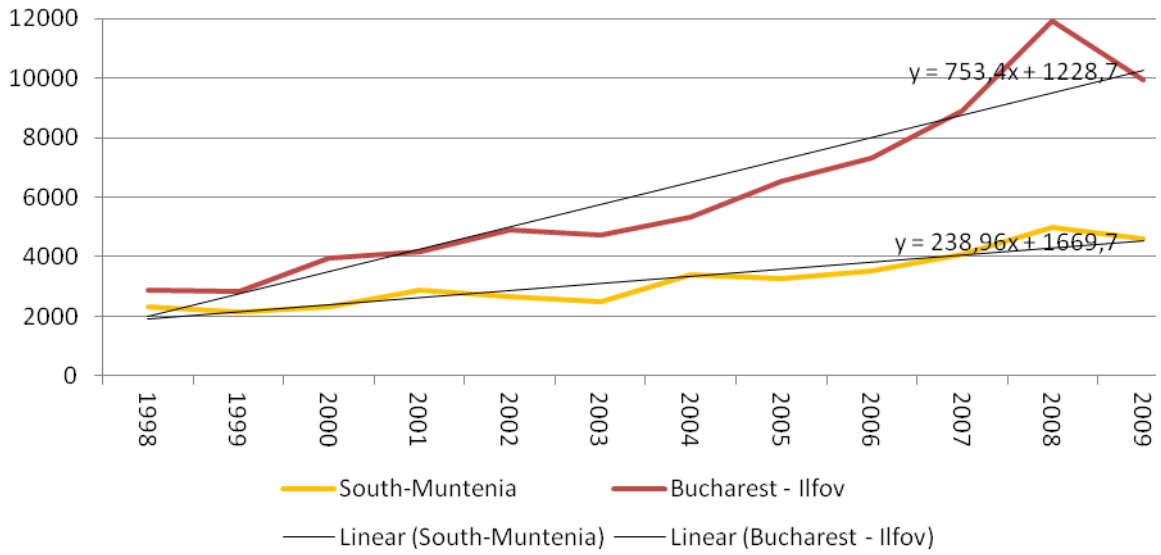
Disposable income of private households

Disposable income is derived from primary income by adding social benefits and monetary transfers (from state redistribution) and subtracting taxes on income and wealth as well as social contributions and similar transfers- as such, it reflects “in-pocket” income that people can spend or save.

In Figure 3, it is presented the disposable income of private households for Sud-Muntenia and București-Ilfov Development Regions in the 1998-2009 period. As it may be found, in both regions, between 1998-2005, a modest growth has been perceived with some peaks of growth in 2001 and 2004 for Sud-Muntenia Development Region and 2000, 2002 for București-Ilfov Development Region. After 2005, both regions had a more rapid growth tendency, more obvious for București-Ilfov Development Region, with a maximum value in 2008 of 11930.1 euro due to the fact that 2008 was an electoral year and the minimum salary, the social allowance for children, together with the retirement allowance were raised.

If we compare the trend between the two regions, it can be observed that the differences in terms of wealth started increasing after 2000, and they were accentuated during pre-accession and accession periods. Following this trend, the biggest backlash was registered in 2008, when the value for the regional redistribution was 66% in București-Ilfov Development Region comparable to the Sud-Muntenia one. This shows that income in these regions require much less support through social benefits than elsewhere. It is presumed also, that the one of the reasons for the differences in terms of disposable income can come from the fact that not all the households’ incomes are declared, more precisely those coming from people working abroad or non-declared activities.

Figure 3 Disposable income of private households 1998-2009



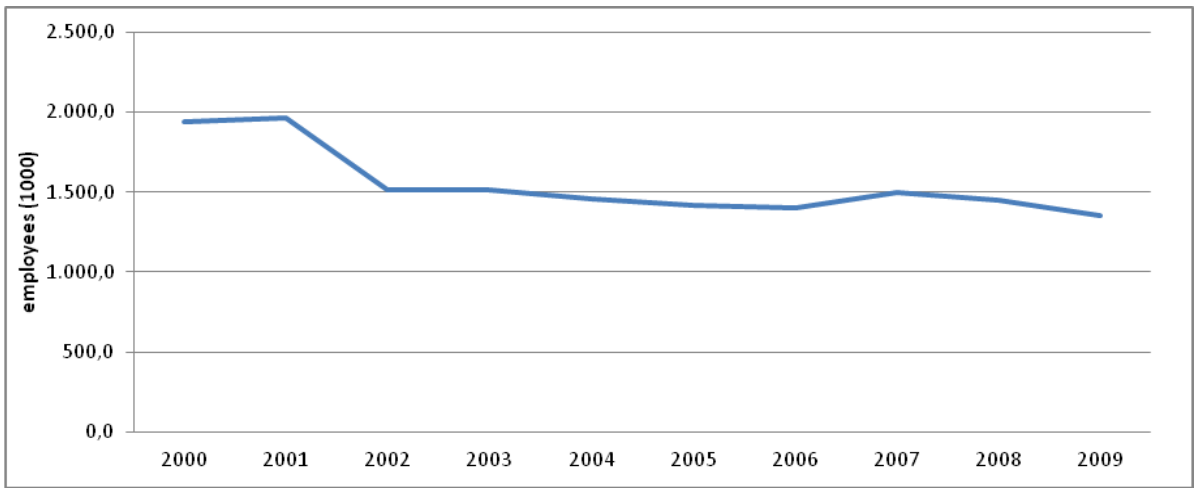
Source: CICADIT Processed data

Employed persons in all NACE

The labour market understood directly through the gross size of the employees (in all NACE) that work in a certain city or region reflects in a great measure the significant changes that underwent inside the national and regional economy. It also shows the contrasting dynamic between București-Ilfov region and Sud-Muntenia region. This strong contrast is also found in the dynamic of the employment rate.

Figure 4 highlights a great shock that occurred between 2001 and 2002 when in a single year more than 500.000 jobs were lost in Sud-Muntenia Development Region. After 2002 the number of employees in the region fluctuated slightly around the value of 1.5 million. The great loss of jobs between 2001 and 2002 had two main causes. The first one is the massive decrease of industrial activity, while the second cause is a slight openness of the labour market especially in Spain and Italy. At the end of the reference period (2000-2009) 520 000 jobs were lost in Sud-Muntenia Development Region.

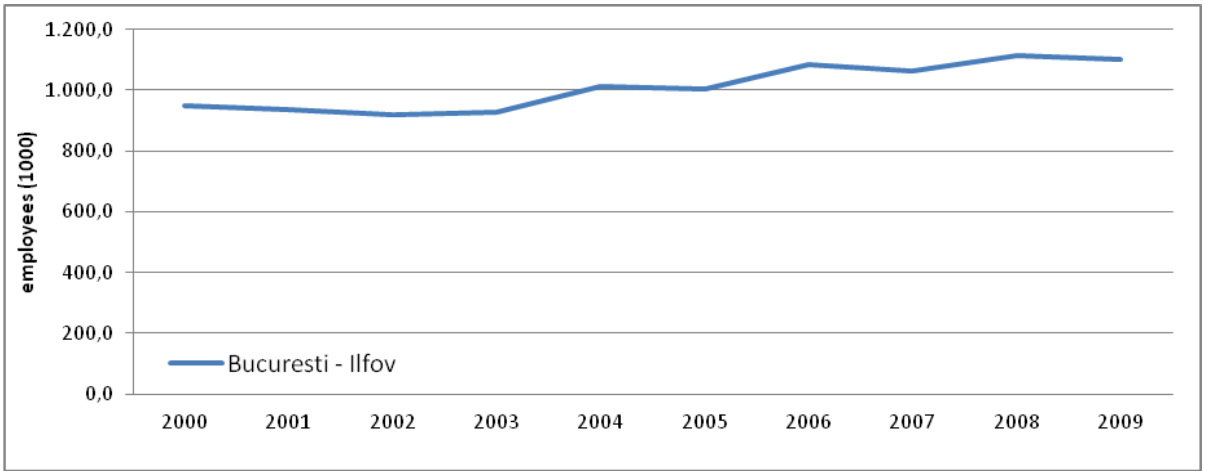
Figure 4 Dymanics of the number of employees in Sud-Muntenia Region



(Source: CICADIT Processed data)

In a strong contrast compared with the evolution of the number of employees in the Outer Metropolitan Region, the number of employees in București-Ilfov Development Region increased in the reference period of 2000-2009. In a small part, the number of jobs lost in OMR was replaced by those created in București and Ilfov County. The number of employees in București-Ilfov Development Region increased with 152 000, while the entire study area accounts for a loss of 430 000 employees.

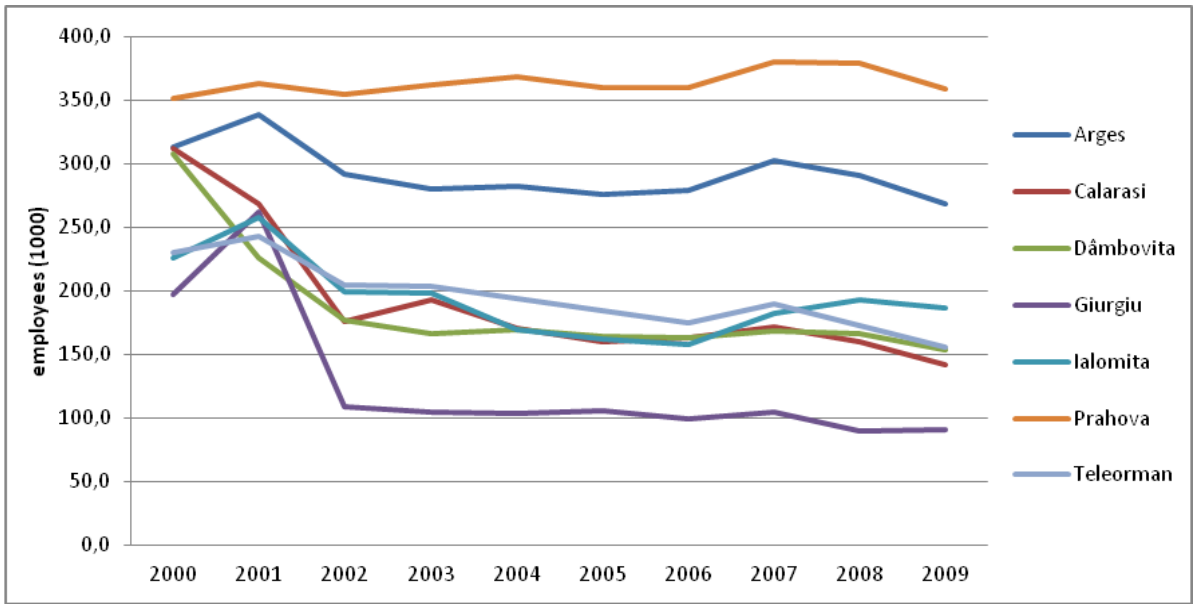
Figure 5 Dynamics of the number of employees in București-Ilfov Development Region



(Source: CICADIT Processed data)

If the level of analysis descends further (at the county level) more territorial evidence of the strong crisis that went on is highlighted. Also very strong disparities can be seen between the counties that compose the Sud-Muntenia Development Region. If some counties manage to control the strong shocks that they had to face, other counties almost collapsed under the weight of the same shocks.

Figure 6 Dynamics of employees inside the Sud-Muntenia Development Region



(Source: CICADIT Processed data)

Argeș and Giurgiu counties set up the extreme cases inside the Sud-Muntenia Development Region. Argeș County with its strong industrial profile shows a great resilience in face of the restructuring forces that shape the national and regional economy. Strong industrial footholds like automobile manufacturer Dacia and petro-chemical plant Arpechim from Pitești city maintain relatively constant the number of employees. But these data don't show the full extent of the changes happened inside Argeș County. Other strong industrial enterprises like ARO Câmpulung-Mușcel (automobile manufacturer) or electronics manufacturer from Curtea de Argeș (ElectroArgeș) stopped their activities. However, it seems that their impact on the total number on employees was inessential.

At the other end of the spectrum is Giurgiu County with a predominantly agricultural economic profile. In only one year, from 2001 until 2002, 150 000 jobs were lost. This accounts for 65.4% drop in the total number of employees. Fewer than 100 000 inhabitants out of 280 000 in 2000 were employed in 2010.

A similar sudden massive drop in the number of employees is registered also in Dâmbovița, a county that has a much more balanced economical profile. At the end of 2009 the total number of employees was reduced by 51%. This massive decrease was abrupt between 2000 and 2003 and relatively constant from 2004 to 2009.

Ialomița and Teleorman counties both register a maximum number of employees in 2001 when a descendent trend starts to emerge. At the end of 2009, 27% and 36% of the total number of jobs were lost in Ialomița and Teleroman respectively.

Employment rate change

The dynamics of the employment rate reveals many questions regarding data quality. The most striking example is that of Călărași county. In 2000 the employment rate was 94% and five years later it drops suddenly to 50.4%. Not taking into consideration the missing data or its quality for some years, the employment rate change still reveals surprising facts.

The employment rate of București-Ilfov Development Region registers an opposite dynamic in comparison to the Sud-Muntenia Development Region. While in the case of București-Ilfov Development Region, the employment rate increases with 7% from 2000 to 2010, the employment rate in the Sud-Muntenia Development Region decreases with 14.3% in the same reference period.

Table 7 Employment rate change				
	1995	2000	2005	2009/2010
Yugozapaden	41,3	42,9	49,5	60,5
Sofia (stolitsa)	46,0	48,5	57,3	73,6
Sofia	35,8	35,5	36,0	38,7
Sud–Muntenia	n/a	55,9	42,4	41,6
Argeș	n/a	46,5	42,7	42,0
Călărași	n/a	93,9	50,4	45,3
Dâmbovița	n/a	55,7	30,6	29,0
Giurgiu	n/a	67,0	36,9	32,3
Ialomița	n/a	74,2	55,6	65,0
Prahova	n/a	41,1	43,6	44,1
Teleorman	n/a	50,4	43,6	39,1
București–Ilfov	n/a	41,7	45,3	48,7
București	n/a	43,5	47,0	50,5
Ilfov	n/a	28,3	34,1	37,6
Croatia	n/a	n/a	31,5	34,0
Macedonia	n/a	24,2	23,1	26,8
Turkey	n/a	n/a	n/a	n/a
Source: EUROSTAT Database				

The same trend can be seen at the level of the counties that compose the Sud-Muntenia Development Region, but with significant differences in the amplitude of the downsize, even when not taking into consideration the Călărași county case. The best example is the case of Giurgiu where in ten years the employment rate dropped with more than 34% (from 67% to 32.3%). With only one exception, all the other counties registered decreases ranging from -4.5 (Argeș) to -26.7% (Dâmbovița). The exception is set by Prahova County (a county with a strong industry and tourism). More to these decreases is the fact that besides the small county of Ialomița, none of the counties reach a rate of more than 50% employment.

The same is also valid for București-Ilfov Development Region, but as previously mentioned, the Ilfov County increased its employment rate in the 2000-2010 period, but still, the threshold of 50% is not met. Decomposing the MR, the CC (București city) stands out with an employment rate of 50.5%. This employment rate is more than the regional average, but far less than Sofia, not to mention other EU capital cities. Comparing the data with the European average, but also with some countries from South East Europe, strong disparities emerge. While București-Ilfov and Sud-Muntenia Development Regions lag far behind the European average, the comparison with the employment rate of Croatia and FYR of Macedonia reveal just how much more there is to be done in order to meet EU 2020 targets.

Unemployment rate

The unemployment rate is high at the European Union level. Compared to this average the unemployment rate of București and of the București-Ilfov Development Region is considerably lower. The unemployment rate continued to decline from 2000 until 2008. The new structure of the economic profile of București (corporate multinationals, small and medium sized enterprises in industry, manufacturing, commerce and services) filled the gap created by the reduction of the former big industrial activities. The lowest unemployment rate was registered in 2009, the value being with 50% under the EU 27 average. In București the unemployment rate was even lower in 2008 (3.1%). The economic crisis had a moderate impact on the employment rate in București-Ilfov Development Region (MR).

As with other indicators, the dynamics registered in București-Ilfov Development Region is in contrast with Sud-Muntenia Development Region, with only a few exceptions at the county level (Argeș). The unemployment rate of Sud-Muntenia Development Region continued to increase until 2006, peaking at 9.4%, the minimum war registered in 2008, after that the presence of the economic crisis is felt through the increase of the unemployment rate reaching the value of 8.3% in 2010, lower than the EU 27 average.

Table 8 Unemployment rate

	2000	2005	2006	2007	2008	2009	2010
European Union (27 countries)	9,0	8,9	8,2	7,2	7,0	8,9	9,6
Yugozapaden	n/a	7,6	6,5	3,9	2,9	4,1	6,8
Sofia (stolitsa)	n/a	7,6	6,2	3,6	2,5	3,9	n/a
Sofia	n/a	9,9	9,0	5,4	:	3,6	n/a
Sud–Muntenia	7,6	9,2	9,4	8,2	6,8	8,0	8,3
Argeș	4,3	5,4	5,2	4,0	3,8	4,9	n/a
Călărași	3,5	12,9	13,0	12,8	11,1	13,5	n/a
Dâmbovița	8,5	10,1	9,7	8,4	7,0	8,3	n/a
Giurgiu	6,8	3,7	n/a	n/a	n/a	n/a	n/a
Ialomița	17,3	8,4	9,4	8,5	7,0	7,4	n/a
Prahova	12,0	15,0	15,2	13,0	10,2	12,3	n/a
Teleorman	4,3	7,6	8,1	7,1	5,2	5,4	n/a
București–Ilfov	7,0	6,9	4,8	4,1	3,4	4,0	4,6
București	7,4	6,8	4,5	3,8	3,1	3,6	n/a
Ilfov	4,5	8,6	7,3	n/a	n/a	7,9	n/a

Source: EUROSTAT Database

At the county level, inside the Sud-Muntenia Development Region, contrasting dynamics are revealed. While some counties manage to keep the unemployment rate under the EU 27 average, other counties' unemployment rate fluctuates widely, being incapable of maintaining

a stable climate regarding the labour market. In this sense the authors should mention some extreme cases. The first one is the case of Argeș County, where the presence of Dacia-Renault factory, and other related and complementary industrial and manufacturing activities, kept the highest unemployment rate at 5.4% in 2000. The economic crisis led to a low increase of 1.1% of the unemployment rate from 2008 to 2009.

At the other extreme cases are Călărași and Prahova counties. And what is even more uncommon, is the fact that these two counties have completely different economic profiles. The first county has a predominantly agricultural based economy, but also some big metallurgic factories at Călărași city and Oltenița (shipyard), both of them almost totally closed (some sections remain open at a fraction of what they were designed for). This strong economic restructuring led to a massive increase of the unemployment rate (from 2000 until 2005 the unemployment rate went up with 9.4% reaching the level of 13.9%). From 2005 until 2009 this rate never got below 11% (higher than the EU27 average).

The case of Prahova county is much more difficult to explain, because this county has a balanced and diversified economic profile, ranging from agriculture, industry (petrol extraction and refineries), manufacture, commerce, services and most of all tourism (the biggest winter destination, but with high number of tourists also in the summer). The unemployment rate was 12% in 2000 and peaked at 15.2% in 2006, reaching its minimum of 10.2% in 2008. The county's economy also suffered a severe restructuring (mainly industries related to machine building and mechanic equipment) and it seems that the development of the tourism sector didn't manage to absorb the surplus of labour force.

Most of the counties that make up the Outer Metropolitan Region have a higher than EU 27 average unemployment rate, but a clear explanation between more and less developed counties does not seem to follow a certain pattern. The factors that contribute to this wide array of dynamics are specific to each county. A predominantly agricultural county has a high rate of unemployment, while other counties with similar profiles don't (Călărași vs. Teleorman); the same is valid for the most developed counties from the OMR (Prahova vs. Argeș).

The Bulgarian region of Yugozapaden has an EU 27 below average unemployment rate and a trend of decrease until 2008. However the economic crisis left some serious marks on the unemployment rate, raising it from 2.9% in 2008 to 6.8% in 2010. Sofia metropolis also follows the regional trend. Data for 2010 are not available, but until 2009 the unemployment rate in Sofia city followed closely the regional trend.

Labour productivity

The labour productivity (measured as GDP in PPS divided per employee) is above the EU27 average in București-Ilfov Development Region, and with 60% over the average in the Outer Metropolitan Region (Sud-Muntenia Development Region).

Table 9 Labour productivity		
	euro/employee (in 2009)	**% from EU 27 average**
European Union (27)	53.814	100
Sud–Muntenia	21.395	40
București–Ilfov	56.476	105
Croatia	40.411	75
Macedonia	n/a	n/a
Turkey	36.794	68
	Source: EUROSTAT Database	

The labour productivity in the Sud-Muntenia Development Region is one of the lowest in EU. Although counties like Argeș and Prahova from OMR have a diversified economical profile, this is not enough in order to raise the GDP/employee at regional level. This is one of the main factors that determined a migration flow towards other EU countries (Italy, Spain, France mainly). Such a low labour productivity can be explained through the predominance of economic activities with low GVA (agriculture, primary industrial manufacture, and primary manufacture of raw natural resources). The same explanation is valid for București's above average labour productivity; with an economical profile dominated by tertiary activities with increasing returns and high GVA.

The national average of labour productivity in Croatia and Turkey is lower than the case of București-Ilfov Development Region, but significantly higher that the labour productivity in Sud-Muntenia Development Region. These numbers highlight how far behind is the state of the economy around the București metropolis. This economic fragility will have negative impact on the further development the metropolis as its development cannot be sustained only by exogenous factors. The necessity of an endogenous growth is imperative for the sustainability of the regional and national economy.

Share of tertiary educated people aged 25-64 in %

The proportion of people aged 25-64 in the European Union with tertiary level education in 2010 was 25.9%. It is clear that there is a generally lower level of higher educational

attainment among older populations in the case study area, particularly those from their late 30's to retirement age. It is worth noting that București-Ilfov Development Region has higher rates of people with a tertiary education in 25-64 age group (ranging from 41.7% to 53.1%), which indicates that they are performing better in the younger generation.

București is Romania's largest city and a cultural, academic, scientific, economic and administrative national centre, besides being a major place for investments.

Educational structure in Sud-Muntenia Development Region can ensure a scholarship for all levels and there are 4 public universities (besides some private universities): Petroleum and Gas University of Ploiesti, University Valahia of Târgoviște, State University of Pitești and "Constantin Brâncoveanu" University of Piteşti. A great advantage for this region related to higher vocational education and future development consists in the proximity of the largest university and research centre from Romania: București is located at less than 90 km from each capital-town of the region counties.

Table 10 Share of tertiary educated people aged 25-64 in %

	2002	2005	2009
Sud-Muntenia	7.1	7.9	9.1
București-Ilfov	22.1	25.4	27.7
Source: EUROSTAT Database			

Early school leavers aged 18-24

This is one of the headline indicators in the EU2020 Strategy which sets a 10% target for early School leaving. Across Europe, the only countries to already have reached the under 10% target are Lithuania, Poland, Slovakia, Croatia, Slovenia, Serbia, Switzerland and Luxembourg (ESPON SIESTA). From 2002 to 2008, the early school leaving rate was reduced significantly from 23% to 15.9%.

Early school leavers in the case study area have generally a good level of retention. This division may be attributable to specific policies in place (ESPON SIESTA).

Table 11 Early school leavers aged 18-24 (Total - București-Ilfov and Sud-Muntenia)

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
19,7	19,1	21,5	22,9	21,7	23	22,5	22,4	19,6	17,9	17,3	15,9
Source: EUROSTAT Database											

Health life expectancy

The health life expectancy measures the average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury. It gives a measure of the population's level of health.

Health expectancies were first developed to address whether or not longer life is being accompanied by an increase in the time lived in good health (the compression of morbidity scenario) or in bad health (expansion of morbidity). So health expectancies divide life expectancy into life spent in different states of health, from a good to a bad health. In this way, they add a quality dimension to the quantity of the lived live (EHEMU Country Reports, 2010).

Because Romania joined the European Union in 2007, health expectancy based on activity limitation (HLY) is not available before this year.

Table 12 Healthy Life Years (HLY) at age 65 for Romania

	HLY	%HLY/LE
Men	7.6	54%
Women	7.7	46%
		Source: EHEMU Country Reports, 2010

The new HLY series, initiated in 2005 with the SILC data, shows that in 2007 women and men at age 65 can expect to spend 46% and 54% of their life without self-reported long-term activity limitations respectively. The HLY values for Romania are 1.0 years below the EU25 average for women and men in 2007.

Some studies reveal that the total years lived by men were less than those for women, for all the health expectancies the years of life spent in positive health were similar or greater for men than women. Compared to men, women spend a larger proportion of their life in ill health and these years of ill health were more likely to be years with severe health problems.

GERD (Gross domestic expenditure on research and development) as % of the GDP

In the actual context, the governments focus to balance lowering their debt while trying to stimulate economical growth. This is why policies that create innovation are increasingly important (The Global Innovation Index 2013: The Local Dynamics of Innovation). Innovation is closely linked to competitiveness, being considered one of the main drivers of economic development on an even more dynamic global market. One way to measure the level of competitiveness of a country is though the share of the GDP allocated to research and development (R&D). The expenditures on R&D, as share of GDP (see Table 13), for the

counties in București-Ilfov and Sud-Muntenia Development Regions are under the EU average of 2%, and have a long distance to reach the Europe 2020 strategy goal for this chapter. The share of GDP for R&D in București-Ilfov Development Region peaked at 1.39% in 2008, registering a severe drop, in 2009 and 2010, at 1,09%. In the same time, Sud-Muntenia region registers a much lower level of R&D expenditures than the previous region, during 2007 and 2010 the share of GDP allocated to research and development dropped from 0.44% to 0.36%.

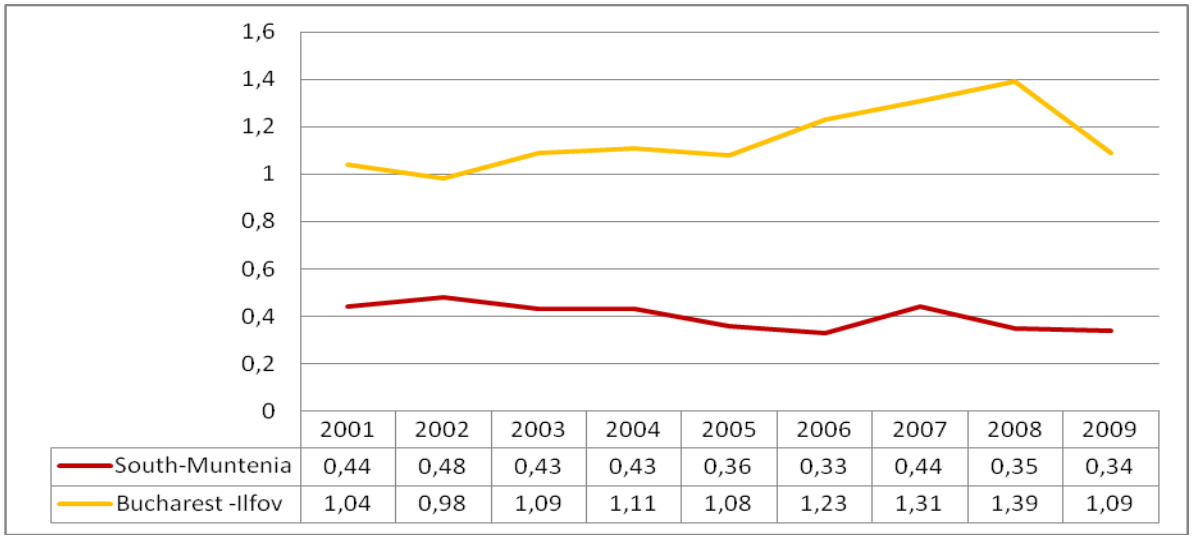
Table 13 R&D expenditures at NUTS 2 level (% of GDP)

	2007	**2008**	**2009**	**2010**
EU 27	1,84	1,92	2,01	2
Bulgaria	0,45	0,47	0,53	0,6
Yugozapaden	0,79	0,77	0,89	1,03
Greece	0,6	n/a	n/a	n/a
Attiki	n/a	n/a	n/a	n/a
Romania	0,52	0,58	0,47	0,46
Sud-Muntenia	0,44	0,35	0,34	0,36
București-Ilfov	1,31	1,39	1,09	1,09

Source: Eurostat Database (n/a: data not available)

The explanation comes from the fact that the main source of funding on research and development is the government, followed by business enterprises. In this way, most of the research centers and university are situated in the București Municipality and will also attract most of the funds for research and development. The peak in 2008 registered in București-Ilfov Development Region is due to the increase in terms of Governmental funding and the sudden decrease in 2009 is a consequence of the sudden cut in terms of money for research and development that followed the economic crisis.

Figure 7 GERD as % of the GDP



	2001	2002	2003	2004	2005	2006	2007	2008	2009
South-Muntenia	0,44	0,48	0,43	0,43	0,36	0,33	0,44	0,35	0,34
Bucharest -Ilfov	1,04	0,98	1,09	1,11	1,08	1,23	1,31	1,39	1,09

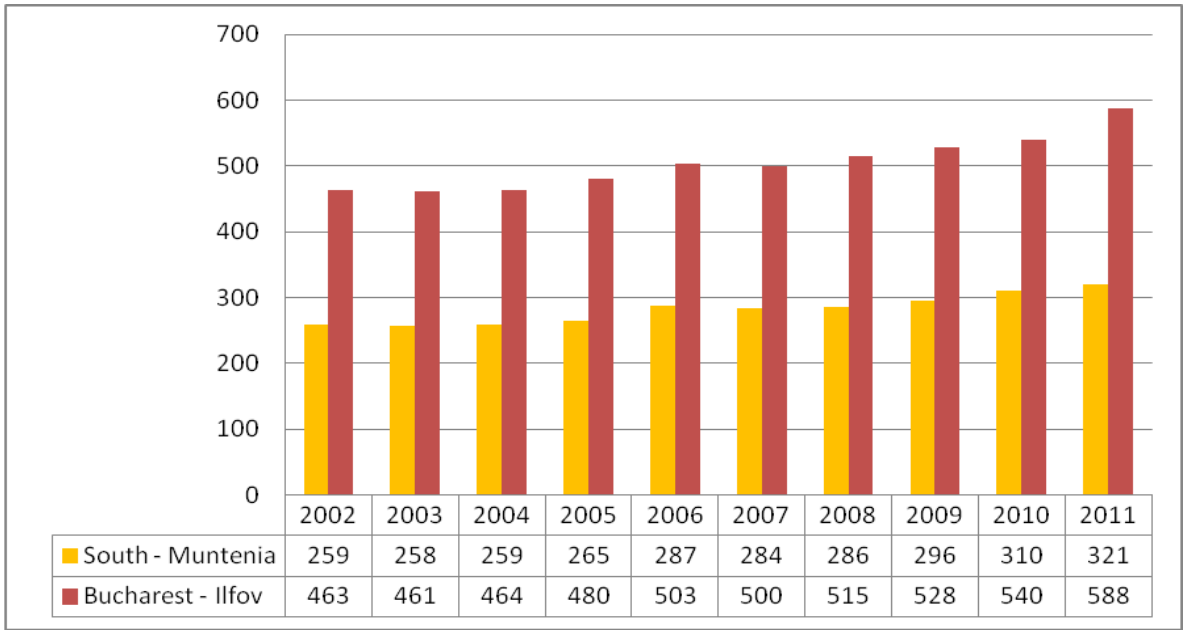
(Source: CICADIT Processed data)

Human Resources in Science and Technology

The Human Resources in Science and Technology improve the understanding of the demand and the supply of people with high qualifications in science and technology. Romania has a big rate of high-qualified people and records shares of more than 40% in terms of scientists and engineers, occupying a top position in Europe from this point of view.

As a general rule, the HRST core is generally concentrated around the capital city and the surrounding regions due to the fact that here are situated the main universities, main research centers, big enterprises with their headquarters and main research units. The same situation can be observed in the case of the București-Ilfov Development Region where the human resources are in continuous and constant augmentation through the years. For Sud-Muntenia Development Region, there is the same tendency with a constant increase in terms of HRST.

Figure 8 Human Resources in Science and Technology



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
South - Muntenia	259	258	259	265	287	284	286	296	310	321
Bucharest - Ilfov	463	461	464	480	503	500	515	528	540	588

(Source: CICADIT Processed data)

Employment in technology and knowledge-intensive sectors

Another important aspect concerning the capacity to innovate is reflected by the number of employees in the R&D sector. In the case of Romania (see Table 14) a clear tendency of reduction of employees in R&D is unfolding. These numbers drop from 0,29% to 0,25% for Sud-Muntenia Development Region, while in the case of București-Ilfov Development Region this share of R&D employees from the total number of employees drops form 2,06% to 1,88%. During the analysed period this share increased at EU 27 level. The main factors that led to this situation are a general under financing of this sector and the low wages that triggered a brain-drain phenomenon towards the private sector, but especially towards Western Europe and US.

Table 14 Employees in R&D sector at NUTS 2 level (% from total number of employees)

	2003	2005	2007	2009
EU 27	1,47	1,51	1,57	1,68
Bulgaria	0,61	0,63	0,61	0,68
Yugozapaden	1,45	1,38	1,26	1,36
Greece	1,33	1,41	n/a	n/a
Attiki	1,86	1,86	n/a	n/a
Romania	0,44	0,45	0,45	0,46
Sud-Muntenia	0,29	0,27	0,3	0,25
București-Ilfov	2,06	2,3	2	1,88

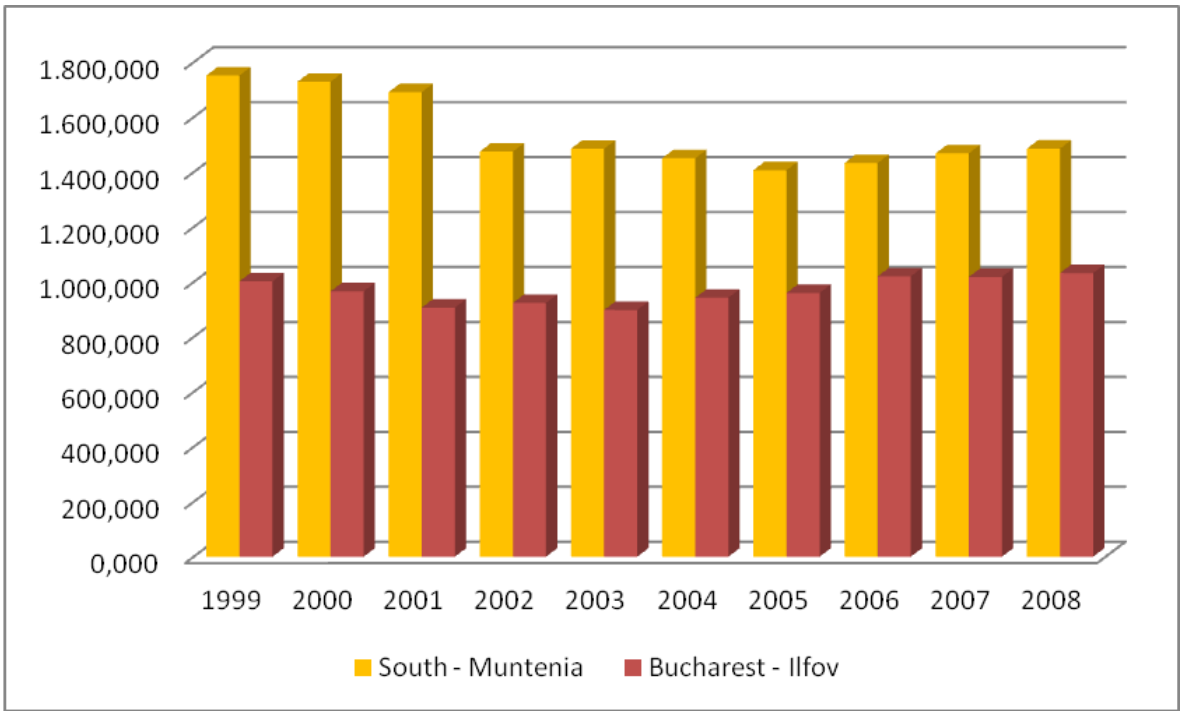
Source: Eurostat Database (n/a: unavailable data)

The Employment in technology and knowledge-intensive sectors indicator includes all the persons aged 15 year and over who during the reference week performed work, even for just one hour a week, for pay, profit or family gain or were not at work but had a job or business from which they were temporarily absent because of, e.g., illness, holidays, industrial dispute and education and training. In high-tech statistics for data quality reasons, the population excludes anyone below the age of 15 or over the age of 74.

For Sud-Muntenia Development Region, the trend is a decreasing one, but it is situated above the values for the București-Ilfov Development Region. Related to the total population of the regions, it can be observed for 2005, that the percentages are pretty much equal, with 42% in Sud-Muntenia Development Region and 43% in București-Ilfov Development Region. This fact is mainly due to the proximity between the two regions.

A certain fact is that between 1999-2008, the number of people employed in this sector has decreased, following the same trend as for other employment sectors.

Figure 9 Employment in technology and knowledge-intensive sectors



(Source: CICADIT Processed data)

Granted and Published Patents

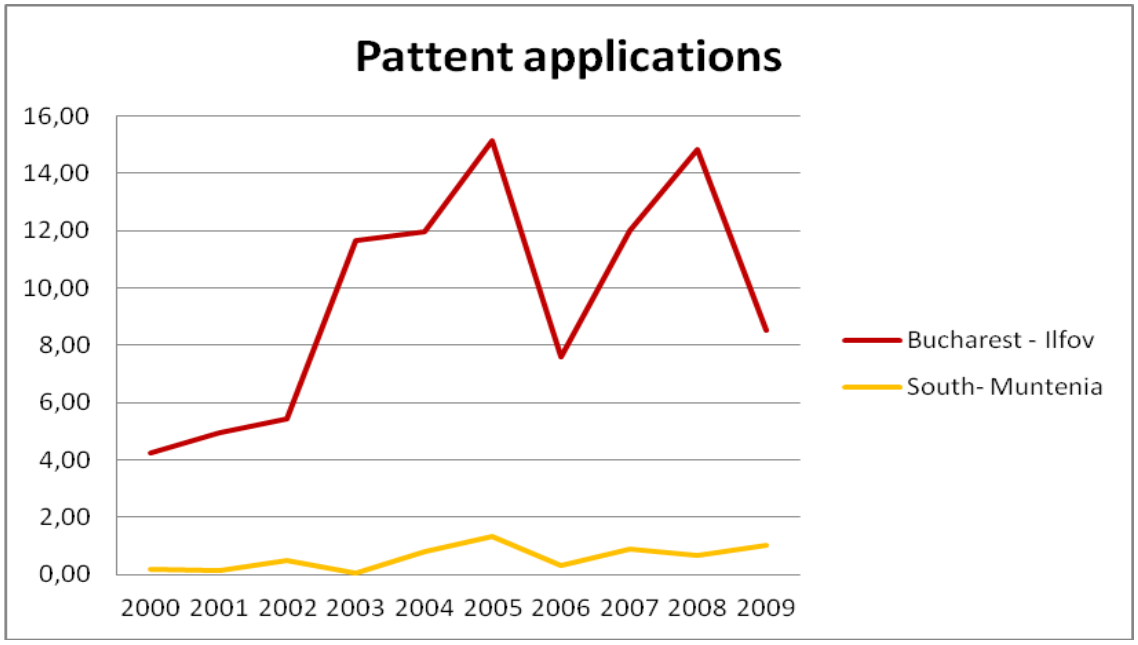
The tendency for patent applications reported to the number of inhabitants shows a clear difference between Sud-Muntenia Development Region and București-Ilfov Development Region. The first one has really constant values that overpass 1 only in 2005 and 2009, keeping the trend correlated to the human resources in science and technology, which means there is a positive relationship between them. The peak in 2005 is mainly due to the launching of the Dacia Logan and the creation of new car models in the Renault Factory in Argeș County.

In București-Ilfov Region, the high number of patent application is due to the existence of an important number of research centers, universities, innovative enterprises, all generating new ideas and products that need to be patented. Ilfov County can compete with the Physics research center in Măgurele that generates constantly new ideas and products.

In the general analysis, we can see two peaks - one in 2005 (15.15 patents/1000 inhab.) and in 2008 (14.83), peaks that can be related to the increases in the research budget assigned by the government. Also, there are two sudden drops in 2006 (7.6) and 2009 (8.52), the last one being due to the reduction in the budget for research and innovation, from 0,53% in 2008 to 0,19% in 2009.

The capacity to innovate can also be indirectly measured thorough the number of patents reported to the number of inhabitants. The values of this indicator highlight a clear difference between the București-Ilfov Development Region and the Sud-Muntenia Development Region. If the first region barely reaches a 2% at national level, the second region registers a 15% in 2005 and 2008; this reflects the activity of Dacia-Renault Group in Argeș County. Ilfov County can also play a very important role in this area, mainly because of the Physics Research Institute in Măgurele.

Figure 10 Patent applications



(Source: CICADIT Processed data)

Technological readiness

% of households having broadband access

Fast internet access is one specific action area of the Digital Agenda for Europe. New and innovative developments of electronic services rely on fast wired and wireless internet access. It is therefore essential to foster and monitor the development of fast internet access as part of the benchmarking framework. It is assumed that by 2013, all citizens within the EU should have access to broadband.

Table 15 % of households having broadband access

	2008	2010	2011
Sud-Muntenia	12	23	35
București-Ilfov	21	33	54
			Source: EUROSTAT Database

The statistics on internet connections and broadband access are closely related, as broadband is a type of Internet connection and efforts are being made to foster broadband access to the Internet, but even with these measures Romania is below the EU average.

The use of personal computer and/or the internet can foster people's capabilities and it has been included in the list of smart growth indicators defined by the Agenda of Europe 2020 and it is of paramount importance in the evaluation of the social dimensions for development.

The probability of having access to a computer at home generally increases with the population density of the region where the household lives.

Households with access to the Internet at home (%)

Differences in access to information and communication technologies (ICTs), such as computers and the internet, create a "digital divide" between those who can benefit from opportunities provided by ICTs and those who cannot. There is evidence that shows how the use of new technologies can lead to greater public participation, providing the public with new tools to make their voices heard (European Commission, 2009).

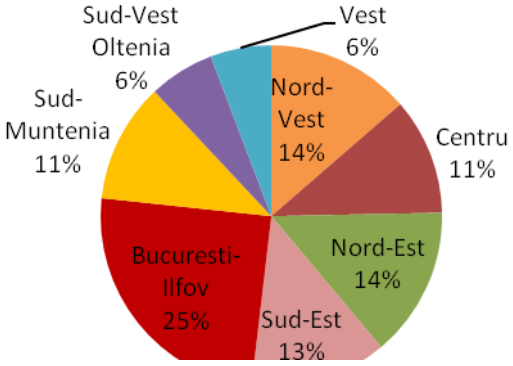
Our analysis reveals that the percentage of individuals who have never used a computer is very high. The probability to have never used a computer decreases with the levels of educational attainment, density of population, and income.

Table 16 Households with access to the Internet at home (%)

	2008	2010	2011
Sud-Muntenia	24	36	45
București-Ilfov	50	67	71
		Source: EUROSTAT Database	

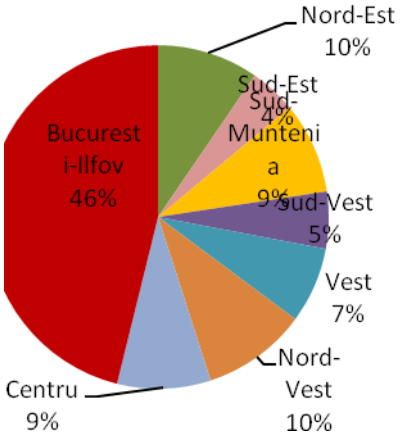
A close attention upon Romania reveals the fact that București-Ilfov Development Region has the highest values of companies that belong to the creative and innovative sector, according to the Romania Statistical Institute (Figure 11). The 25% share reveals how strong this economical sector is inside this region and indirectly reflects the competitiveness of the regional economy.

Figure 11 Regional shares of innovative companies in Romania (2010)



Source of data: NIS, Tempo-online

Figure 12 Number of employees in R&D, per regions (2009)



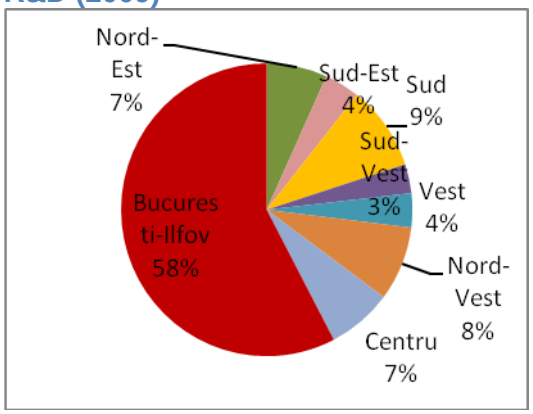
Source of data: Romanian Statistical Yearbook

Also, the regional distribution of employees in R&D is disproportionate, București-Ilfov Development Region concentrating almost the half of employees in this sector (Figure 12)

The same unequal distribution is also found regarding the total expenditures in R&D, București-Ilfov Development Region registering almost 60%.

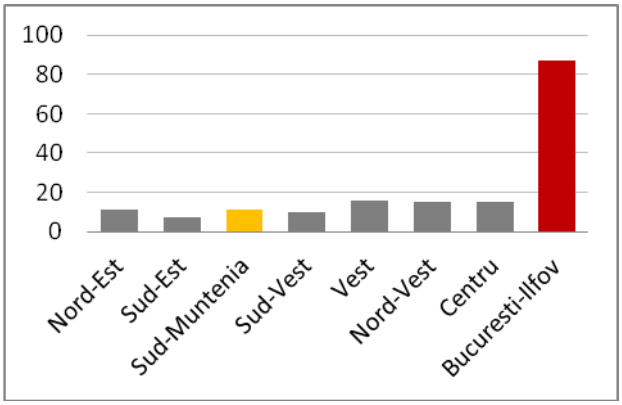
The number of employees/10.000 inhabitants, in 2009, was of 87 for București-Ilfov Development Region, while the other regions scored much less (Figure 13).

Figure 13 The regional share of regarding the total expenditures on R&D (2009)



Source of data: Romanian Statistical Yearbook

Figure 14 Number of employees/10.0000 inhabitants in R&D, per region in 2009



Source of data: Romanian Statistical Yearbook

2.1.2 Demographic and social structure, well being

The population dynamics has consequences reflected at the regional competitiveness and territorial cohesion level (ESPON, Territorial Observation no.1, 2008). At European Union level, we can still observe differences, certain regions being characterized by attractiveness, marked by a high number of immigrants and a constant population growth, while other regions are affected by a decrease in terms of inhabitants, caused by emigrations and less by the negative rate of the natural increase.

The migration stream, population ageing and the low fertility rate still remain a challenge at the European level (ESDP, 1999; Demography Report, 2010; DEMIFER, 2010). This has consequences on the economy and national and supranational social structures, forcing the European Union to seek to promote policies to increase labour force and its use (EU2020S). Even if București and Sofia population mark a slight decrease, their attraction force can be felt in the migratory movement.

The demographic aspects are closely linked to the economic and social ones, so that an integrated approach of the population as labour force is essential. Especially in the current economic context, the human capital receives a particular attention. For example, one of the European 2020 Strategy aim is ”to make full use of the labour market” (p. 17) by reducing unemployment, facilitate a greater involvement of women, older workers and migrating workforce, vouching for a high skilled population and reducing the poverty rate. Anyhow, these targets can be more challenging for some regions than for others (ESPON SIESTA, Final Draft Report), requiring individualized approaches from one region to another.

The analysis of the population and of the social aspects specific to the three study cases (București, Sofia and Athens) is based on the contributions of ESPON projects such as: FOCI (the current status and the perspectives of the population growth and the migratory flow, as well as the human effects on the environment and vice versa in the metropolises and the metropolitan areas); DEMIFER (the development of some demographic scenarios that represent the basis for the regional policies); ESPON 1.1.4 (appreciations at a national level and comparisons between the EU member states), but also on national and international documents that focus on population and migration status, and on the causes and effects of the phenomena and processes at a national and supranational level, as well as on possible policies for the long-term improvement of the difficulties and socio-economic challenges determined by the demographic evolution.

Methodology

For determining the current state of the population, the migratory flow and the well-being in the three case studies, a number of specific indicators have been used, and as specific years, there have been taken into account the gathering and the analysis of the most recent year available for each indicator and data series starting with 1990 in five-years intervals or every year if it was relevant. This approach follows on one side to address the changes due to the shifting of Romania and Bulgaria to a new political regime and economic system and their integration in the European Union and on the other side to identify as much as possible the effects of the economic crisis, assessment that will remain largely speculative due to the missing of recent statistical data of the year 2009 for certain indicators. The comparative analysis doesn’t remain only at the level of the three case studies, but takes as a reference point the EU27 average, as well as feedback (subject to the availability of the) statistical data from the Balkan countries.

To compare the different indicators it was necessary to standardize the values. The method to standardize is by z transformation:

$$Z_i = {X_i - X}/{S}$$

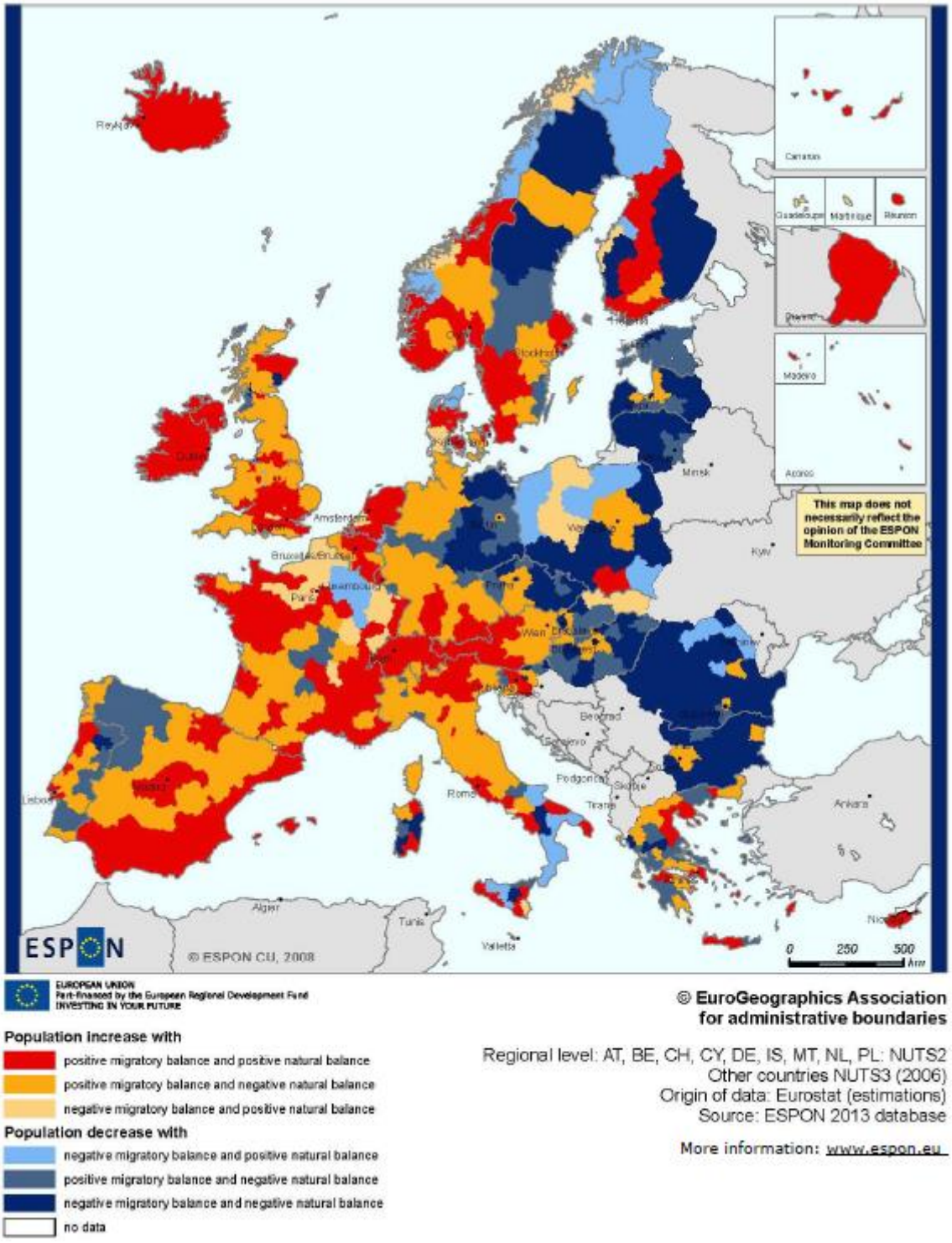
This method transforms all indicator values into standardized values with an average 0 and a standard deviation 1. It has the advantage to consider the heterogeneity within groups and maintain its metric information. (Smart cities - Ranking of European medium-sized cities Project, Final Report, 2007, pp.14)

Description of the general demographic context

With the change of political regime, the total number of people in Romania has a continuous downward trend. According to the 2011 Census, Romania has a total population of 19.042.936 inhabitants, with 18% less than in 1990. This phenomenon comes as a consequence of the low birth rate and of the intensified migratory processes in the last 20 years. At national level, the natural growth has positive values at the beginning of the 90's. At that time, the number of newborns exceeded that of the deceased with 22%, while in 2009 the number of deceased overpasses the newborns number with 14%.

Imbalances at the demographic level in Romania can be observed by analysing the population pyramid where at the level of the years 1995-2009; the majoritarian adult population fails to be replaced by the young generation, fact that can lead to a standstill in the country's future development. The fertility rate decreases from 56.2‰ in 1990 (in 1980 this was at about 75‰) to 41.1‰ in 2009. With the decrease of the fertility rate, there is also a delay in taking the decision to have children. If until 2009 the top of the fertility rate was recorded for the 20-24 years age group, in 2005 and 2009 the dominant births are for the women with ages ranging between 30-34 years.

Map 17 Territorial evidence on population developments (2001-2005)

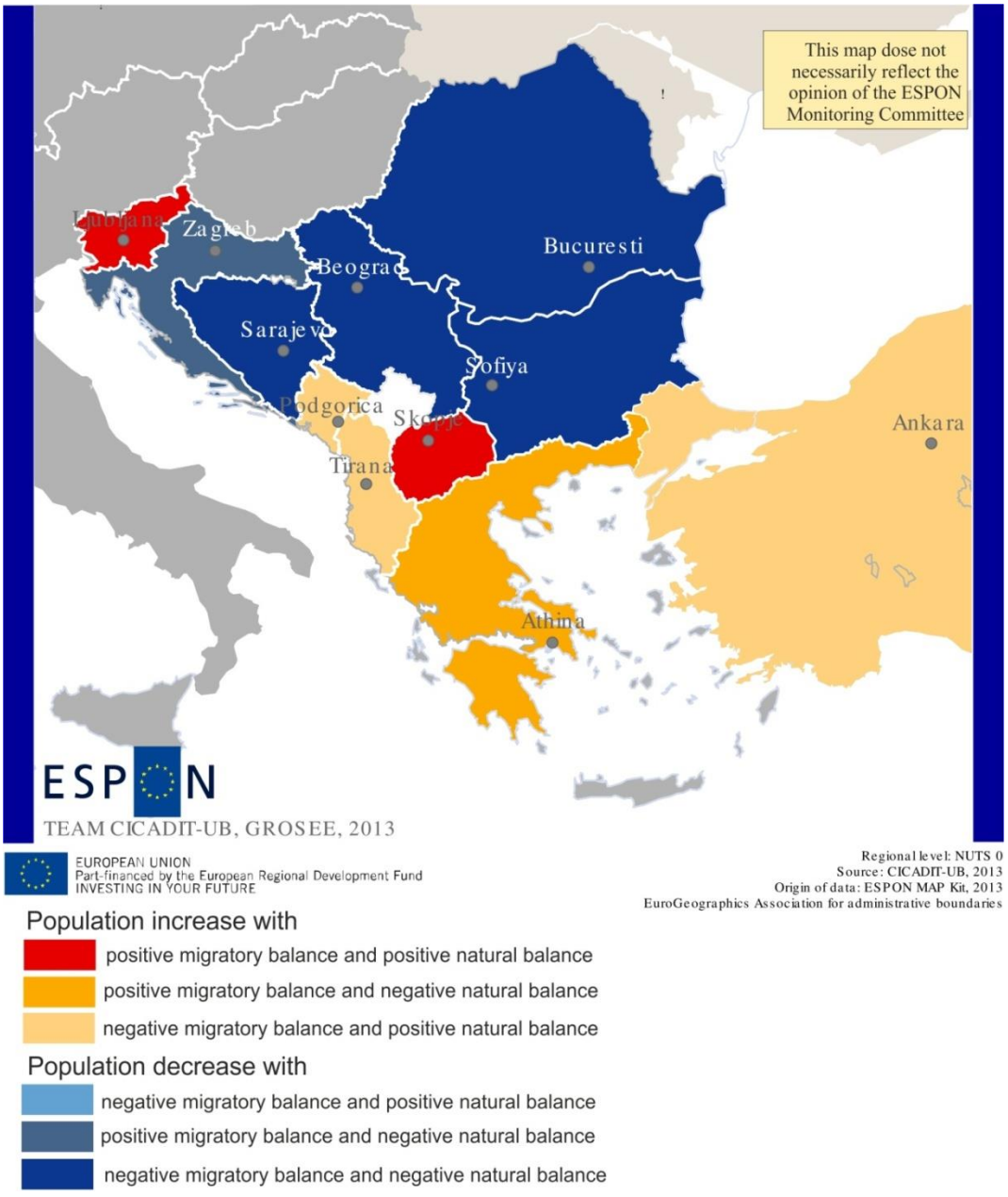


(Source: ESPON, Territorial Observation no.1, 2008)

A comparison of the Balkan countries reveals a mosaic profile of the population growth. Most of the regions in Romania and Bulgaria register a negative population change in the three analyzed intervals (1998-2002, 2003-2007 and 2008-2012). This is due to negative values of

the natural increase and net migration. Bosnia-Herzegovina and Serbia register the same tendency at the national level for the period 2008-2011. Unlike them, Greece is characterized by a diversity of the demographic growth, registering at a national level, a positive population change from 1998 until 2012. Albania, FYROM and Montenegro stand in to the same positive trends at a national level for the period 2008-2012, the increase being determined especially by the positive natural growth (Map 18).

Map 18 Population dynamics in South East Europe 2000-2010



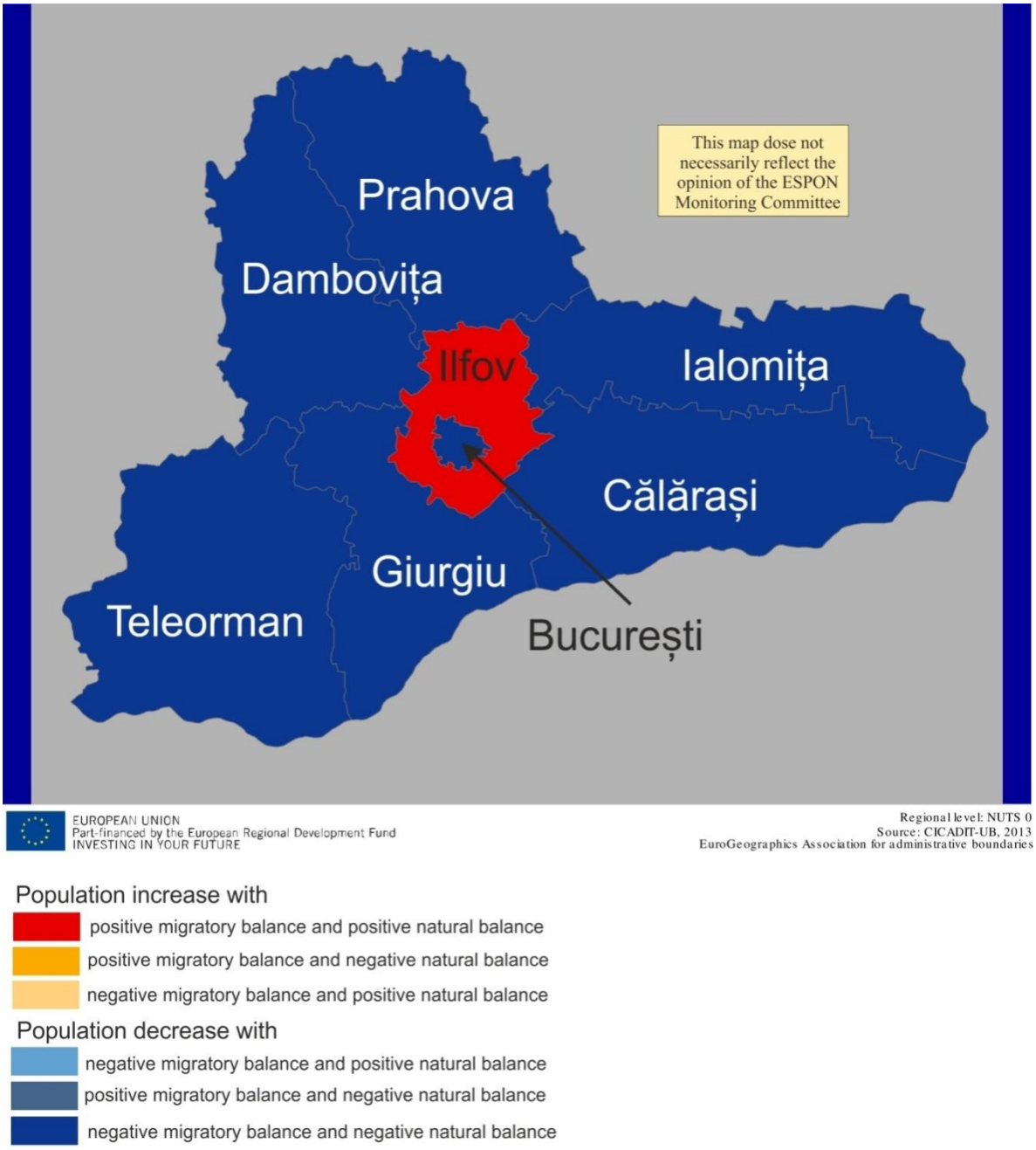
By analysing the big cities hierarchy[1] at the national level, from a demographical point of view, we notice a detach of the București municipality with its over 1.900.000 inhabitants, according to the 2011, in comparison to the next biggest urban centres, that slightly count 300.000 inhabitants. The demographic dynamics of each city is a specific one, representing its economic evolution or involution barometer.

Nevertheless, by generalising, two types of demographic dynamics can be observed. First of all, there are the urban poles with a constant decrease in terms of population starting with 1991 until 2009 (Arad, Baia Mare, Braşov, Brăila, Satu Mare, Sibiu, Oradea, Târgu Mureş), as a consequence of the eliminating the structures of the extensively developed industry during the centralised growth. In the second category, there are cities with alternating periods of growth and demographic decrease. In both cases, after 1995, the decrease is almost continuous, accentuated by the urban-rural migration and by the high emigration levels to the West-European countries.

A closer look at the case study area reveals a negative balance in all counties, except Ilfov County. In this last county, the population increases because of the positive migration rate, as well of the positive natural balance. This fact reinforces the presence of the suburbanization processes on the one hand, but also evidences a relatively young population with higher living conditions than in the other parts of the area.

[1] 24 cities have been analyzed, with a population of over 100 000 inhabitants, namely: Arad, Bacău, Baia Mare, Botoșani, Brăila, Brașov, București, Buzău, Cluj Napoca, Craiova, Drobeta Turnul Severin, Focșani, Galați, Iași, Oradea, Piatra Neamț, Pitești, Ploiești, Râmnicu Vâlcea, Satu Mare, Sibiu, Suceava, Târgu Mureș, Timișoara; taking into account the years 1991, 1995, 2000, 2005, 2009.

Map 19 Population dynamics in București and its metropolitan area 2000-2010



General description of the study area

The economic evolution from the last years affected the dynamics and the structure of the demographic phenomena not only at the capital level, but also the entire support space from where București takes its necessary resources. Both regions encountered economic elimination of the processes (deindustrialisation, land use change of agricultural lands, transport reorganisation, reinstitutionalisation), but also orientation to an accentuated tertiarisation.

In 2012, the total population of the study area (București-Ilfov and Sud-Muntenia Development Region) was of 5.504.112 inhabitants from which 41% belongs to the București-Ilfov Development Region. Over the last twenty years, the population in the study area experienced a decrease, the most evident being in the case of the municipalities that represent the Sud-Muntenia Development Region (in total, a diminishing of the population with more than -10%). The declaration of an important number of towns located next to the capital (such as Otopeni in 2000, Popești-Leordeni, Voluntari, Fierbinți Târg in 2004 and Chitila, Pantelimon, Bragadiru and Măgurele in 2005) lead to the induction of a demographic growth phenomena at the micro level study area.

The mark of the capital over the surrounding space demography took place in time under the form of such phenomena as: commuting, final remote displacement for more than 50 km or demographic ageing. The surrounding space has the function of a commuter belt (commuting area). Its extend broadening beyond the urban periphery, in relation to the development degree of the road infrastructure. To increase the efficiency of the commuting transport between the capital and the surrounding towns, it is necessary to introduce some easier links and the local authorities purposed the use of some transport means with intermodal functional pit stops where the rapid transfer of population can be assured from the urban one, typical for the Capital, to the extra urban ones, by realizing the connections with the Sud-Muntenia Development Region or the rest of the country.

The definitive displacements of the capital population in different points of the study area have been realised not only under the stimulus of the economic growth that some administrative-territorial units encountered after 2000 (after the creation of industrial and technological parks, the implantation of new economic activities along the Bucureşti-Piteşti and Bucureşti-Constanţa motorways, the declaration of new towns etc.), but also as a consequence of the residential investments boom in different areas/spots of the suburban area. The mobility of the capital's inhabitants from the old working neighbourhoods to those residential areas or to other spaces inside the city had a visible impact on the asymmetrical development of the Capital and its metropolitan area (extended to the north and the west). The demographic pressure over the space has been superior on account of the space's physical qualities: lakes, forests, recreational spaces.

The townships around București have been considered perfect spaces to develop real-estate, industrial or services projects. The characteristic of these townships situated in the suburban space is that they represent an important percentage of the working population (15-64 years old), that is an advantage in the local economy development and in their demographic consolidation.

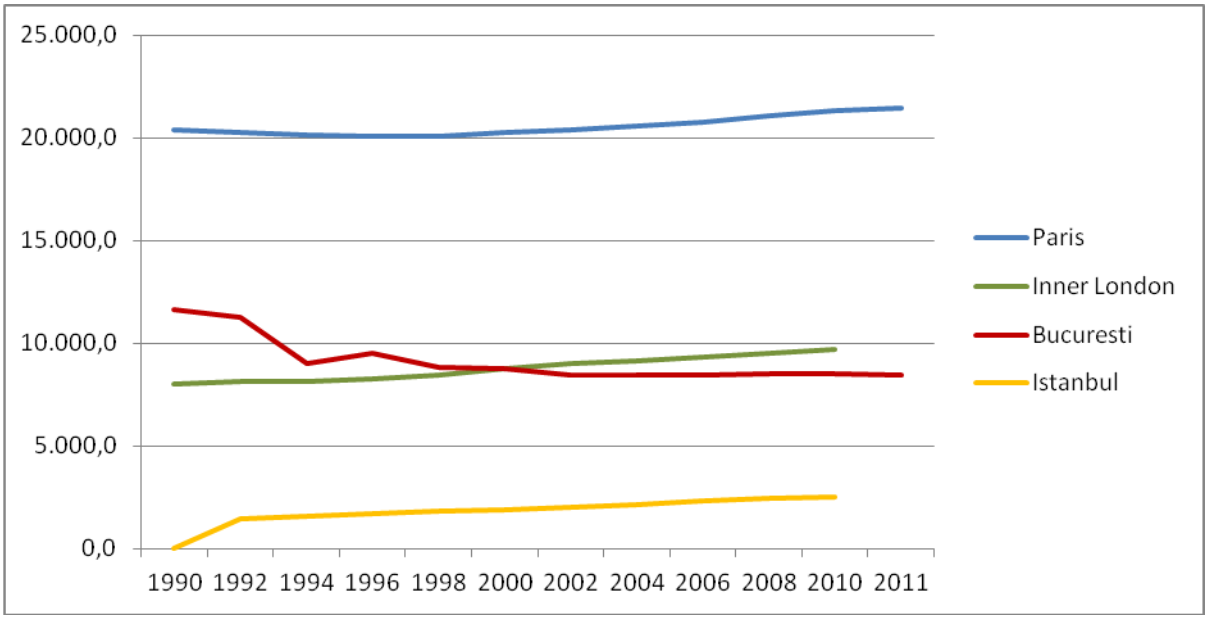
Population differentiated dynamics. Trends in the evolution of the population

According to the statistical data, in 2010, the total stable population of the București-Ilfov Development Region was of 2.263.261 inhabitants, representing 10.5% from the total population registered at national level, with 91.8% of the population living in the urban areas, namely 85,8% of the population being concentrated in București.

The București influence on the population density at a regional level is very clear; București–Ilfov Development Region has the highest density, of 1 288 inhabitants/km^2 according to the 2011 statistical data (București city is registering a density of 8 431 inhabitants/km^2).

Evolutionary, the density in the municipality of București decreased from 1990 to 1997, with a sharp break in 1994.In 2011 the population density registered 8 431 inhabitants/ km^2, with less than 3 178 inhabitants/km^2 compared to 1990. On the other hand, in Ilfov County we can observe an increase in terms of population density, especially starting with 2004 and reaching a population density of 219 inhabitants/km^2 in 2011 (from 170 inhabitants/ km^2 in 1990). In comparison to Sofia and Attiki, the population density in the Municipality of București registers the highest values (Sofia reaches a maximum of 1 047 inhabitants/km^2 in 2011, and Attiki 1 080 inhabitants/km^2 for the same year). Only Paris and London are beyond București density, positioning the capital of Romania on the third place of the European capitals (Figure 15).

Figure 15 Population density in Europe



(Source of data: Eurostat Database)

In the Sud-Muntenia Development Region, the density at the 2011 level varies between 64 inhabitants/km^2 in Călărași County and 175 inhabitants/km^2 in Prahova County. The general tendency is a decreasing one in the entire region.

Table 17 Population density in Sud-Muntenia Development Region (inhab./km^2)

	1990	1995	2000	2005	2010	2011
Sud – Muntenia	107,6	105,6	103,8	99,6	97,5	97,0
Argeș	101,0	100,9	99,9	96,0	95,0	94,7
Călărași	71,9	70,2	69,3	66,4	65,2	64,7
Dâmbovița	143,5	141,3	140,0	136,2	134,4	134,2
Giurgiu	93,7	89,8	87,3	84,6	82,8	82,5
Ialomița	71,2	70,8	70,6	67,7	66,4	66,2
Prahova	190,6	188,7	185,3	178,8	175,6	174,7
Teleorman	88,3	84,1	81,2	75,0	70,6	69,8

Source: Eurostat Database

București-Ilfov Development Region follows the national and European demographic ageing tendency, registering during the last decade important decreases at the population level between 0-14 years old and in the same time, slight increases in terms of population older than 65 years (an annual rate of about 0,1%).

The share of age group 0-20 years in București-Ilfov Development Region is 17.3% of the total population, although a comparable proportion of young people from other European regions is considerably lower than the national percentage (21.3%). Though, this trend manifests itself nationally, in București-Ilfov Development Region, it is more pronounced than in the country, as often happens, paradoxically, the developed regions from an economic point of view. Consequences of demographic aging are particularly vital, especially in economic terms, causing imbalances in the labour market due to the increasing number of retirees and the elderly down to work. If its aftermath does not apply right away, it will become apparent in the coming years that the population aged 0-14 years will reach maturity, and part of the working age will be retired.

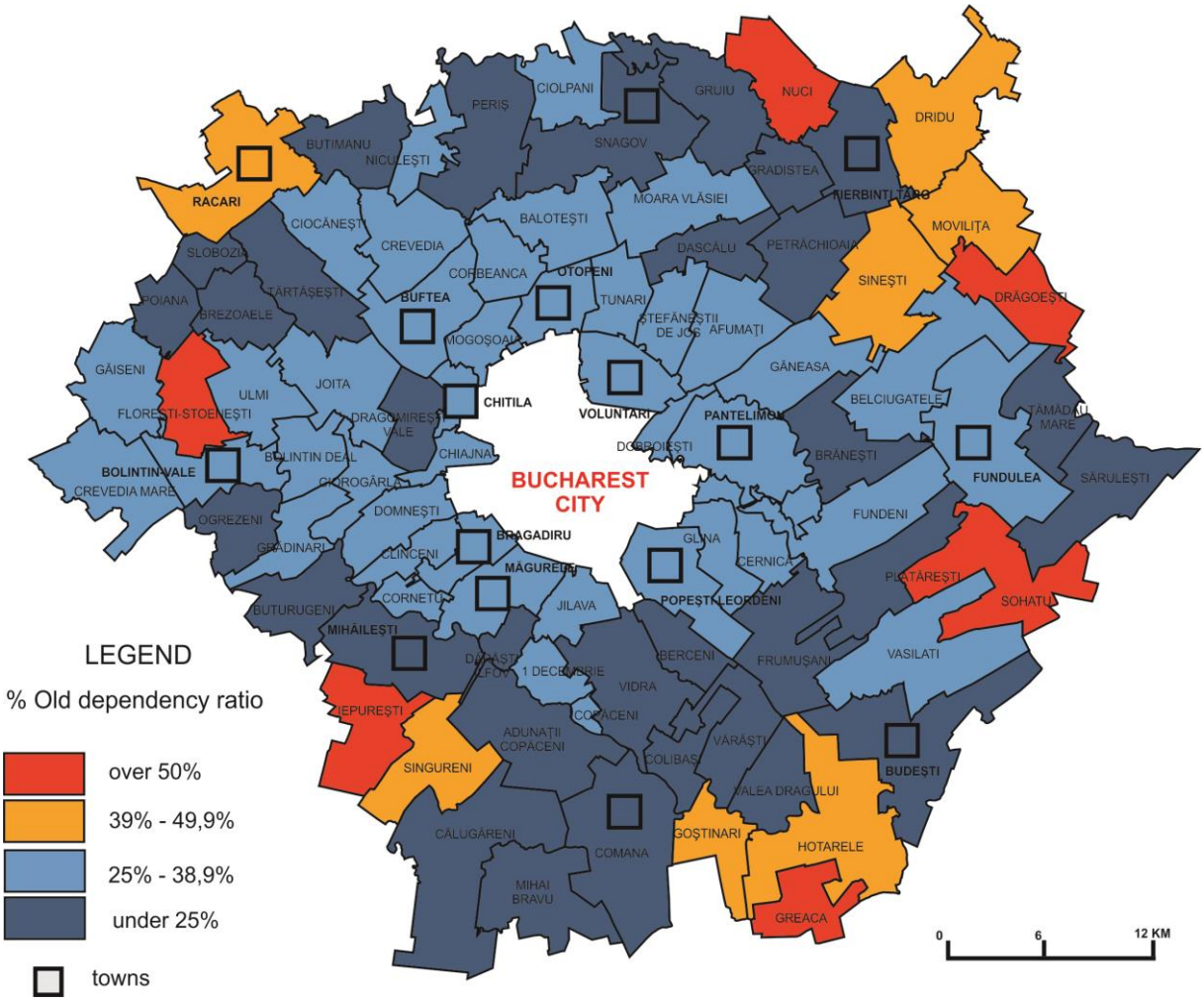
Table 18 Young and old dependency ratio

	Young dependency (number of people aged 0-14)/(number of peple aged 15-64) x 100									
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
București	17,71	16,91	16,09	15,43	15,21	15,39	15,66	16,15	16,76	17,30
București-Ilfov	18,67	17,81	16,94	16,20	15,93	16,05	16,25	16,68	17,27	17,80
Sud-Muntenia	25,78	24,68	23,70	22,80	22,38	22,15	21,84	21,63	21,56	21,42
România	25,83	24,76	23,76	22,84	22,32	22,06	21,80	21,71	21,68	21,61
EU27	25,03	24,69	24,33	24,02	23,71	23,49	23,33	23,29	23,32	23,35

	Old dependency (number of people aged 65 and over)/(number of peple aged 15-64) x 100									
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
București	19,10	19,29	19,45	19,62	19,58	19,35	19,21	19,19	19,32	19,37
București-Ilfov	19,36	19,54	19,68	19,81	19,76	19,51	19,33	19,22	19,28	19,22
Sud-Muntenia	23,29	23,56	23,87	24,19	24,42	24,44	24,38	24,32	24,44	24,28
România	20,38	20,63	20,87	21,10	21,25	21,30	21,31	21,27	21,37	21,26
EU27	23,83	24,09	24,34	24,66	24,95	25,19	25,36	25,61	25,94	26,22
(Source: Eurostat Database, processed data)										

At a more detailed level, certain towns near the capital register alarming values in terms of demographic dependency of over 50%. Mainly it is about those isolated areas that are situated far from the main and secondary roads. On the opposite side, there are some communes in Ilfov County with an increase concerning the population growth during the last years and some recently declared towns such Bragadiru, Buftea, Pantelimon sau Popești Leordeni where the elderly dependency rate varies between 11% and 14%.

Map 20 Old dependency ratio in the Metropolitan Area of București.



However, in recent years this has begun to slightly increase in terms of young people, with a higher fertility of about 2-3‰, reflected in a positive natural growth values. In general, the fertility rate is quite low: 31.5 at the region level and 30.4 at the Capital level (Table 19).

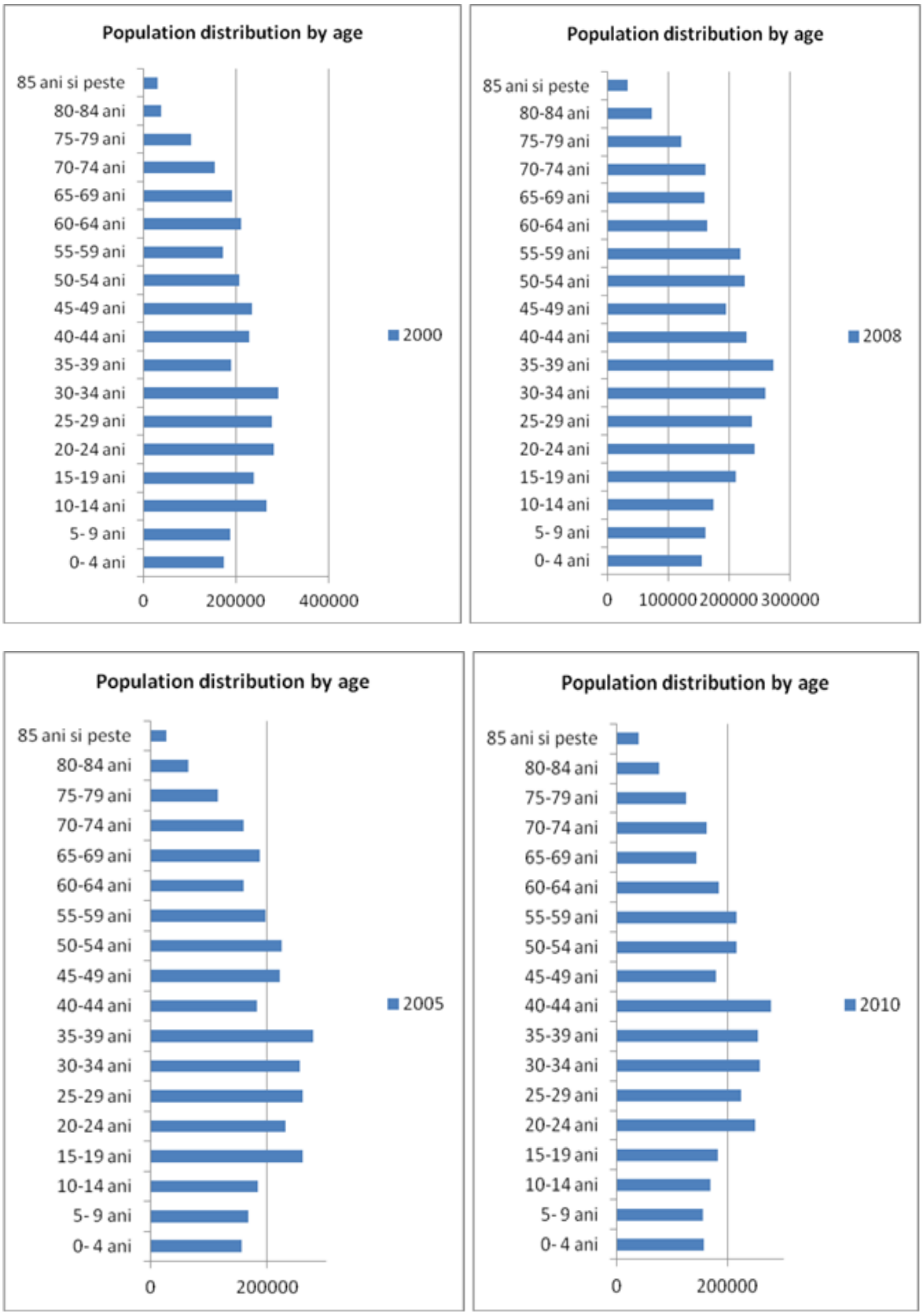
Table 19 Population number and fertility rate

	Population number				Fertility rate			
	2000	2005	2008	2010	2000	2005	2008	2010
Total	5756866	5547963	5534038	5528968	40,3	39,4	40,6	39,4
Argeș	672923	646899	644487	640484	36,8	35,7	34,9	36,2
București	2010050	1927448	1943981	1944451	26,6	33,7	39,3	41,4
Călărași	331715	318360	314081	312697	46,8	45,2	46,8	44
Dâmbovița	551926	537910	531441	530332	41,1	37,9	39,1	39
Giurgiu	294911	287462	282638	280959	44,3	38,7	42,7	40,7
Ialomița	304583	293102	289501	287678	45,7	42,9	48,9	46,1
Ilfov	275494	282320	298021	317247	37,9	40,5	46,1	44,8
Prahova	856961	829253	819600	814689	37,3	38,3	36,2	35,1
Teleorman	458303	425209	410288	400431	40,8	36,4	35,6	35,8

Source: NIS, processed data

Sud-Muntenia Development Region is marked by strong regional disparities. The north-central part has gathered the attention and focus of a greater number of viable industrial units and all public higher education institutions, including most research institutes. The south has a predominantly agricultural profile, the industry being severely affected by the transition; one of the consequences was a higher rate of unemployment from northern counties. The south has still a very good advantage in terms of accessibility to the national transmission system (Danube, the Danube - Black Sea Canal which connects to Constanța, European Corridor 4, railway București - Constanța), but this potential is not sufficiently exploited. These disparities are reflected in the demographical field, with a higher ageing rate in the southern part of the region. Otherwise, the general aging tendency (Figure 16) due to the negative natural increase and to the emigration of young people is more important in two counties: Teleorman and Giurgiu. The level and the dynamics of the tertiary sector, presenting fluctuations through time and space, are under the real actual population needs and the low investments transform the creation of new jobs in an aim.

Figure 16 Population distribution by age groups (2000, 2005, 2008, and 2010) in Sud-Muntenia Development Region



A detailed analysis at the Sud-Muntenia Development Region level, shows a reduction in terms of population with over 173 thousand persons (- 5%) between 2000–2008. Sud-Muntenia Development Region is the second development region in terms of size, having more than 15% of the Romanian population. There was a decreasing tendency of the population at a regional and county level between 1990-2010. Concerning the total population at the county level, an unequal distribution can be observed, the largest counties exceeding approximately twice the smallest ones (Giurgiu and Ialomița count about 300 000 persons each, while Prahova and Argeș have more than a double population).

At a regional level, the rural population is dominant, where the main activity is the agricultural one. The reorientation tendencies of the rural activities to the alternative non-agricultural ones are at their starting point. Between these activities, the tourism with a very high potential, especially in the mountain and hill areas, could absorb a part of the local labour force, would diminish emigration and would assure the general socio-economic stability of the rural space. Its location near the capital offers an important advantage to the region, taking into consideration its human and economic potential. București accessibility and almost central position are elements that would encourage mostly the rural and the mountain areas and the areas close to the Danube.

The analysis of the demographic potential indicates a number of beneficial factors for the mitigation of the process of economic and social inequalities: increasing birth rate, the positive net migration rates. The surplus of the female population is an opportunity for this sector because employment requires specific implementation of female labour force strategies, necessary for the attenuation of economic inequalities gender.

Table 20 Birth rate (%)

	1990	1995	2000	2005	2010
Sud-Muntenia	12,9	10,2	10	9,6	9,4
Argeș	12,7	10,4	9,7	9,4	9,2
Călărași	13,9	11,1	11,2	11	10,5
Dâmbovița	13,9	10,9	10,4	9,7	9,8
Giurgiu	12,8	10,8	9,8	9	9,5
Ialomița	14,2	11,4	11,2	10,6	11,1
Prahova	12,2	9,4	9,7	9,9	8,8
Teleorman	11,8	9,3	8,9	7,9	7,8
București–Ilfov	10,5	7,5	8	9,8	11,2
Ilfov	12,1	9,4	9,8	10,7	12
București	10,3	7,3	7,8	9,7	11

Source: NIS Romania

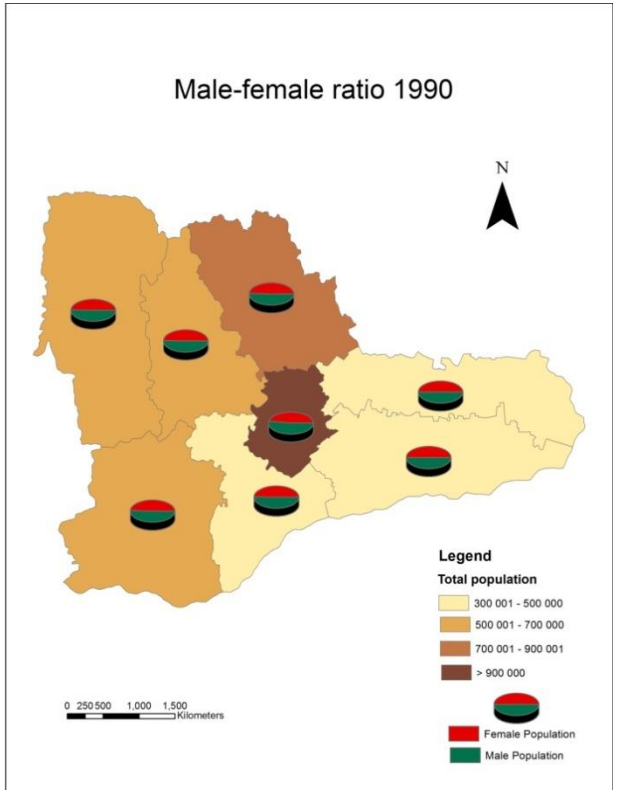
Table 21 Mortality rate					
	1990	1995	2000	2005	2010
Sud-Muntenia	11,6	13	12,3	13,3	13,3
Argeș	10,2	11,2	11	11,6	11,7
Călărași	12,1	13,8	12,7	13,8	14,1
Dâmbovița	11,5	12,5	11,5	12,4	12,1
Giurgiu	14,2	16,7	14,7	15,8	16,2
Ialomița	11,5	12,8	12	12,5	13,3
Prahova	10,6	11,6	11,4	12,3	12,2
Teleorman	13,4	15,5	15,5	17,7	17,2
București–Ilfov	10,4	11,7	11,1	11,6	11,1
Ilfov	11,9	13,2	11,9	12,2	11,2
București	10,2	11,5	11	11,5	11,1
Source: NIS Romania					

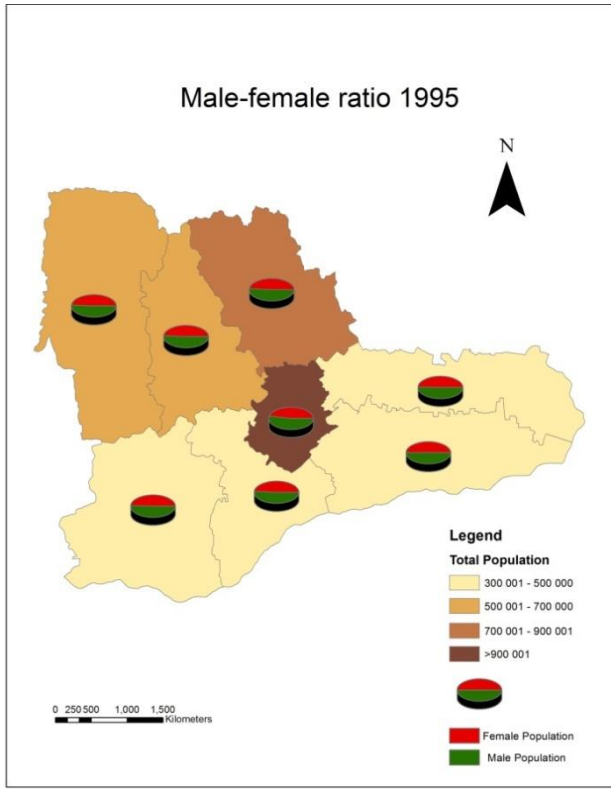
Table 22 Infant mortality (%)					
	1990	1995	2000	2005	2010
Sud-Muntenia	30,3	23	19,3	16,5	10,9
Argeș	23,8	18,1	21,4	18,8	11,2
Călărași	38,3	28,2	22	18,6	15,1
Dâmbovița	28,1	19,9	15	13,8	8,2
Giurgiu	31,9	29,1	15,5	18	12,3
Ialomița	46,7	29,2	28,2	16,7	10,6
Prahova	28,1	22,2	18,3	14,7	9,3
Teleorman	27,5	22,7	17,2	17,1	13,5
București–Ilfov	21,5	15,2	12,9	9,5	6
Ilfov	31,5	19,3	14,4	9,5	9,1
București	20	14,5	12,7	9,4	5,4
Source: NIS Romania					

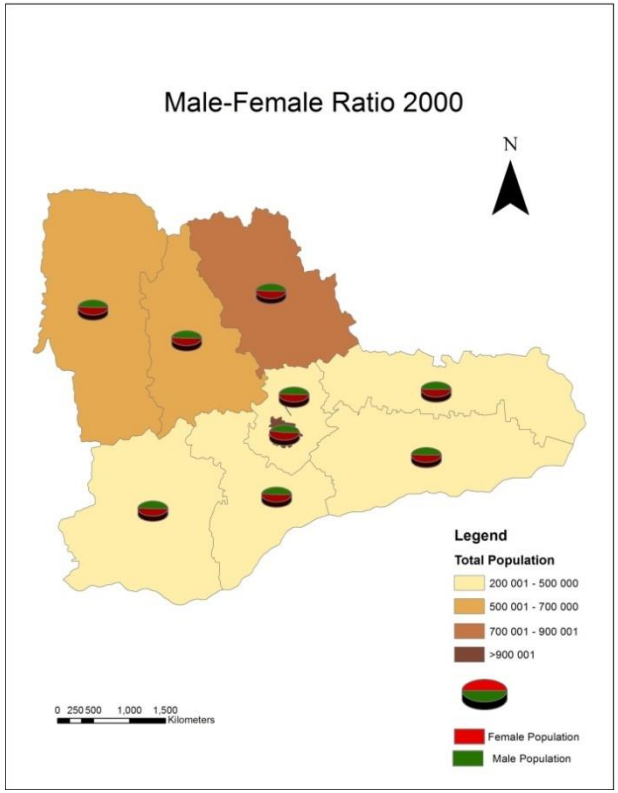
Table 23 Natural growth/rate of natural increase					
	1990	1995	2000	2005	2010
Sud-Muntenia	1,3	-2,8	-2,3	-3,7	-4
Argeș	2,5	-,8	-1,3	-2,2	-2,5
Călărași	1,8	-2,7	-1,5	-2,8	-3,6
Dâmbovița	2,4	-1,6	-1,1	-2,7	-2,2
Giurgiu	-1,4	-5,9	-4,9	-6,8	-6,7
Ialomița	2,7	-1,4	-,8	-1,9	-2,1
Prahova	1,6	-2,2	-1,7	-2,4	-3,4
Teleorman	-1,6	-6,2	-6,6	-9,8	-9,4
București–Ilfov	0,1	-4,2	-3,1	-1,8	0,1
Ilfov	0,2	-3,8	-2,1	-1,5	0,8
București	0,1	-4,2	-3,2	-1,8	-,1
Source: NIS Romania					

Table 24 Life expectancy				
	2000	**2005**	**2008**	**2010**
Sud-Muntenia	70,6	71,59	72,97	73,14
Argeș	71,4	72,25	73,26	74,05
Călărași	69,67	70,28	71,51	71,84
Dâmbovița	70,73	72,26	73,36	73,62
Giurgiu	69,59	70,5	71,51	71,96
Ialomița	69,91	70,9	72,61	72,32
Prahova	71,07	72,27	73,98	73,85
Teleorman	70,33	70,89	72,53	72,26
București–Ilfov	72,19	73,84	74,46	75,34
Ilfov	70,14	71,89	72,39	73,14
București	72,51	74,14	74,78	75,71
				Source: NIS Romania

Map 21 Male – female ratio 1990, 1995 and 2000







Migration

Migration in Romania has undergone significant changes since 1990, both in the national and international migratory movement. Nationally, there has been a major change in terms of the migration process. If in 1989 there was a rural-urban dominant proportion, it acquired a reverse sense in the second decade of 1990-2000. If in the centralized economy, the processes of industrialization attracted permanently extensive rural population (the over plus from agricultural collectivization), after the first 6-7 years of post-communism, the whole concept of migration has changed from urban to rural. Urban-rural flow patterns included retirees and part of the young workforce commuting to nearby cities in the first stage. Later on, especially around large cities, the rural flow migration structure included a special category of young people (those earning an income that was well above the average one), who preferred to leave the city and follow the path of the new rural residential areas with accessibility to major cities.

The volume of migration in the Sud-Muntenia Development Region, assessed by total arrivals, including other counties shows, indirectly, the role that large cities (over 100 000 inhabitants) have had in attracting migrants from other counties (Table 25). In this context we can take the example of Prahova and Argeș, in the number of arrivals from other counties is higher than 7 000 people. București city (including FUA) attracted more than 145 000 people.

Table 25 Migrants attracted from all Romanian counties to the South and București-Ilfov Regions in 1990.

	Arrivals Total	Argeș	Călărași	Dâmbovița	Giurgiu	Ialomița	Prahova	Teleorman	București
Argeș	7229	-	76	582	48	69	169	651	265
Călărași	2090	68	-	32	143	371	77	84	123
Dâmbovița	1806	245	29	-	74	63	227	78	156
Giurgiu	1474	18	74	81	-	43	25	377	139
Ialomița	2357	20	421	38	26	-	144	38	130
Prahova	7898	250	140	920	107	674	-	127	372
Teleorman	1587	103	61	46	192	42	37	-	153
București	145010	3165	15619	8207	15605	11762	4635	18094	-

Source: Processed data after „Changes of domicile", NIS (1991)

Analysis of internal flows in the Sud-Muntenia Development Region and București-Ilfov Development Region reveals dramatic changes, detaching 1990. Number of arrivals in that year in București-Ilfov Development Region (Ilfov county belonged entirely to București) from Sud-Muntenia Development Region was over 77 000 people.

The most important contributors to this value are represented by the agriculture counties and among the least developed, there are to be mentioned Teleorman (over 18 000 people),

Călărași and Giurgiu (almost 16 000 people each), Ialomița (about 12 000 people). Counties in north, more developed have had a much lower contribution (Argeș, more than 3 000 people, Prahova – Dâmbovița, between 5 000 – 8 000 people). The reason for this massive movement to București is that after the fall of the totalitarian regime, people who lived temporarily in București were residing in the city (which was considered a closed town, as all major cities) and people of București, the „bachelor degree" owners, that were forced to complete an internship outside the city (including change of residence), returned to their families.

Therefore, it is a confirmation of social reality and location. Since 1991, the flow intensity decreases back to normal. That is why, after 20 years, differences have diminished greatly, falling, regardless of county population, in a range between 1 300 and 2 500.

It is very interesting to analyse migration between FUA and CC since 2000, when there is available data for the two entities. There is a permanent increase in the migration deficit for FUA that is strengthened during 2010: București loses nearly 10 000 people for FUA (Table 26). After 2000, the attraction for FUA became more intense, peaking in 2008-2010, when the explosion of residential areas around București caused a permanent shift of a younger and well prepared population towards some of the cities and municipalities Ilfov county. The changes were so striking that some authors even speak of a rural gentrification (Nica-Guran, 2009)

Table 26 Migration balance between CC and FUA after 2000

	2000	2005	2010
Difference between arrivals and departures from CC to FUA	- 1167	- 2684	-9676

Source: Processed data after „Changes of domicile", NIS (2001, 2006, and 2011)

By 1990, the movement of internal migration was disrupted, resulting differences in the volume of arrivals and departures at the county level. But once adjusted, aspects of the consequences of policies from the communist period, migration from CC, FUA and OMR and within each county, they return to low values and the same intensity. For example, the share of total migration within districts migration remains approximately equal (Table 27).The only county that captures the low values is Ilfov County (FUA), in which changes are much smaller home in comparison to migration, especially, from București to this space.

Table 27 Share of migration process within the counties in relation to the total number of migrants					
County	**1990**	**1995**	**2000**	**2005**	**2010**
Argeș	72.53	70.31	75.90	81.13	74.15
Călărași	52.09	55.63	48.41	58.57	49.64
Dâmbovița	63.24	61.43	67.19	74.99	63.60
Giurgiu	43.95	42.30	39.39	47.73	34.16
Ialomița	49.89	52.37	50.92	61.66	53.82
Ilfov	0.00	0.00	15.26	16.15	7.31
Prahova	68.49	64.34	71.70	76.41	69.03
Teleorman	74.39	62.18	60.92	71.58	55.09
București	15.44	67.34	59.26	66.62	55.61
Source: Processed data after „Changes of domicile”, NIS (1991, 1996, 2001, 2006, and 2011)					

Demographic structures, evolution and trends

The general trend since 1990 is that of a falling population. Both the city of București, the city core (CC) and Sud-Muntenia Development Region have handled decreases of the total population between 1990 and 2010.

The magnitude of this decrease is differentiated: The population in Sud-Muntenia Development Region decreased by 9.7% in 2010 compared to 1990, while that of București decreased by 3.3%. Only Ilfov county, which acts as a Functional Metropolitan Region (FMR) has registered an increase of 15.2% in the same period. If in relative terms this figure seems impressive, in absolute terms the number of people grew by only 39 000 inhabitants, as Ilfov county is among the smallest ones in Romania. This increase in the number of inhabitants of the FMR is explained by the growing suburbanisation process, some residents of București preferring to move in the nearby metropolis, especially in the northern part (Mogoșoaia, Chitila, Otopeni and Voluntari).

An interesting situation is found in the case of population decline in the Sud-Muntenia Development Region. Differences within this zone are significant, ranging between -5.6% and -20.5%. The most severe population decline was recorded in the Teleorman County, where in 20 years the total population decreased by over 100 000 (from 503 000 in 1990 to 400 000 in 2010). At the opposite pole is Argeș, which recorded in the same period a decrease of only 5.6%. The two counties located at the spread of population dynamics have completely different dominant economic profiles: first, agricultural, industrial and other. Teleorman industry, created on the basis of extensive after 1970 was the first almost completely dismantled. Surplus labour in urban centers and rural partially turned to agriculture, another important part migrated to București, but most important, in the last

decade, massive left to work abroad. Moreover, all counties in the south of București record important decrease (over 10%), explained by the same phenomena as in Teleorman. Much smaller decreases were recorded in the county seat, which, due to territorial functions, perform (industry, trade, services, administrative) and provide more jobs and some stability.

Structure on environments (urban-rural) reveals a major feature of the region studied, namely sharp rurality of this space. There can be no discussion regarding the division of urban and rural population concerning București metropolitan population and about the city core. Officially, all the inhabitants live in urban areas, although in some peripheral or old neighbourhoods, urban and technical conditions show a semi-urban comfort.

Ilfov County recorded the most active dynamic conversion of rural areas in urban areas, where we see major changes in the status of settlements that became cities in the past 10 years. This explains why the urban population has grown considerably since 2000, ranging from 7.1% to 42.7% in 2010. In this way certain villages were declared cities by administrative decision (Chitila, Otopeni, Voluntari, Pantelimon, Popești-Leordeni, Bragadiru).

Sud-Muntenia Development Region taken as a whole is characterized by a dominance of the rural population, down from 1990 (from 61.2% to about 53% of the total population of 2010). In 2010 the only county with a share of over 50% urban population is Prahova (50.3%) with a high density of cities, but also the largest city in the region. The highest degree of ruralism is recorded in Dâmbovița county (69.2%) and Giurgiu (68.8%). From this point of view, the distinction between counties facing the southern and northern part of the București metropolitan area are no longer satisfied when referring to a permanent reduction of the rural population. If in the cases of counties characterized by a high ruralism, the share of rural population gradually decreases due to negative natural increase and migration for work; the case of Prahova county (with predominantly urban population) is a special one: urban population decreases between 1990 - 2010 from 51.4% to 50.3%. This decrease is caused, on one hand by some attractions of rural areas with high tourism potential, and on the other hand by labour migration from small towns (numerous) to București or other countries.

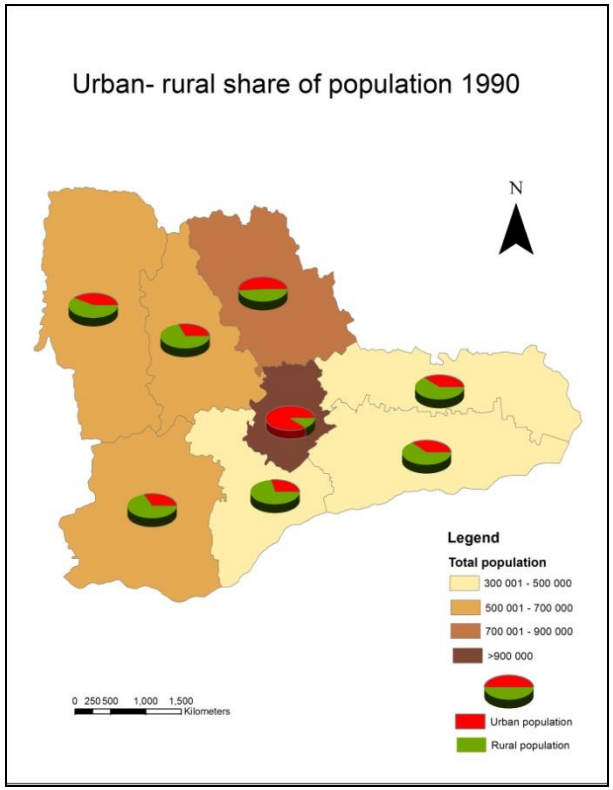
Table 28 Urban – rural share of population

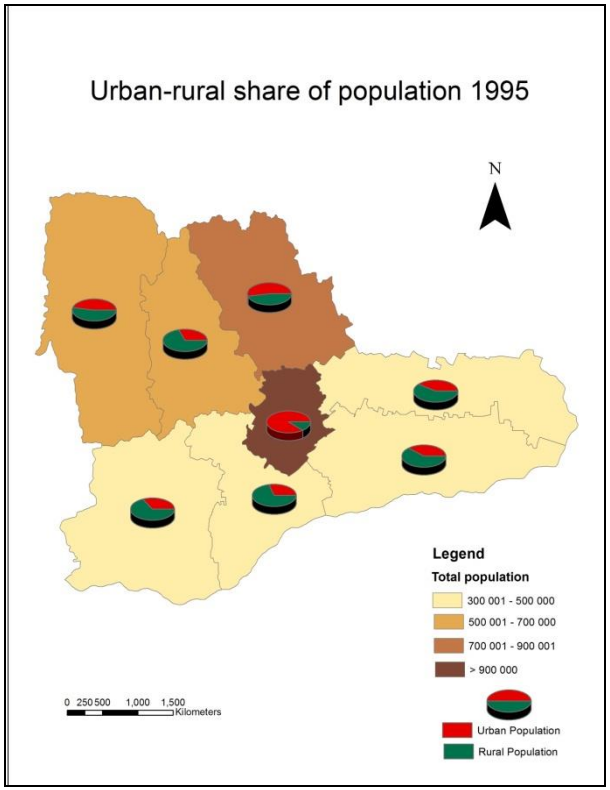
Region	Urban-rural	1990	1995	2000	2005	2010
Sud-Muntenia Development Region	**urban**	39,4	41,7	41,7	41,7	41,4
	rural	**60,6**	**58,3**	**58,3**	**58,3**	**58,6**
Argeș	**urban**	41,8	47,4	48,1	48,1	47,7
	rural	**58,2**	**52,6**	**51,9**	**51,9**	**52,3**
Călărași	**urban**	38,1	39,9	39,4	39,0	38,5

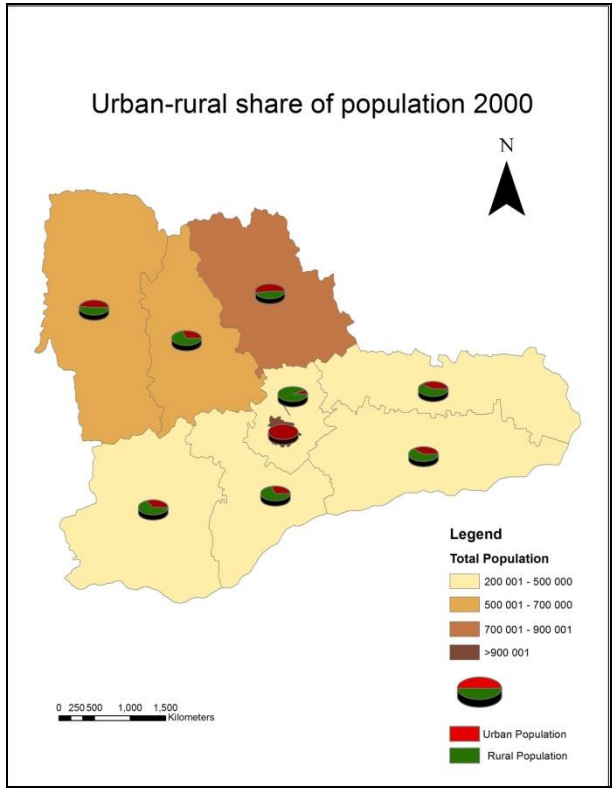
	rural	**61,9**	**60,1**	**60,6**	**61,0**	**61,5**
Dâmbovița	**urban**	31,1	31,5	31,3	31,3	30,8
	rural	**68,9**	**68,5**	**68,7**	**68,7**	**69,2**
Giurgiu	**urban**	28,7	30,5	30,8	31,0	31,2
	rural	**71,3**	**69,5**	**69,2**	**69,0**	**68,8**
Ialomița	**urban**	38,8	41,7	41,4	45,6	46,1
	rural	**61,2**	**58,3**	**58,6**	**54,4**	**53,9**
Prahova	**urban**	**51,4**	**52,4**	**52,1**	**50,9**	**50,3**
	rural	48,6	47,6	47,9	49,1	49,7
Teleorman	**urban**	32,5	34,4	34,6	33,5	33,6
	rural	**67,5**	**65,6**	**65,4**	**66,5**	**66,4**
Ilfov	**urban**	n/a	n/a	7,1	26,1	42,7
	rural	n/a	n/a	**92,9**	**73,9**	**57,3**
						Source: NIS

Regarding gender structure, differences are similar to the other European regions, respectively the dominance of female population. If, on the whole, it is 2%, there should be noticed that for București-Ilfov Development Region the imbalance is higher (3%). This situation can be explained by the fact that similar to large European cities, the city of București has an educated population and health insurance systems, which attain a high average age of the male population, and especially of the female.

Map 22 Urban – rural share of population 1990, 1995 and 200







2.1.3 Internal connectivity

Specific characteristics of the analysed area in relation to the connectivity

Even from the beginning the city evolved in a radial structure as a result of not having any major natural barriers, but with a slight tendency to a northern expansion. In the '70s the structure and morphology of the city was profoundly disrupted by the aggressive urban planning of the communist regime. Nowadays București is divided in 6 districts each governed by a district mayor, simultaneously the city being governed by the city mayor. It has a clear tendency of enlargement to the north, but also along the principal structural axes in the eastern and western part of the city.

Looking at the entire study area, București is the most dens populated area. The Inner Metropolitan Region, considered by the research team as the Ilfov County is less dense, with over 56% rural population. The Sud-Muntenia Development Region experiences an important influence by the capital city, perceivable also through the pre-urban commuting phenomenon..

In terms of transport, in the case study area there are all means of transport (except the water transport). For the air transport, the two airports are representative: Băneasa "Aurel Vlaicu" (closed for the moment) and the International Airport "Henri Coandă" – Otopeni (for both national and international flights). Land transports are represented by a dense railway infrastructure (all the main railway lines start from the Capital city and link it to the main cities in the country and in Europe). The roads network is well represented in the case study area. Three motor ways start here – A1 to Piteşti, A2 to Constanţa and A3 to Braşov (partially finished), shortening the distances from the Capital to some of the main cities of the country. Inside București there is a dense network for the public transport, network that includes surface transport with various bus and trolleybus lines, as well as underground transport.

The water transport is missing in this area and it can be counted only as a project in the situation in which the works for the Dâmboviţa – Dunăre Channel would resume, fact that would transform the Capital city also into a port.

However also some shortcomings can be perceived, such as a viable link between the capital and Otopeni Airport, road or rail hubs, rehabilitation of the railway network towards Giurgiu, a better management of the public or private pre-urban transport etc.

Road, train and air transport: flows, infrastructure, capacity

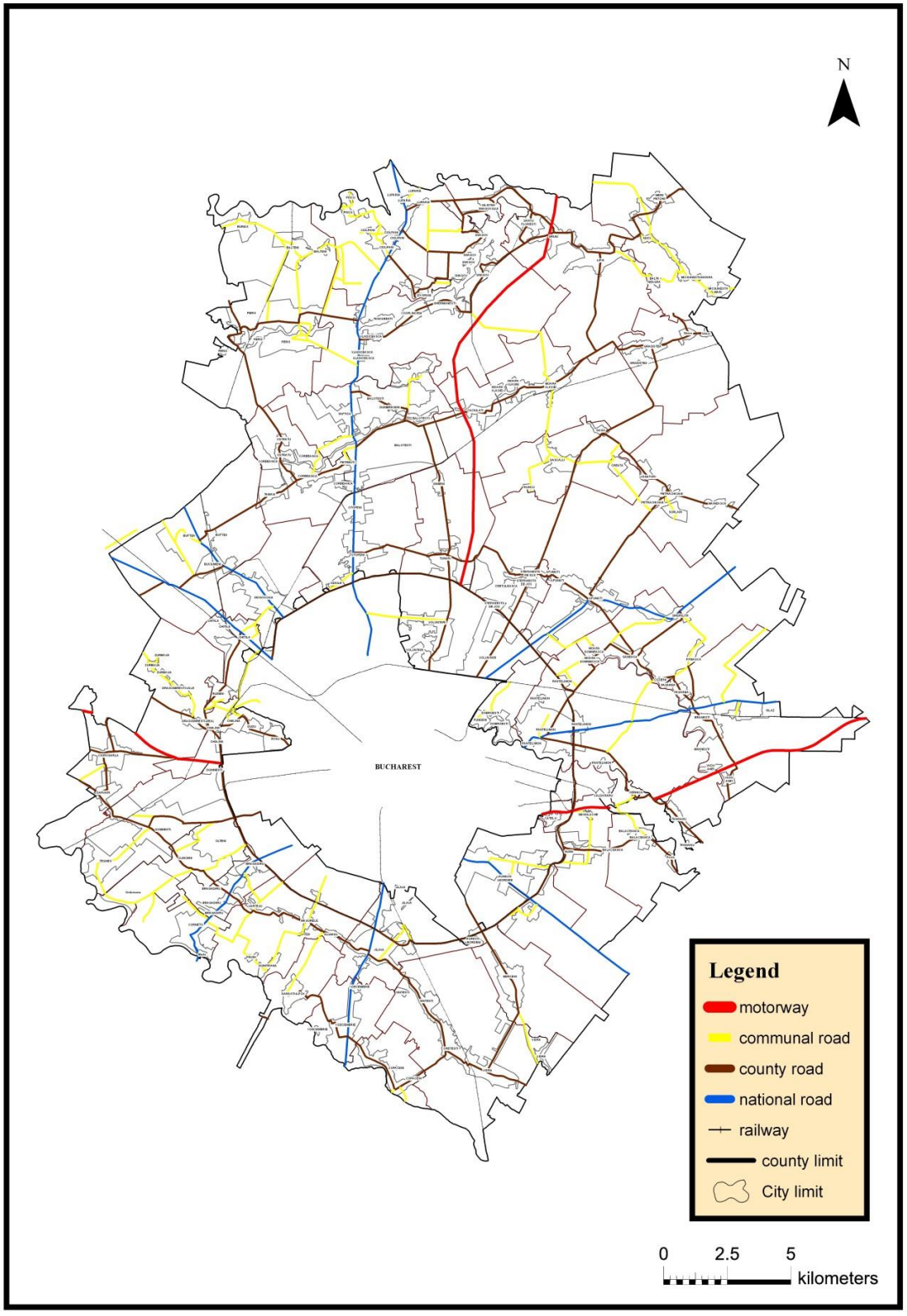
Road infrastructure

The road network in the capital city of Romania has a radial pattern, nine main roads converging to the central part of the city, and a circular pattern surrounding the city as a result of the two circular roads.

Since 2004, București is linked by the motorway A1 to Pitesti, a city 126 km far away. It was at that time, the only motorway at national level. A second motorway A2: București-Constanța was opened in 2007 and was operable for its entire length by 2012, linking the capital with the main port of Romania and one of the most important of the Black Sea. In the same year, 2012, the segment București – Ploiești of the motorway A3 (București – Brasov) was opened to the public. For the southern part of the country the European Road (E85) connects București with Giurgiu and further on with Bulgaria through Ruse. A motorway is planned as a bypass road surrounding the capital city (A0); meanwhile works have started in 2010 for the enlargement of the București existing ring-road.

In the same time, București is crossed by other three European roads (E70: București-Pitești-Craiova-Timișoara, E60: Constanța-București-Ploiești-Brașov-Oradea, E81: București-Pitești-Sibiu-Cluj Napoca-Satu Mare) and represents a node in the PAN European Corridor IV and IX.

Map 23 Transport network of the București-Ilfov Development Region (by CICADIT)



Railway infrastructure and connections

Out of the official 10 railway stations in București only five provide connections to the Ilfov County and four of them (București Nord, București Basarab, București Basarab Haltă, București Triaj) are located on the same main route.

We can acknowledge three different cases:

1) The settlement that benefits from there localization on a main railway route. The general passenger flow tendency registers a higher number of departures from the settlement to București, mostly until 12 o'clock and after 17 o'clock, proving the commuting phenomena.

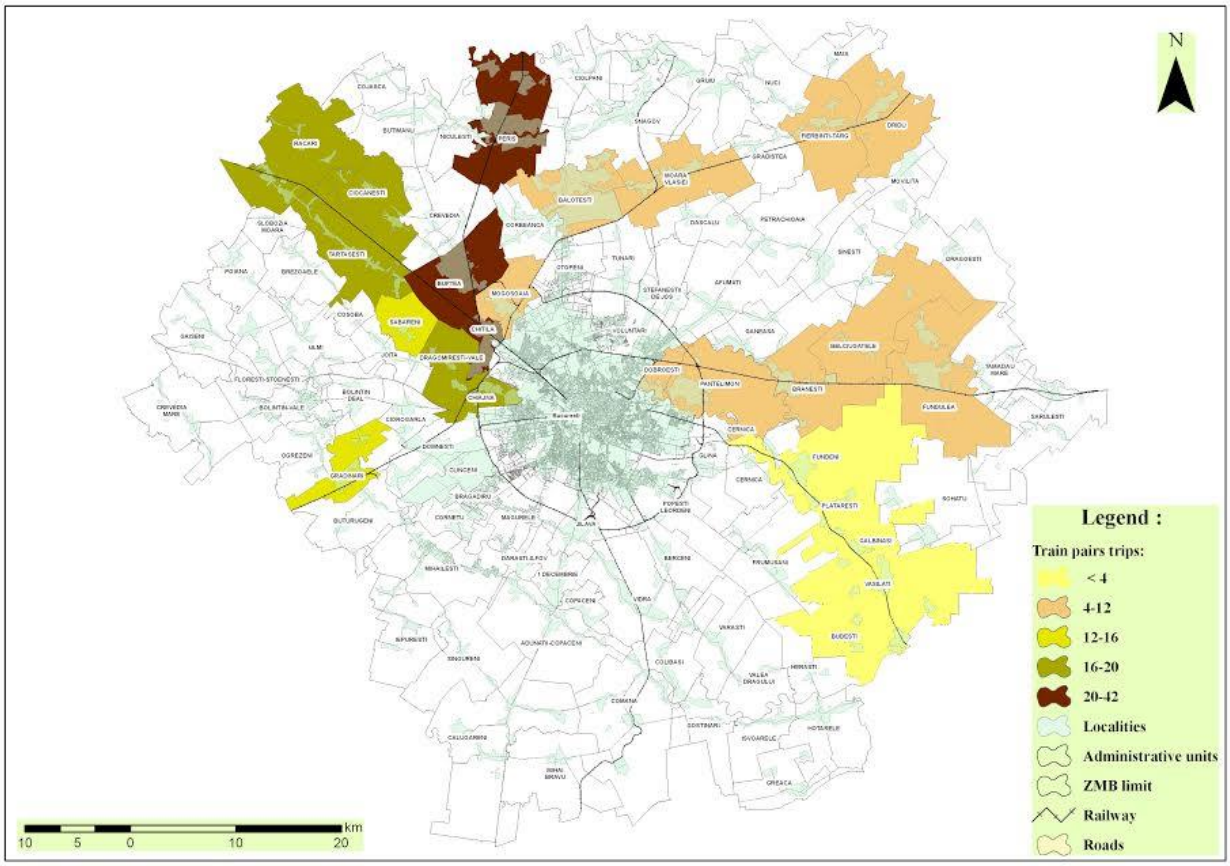
2) The settlement is equipped with the necessary infrastructure, but there are no trains that stop at the railway station. In most of the cases these stations are far from the settlement and they do not provide any possibilities for further transport.

3) A third fact that proves the poor connectivity of the Core City to the surrounding regions is represented by the inexistence of any railway infrastructure between the towns and București (see Voluntari, Bragadiru, Măgurele and Otopeni).

The trains that serve the metropolitan area of București have been taken into account in order to highlight the railway transport links between București and the towns in its metropolitan area. It has been considered as being useful a comparative analysis (for 2006 and 2013) in order to capture the qualitative and quantitative changes of the railway infrastructure in the analysed area.

Railway accessibility calculated for 2006 in Bucureşti metropolitan area (Map 24) is more pronounced on the West, North and North West , the most frequent stops of the trains that leave the capital being registered in places such as: Buftea, Chitila, Periş (20-40 train sets/24 hours), followed by Tărtăşeşti, Ciocăneşti, Răcari, Chiajna (between 16-20 train sets/24 hours).

Map 24 Railway connections between București and the towns in its metropolitan area (2006-2007)



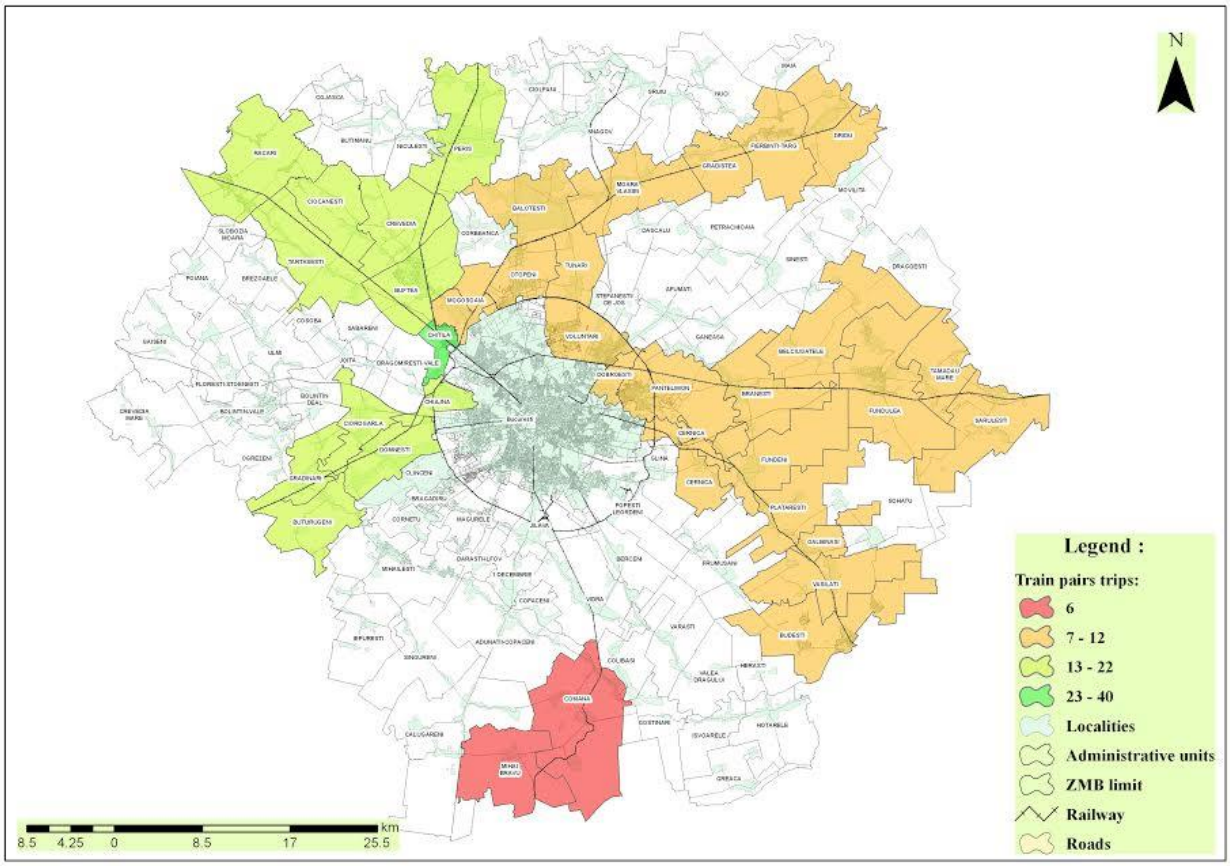
(Source: Pintilii, 2008, p. 68)

On the opposite side, there are the towns situated along the railway to Oltenița (Cernica, Plătărești, Vasilați) that are served by less than 4 trains/24 hours (Pintilii, 2008, p. 68).

For 2006, it should be noted that the towns in the metropolitan area served by the railway Bucureşti-Giurgiu, haven't been represented on the map because in 2005 due to the floods, some landslides occurred and caused the collapse of a bridge in Grădiştea (Comana town, Giurgiu County), thus generating the suspension of the railway traffic.

For 2013, there has been a reduction in the number of trains in the North-Western area (Buftea, Răcari, Periș) served by 13-22 trains/day. The exception is Chitila that registers the highest value (23-40 trains/day), being an important railway junction (from Chitila, there is a branch of the main railway to 1000 Ploieşti and the secondary railway 901 Titu – Piteşti).

Map 25 Railway connections between București and the towns in the metropolitan area (2012-2013)



(Source of data: The National Railway Company "CFR" SA)

The North-Eastern area is better served between 2012-2013 taking into consideration that the stations Baloteşti şi Grădiştea were reintroduced in the railway circuit. There can be also added the new trains that represent the link between the capital and Otopeni International Airport.

The train trips have been reintroduced on the railway segment Giurgiu-Comana (6 train pairs/day), the railway is not in full use (for the segment Comana-București), and since the reconstruction of the Grădiște bridge has not been completed yet.

Water transport (Ports)

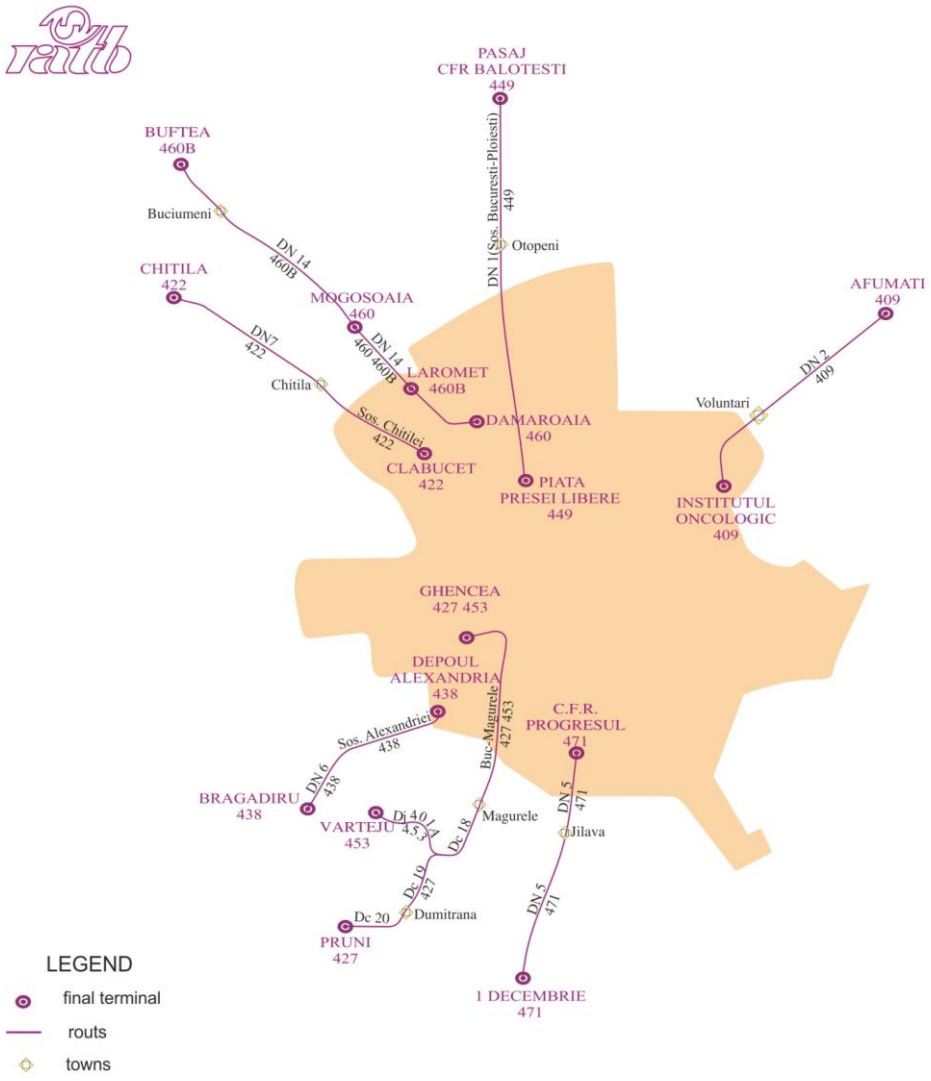
Even though București has not a port, it is connected by the European Road E85 to the Danube Port in Giurgiu, about 63 km away, and by the National Road 4 to the Danube Port in Oltenița about 70 km away. As it was already mentioned, the opening of the A2 motorway, led to a direct and rapid connection of București with the Black Sea main port, Constanța.

During the communist period, works started for building a Danube-București Canal aiming to link the capital city through the Danube to the Black Sea. Nevertheless this projects were made earlier by the time of the Romanian Royal House. (PATJ Ilfov, 2004) With the fall of the communist regime the works on the canal stopped, although more than a half of the project was finished (PATJ Ilfov, 2004) Several attempts were made till now to finish the project, but without success.

Public network infrastructure

The public transport network in București is organized by two different public companies , Metrorex managing the underground transport system and RATB operating the surface transport network composed of day, night, touristic and suburban busies; trolleybuses, trams and light rail.

Map 26 Pre-urban Public Transport Network



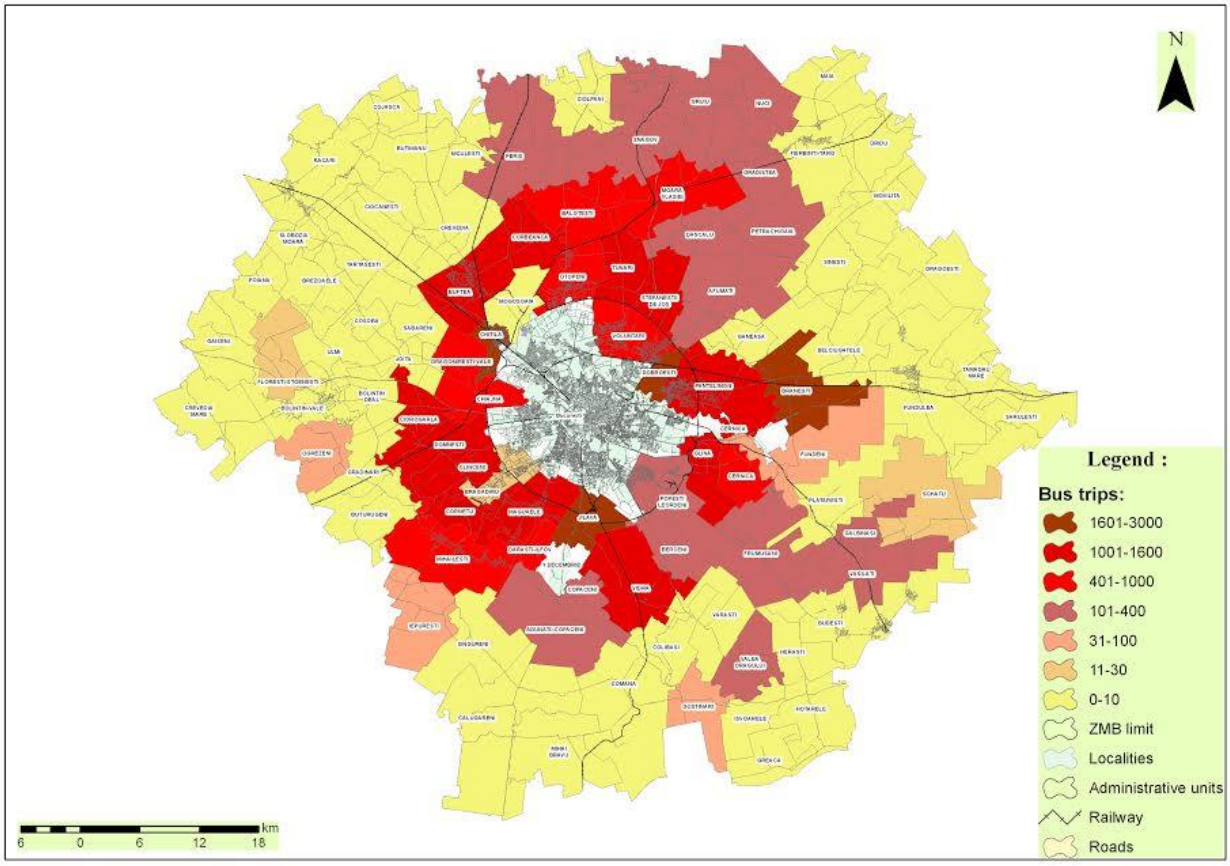
(Source: changed after: www.ratb.ro)

Regarding the road transports, data concerning the pre-urban trips have been collected and offered to the population by the București City Hall through the Autonomous Administration for Transports București (RATB) as a state-owned operator, but also concerning the trips offered by the private operators. The routes operated by private transport companies have paths longer than the pre-urban trips, the latter being functional only in the Ilfov County.

The general configuration of the road transport infrastructure in the București Metropolitan Area is typical for a convergent structure (Cepoiu, 2009).

By analysing Map 27 there is a predominance of the number of trips in 2006 in the administrative units in Ilfov County because their values represent a sum of the number of trips performed by public and private operators.

Map 27 Road transport connections between the Municipality of București and the towns in its metropolitan area (2006)



(Source: Pintilii, 2008, p. 66)

In 2006, according to the statistic data provided by RATB, the highest number of trips provided by the national transport operator (over 1000 trips) were directed to Măgurele (1028 trips/week), followed by Cernica (786 trips/week), Chitila (662 trips/week) and Jilava (616

trips/week). The high number of trips to Măgurele is understandable if we consider that on the one hand there is a famous research institute and a faculty with the same profile as the institute (The Research Institute and the Physics Faculty), and on the other side a student campus (dormitories belonging to the University of București) (Pintilii, 2008, p. 66).

The lowest number of trips (under 100/week) are made to Nuci (72 trips/ week), Dascălu (56 trips/week) and Snagov (42 trips/ week). A peculiarity for Snagov Is the fact that the low number of trips is attributed to the fact that in most of the cases, the trips are directed towards the tourist complex in the town and the private cars are the ones used the most often (Pintilii, 2008, p. 66-67).

Races conducted by private carriers are designed to complement those of Ilfov County. However there is to be noted that most races still incur in some administrative units Ilfov County, given the large share of the operators (70.21 %) regarding the number of flights operated in the area analyzed. Thus, the first place goes to Chitila (2200 trips / week), followed by Brăneşti (1350 trips / week), Jilava (1250 trips / week) Ciorogârla (1170 trips / week) and Corbeanca (1130 trips / week). In a range between 110-550 trips, there are to be mentioned towns and villages that lie in other counties like: Mihăileşti - Giurgiu (420 trips / week), Bolintin -Vale (340 trips/ week). Vasilaţi - Calarasi County (110 trips / week). Lowest values are recorded in settlements on the outskirts of the metropolitan area of București.

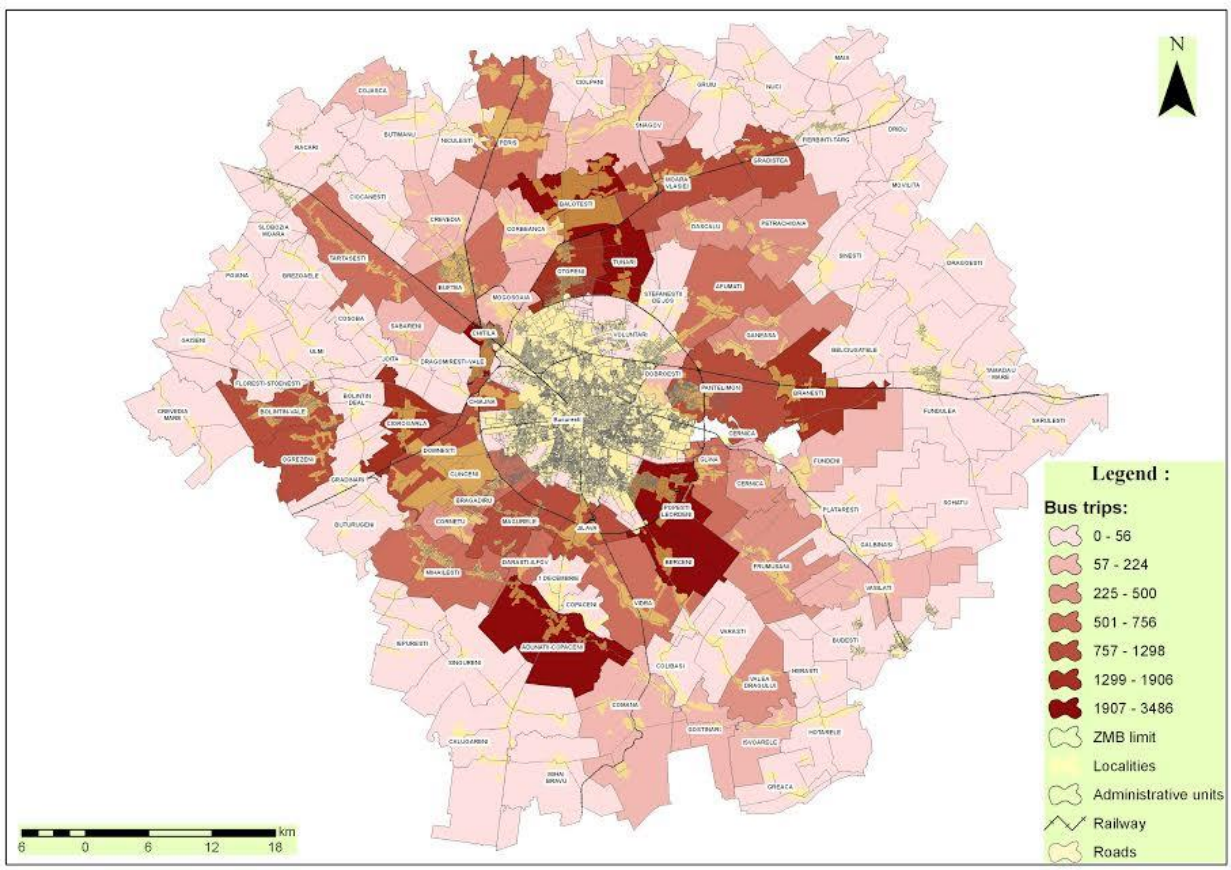
Related to the year 2013, the same pattern is found in the context of the territorial administrative units located in the first and second ring surrounding București, which are better served in terms of road transport. But there is a number of differences relating to race numbers due to fact that the Autonomous Administration for Transportation București reduced the frequency to some cities in the metropolitan area: Magurele (503 trips / week), Cernica (448 trips / week) or removed some suburban races (Brăneşti București, București-Jilava, București Periş, București-Moara Vlăsiei-Sitaru, etc.), the last ones being operated only by private operators.

There should also be specified the fact that urban transport decided increasing the number of express line races linking the capital from Otopeni International Airport, providing overnight races and a frequency of 45 minutes. However, in 2009 a new line of express running from North Station Railway to Otopeni airport has been opened. The train travels the route București North Railway Station - Yard - Chitila - Mogoşoaia - Baloteşti, where passengers continuie their journey by bus to the international airport Otopeni

Regarding road transport firms insured by private operators, it appears that the greatest number of races are kept mostly for settlements of Ilfov County: Popeşti Leordeni (3486 trips/ week), Chitila (2440 trips/ week) Berceni (2736), Baloteşti (2170 trips / week) (Map 28). This

is explained by the fact that in Ilfov County, 80% of households have at least one person who usually uses public transport (Ilfov Development Strategy - "Horizon 2020", 2013).

Map 28 Road transport connections between the Municipality of București and the towns in its metropolitan area (2013)



(Source: Processed data by CICADIT after www.autogari.ro)

There should also be mentioned the increase of races towards Popesti Leordeni as opposed to the previous period, due to fact that inside the city there have been created new residential areas (Danubiana district), the high demand for road transport commuter being related to the fact that most of the population works in București, and to the reduced distance between Popeşti Leordeni and the capital city. The same situation can be found in other administrative units located in the south of the capital city, where there are many real estate projects some completed, others in progress (Berceni).

Particularly for Popesti-Leordeni is the company Agropol, the biggest one in Ilfov County, for which there are special races operated by the private carriers, ensuring transport of the employees.

A series of administrative units situated in the first two rings from around the capital have not met an increase of transportation operated by private carriers as on the fond of commuting from the capital city to the specific point of destination, most of the commuters are using their personal vehicles. (Voluntari: 868 trips / week, Jilava 802 flights / week).

Medium values are recorded in the administrative territorial units located at a greater distance from the capital city Bolintin Vale (1112 trips/ week), Domnesti (994 trips/ week) Mihăileşti (630 trips/ week), Darasti Ilfov (756 trips/ week).

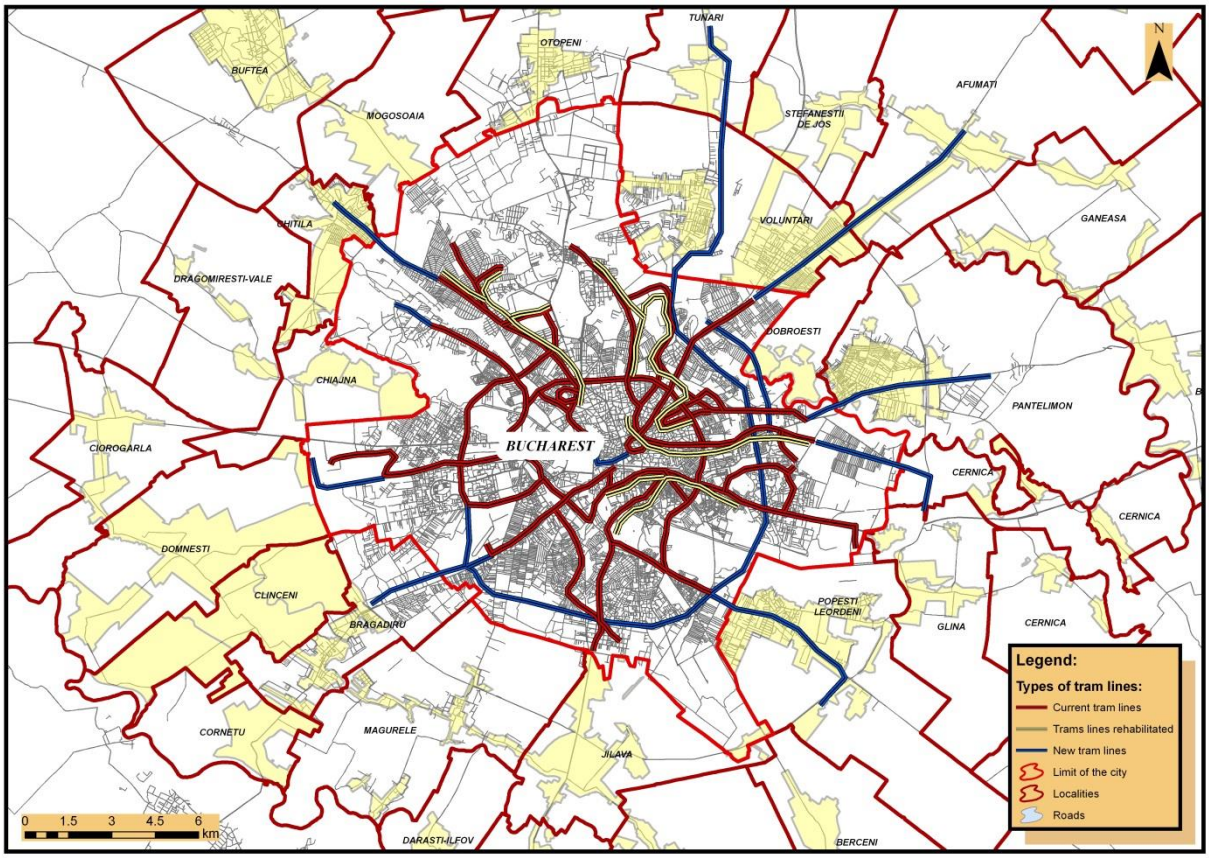
Roads network in the metropolitan area of București is now developed and complex as it combines in the same infrastructure the great transit (ring road), convergent movements of capital and internal displacements in this area. There are, however, real failures related to the current capacity of the axes of communication, operation and their management (Cepoiu, 2009).

It is important to note a number of measures that regional administrations provide in between 2014-2020 on improving and expanding public transport network that provides connections between București and its metropolitan area and inside them. The Romanian Railway Company proposes to modernize the railway belt of the capital and several railway stations, along with the achievement of intermodal connections. Also, there are plans for modernization and expansion of the railway network in the capital city and the development of existing passenger transport network in the metropolitan area. There are currently new lines of railway project that will connect the capital with a number of towns and situated close to it, including Domnești or Căciulați.

From an organizational point of view, there is a “partnership” between the representatives of the București City Hall and the members of the Ilfov County Council regarding the common infrastructure projects in terms of road, railway/subway issues, the creation of intermodal points to increase accessibility for the population and goods, but also concerning the new proposals related to the alternative transport (extension of the bike lanes).

To this respect, we can mention the integrated territorial investments projects for București and its metropolitan area: extensions of the public transport lines from București to the towns in Ilfov County (extension of the tram lines from București to Tunari, Voluntari, Afumaţi, Gara Popeşti-Leordeni, Bragadiru) (Map 29).

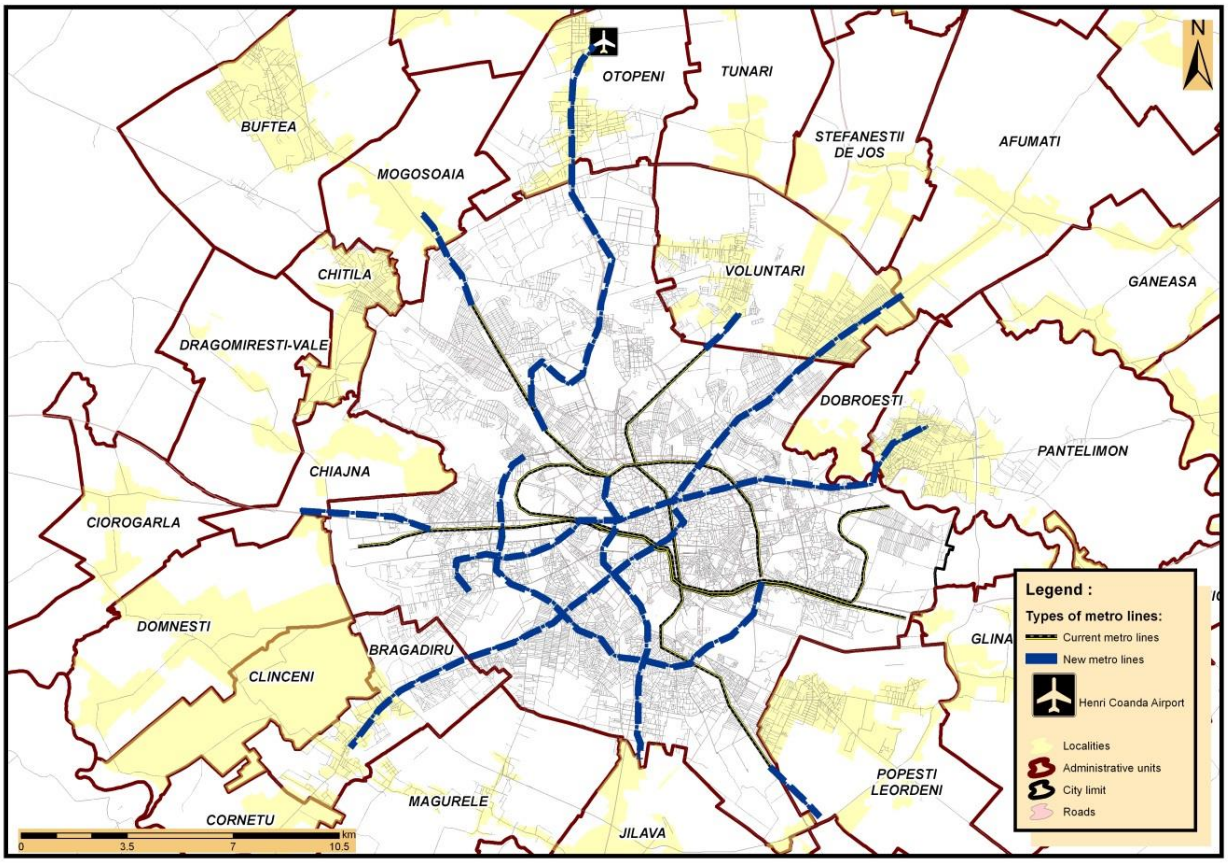
Map 29 Tram lines network in București and their extension to the metropolitan area



(Source: București City Hall - Mobility Department)

The extension of the metro network is proposed for București to Otopeni, Mogoşoaia-Buftea, Pipera - CF Bucureşti – Constanţa şi Berceni – Popeşti –Leordeni) (The Development Strategy for Ilfov County - "Horizon 2020", 2013). There is also the option that the metro lines linking București and the town in Ilfov County would be built to the surface as they generate lower investments costs (Map 30).

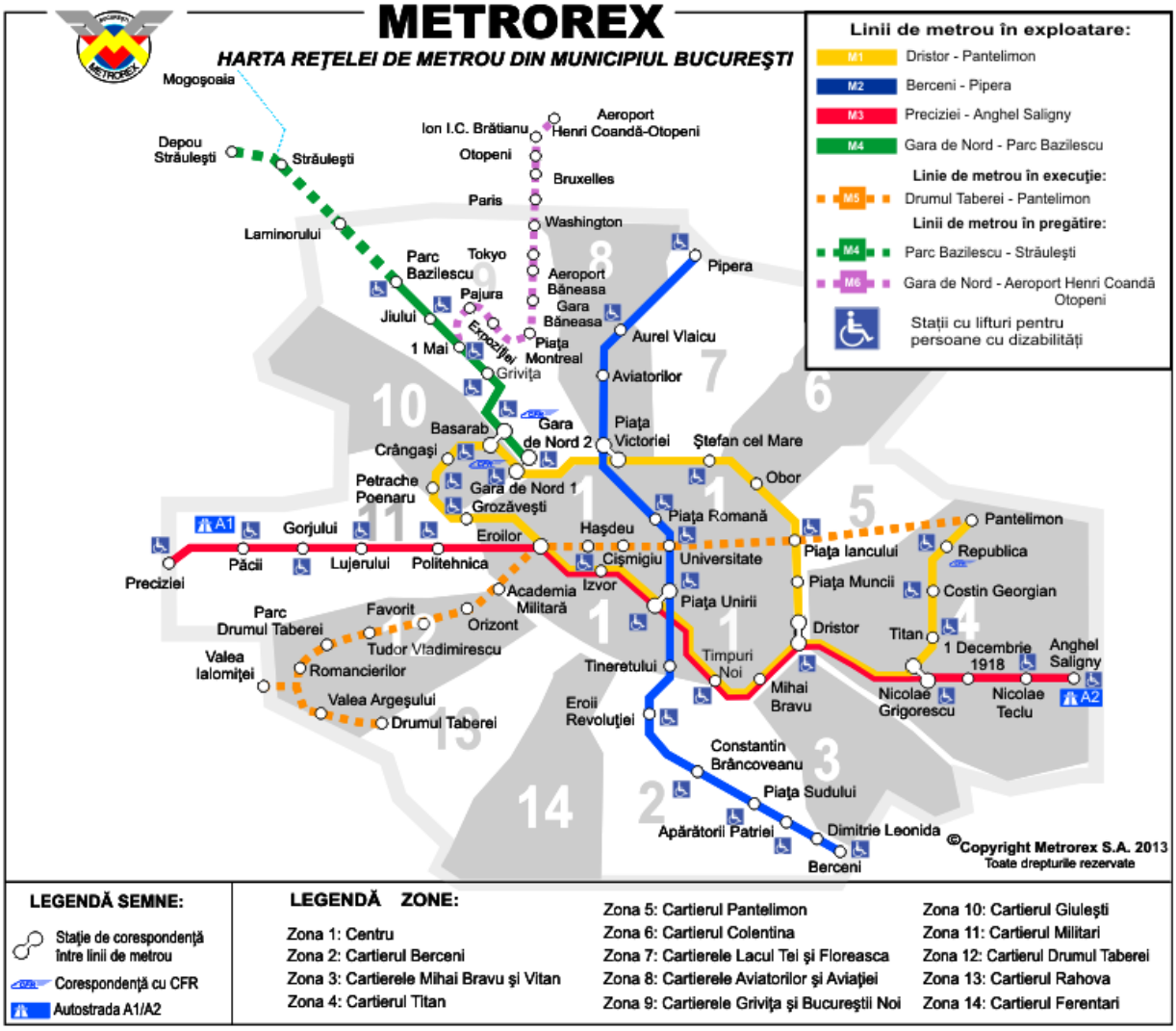
Map 30 Metro lines network in București and their extensions to the metropolitan area



(Source: București City Hall- Mobility Department)

Besides the surface transport network, there are 4 main metro lines that have been built during the 70's and 80's. Extensions of the already build network have been made between the 90's and the beginning of 2011. The fifth metro line is under construction and will link the south-western part of București to the south-eastern one. It will have 6.5 km in length and will offer a mean of transport for more than 300 000 persons living in overcrowded west neighbourhoods built in the communist era, facilitating the accessibility to the city center of the capital.

Map 31 Underground transport network



(Source: http://www.metrorex.ro/Resurse/Harta/harta.png)

The fleet of vehicles per operator and passenger movement change

The total number of vehicles in use is 2142 out of which 507 trams, 302 trolleybuses and 1333 buses (www.ratb.ro/statistici.php). The underground public transport system summarizes 44 trains type “Bomber”, built between 2002 and 2008, and 33 trains type Astra ÏVA, built between 1976 and 1992. (www.metrorex.ro)

Table 29 Public transport of passengers per year for metro				
	2008	**2009**	**2010**	**2011**
Passengers (thousands)	182.129	170.888	174.670	170.525
(Source: Annual Report, 2011 – www.metrorex.ro)				

Accessibility to basic urban functions and services

The accessibility to hospitals has been calculated from the location of the hospitals referred to public transport network in order to calculate the distance traveled by the population who seek for medical (mean of calculation also used and applied by Naphtali, 2006). Some hospitals have been selected in the idea of showing the accessibility to hospitals also of the population that lives outside București and that seeks for medical services of the unique hospitals at national level (eg. Emergency Hospital for Plastic Surgery and Burns) or of the hospitals that have modern equipment or a high professional quality of the doctors (București is the most important medical centre in Romania).

The analysis shows that the majority of the hospitals in București are accessible to the population, especially those on the central and east-western axis and this is because they are connected to more types of means of transport. (Map 32)

The hospitals that show a medium accessibility are generally situated on the city's eastern border (e.g. Fundeni hospital) and the southern one (Bagdasar Arseni hospital), characterized by a lower density of the means of transport (maximum two types of transport or the absence of the metro). Therewith, the location of the hospitals at the extremities of the city implies also a lower accessibility if the patients come from the opposite side of the city, even if they are using their own car (due to the heavy traffic). Nevertheless, these hospitals have the advantage to be more accessible for the patients coming from the towns next to the capital.

Accessibility to grocery services

The number of rides of the public means of transport has been taken into consideration, as well as the length of the public transport network in order to represent the time spent to get to grocery services in the municipality of București. The representation had as a basis the difference in measure considering the usable surface occupied by the grocery services. The disposal of the grocery stores shows an uniform repartition at the city level, with a more dense concentration on the east-west axis and in the central area (Map 33). By analysing the accessibility to the grocery services, it can be observed that the most accessible are those in the city centre due to the fact that here we can see the convergence of the means of public

transport, both on the surface and in the underground. In the northern part, there is a second commercial area characterized by a high accessibility.

Also there are areas with a medium accessibility and a little bit higher in the northern and south-western part of the city, these areas having access to more means of public transport. In the case of the commercial areas in the western part of the city, there is a low accessibility due to the fact there is only one main access road from the western periphery to the capital centre (Iuliu Maniu Boulevard). At the bottom of the public road in the western part of the capital there is a very intense circulated motorway, fact that causes a heavy traffic in the area. The western axis of the city is on one side crowded due to the daily commuting and on the other side, due to the existence of the motorway that determines a lot of persons from outside the city to transit the area. It is also important to notice the fact that one of the commercial complexes in the western part of București is situated outside the administrative area of the city and it is used as a source of supplies for the population of the București western neighbourhood Militari, but also for the population that lives in the town next to București. It can be mentioned also the fact that for a better accessibility to the big commercial areas, in the city or those in its peripheral area, the surface public transport network has been extended. Some of the commercial centres assure free transport with microbuses at the neighbourhood level in order to improve the population accessibility to the grocery services.

Accessibility to airports

Even if the accessibility may be measured in various ways, distance was used to measure the accessibility to the airports.

Accessibility to the Otopeni airport was underlined by taking into account the two express lines that start from the city centre, namely the North Railway Station. The express line has 6 stops in the first half of the track and then there is no stop until the airport. The frequency of the express during the day is at every 20 minutes. To insure a better traffic on the city-airport segment, it was also decided to have night trips at every 40 minutes. An express trip lasts in general 45 minutes, especially if it is considered that it passes over a big part of the city and other intersections in the north part of the city (with an intense circulation). Some traffic depletion measures have been taken (e.g. the build of the Baneasa passageway in the north part of the city) that allowed a traffic reflow. (Map 34)

By analysing map 34, it can be seen that the highest accessibility is for the inhabitants from the central part of the city. For the inhabitants living in other parts of the city, the accessibility is more reduced because they have to use an extra mean of transport to get to the express

station. On the map, we can observe also other lines of public transport to indicate the options that can assure the access of the persons living in other parts of the capital to the express line stations.

Accessibility to universities

The representation of the university centers from the capital city has been realized taking into consideration the place of the university at the city level. The biggest universities in București have been placed in the central area of the city or in its first ring, due to their historical location. The central position inside the city has the advantage of a good accessibility to multiple means of transport. (Map 35)

One exception in given by the Physics Faculty of the University of București that has its location in Magurele City ,in the south-western part of București. Its location in another administrative unit determines a ticklish accessibility, on one side because of the long distances and on the other side the lack of the public transport at the south-western part of București to Magurele city (for the moment, only private companies are operating on the route).

Starting with the 90's, also private universities have been created and their location in the territory was established in function of the available spaces that could be bought. If some private universities succeeded in having all their buildings in the same place, situation favoured also by a limited number of specialties (ex. Economic and Law profile: Romanian-American University), other universities with more specialties have also more locations at the city level (e.g. Spiru Haret University).

For the universities that have their buildings outside the central area, the public means of transport assure a good accessibility. Even for the universities in the peripheral areas of the capital, the accessibility is good (e.g. in the eastern part of the city there is a metro line that goes until the city's eastern administrative limit).

Accessibility to industrial zones

București had a special development of the industrial sector, being until the beginning of the 90's, a city with a high industrial productivity. This fact explains the big number of industrial areas at the city level, one of them being inside the city, due to the fact that at the moment when it was built, it was situated at external limit of the built-up area. As a consequence of the important territorial expansion of the city, the oldest industrial areas have been absorbed by the city. (Map 36)

The accessibility map to the industrial areas shows a high degree of accessibility, even for those at the city's periphery. The industrial areas are well connected from the public transport point of view due to the fact that before the 90's a great number of people was working in these industrial units and the communist regime facilitated the access of the employees to the working place. In that direction, it can be mentioned the fact that the first metro line opened to the public, was the area Semanatoarea-Eroilor that connected to the Semanatoarea industrial unit. Subsequently, the link to the Timpuri Noi industrial area was build.

It can be observed that most of the industrial areas are situated on the first circulation ring or next to some intermodal hubs (e.g. Obor industrial area where tram, bus, trolley and metro lines are converging). The industrial areas situated on the peripheral zone of the capital are linked through radial axis and also through the metro.

Accessibility to compulsory schools

There is a high and very high accessibility to compulsory schools in București as a consequence of their big number and their compact grouping in the neighbourhoods. (Map 37)

If in the case of compulsory schools, the subscription to the neighbourhood schools criteria has to be respected. Concerning the high school admission, the students' distribution is made in function of the grade taken at the graduation exam (given at the end of the eighth grade). In the same time, there are some situations when the students choose high schools from outside the city in order to attend a prestigious high school. This situation implies also a longer route if the high school is not in the same neighbourhood.

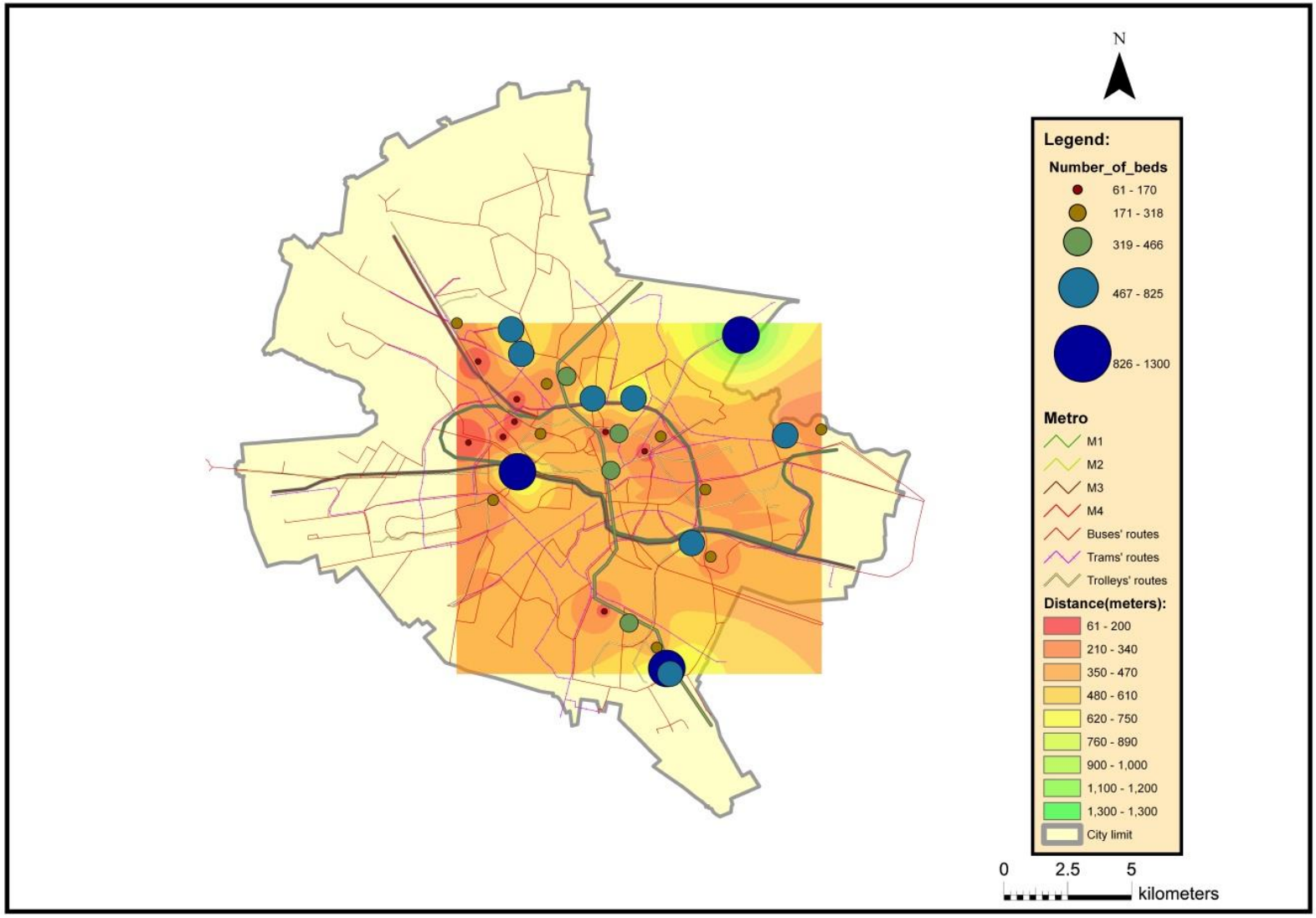
Accessibility to parks

The accessibility to parks is high due to the big number of parks and their uniform repartition at București level (fig.). By analysing the parks accessibility map, it can be observed that the southern and western parts of the capital have a lower density in terms of parks. In the same time , the city's north and the central part have larger surfaces with parks because here are some of the oldest landscaped parks in București (e.g. Cismigiu Garden) or parks with extended surfaces (e.g. Herastrau park) (Map 38).

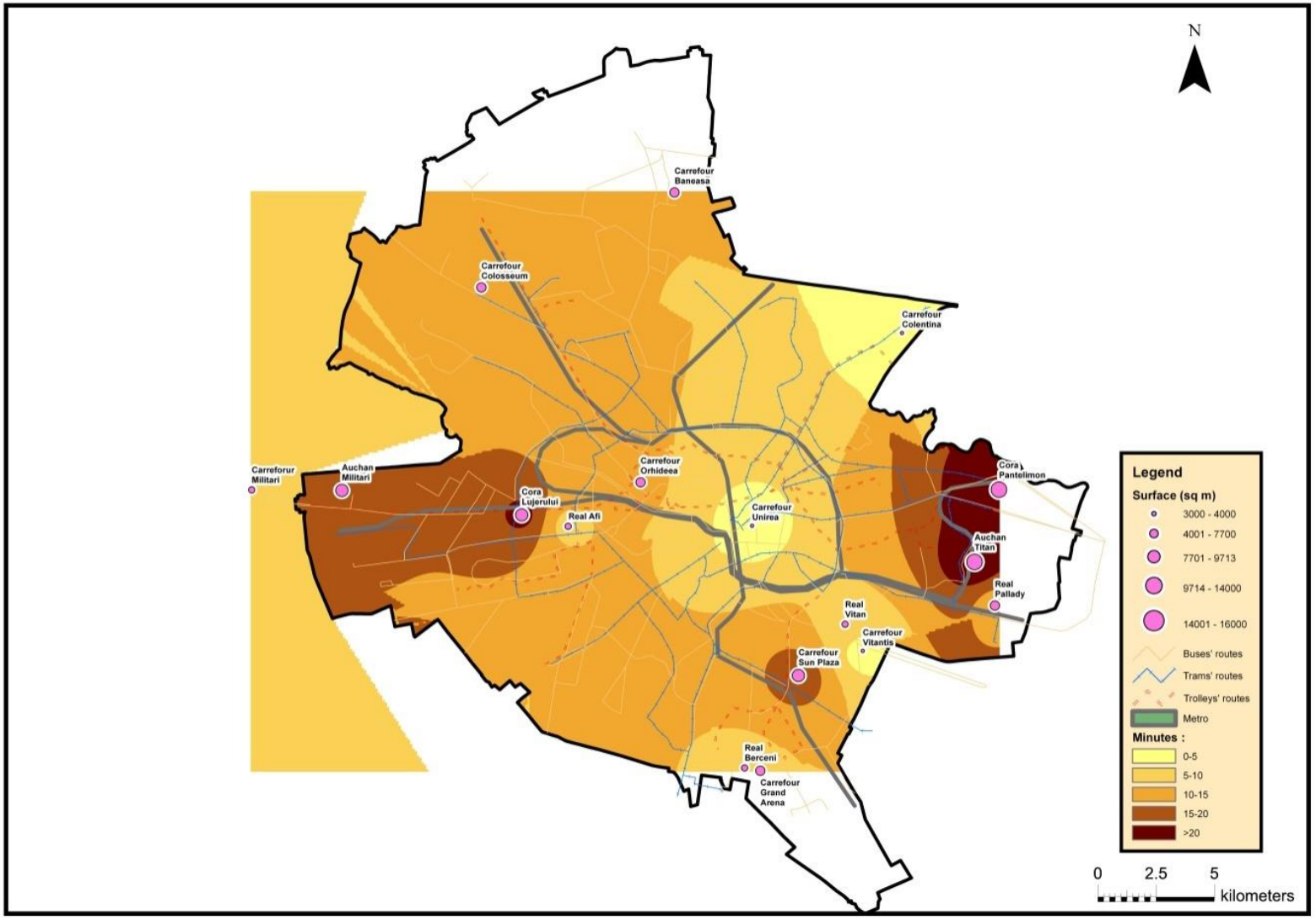
Even if many parks are situated at the district's periphery, they have a really good accessibility due to the existence of many entrances. Therewith, they have a good degree of accessibility at the district level because they are served by public transport means. The

parks that have a larger surface also serve various neighbourhoods (e.g. Tineretului Park serves Timpuri Noi and Eroii Revolutiei neighbourhoods; Herastrau park serves Primaverii, Floreasca, Aurel Vlaicu, Nicolae Titulescu neighbourhoods).

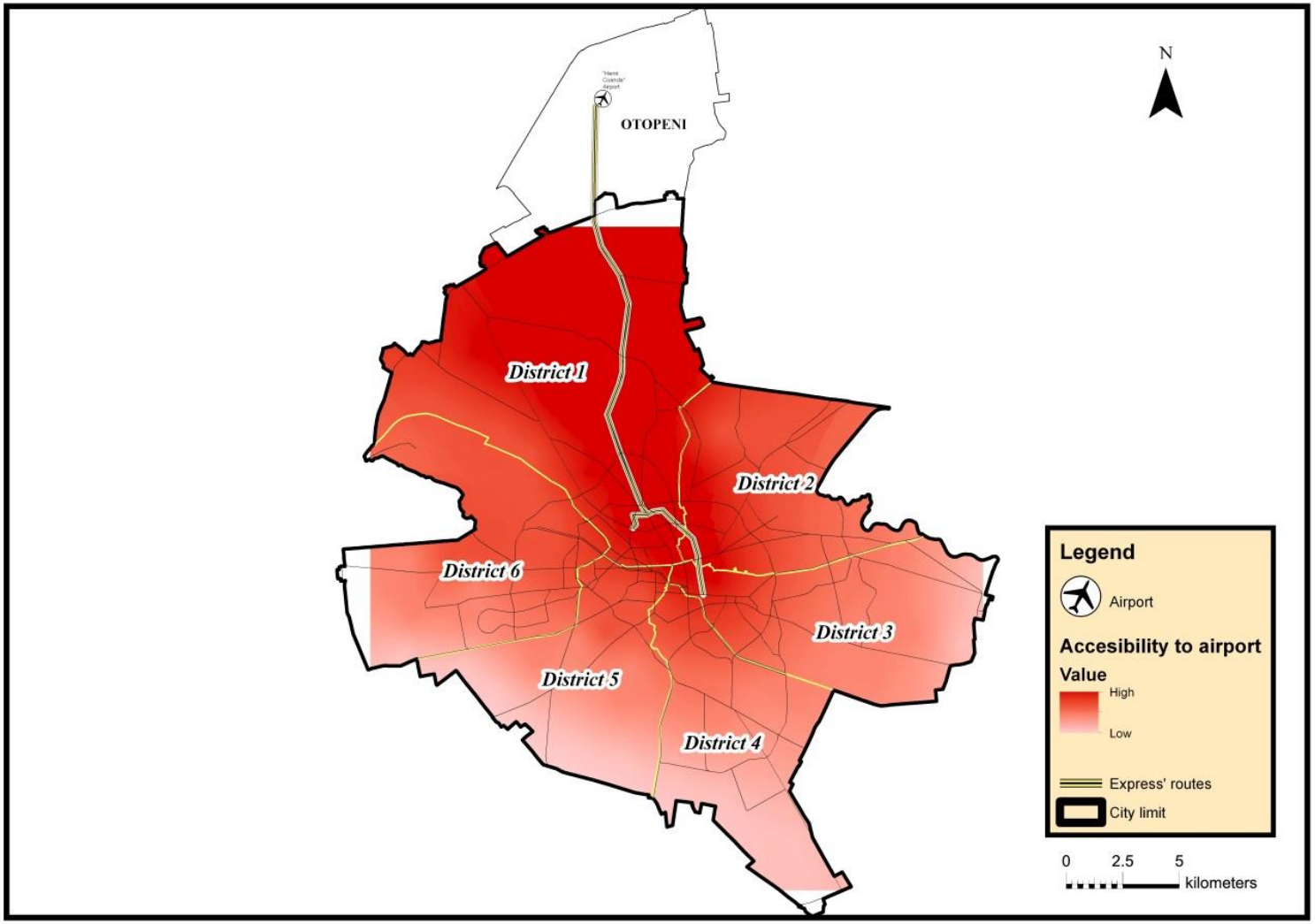
Map 32 Accessibility to hospitals (by CICADIT)



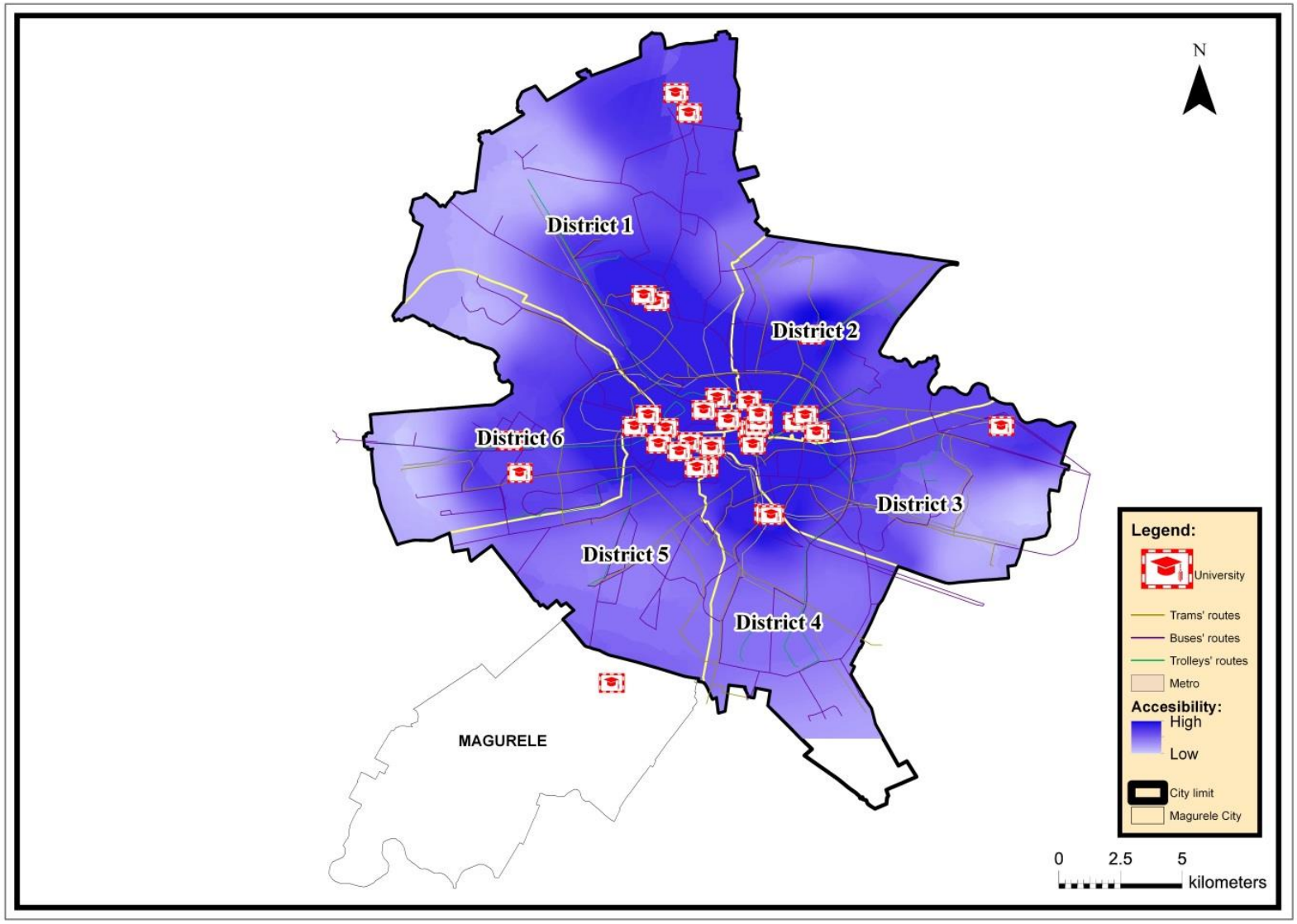
Map 33 Accessibility to grocery services in București (by CICADIT)



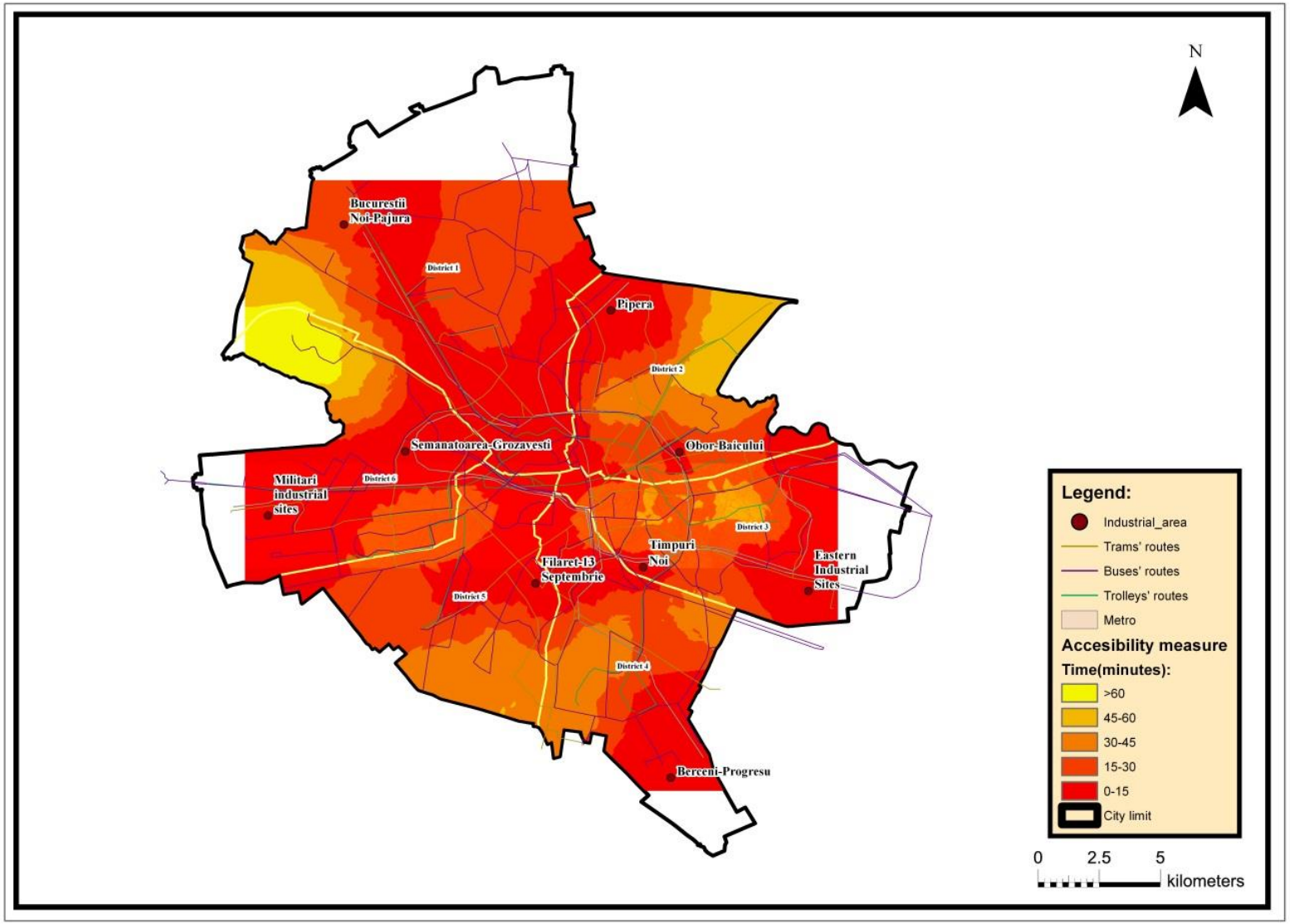
Map 34 Accesibility to „Henri Coanda" Otopeni airport (by CICADIT)



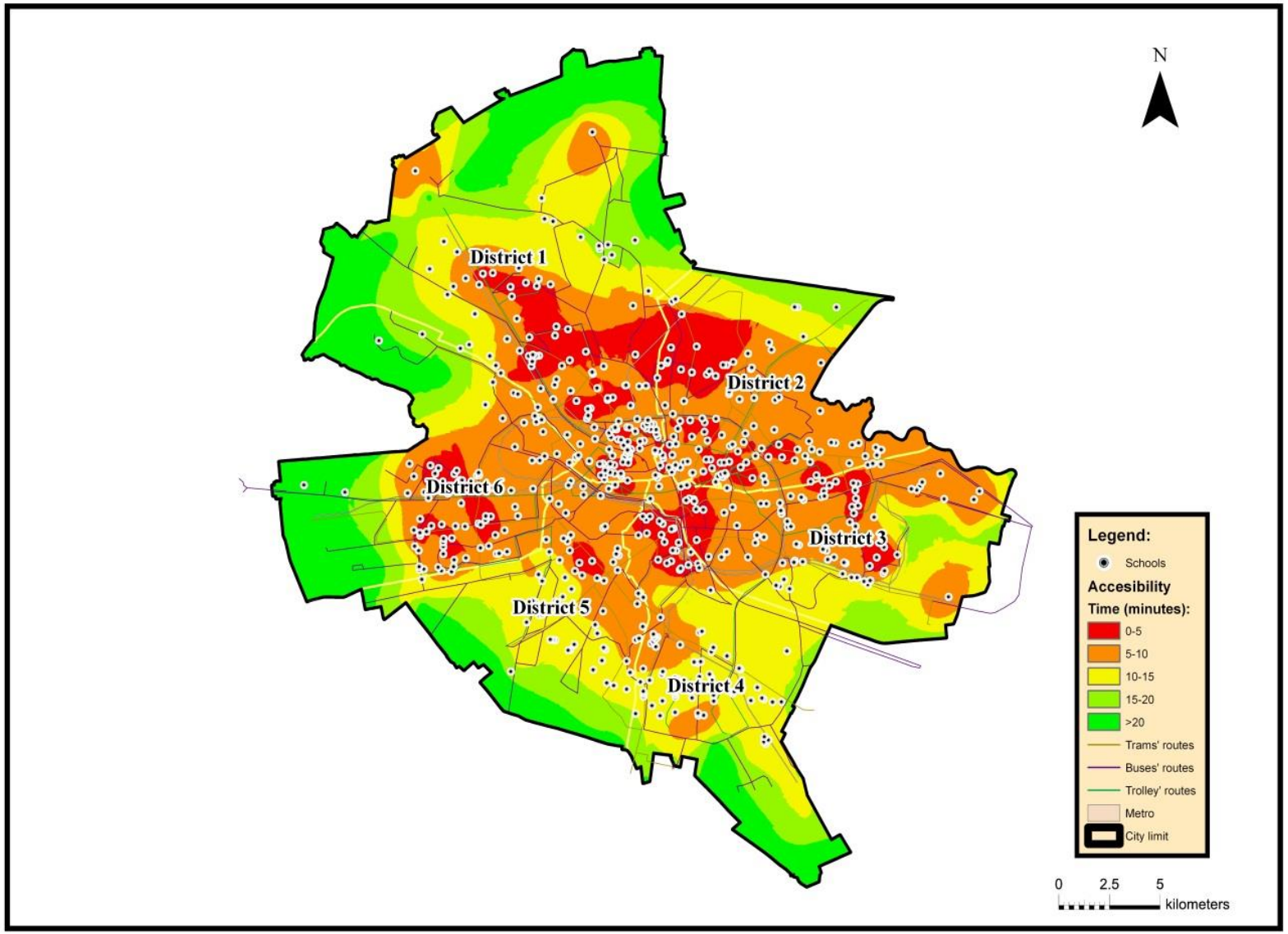
Map 35 Accessibility to universities - București municipality (by CICADIT)



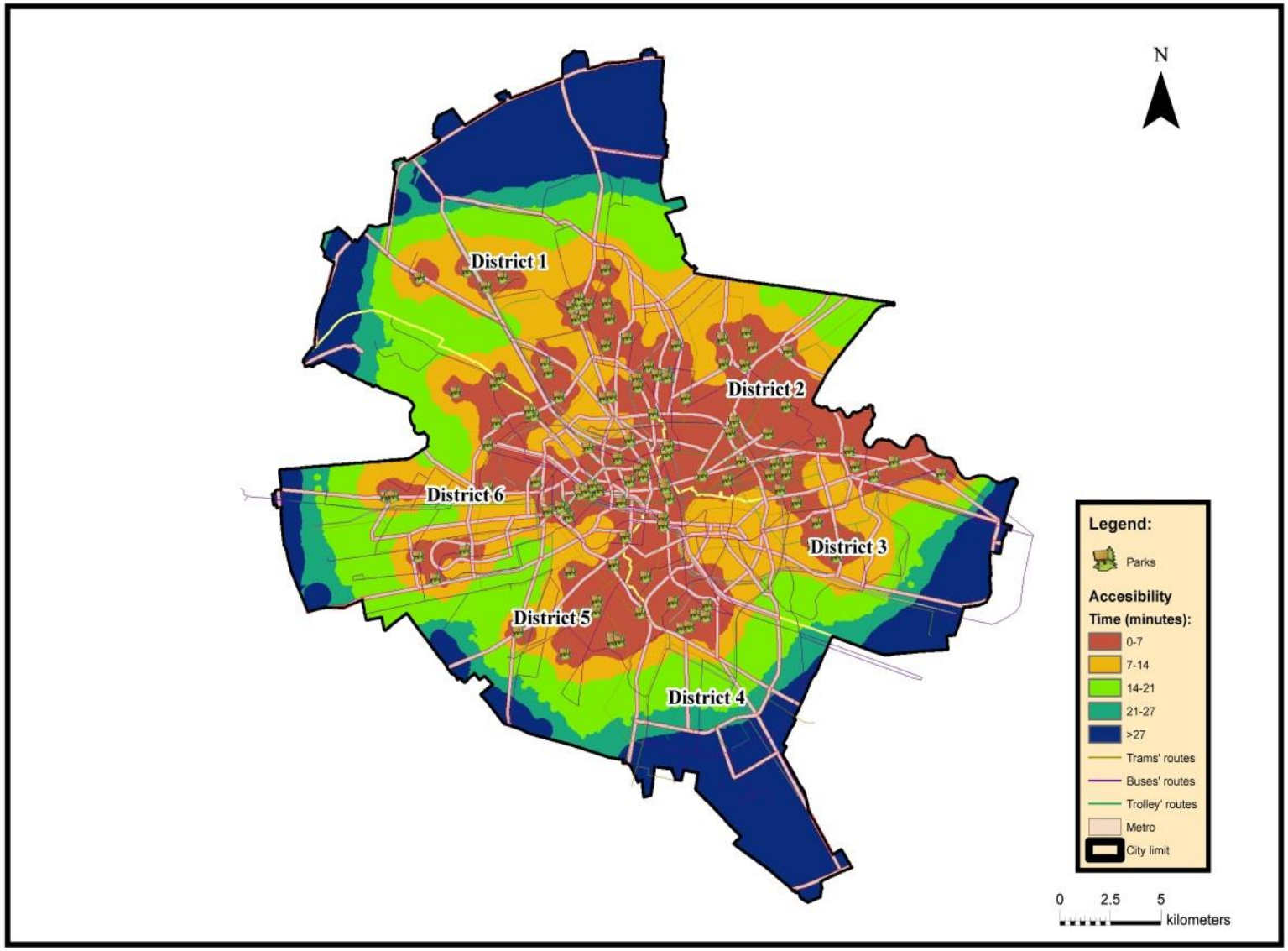
Map 36 Accessibility to industrial zones - București municipality (by CICADIT)



Map 37 Accessibility to compulsory schools (by CICADIT)



Map 38 Accessibility to parks (by CICADIT)



Existing transport policy and planning

According to "*The Plan for the Sustainable Development of București Municipality 2009-2012*"[2] the city struggles with an overcrowded road system, "tending to reach its limits" (pp. 24). The development of traffic intensity after 1990, as a result of the increase in terms of incomes, quality of life, and time and comfort of travel by private car, caused the overloading of the existent infrastructure. In terms of public transport, the document mentioned above stipulates the fallowing strategies: (1) promoting the integrated use of the multiple transport modes; (2) rehabilitation and modernization of the transport infrastructure (tram lines, depot, GPS systems, roadway); (3) protecting and revitalizing the historical area of the city centre; (4) progressive and fazed increase of traffic capacity of the arteries; (5) increase connectivity to the motorway; (6) completion of the Basarab Overpass; development of a global strategy to create parking spaces. Additional to these strategies the Plan of Sustainable Development of București Municipality envisages improving the general road network by progressively increasing the traffic capacity of the roads in relation to traffic growth (widening the roads and construct passages). Finally, in the perspective of a sustainable development of the transport network the same document foresees to improve the general supply of the public transport system connecting București to its Metropolitan Region by using an efficient intermodal network, a strategy that is still lagging behind.

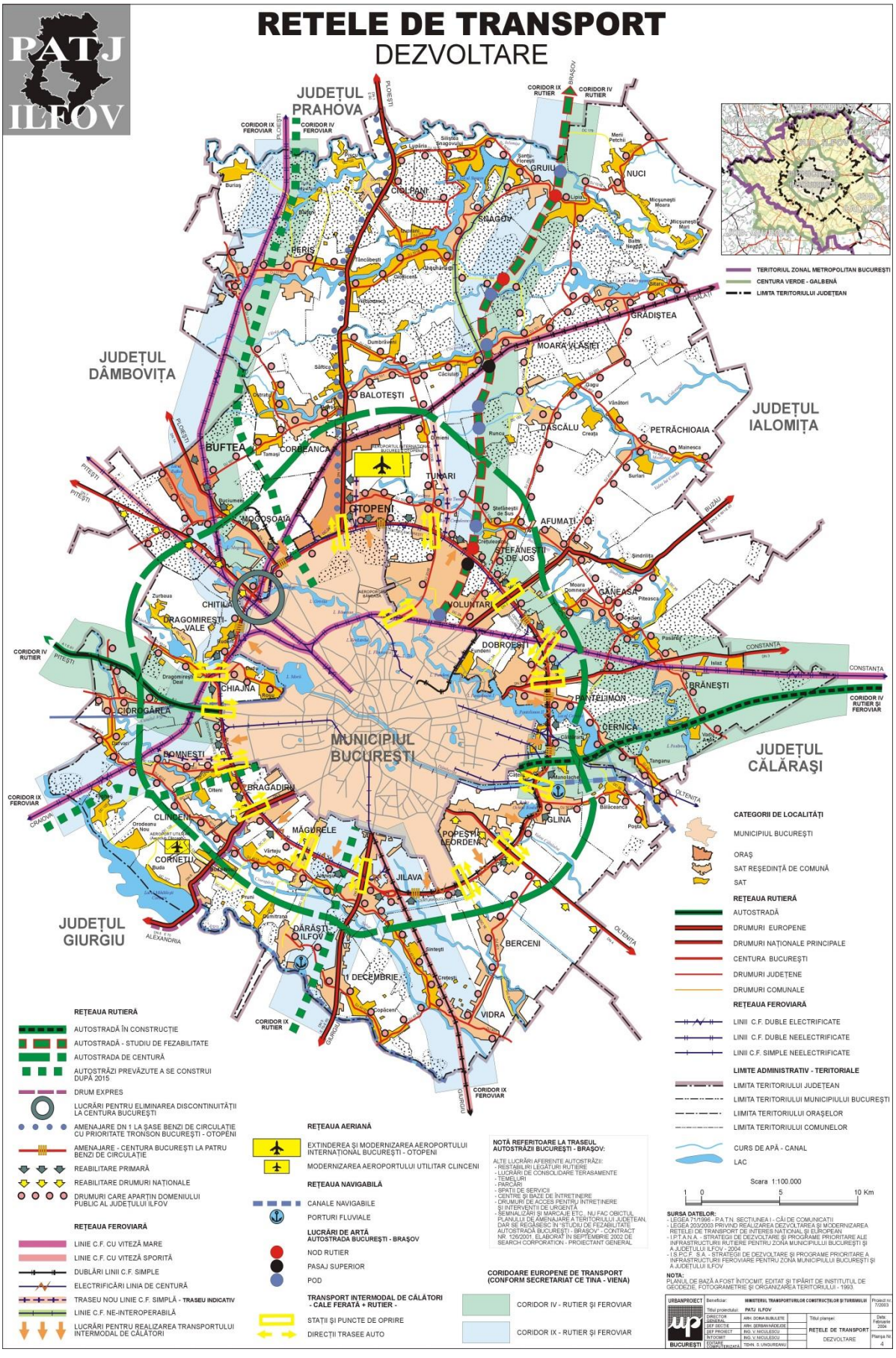
The Spatial Development Plan for the Ilfov Conty[3] (2004) has as priority the improvement of the road infrastructure and the traffic conditions aiming to reach European standards. In the same time, intermodal railway-minibus networks are proposed and they should ensure a better accessibility to points of interest and a better connectivity between Ilfov and București.

An important aspect of transport network development is the completion of the Arges-Danube Chanel offering the county and the entire region possibility of a navigable river with all its countries, considering that the Danube is part of the pan-European transport corridor.

[2] Planul de Dezvoltarea Durabila a Municipiului București 2009-2012, http://www.pmb.ro/primarul/prioritati_proiecte/program_dezvoltare_2009_2012/docs/Plan_strategie_2009-2012.pdf

[3] Planul de Amenajare Teritoriala a Judetului Ilfov, 2004 http://www.mdlpl.ro/_documente/dezvoltare_teritoriala/amenajarea_teritoriului/patj_ilfov2/Memoriu%20Etapa%20II.pdf

Map 39 Transport network in Ilfov County - Development (2004)



(Source: Plan de Amenajare a Teritoriului Judeţean Ilfov[4])

The București-Ilfov region will be crossed by to Pan European Corridors: (1) Corridor IV (Berlin – Nümberg – Praga – Budapesta – Bucureşti – Constanţa – Salonic – Istanbul); (2) Corridor IX (Helsinki – S. Petersburg – Moscova – Pskov – Kiev – Liubashevska – Chişinău – Bucureşti – Dimitrovgrad – Alexandropolis) (Regional Development Plan București-Ilfov 2007-2013, published in 2006) [5]

2.1.4 Environment

Environmental protection and reducing the risks from climate change are key objectives of the EU policy. They underpin the concept of sustainable development – fundamental policy goal in the Europe 2020 Strategy which suggests that economic growth (smart), social cohesion (inclusive) and environmental protection (low carbon economy) should go hand in hand and complement one another. Also, a new Environment Action Program for the EU, entitled Living well, within the limits of our planet, proposes to enhance Europe`s ecological resilience and transform the EU into an inclusive and sustainable green economy. This target will be implemented through the protection of natural capital, encouraging more resource efficiency and accelerating the transition to the low-carbon economy.

In urban areas the environmental, economic and social dimensions strongly overlap. Big cities face similar environmental problems such as poor air quality, high levels of noise, congestion, urban sprawl, waste and waste-waters generation, low efficiency in using resources etc.

Research has shown that Greece, Bulgaria and the South and South Eastern part of Romania are among the EU regions with a high climate change vulnerability index (see The climate change challenge for European regions, DG Regio, 2009). According to the latest Eurostat data (Energy, transport and environment indicators, 2012), the three countries continue to demonstrate poor results in the field of waste management. The Espon Climate (2011) project shows further that the metropolitan regions in Bulgaria, Romania and Greece lag behind the most EU capitals in terms of adaptive capacity to climate change. The overall adaptive capacity for the three metropolitan regions measured as a combination of economic

[4] http://www.mie.ro/_documente/dezvoltare_teritoriala/amenajarea_teritoriului/patj_ilfov2/Planse/4.jpg

[5] http://www.regioadrbi.ro/media/6779/Planul%20de%20Dezvoltare%20Regionala%20București-Ilfov%202007-2013.pdf

capacity, infrastructural capacity, technological capacity, knowledge and awareness and institutional capacity, is evaluated as a low one.

Methodology and indicators

For the analyses, the set of indicators was extracted from the national reports dated in 2010, the most recent year in which complete data bases of all the required indicators for București–Ilfov and Sud-Muntenia Development Regions and their administrative units could be established. The data is specific for the NUTS 3 and NUTS 2 levels, for few indicators (waste volume per capita, the cover of the sewage system, agricultural surfaces, and arable surfaces) the data is specific for LAU2 (the county level).

For all the indicators, there is data available for the period between 2004 – 2010 specific for NUTS 2 and NUTS 3 levels in the București–Ilfov Development Region.

Specific characteristics of the Metropolitan Region of București related to environmental issues

The metropolitan region of București represents the high antrophic area from Romania. It overlaps the south-central part of the Romanian Plain and its characteristics are:

- The existence of loess and alluvial deposits which are restricting the major infrastructure projects; these deposits have a role in loading the breathing air and surface waters with an important amount of particulate matters;
- High seismic risk, emphasized by the large number of socio-economic objectives exposed to earthquakes of VIII degrees MSK (the 6 degree Richter quakes frequency is 10 years, 20 years for the 7 degree Richter quakes, 50 years for 8 degree Richter quakes and 200 – 300 years for the 9 degree Richter quakes) (IGAR,2010);
- Low altitudes of 50-150 m, the surfaces being generally flat, proper for different types of human insertions;
- Continental climate (9.8^{o}C – 11.2^{o} C annual average temperature, annual rainfall of 500 – 600 mm), with the tendency of pass from four seasons to two season (a droughty and very hot season in which the heat island effect in București has increasing trends and a cold season, in which the continental influences from north-east are frequent);
- Small depth of ground waters, increasing their pollution exposure, but also issues regarding different socio-economic objectives (including agriculture land);

- High transformation level of the water courses (Dâmboviţa, Argeş, Colentina and Ialomiţa rivers), meant to decrease their threats (especially flooding risks) and to use them (fisheries, irrigation, recreation and other economic and social utilities);
- High level of anthropic transformation of nemoral and steppe ecosystems and also azonal ecosystems (especially wetlands), characterized by a very low naturalness degree and small surfaces;
- Small amount of aquatic surfaces (4.9%) and forest land (10.5%) (Iojă, 2008).

Agriculture lands are the main land use (76.8%), built surfaces representing 4.65% from the entire territory. The resident population inside the study area counts 566,700 inhabitants. The average density of the population is 111.5 inhabitants/km^2 (Rey, Groza, Ianoş & Pătroescu, 2007), with a large territorial variation [range = 21 – 1110; ±155].

The economic structure of the metropolitan area is dominated by industrial and tertiary activities from București, the most developed city in Romania (21.7% of the national GDP), and from localities situated in its proximity (Nae and Turnock, 2011a). Agriculture is an important aspect of the landscape, lately influenced by abandonment, excessive fragmentation of private properties (Andrusz, Harloe and Szelenyi, 1996), and particularly its largely subsistence character (Iojă et al., 2007).

Integrated environmental assessment of București and its metropolitan region

Water, waste

Water used per capita (l/h/day)

Water represents a key resource in the metropolitan area of București, representing a support for life and economic activities and also being a receiver and mean of transfer of the environment externalities generated by the human society.

The Development Region București–Ilfov has estimated water resources of 818 million m^3, and for use is 570 million m^3 (43% are underground water).

The Development Region București–Ilfov is characterized by the highest water volumes used at a national level (3440.64 m^3 per capita/year in comparison with 321.9 per capita/year at a national level and 481.69 per capita/year in Sud-Muntenia Development Region). The high values from Ilfov county (16479.86 m^3 per capita/year) are explained by the fact that they provide water for over 1200 uses, the most important quantities being used by București city, lakes (including fisheries) and big industrial units from București (DOOSAN-IMGB, CET South, CET Grivița, ISOVOLTA, RATB, FAUR).

The dependency on hard renewable water resources (deep and medium depth underground waters) is lower in Sud-Muntenia development region (9.58%) and much higher in București–Ilfov development region (44.65%, for București only 59.4%). At national level the hard renewable water resources dependency has a value of 20%, the values from Development Region București–Ilfov showing the unsustainable way of water resources exploitation from this area.

This reality is also explained by the fact that 40% from the underground water collected in București are used in industrial activities (21.2% in București–Ilfov Development Region).

From this water volumes, 151.3 m^3 per capita per year in București–Ilfov Development Region (151.9 m^3 per capita per year in București and 53.3 m^3 per capita per year in Sud-Muntenia Development Region) are provided through the public network of water supply. It represents an average consumption of 416.6 liters per capita per day in București–Ilfov Development Region (416.3 liters per capita per day in București) in comparison with 146 liters per capita per day in the Sud-Muntenia Development Region.

From the water volumes spread in the public network, in București-Ilfov Development Region 43.4% are used in residential purpose (compared with 62% in Ilfov county), and 12.4 % for the industrial sector (3.04 % in Ilfov county). 41% of the water volumes distributed in București–Ilfov Development Region are lost because of the bad maintenance of the water distribution infrastructure.

The maximum amount of people who benefit from the water providing network is recorded in București (88.27% of the total population), much higher than the amount recorded in Ilfov county (19.28%) and the Sud-Muntenia Development Region (34.46%). The trends lead to an extension of these networks, especially in the areas where the pollution of the ground waters with low depth is a defining process.

Table 30 Consumption of water (cubic meters per year) per inhabitant

	1989_1993	1994_1998	1999_2002	2003_2006	2007_2009
Stockholm		157,6			131,8
Lisbon	91,4	98,4		123,1	122,0
Roma		124,9	146,6	120,4	120,6
Madrid	173,0	84,7	83,6	79,6	90,9
Luxembourg	100,3	85,6	95,5	102,1	80,5
Vienna	91,3	85,1	83,6	78,6	79,9
Bratislava	162,7	122,1	106,5		79,2
Brussels	62,2	61,0	70,4	61,3	56,4
Berlin	78,2	62,6	45,3	59,5	54,0
Warsaw	120,6	104,3	81,6	56,0	49,7
Riga			89,0	100,0	0,1

Sofia			119,3	125,4
Paris				97,6
Helsinki			95,4	76,4
Copenhagen			66,1	63,6
Vilnius	155,7	96,0	60,0	60,5
Athens				57,6
Tallinn		117,7	58,4	56,2
București	174,5	164,0		55,2
Amsterdam			125,5	
Budapest	151,9	104,9	91,4	
Ljubljana	118,2	97,9	86,7	
Istanbul			85,3	
Prague	121,4	88,9	78,8	
Nicosia	38,5	47,3	49,2	
Valletta	124,3			
Dublin			n/a	
London			n/a	
Zagreb			n/a	
				Source: Eurostat Database

Share of population served by public sewage (%)

The high rate cover with sewage system is recorded in București (94.89% of the total population), only 1.73% of the population not having access to any type of sewage. In Ilfov County, the situation changes significantly, only 10.96% of the population having access to the sewage system (some of the county's settlements being connected at the București sewage system).

The total length of the sewage network in the București–Ilfov Development Region is 1874 km, most of this length being recorded in București city.

Most of the administrative units from Ilfov County have fewer than 5% rate of persons connected to the sewage system. In the Sud-Muntenia Development Region, the situation is similar, just in the big urban places there are more than 50% of the population connected to a sewage system. In the rural places, the average values are below 5%. The general trend is to increase the cover of sewage system access, by accessing funds through EU projects.

Share of population served by UWWTP (%)

1.92 million inhabitants within București and from the 7 municipalities partially connected to the București sewage system do not benefit from a waste water treatment plant (UWWTP). The situation is also similar in the other settlements which have a sewage system from Ilfov County, except for Buftea town which has a *WWTP* based on mechanical and biological treatment (covering less than 1% from the regions' population). In the Sud-Muntenia development region, the population who is connected to a *WWTP* is not exceeding in any county more than 0.5% from the total population. The isolated presence of the *WWTP* functioning based on biological treatment, is linked with some financed European projects for small and medium sized communities.

The situation changes from 2013 when the deadlines for the construction of the *UWWTP* have to be met for București, Ploiești and other administrative units.

Percentage of treated waste water (%, at least with secondary treatment)

In București–Ilfov Development Region the amount of waste waters volumes are very high (417.941 million m^3 by București only), mainly resulted from the residential activities and industry. The waste waters are untreated, București waste water treatment plant is about to be completed. In the other settlements in the București–Ilfov Development Region the situation is similar, the existing waste water treatment plants are either technological overpassed or in different stages of rehabilitation.

Most of the economical agents from the industry and stock rising sector are holding waste water treatment plants based on mechanical treatment (some of them using biological treatment). Even so the waste water volume which benefits from treatment is below 0.5%. The situation is similar in Sud-Muntenia Development Region, where 0.68% of the residential waste waters benefits from at least secondary treatment. In Giurgiu County, from the 10 waste water treatment plants, 6 are based only on mechanical treatment.

The discharged of untreated or insufficient treated waste waters leads to the existence of some critical areas from an environmental point of view, examples in this direction being the water courses of Dâmbovița and Argeș rivers downstream București. The low quality of the water influences peoples' health and also influences the attractiveness of the landscape, leading to social segregated areas.

Collected annual waste amount (tons)

The increased density of population and economic activities, as well as high living standards determine increased urban, industrial and agricultural waste quantities.

In București city, approximately 1.67 million tons urban wastes per year are produced, almost 42% being deposited on landfills. From this amount, 708 920 tons per year come from households, their composition being predominantly represented by biodegradable matter (39.68%), inert matter (11.2%), paper (8.4%), glass (8.5%) and metallic products (4.5%). The daily producing index for household waste is 1.2 kg/inhabitant, which is a higher value than the one of the other urban (0.8-0.9 kg/inhabitant) and rural areas (0.3-0.4 kg/inhabitant) areas in Romania.

In Ilfov County, total waste amount deposited in landfill is 76 800 tons/year, daily producing index for household waste being 0.6 kg/inhabitants.

In Development Region București Ilfov, the selective collection determined a significant increase of the recovered materials. Thereby, in 2010, 24.6 tons of PET material, 139 tons of paper, 6 400 tons of DEEE, 20905 tons de batteries, 3 932 tone de tiers is 195 893 tons of waste oil have been recycled.

In the Sud-Muntenia Developing Region, the annual waste amount is 575 044 tons that corresponds to a daily producing index of 0.57 kg/inhabitant.

Land use/environment quality

Agricultural area (hectars)

The agricultural lands are an important part of the green-yellow belt of București, being open spaces which support the minimum requirements of some biological communities and also being the support of agricultural product at a regional level.

The agricultural land within București represents 3 481 ha, meaning 14.61% from the total city area. Most of these areas are abandoned because of the lack of agricultural attractiveness, but also because of the high fragmentation level of the lands due to build areas.

In Ilfov County, the agricultural land is 102 222 ha (64.59% from the total area), also facing issues regarding abandonment and conversion into built areas. Most of the agricultural land is allocated to arable activities, the other types of agricultural land uses having less importance.

Arable land (hectares)

The arable areas represent the main agricultural use in București–Ilfov Development Region, representing 84% of agricultural land in București (2940 ha) and 96% in the Ilfov county (97 823). The agricultural land fragmentation is very strong, fact that leads to a variety ways of management (abandonment, unorganized waste depositing, the intensive or extensive land use for different types of crops, etc.). In București over 90% of the arable lands are abandoned.

In the Ilfov County, but also in the area being part of the Sud-Muntenia Development Region influenced directly by București, the reactivation of the agricultural activities is notable, especially in the less attractive areas for real estate businesses. In the Argeș-Sabar low plain, the specific corps are those of vegetables harvested in green houses where the high level of fertilizer use (most of the time uncontrolled), the high number of successive crops, the important fragmentation rate and the pressure over the water resources are making these activities to have a cumulative importance over the environment.

Surface of landfills (hectares)

The high quantities of wastes are requiring larger areas for depositing, in the context that the recovery and recycle rate is still very low.

In București–Ilfov Development Region, 32 landfills not meeting EU requirement were active, summing a total area of 36.5 ha, which were closed until 2010.

At the moment, there are 3 landfills according with the EU requirements, which are used by București and Ilfov County.

- Glina, situated in the south – east of București, in a swampy area, with a total capacity of 26.4 million m^3 and a total surface 110 ha;
- Chiajna, situated in the north – west of București, with a total capacity of 4.5 million m^3 and a total surface of 23.67 ha;
- Vidra, situated in the southern part of București, in the Argeș-Sabar low plain, with a total capacity of 4.5 million m^3 and a surface of 42 ha.

Besides these residential and urban landfills, there are small areas, for depositing industrial and agricultural wastes, the most representative being managed by NEFERAL, Caramidarie Jilava, Pig farm Periș.

Share of green areas of total urban areas (%)

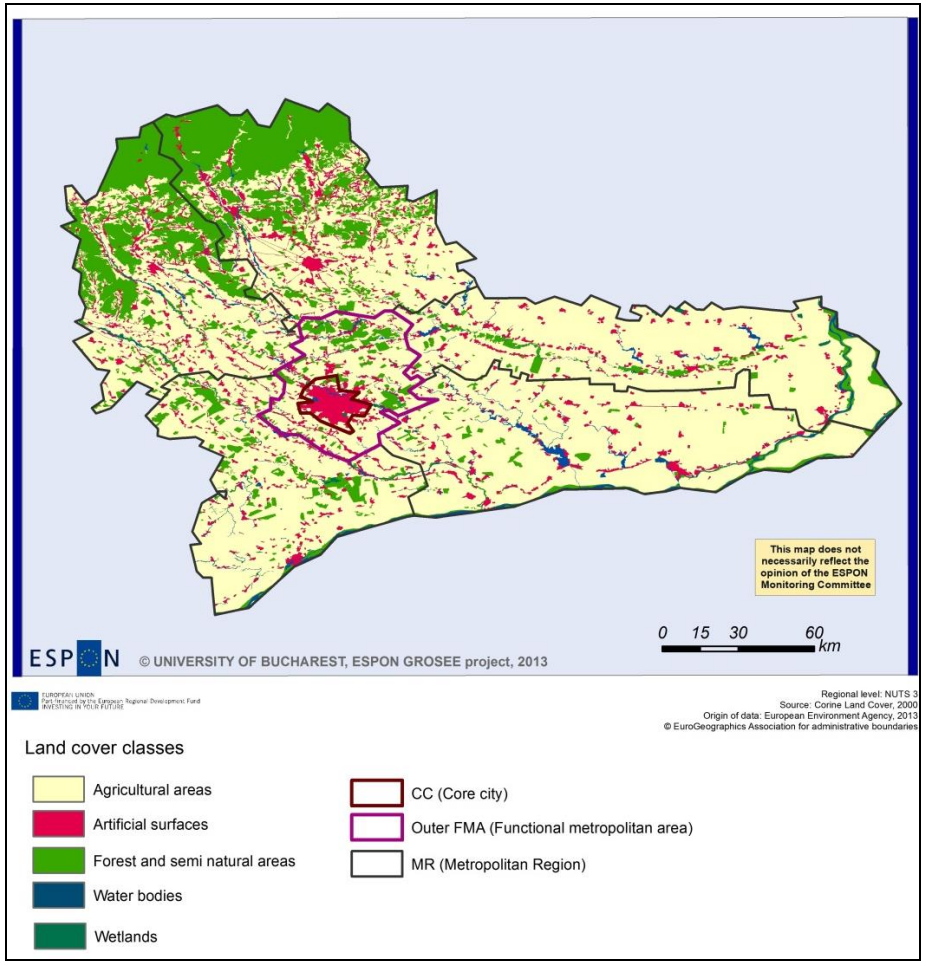
In the București–Ilfov Development Region, the green spaces area has dropped in between 1990 and 2010, because of some parks dissolution and the area reduction of other parks by passing the ownership from public to private, followed by the development of built areas or parking lots (Pătroescu et al., 2004). The property recover of the land which was abusively seized by the communist regime affected the existing parks, becoming trade unit between the ex-owners and local administration.

The green spaces conversion determined an important green space deficit per capita. In București case, the role of green spaces is extremely important for the urban profile (CCMESI, 2008b), they have to satisfy a population of 2.5 million inhabitants (8 117 inhabitants per km^2) (Rey et al., 2007) and to solve some environmental issues generated by the built areas (65% of the total city area), traffic (~1.5 million vehicles per day) and the pollutant economical activities (industry, construction etc.).

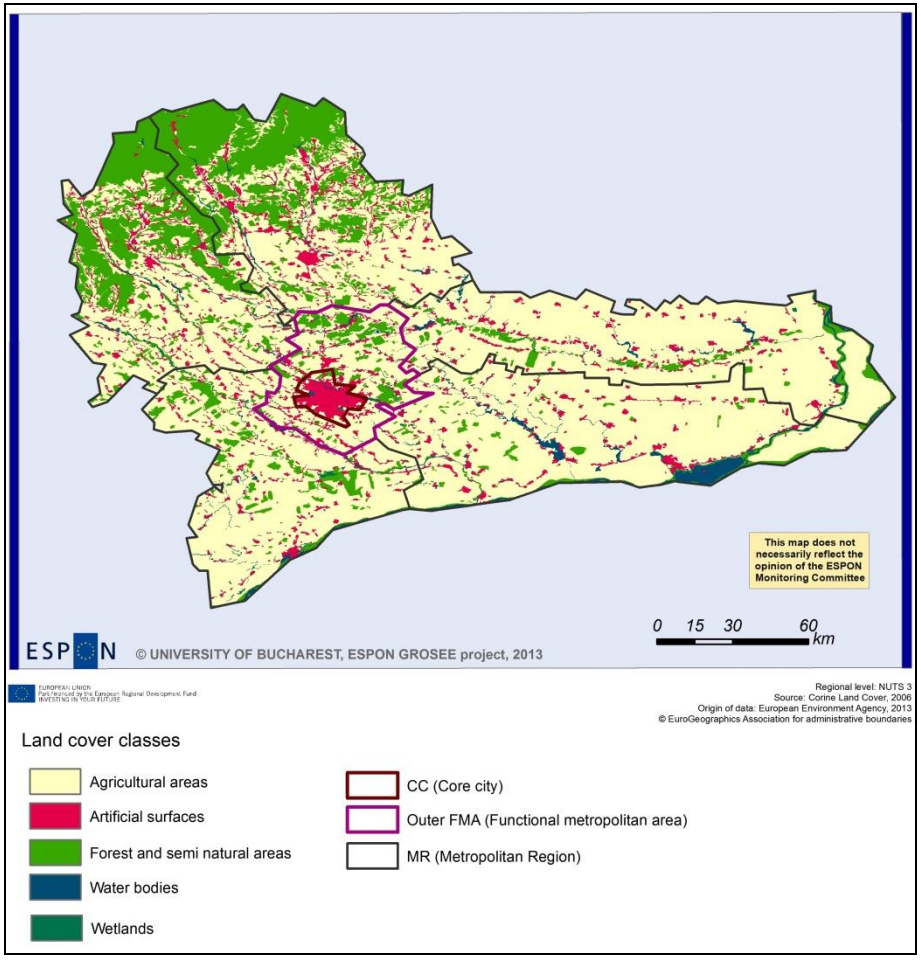
The green spaces area from București, occupy 4 511 ha (6% from the total city area, 23.7 m^2 per capita), from which 29.9% is represented by urban parks (Iojă et al., 2010, Iojă et al., 2008).

In the urban settlements from Ilfov County, green spaces rate is below 5% (most of it 1 – 2 %), showing the rural characteristics of land planning for these spaces.

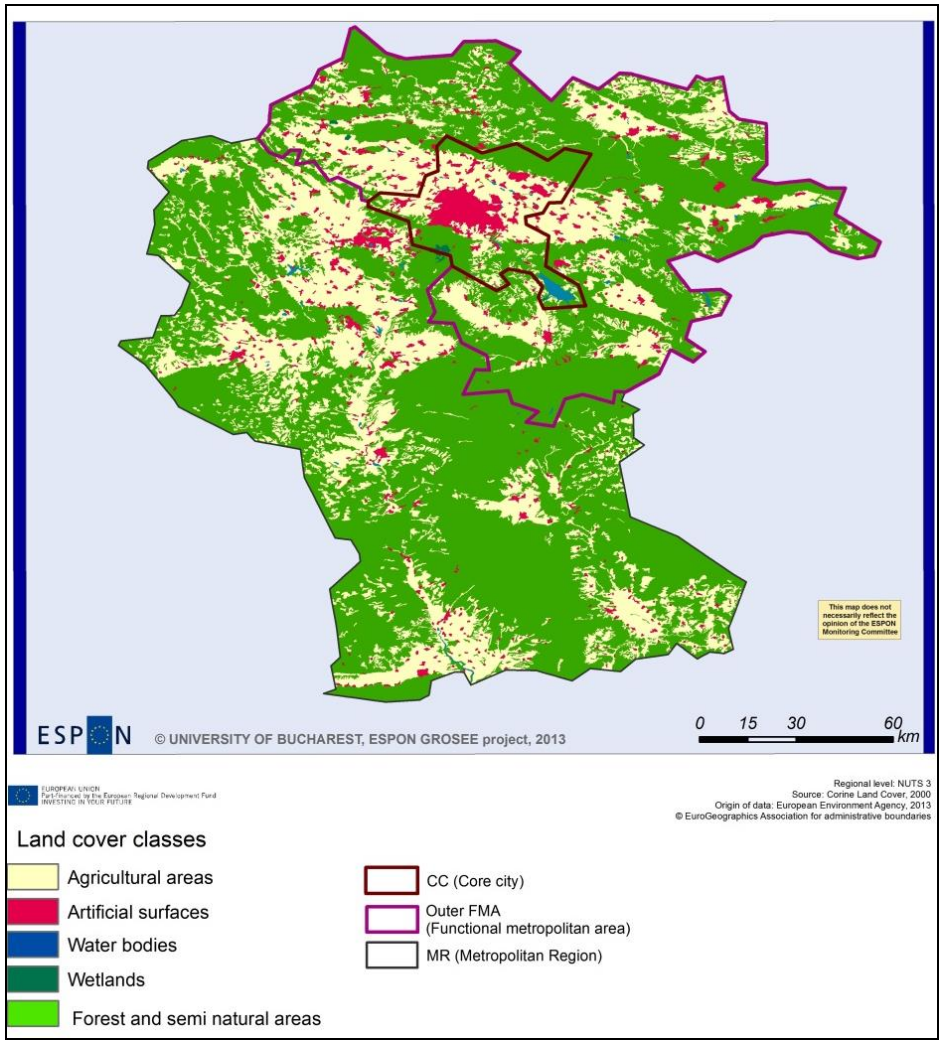
Map 40 Land cover in București metropolitan region corresponding to NUTS 3 (2000)



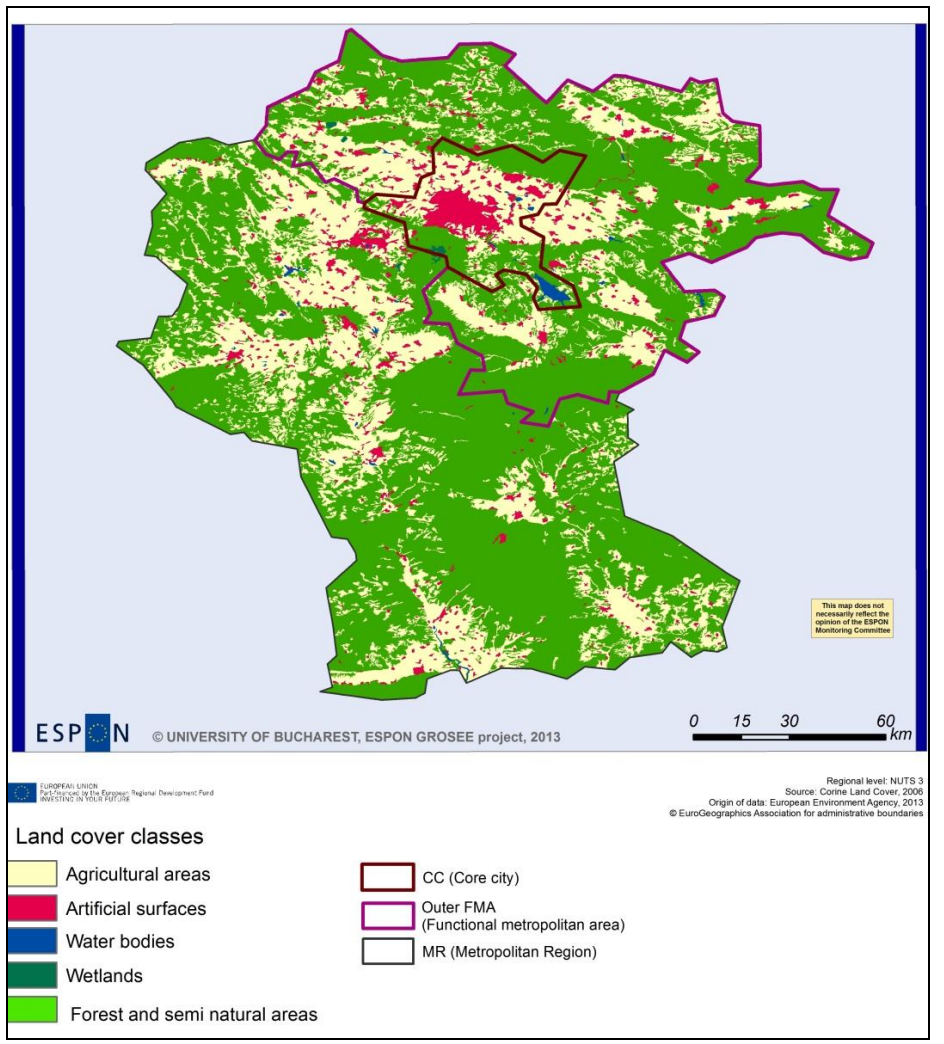
Map 41 Land cover in București metropolitan region corresponding to NUTS 3 (2006)



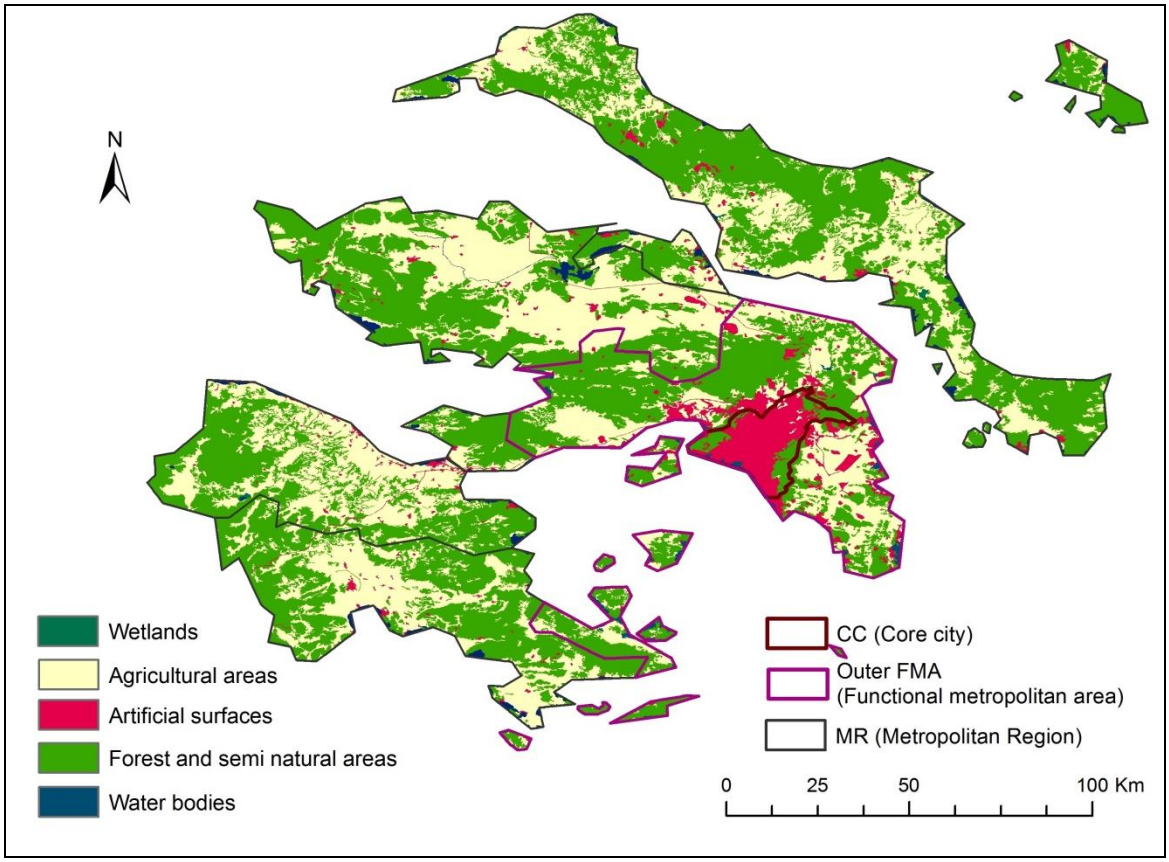
Map 42 Land cover in Sofia metropolitan region corresponding to NUTS 3 (2000)



Map 43 Land cover in Sofia Metropolitan region corresponding to NUTS 3 (2006)



Map 44 Land cover in Athens study area corresponding to NUTS 3 units (2006)

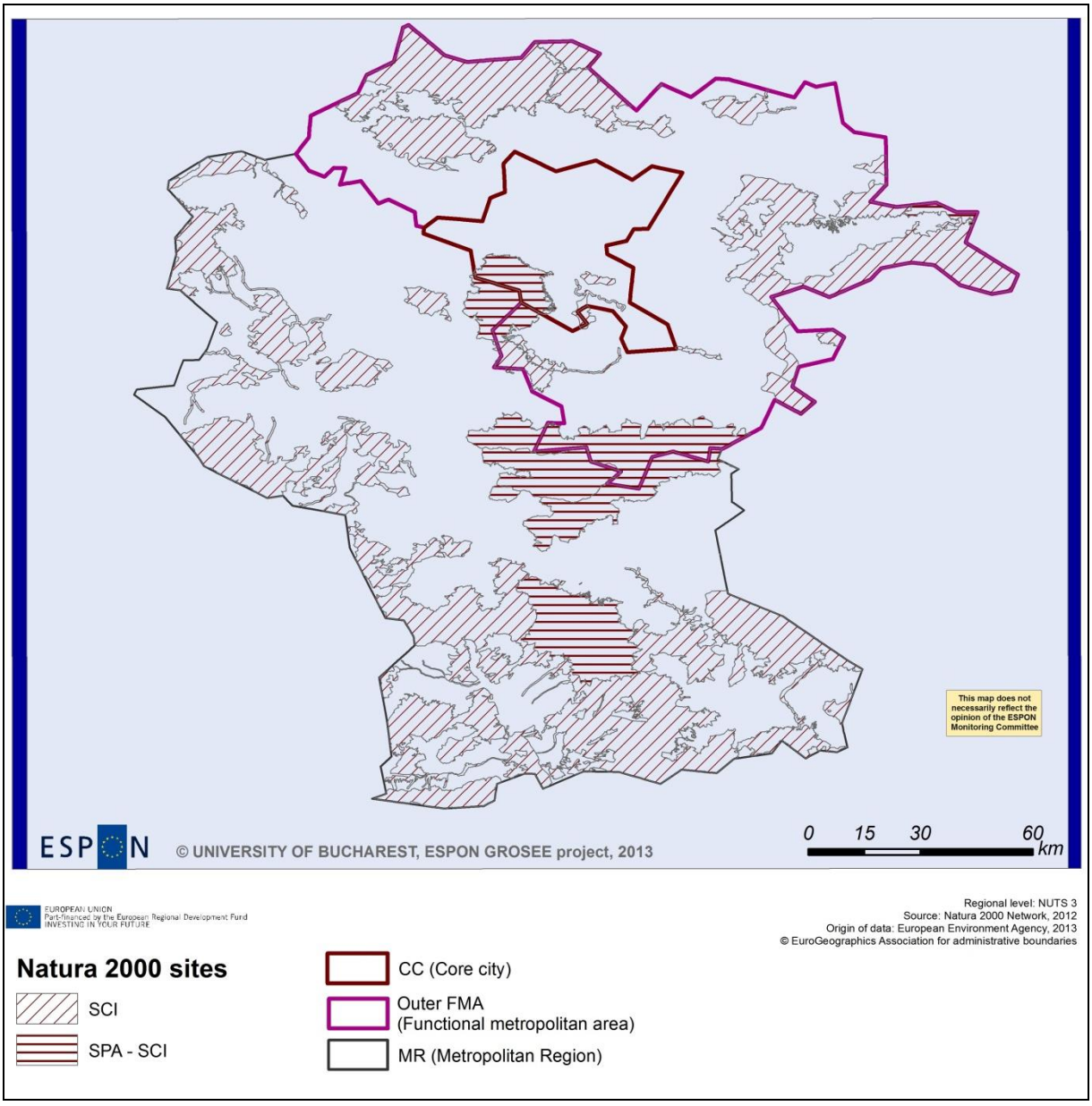


Share of area covered by NATURA2000 sites (%)

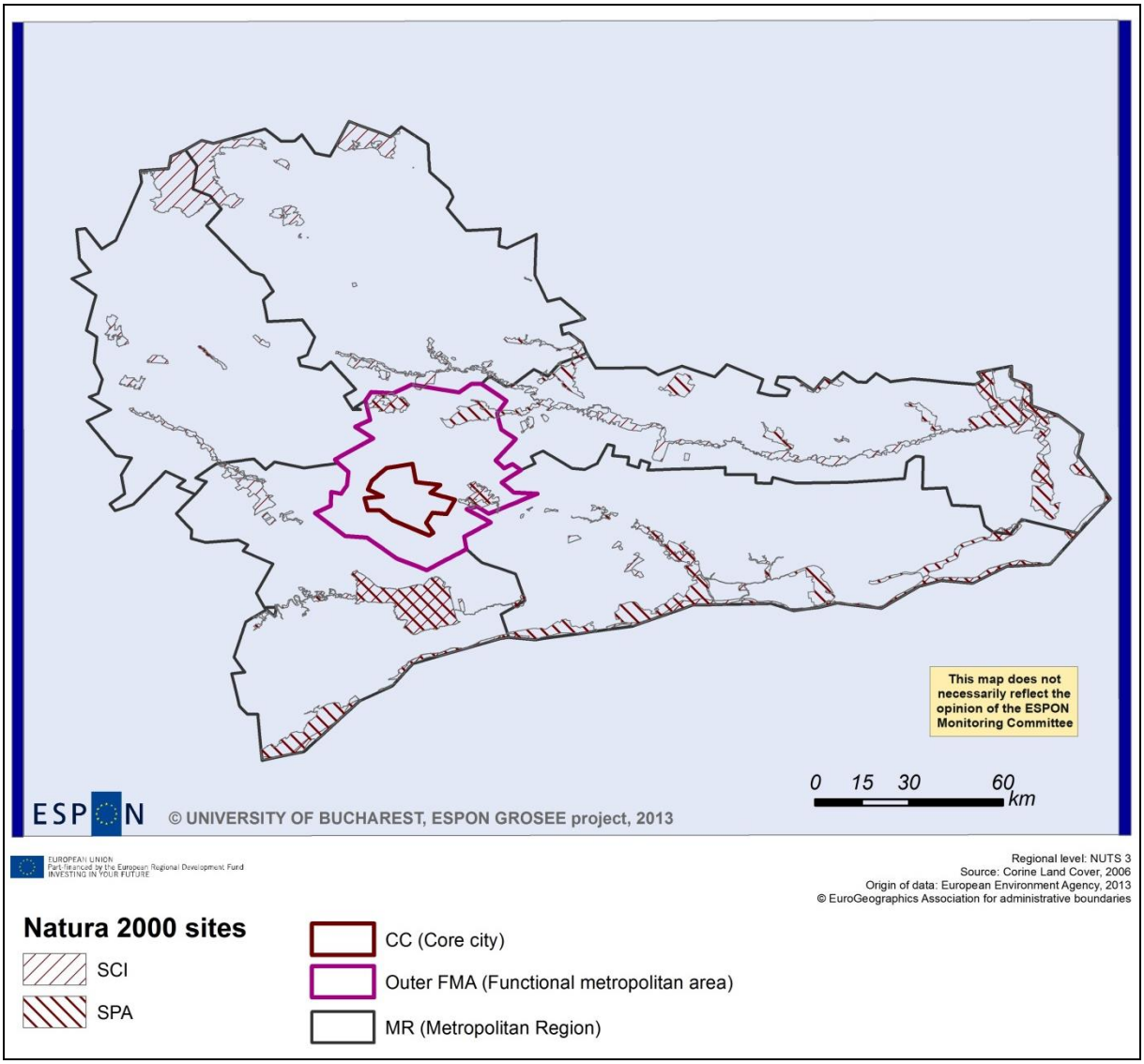
Protected areas are territories where there are conserved and protected habitats and plant species and animal species, unique, threaten or representative for a territory. The high level of anthropic pressure, but also the high economical interest did not formed favorable factors in declaring more natural protected areas. In București-Ilfov Development Region there is a single Special Protected Area (SPA) (Grădiștea-Căldărușani-Dridu), with a total area of 6642.3 ha, representing 3.6% of the region' territory and an Sites for Community Interest (SCI) (Scrovistea), with total area of 3374.3 ha, representing 1.8% of the region' territory. The Natura 2000 sites cover only 5.4% of București-Ilfov Development Region.

In the Sud-Muntenia Development Region, there are 27 SCI protected areas (238544.66 ha, which represents 6.9% of the total region) and 23 SPA protected areas (136359.88 ha, representing 3.95% of the total region).

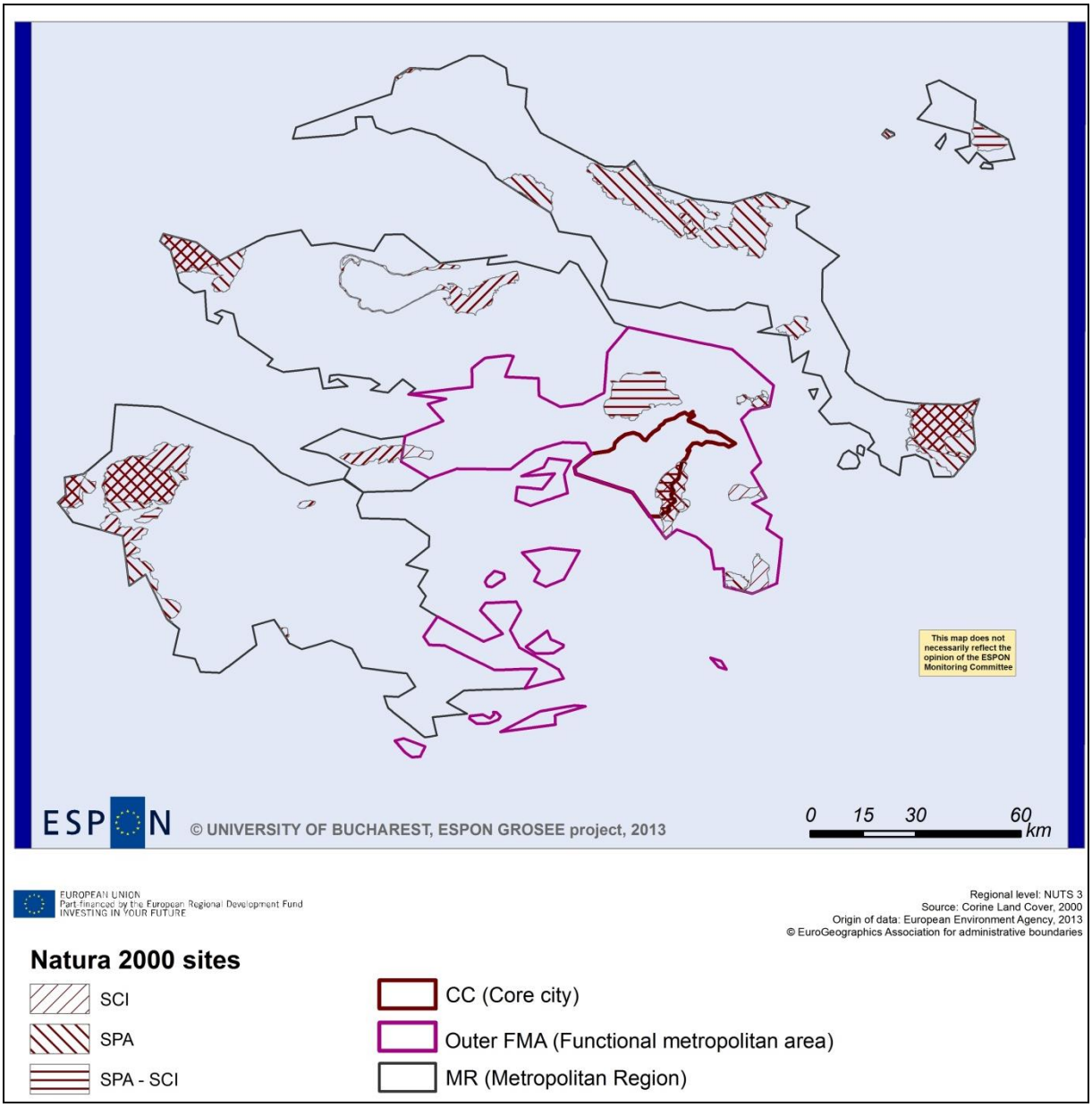
Map 45 Natura 2000 sites in Sofia metropolitan region



Map 46 Natura 2000 sites in București metropolitan region



Map 47 Natura 2000 sites in Athens metropolitan region



Length of biking trails (km)

Biking trails are part of the transport infrastructure created as a mobility alternative to road traffic. After 2008, 122 km of biking trails have been created in București (8 routes). Because of their deficient planning and the lack of safety travelling, in 2012 the Municipal Police declared them illegal. Thereby, at this moment, București has no biking trails at all. This situation is present in all the administrative units that are part of Ilfov County.

Air Pollution

Number of days with ozone (O_3) concentration that exceeds 120 µg/m^3

The tropospheric ozone concentration is an indicator of the presence of photochemical smog, being present during the summer time. In București-Ilfov Development Region, values higher than the 120 µg/m^3 threshold have been recorded for 7 days (2 recordings for the monitoring stations from București and 5 recordings for Balotești monitoring station that is located in Ilfov County). The number of over range values is low when there are favorable conditions for tropospheric ozone formation (high temperatures, high concentrations of ozone precursors).

In Sud-Muntenia Development Region, 42 values have been recorded, being higher than the 120 µg/m^3 threshold, most of them in the plane area.

Emissions of sulphuric oxides into atmosphere (tones)

Sulphur dioxide results mainly from road traffic and industrial activities. At national level, the emissions recorded a drop-out after the decrease of black oil amount used by the central heating system and the sulphur removal from diesel fuel. Thereby, between 2003 and 2010 the amount of sulphur dioxide emissions decreased from 104 097 tons to 2004 tons. The share of Ilfov county is of only 50 tons, being related to road traffic.

Higher values are recorded in Sud-Muntenia Development Region (10095.34 tons), being related to the companies involved in petroleum manufacturing (Ploiești, Pitești), metallurgy (Târgoviște), and chemical products (Turnu Măgurele).

The emissions decrease was followed by a decline in the incidence of acid rain that affected the natural and anthropic ecosystems.

Methane emissions into atmosphere (tons)

Methane emissions are related especially to organic matter anaerobic decomposition processes (stock raising, waste depositing), exploitation, transport and processing of natural gas. In București-Ilfov Development Region, the highest emissions came from stock raising and petrochemical activities, located in Ilfov country (990 tons).

In Sud-Muntenia Development Region, the values are higher (1 282 tons) due to industrial and stock rising activities.

Carbon dioxide emissions into atmosphere (tons)

Carbon dioxide is the main greenhouse gas emitted in București-Ilfov Development Region. The quantities reached 7 263 million tons (from which 7 212 million tons per year came from București), the main producers being represented by the energetic industry and road traffic. In București-Ilfov Development Region, there are 12 economic agents that run under the incidence of Directive 2009/29/CE for modifying the Directive 2003/87/CE, most of them acting in the energetic sector.

Dinitrogen emissions into atmosphere (tons)

The emissions of dinitrogen into atmosphere recorded values that are much smaller than the ones of carbon dioxide, for the București-Ilfov Development Region, the quantities reaching 292 tons per year.

Ammonia emissions into atmosphere (tons)

The ammonia emissions in București-Ilfov Development Region reach 678.2 tons per year (from which 370.33 tons came from București). The amounts are much lower than the one produced in Sud-Muntenia Development Region, where they are related to stock raising, chemical and petrochemical industrial activities.

Table 31 Number of days particulate matter concentrations (PM10) exceeds 50 µg/m³ in Urban Audit cities - days

	1999_2002	2003_2006	2007_2009
Sofia	12,0	104,5	176,3
București		147,0	167,0
Valletta			64,0
Budapest	166,0	33,0	39,0
Roma	36,0	13,0	30,8
Warsaw	57,0	39,0	30,6
Brussels	33,7	15,0	26,3
Vienna	28,0	20,7	17,0
Riga	57,0	:	15,0
Lisbon	41,0	55,0	14,0
Paris	5,0	3,3	13,0
Prague	38,8	51,3	12,7
Madrid	39,0	47,0	11,5
Amsterdam	17,0	24,0	11,0

Dublin	11,0	5,5	11,0
London	13,7	8,6	9,4
Berlin	17,5	17,0	8,8
Vilnius	27,0	19,0	5,0
Tallinn	3,0	8,0	4,0
Helsinki	3,0	3,0	4,0
Stockholm	1,0	3,0	2,0
Copenhagen	49,0	2,0	2,0
Nicosia	144,0	183,0	
Athens	174,0		
Luxembourg	1,0		
Zagreb		n/a	
Istanbul		n/a	
			Source: Eurostat Database

Expenses for environment protection

Expenditure on protection and restoration of the environment

Expenditure used for the protection and restoration of the environment has been deducted from Sectoral Operational Program Environment projects, in București-Ilfov Development Region 72 million euro being used for the development and modernization of water providing and sewage systems, and 320 042 euro for biodiversity conservation. In Sud-Muntenia Development Region the expenses were being used as follows: 611.7 million euros for the development and modernization of water providing and sewage systems, 77.1 million de euros for waste and contaminated sites management and 8.82 million euros for biodiversity conservation.

Risks and hazards

Annual quantities of hazardous waste

The annual quantities of hazardous waste for București-Ilfov Development Region have not been correctly evaluated, different contradictions between the reported values being observed. From the total amount, 1 845 tons per year are being incinerated in Iridex incinerator, 1 474 tons coming from medical activities and the rest of it from industrial activities.

Total European funds for flood protection and decreasing coastal erosion

In București-Ilfov and Sud-Muntenia Development Regions, no project has been financed from European founds for flood protection, even though there are vulnerable areas at these kind of risks.

Climate change

Potential vulnerability to climate change

For the analyzed metropolitan areas, the ESPON Climate project (2011) results have shown an increase of the annual average temperatures with 3.6 to 4 ^{0}C, especially in the hot weather season, when an increase by 30 to 40% of the number of summer days is predicted. At the same time, the prediction shows a decrease of precipitation quantities during summer time, by 20 to 40 % in București and Sofia metropolitan areas and over 40% in the case of Athens.
Related to climate change sensitivity, for the analyzed metropolitan area it can be observed that:

- There are low values of physic sensitivity (0.2-0.4);
- Medium values of social sensitivity in the case of București and Athens (0.4-0.6) and low values in the case of Sofia (0.2-0.4);
- Medium values of economic sensitivity in the case of București and Sofia (0.4-0.6) and high values in the case of Athens (0.6-0.8);
- Very low values of cultural sensitivity in the case of București and Sofia (0-0.2) and medium values in the case of Athens (0.2-0.4);
- Medium values of environmental sensitivity (0.4-0.6) for București and Sofia and high values in the case of Athens (0.6-0.8);

Regarding the potential impact of the climate change, it is expected to:

- No changes to be registered for the potential physic impact;
- A low positive potential impact for București and Sofia and a low negative in the case of Athens;
- A medium increase of the economic potential impact;
- The environmental potential impact to turn medium for București and Athens and high for Sofia;
- The cultural potential impact tends to become low positive in the case of București, unchanged in the case of Athens and low negative in the case of Sofia;
- The synergic effect for all the three capitals to be medium negative;

- The potential vulnerability to climate change will show a low increase for București (0.1-0.3) and a medium increase for Athens and Sofia (0.3-0.5).

Even though the present impact is medium and the perspectives show an aggravation of the situation generated by climate changes in all the analyzed metropolitan areas, the adapting capacity is lowest in the case of București and low in the case of Sofia. As long as in all the analyzed metropolitan areas the greenhouse gas emissions are high, the mitigate capacity is low.

The ESPON Climate scenarios show that Eastern Europe is affected by demographic changes that can lead to an increase of climate change sensitivity. Thereby, the population aging process will make the people more vulnerable to heat waves and less capable to adapt.

ESPON Climate highlights the fact that the adapting level of intervention capacity to climate change will be an important factor in determining future disparities.

2.1.5 Territorial and urban structures and policies

Specific characteristics of the case study area

The territory coverage by urban settlements shows a higher figure at the MR (RO3) level – 1.57 – than the national average of 1.34. The scores are also higher in terms of villages' density as well as for the ratio communes[6]- towns. The ratio villages - towns and of villages per commune are lower than the national average. The figures indicate that the region has a more dense human settlements network and that the urban network is more developed as compared to the national average. The smaller figures for villages / commune show a smaller fragmentation, yet rather normal for a plain area and a flat territory, which represent more than 2/3 of the MR (RO3).

However, it may be noticed that there are great discrepancies among sub-regions and within them at county level. The figures also reflect in a sensitive way the different geography of the territory. The Northern part, which is also more populated and more urbanized has a higher density of towns and villages, whereas the Southern part has much lower densities. Ilfov County

[6] In Romania the term "commune" defines a rural administrative unit, whereas "town" or "city" refers to an urban territorial – administrative unit.

presents rather unusual figures, strongly deviating from the average. This can be explained by its small size and bye the relatively high number of towns (the Southern counties which are 2.5-3.0 times larger than Ilfov have 1.5-2.0 times less towns). A rather unbalanced situation can be noticed in the case of Argeş county, which is also the largest in the region and has a very diverse geography, from lower plain areas in the South to hilly and higher mountainous ones to the North.

Table 32 Density of the settlements in the Metropolitan Region of București

Macroregion /Development region /County	Tows / 1000^2 km	Villages / 100^2 km	Communes / towns	Villages / towns	Villages / commune
Total România	**1.34**	**5.43**	**8.94**	**40.49**	**4.53**
MACROREGION 3	**1.57**	**5.82**	**9.67**	**37.02**	**3.83**
Sud-Muntenia	**1.39**	**5.86**	**10.81**	**42.06**	**3.89**
Prahova	2.97	8.59	6.43	28.93	4.50
Dâmbovița	1.73	8.71	11.71	50.43	4.30
Ialomița	1.57	2.85	8.43	18.14	2.15
Argeș	1.03	8.44	13.57	82.29	6.06
Călărași	0.98	3.14	10.00	32.00	3.20
Teleorman	0.86	3.99	18.40	46.20	2.51
Giurgiu	0.85	4.74	17.00	55.67	3.27
București-Ilfov	**4.94**	**5.00**	**3.56**	**10.11**	**2.84**
Ilfov	5.05	5.75	4.00	11.38	2.84
București Municipality	4.20	n/a	n/a	n/a	n/a

Source: NIS, Statistical Yearbook 2010

The urban development patterns of the case study area and their sub/divisions

Urban tourism, education and culture areas and centers (is developed in other sections)

The tourist potential of the București–Ilfov Development Region is represented by the attraction capacity of the Romanian capital and of the cultural and natural values in Ilfov County. The tourist offer is mainly centered on business. The tourism, culture, recreational and sports activities are considered as secondary segments.

Starting with 2000, the tourist sector in București-Ilfov Development Region encountered a constant development proven by the permanent growth of existing accommodation capacities in operation and the number of nights spent in tourist accommodation (Table 33).

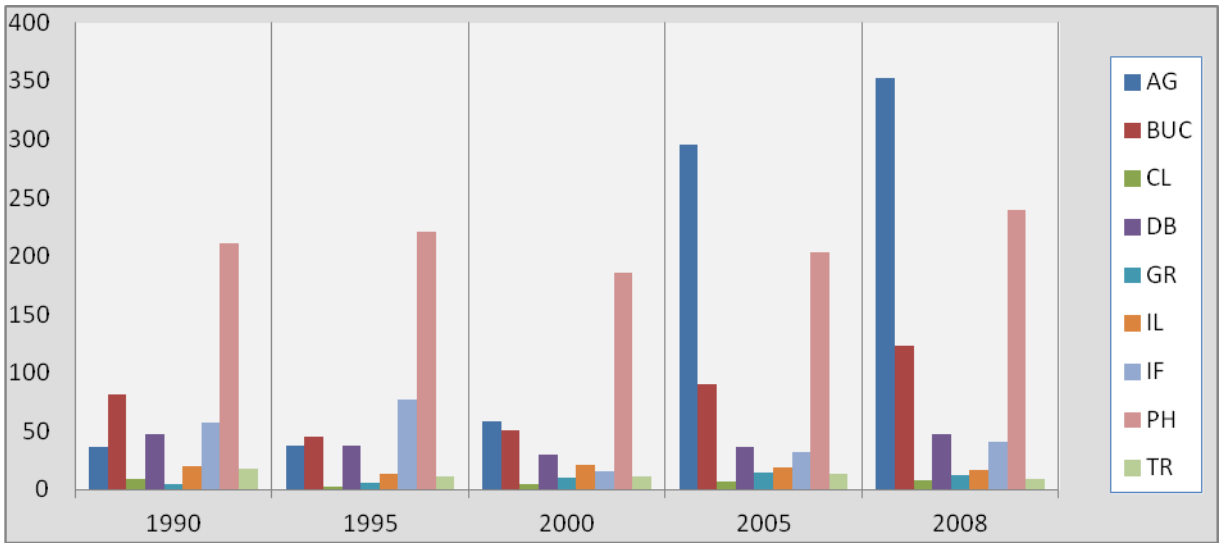
The total tourist capacity increased during the analyzed period. The greatest number of arrivals, correlated with the number of nights spent in the tourist accommodation was recorded in București, followed by Prahova county both in 2005 and 2008.

Table 33 Arrivals of tourists and nights spent in tourist accommodation				
	Arrivals of tourists		Nights spent in tourist accommodation	
	2005	*2008*	*2005*	*2008*
Argeș	95769	144104	248080	315814
București	739012	952336	1365956	2012173
Călărași	11714	15946	52927	53191
Dâmbovița	58245	72276	243800	302230
Giurgiu	15077	28314	69379	90042
Ialomița	34163	52481	238281	304068
Ilfov	92324	85825	115300	200719
Prahova	346540	417119	929064	1017187
Teleorman	12049	19917	25687	33361
				Source: NSI

In

Figure 17, it can be observed the total dynamics of the accommodation units between 1990-2008. We can observe a dramatic increase in the number of accommodation units through the role played by the privatization processes and the entrepreneurial initiative in tourism. After 2000, Argeș county and București city emerged.

Figure 17 Existing tourist accommodation capacity by type



Source: NSI Romania

Known as the Little Paris in the Interwar period, București still has an important historical and cultural heritage that hardly survived the destructing urban policy of the 80's when almost 450 ha of the city centre were demolished and a „new civic centre" was built (including the Parliament Palace). The Romanian capital-city remains an important historical and cultural centre of the country, counting about 270 churches of which 74 were declared historical monuments, the oldest being built between the XVth and the XVIth century. București accommodates a quarter of the Romanian cultural heritage and offers a wide range of cultural/entertainment venues, represented by approximate 50 museums, 8 state theatres and 6 private ones, the National Circus and an important number of cinemas (Market Intelligence – București-Ilfov Development Region). In 2004, there were over 4000 entertainment shows, including musical and opera shows, traditional music shows that had more than 1 million viewers (almost a quarter of the national entertainment shows and viewers). Also, the city is the most important national university center and it has the highest number of libraries and research centers. However, the cultural heritage of the region is not sufficiently promoted (there are no green info lines, information centers, information boards).

Ilfov cultural heritage is represented by monasteries and palaces, built between the XVIIth and the XIXth century. Mogoșoaia palace is on the UNESCO heritage list. The church of the Snagov monastery keeps the grave of Vlad Țepeș, known also as Dracula. Unfortunately, the county's historical heritage remains difficult to access due to a bad infrastructure of the local roads and isolation specific to their location.

If we speak about business tourism, București is the most important business center in the country, thanks to the presence of the main offices for the most important Romanian and foreign banks and to the major fairs organized at a national and international level, as well as conferences and seminars.

Both the cultural tourism and the business one contribute to the increasing flows of the urban tourism. This trend is anticipated by the constant growth of the 4 and 5 starts hotels, due to massive investments and new investments of the existing hotel chains: Golden Tulip, Accor, NH Hotels, Marriott, Hilton, Holiday Inn, Best Western, Rin Hotel.

For the tourism development, there are several contributory factors: the capital function, the more developed infrastructure, various leisure possibilities, the global reputation of the People's House (the second largest building in the world in terms of size), as well as other tourist sights of cultural interest.

There are a few weak points: the small number of tourist information centers, the limited possibilities of visiting the palaces around București, as well as the very poor infrastructure and the unpaved roads in Ilfov County.

The natural areas around București are places of rest, especially during weekends, but their environmental impact is a negative one due to the increased pressure on these areas.

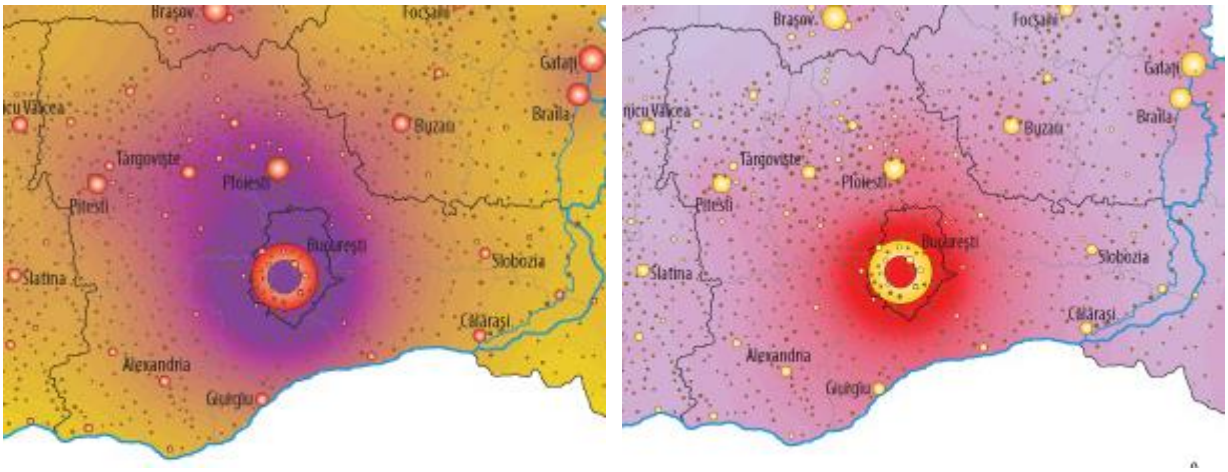
The northern part of the Sud-Muntenia Region has an important exploited tourism potential. The most important areas with tourism potential are: the mountain resorts on Prahova Valley, Bucegi Mountains, tourist villages and natural parks in Bucegi and Piatra Craiului, the spa resorts in the region (Slanic Prahova, Vălenii de Munte, Pucioasa, Câmpulung-Muscel).

In contrast, even if the south of the region has a high potential, due to the presence of the Danube and of some important rivers such as Arges, it has a reduced significance in the regional tourism.

Policentricity

The **structural polycentricity** of the MR (RO3) as defined by the "Critical Dictionary"(ESPON 1.1.1, 2005) representing "the spatial distribution of urban nodes and the spatial orientation of flows in a territory" is strongly mono-nuclear due to the domination of the capital city. However an out- coming polycentrism can be observed due to the existence of the 7 county capitals which polarize the social life and economic activities at the counties level (NUTS III). In some cases their marginal - peripheral position (Călăraşi, Giurgiu) and / or size (Alexandria, Slobozia), are not favoring a significant polarization and counter-weight to the strong attractiveness of the capital city. The weakness of the Southern and Eastern poles may also explain the lower level of development of these areas, less urbanized and industrialized. The 3 poles of the Northern part of the MR (RO3) – Piteşti, Ploieşti and Târgovişte – are in a better position in relation to their territory of influence, are larger and better related to major communication axes, two of them (Piteşti, Ploieşti) being connected to the capital by motorways.

Map 48 Intensity (left) and orientation (right) of polarization within the MR (RO3)

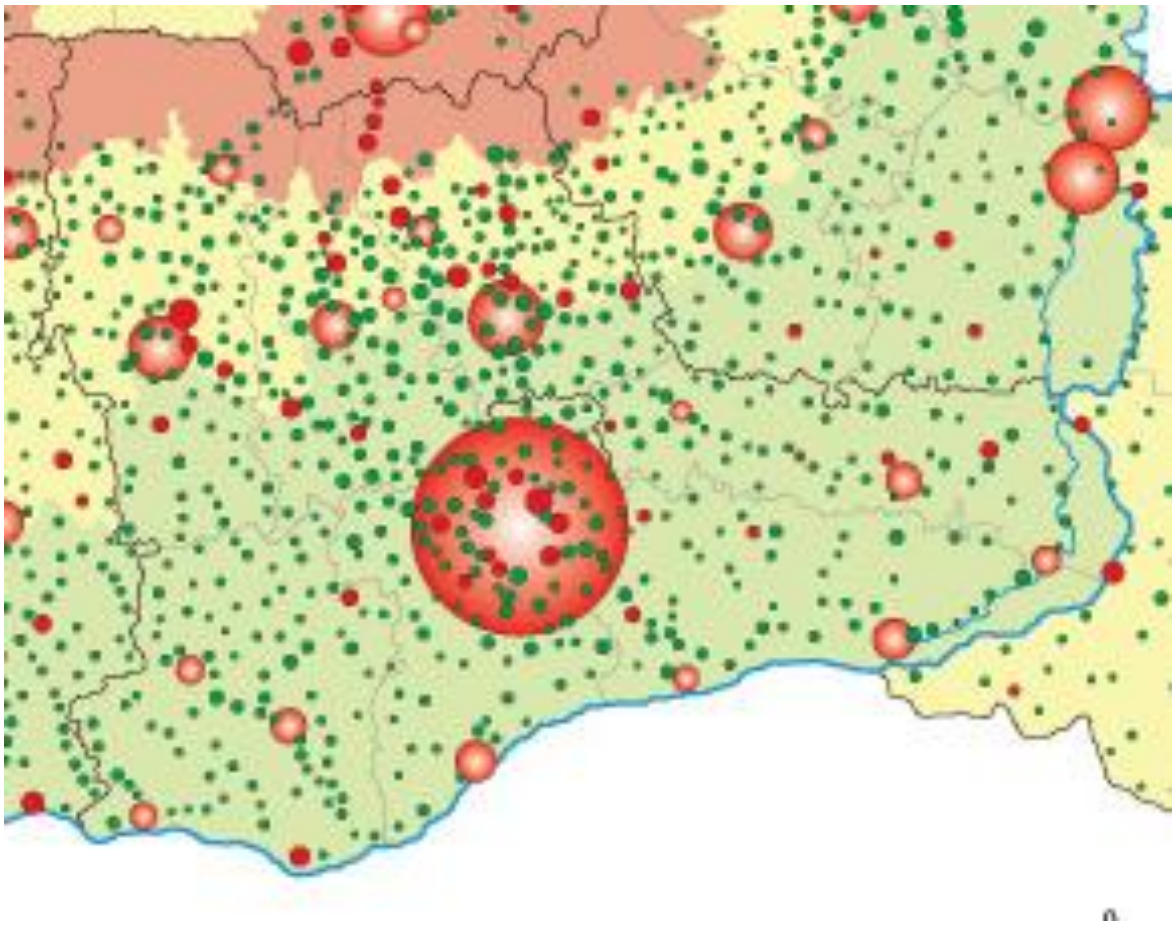


(Source: Cuguat-TIGRIS, 2007 http://mdrt.ro/dezvoltare-teritoriala/atlas-teritorial-on-line)

Spatial polarization at regional level is rather week, except the surroundings of the capital city and 2 other cities, due to the natural linear development of the settlements network along the river valley and roads. The spatial distribution of the localities is following a preferential direction from north-west to south-east. A radial and circular distribution pattern can be observed mainly around Bucureşti and Ploieşti. In both cities as well as in Piteşti conurbation processes can be noticed.

In terms of relational polycentricism, of flows and cooperation, this is rather weak at the level of the whole region, but quite strong in some specific areas. The last two decades of unsuccessful approach to setting up a large metropolitan area around the capital city, show a weak capacity for cooperation at institutional level and in terms of strategic and spatial planning.

Map 49 The human settlements network and their spatial distribution within the MR (RO3)



(Source: Cuguat-TIGRIS, 2007 http://mdrt.ro/dezvoltare-teritoriala/atlas-teritorial-on-line)

Within the study area a diversity of functional and spatial development patterns of the localities can be observed. Different typologies and classifications can be taken into consideration.

According to the rank classification (law 351 / 2001[7]) the MR (RO3) has:

- the capital city – rank 0
- 1 rank 1 city (Ploieşti)
- 15 rank 2 municipalities (Piteşti, Câmpulung, Curtea de Argeş, Călăraşi, Olteniţa, Târgovişte, Moreni, Slobozia, Feteşti, Urziceni, Câmpina, Giurgiu, Alexandria, Roşiori de Vede, Turnu-Măgurele)

[7] Law 351 / 2001 for approval of the Section IV of tha National Territorial Plan – Human Settlements network.

- 40 rank 3 towns (8 in Ilfov, 4 in Argeş, 3 in Călăraşi, 5 in Dâmboviţa, 2 in Giurgiu, 4 in Ialomiţa, 12 in Prahova, 2 in Teleorman)
- 551 rank 4 localities (communal centres)
- 1559 rank 5 localities (villages)

In terms of population size the MR (RO3) has:

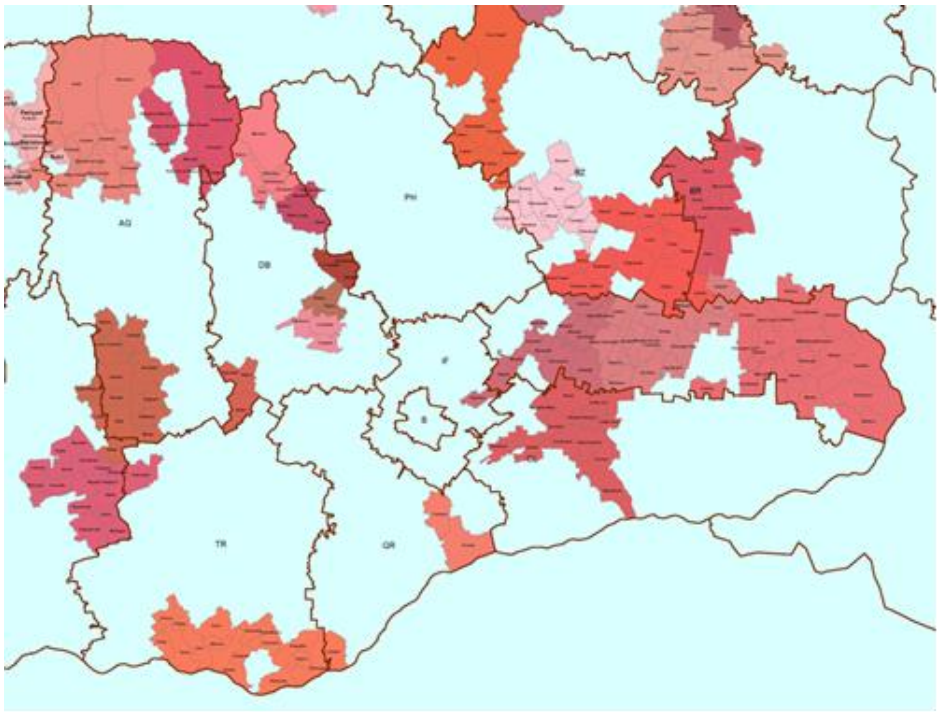
- 1 city over 1,000,000 inhabitants /Bucureşti)
- 2 cities over 100,000 inhabitants (Ploieşti, Piteşti)
- 3 towns between 50-100,000 inhabitants (Călăraşi, Giurgiu, Târgovişte)
- 12 towns between 20-50,000 inhabitants
- 24 towns between 10-20,000 inhabitants
- 15 towns under 10,000 inhabitants

In terms of administrative roles:

- 1 national capital
- 7 county capitals (Alexandria, Călăraşi, Giurgiu, Ploieşti, Piteşti, Slobozia, Târgovişte)

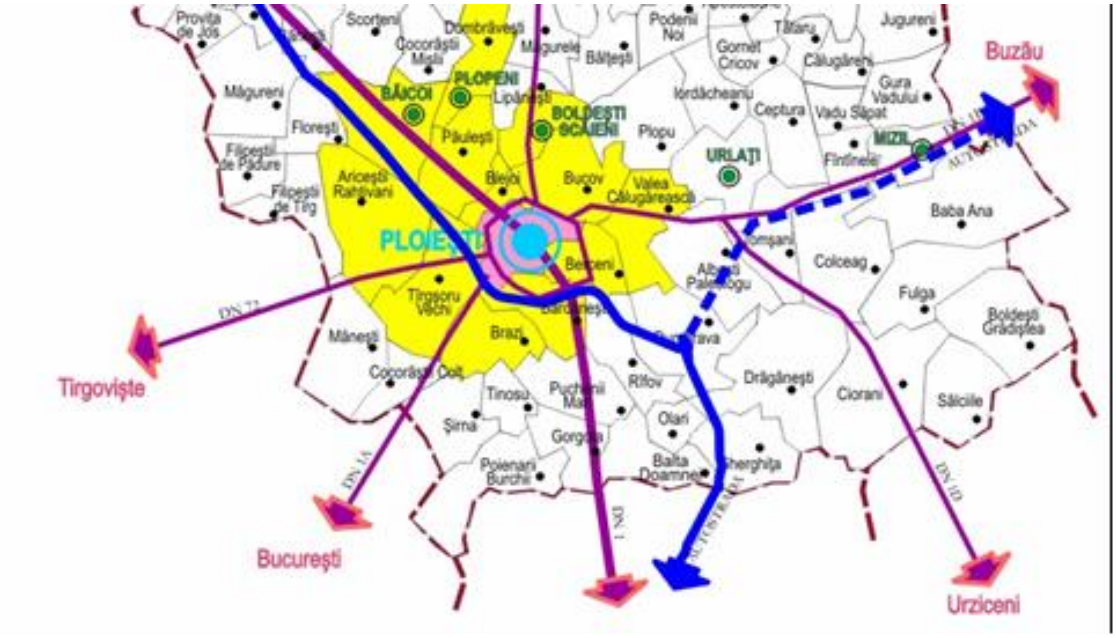
There are 14 local intercomunal associations (Local Actions Groups – LAGs) set up under the National Plan for Rural Development, encouraging cooperation among communes and small towns to develop project proposals on the basis of common strategies and programmes. The LAGs are located as follows: Argeş – 3, Călăraşi – 1, Dâmboviţa – 5, Giurgiu – 1, Ialomiţa – 3, Teleorman – 1.

Map 50 The distribution of the LAGs within the MR, 2010



(Source: Ministry of Agriculture and Rural Development – Management Authority for NPRD, platform LEADER (http://leader-romania.ro/index.php)

Map 51 The association of Ploieşti metropolitan area



(Source: *http://www.ploiesti.ro/ADI/index.php*)

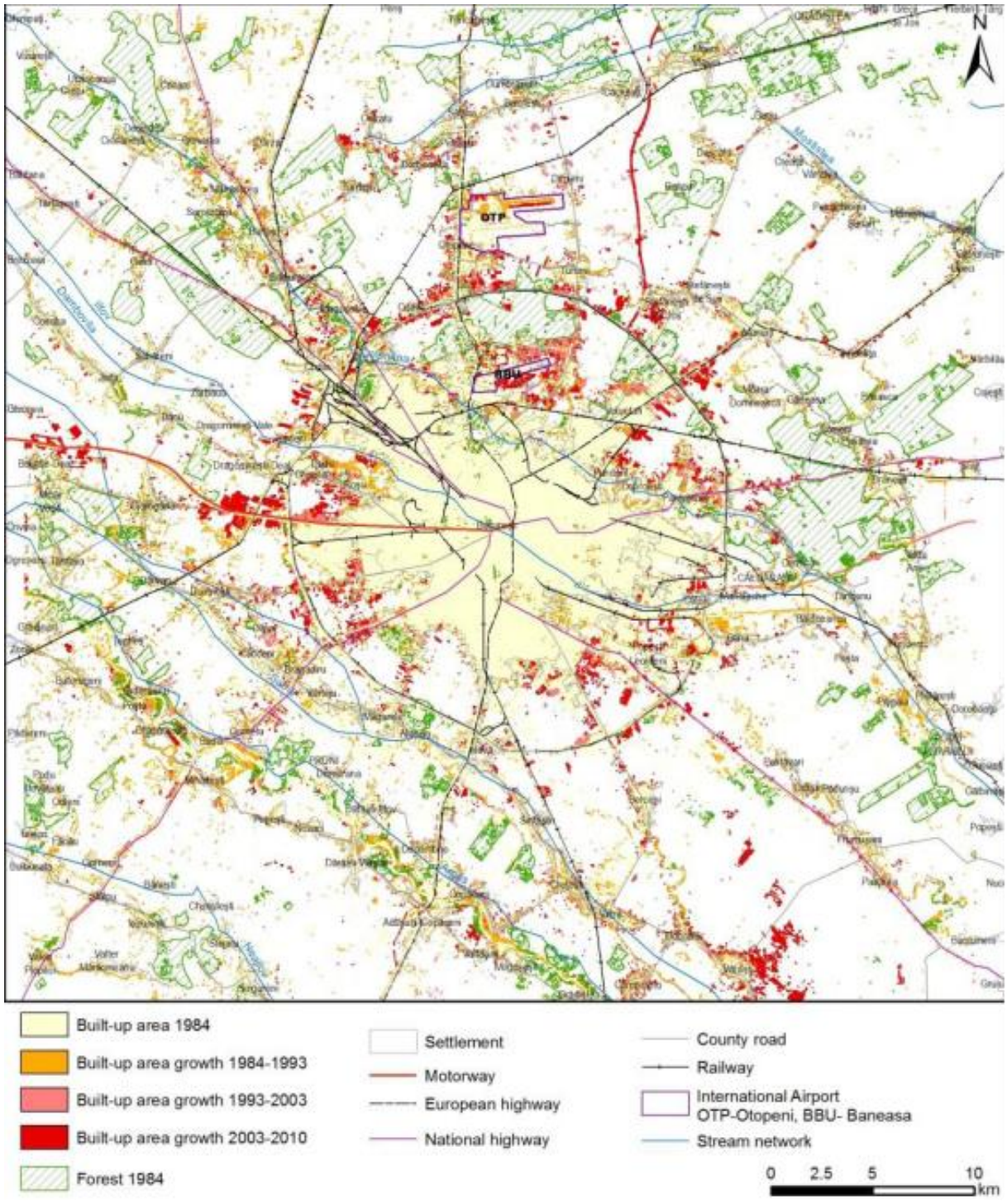
There is also one Intercommunal Development Association of the Growth Pole Ploieşti-Prahova including 16 members: the municipality of Ploieşti, 4 towns, 10 communes and the County Council. The association was set up under the ROP 2007-2013, Priority Axis 1.

Built areas expansion inside and outside the case study area in relation to the real estate market

București urban pressure is the result of the decreasing importance of agriculture in the local economy. Arable land near București will be transformed into built-up areas due to the low prices in terms of lands (Simion, 2012). In most cases, the spatial extension of the residential areas has not completely solved the access to transportation as well as the territorial technical infrastructure (water distribution, gas, and sewerage) (

Map **52**).

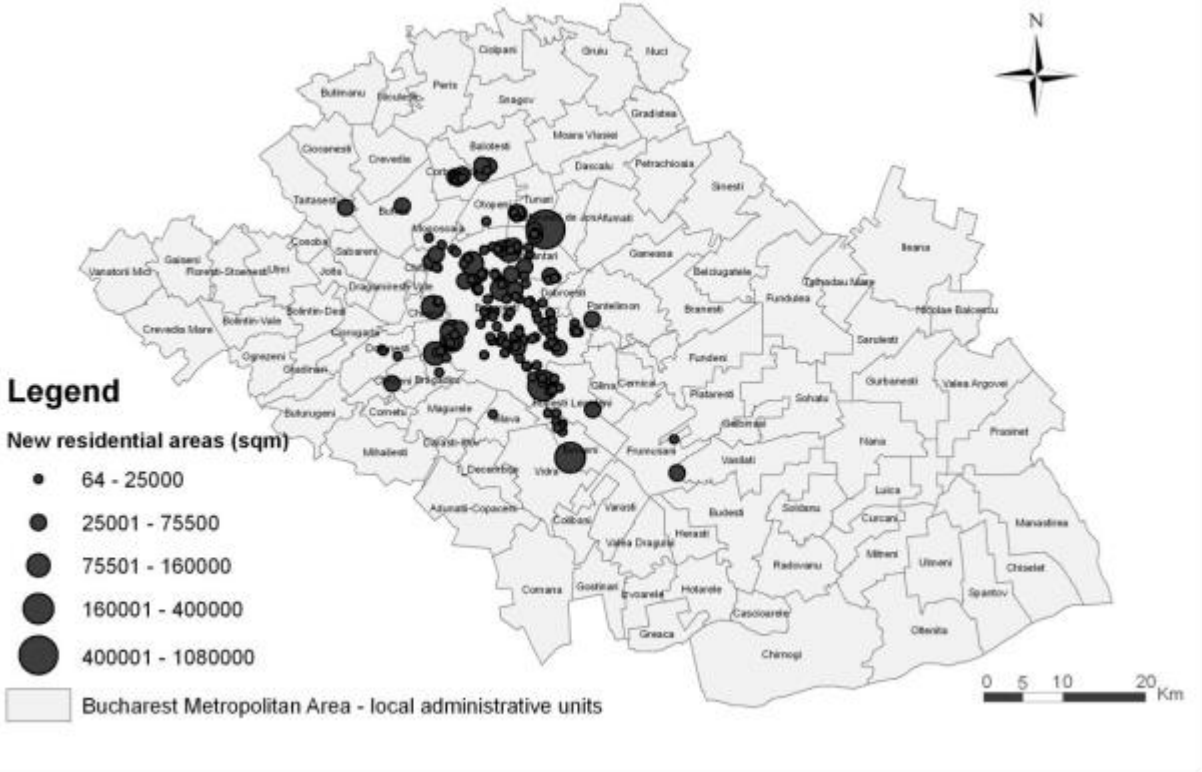
Map 52 Land use dynamics in BMA



(Source: Simion, 2012)

The analysis of the real estate transactions shows that most of the land has been transferred from those working in agriculture to people who have other occupations, usually outsiders. This emphasizes again the sub-urbanization process in the metropolitan area. There are some cases where the land prices (per m²) have increased more than five times during the last decade (Bălteanu and Grigorescu, 2006). The decrease of the agricultural land continued until 2008, the period of 2006-2008 being considered the peak of a real estate boom, after which several real estate projects failed, although the land had been purchased (Pătroescu, et all, 2011).

Map 53 New residential nuclei in the București Metropolitan Area (built after 1990 and ongoing)



(Source: Pătroescu et all, 2011)

There is a dynamic phase characterized by numerous transformations: speculative buying followed by non-use of land, extension of the built space or uncontrolled expansion of residential areas, development of business and logistics platforms which require intensive land

consumption. Also there were some negative effects on the environment through the conversion of areas with natural or close to natural features into residential areas (Pătroescu et all, 2011).

Urban sprawl in relation to transport infrastructure

The urban sprawl can be noticed especially around the capital and to a certain extent in the proximity of the 7 county capitals. The current tendency is the expansion of the urban built-up area along the main roads. Main road penetrations to the capital, but also the outer road ring have been built during the last two decades of transition. Whereas on the ring road, industrial and storage buildings were located, along the radial housing and commercial services were preferred. The continuity of the built-up space of the capital towards its surroundings has generated a particular landscape of the periphery characterized by heterogeneity and unstructured environment of a rural character. At some of the main junctions, or in the proximity of transportation nodes a number of commercial centres were developed in some cases including several types of hypermarkets. Such areas developed usually on the territory of neighboring communes, proving a need of institutional cooperation and common planning approaches. The development of such areas, a record of the new type of consumerist society had negative effects over the development of commercial services in the inner-city cores and made necessary some very costly development of road infrastructures to solve the traffic congestion in some main means of transportation networks. New bridges or tunnels have been built, especially in the North of the capital and many are under construction now.

Land use patterns (built and green areas) in relation to urban planning arrangements

In terms of land organization, subsequent to the inflexibility of the Communist Era, rapid and unpredictable developments followed after 1990 (Bourdeau-Lepage, 2002, 2004) all over Central-Eastern Europe.

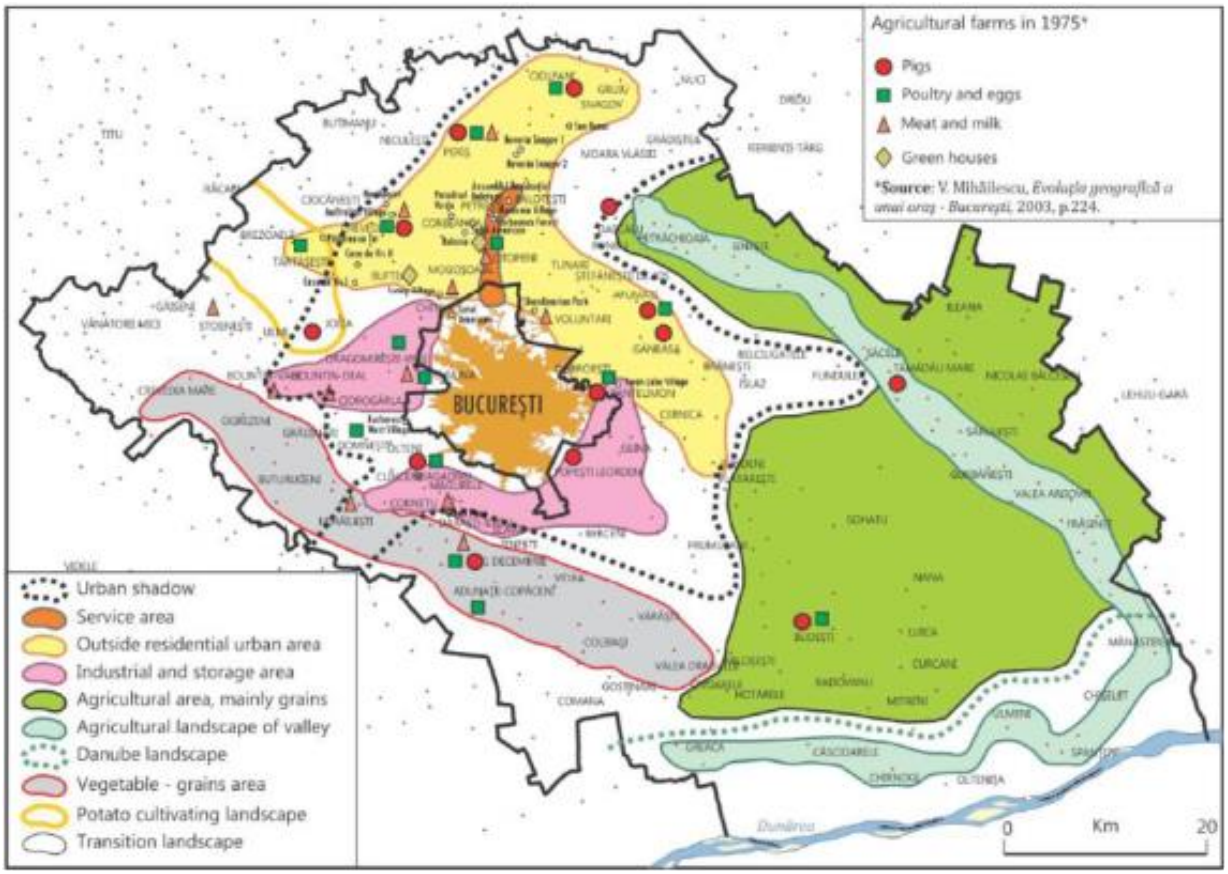
Petsimeris (2003) highlights a general development model of the South-European metropolises under the circumstances of an urban evolution, similar with the spatial dynamics of the Municipality of București in some aspects. For instance, in the territorial expansion models of Athens and Rome one can notice linear tendencies of urban development along the main transportation axes as well as the appearance of residential zones outside these cities.

Table 34 Change rates and directions in km² and percentage for the land cover				
Classes/Period	**1984-1993**	**1993-2003**	**2003-2010**	**% change from study area for time intervals**
Built-up area	+39.17	-12.63	+31.51	+1.51, -0.55, +1.38
Agriculture	-18.46	-24.18	-33.48	-0.81, -1.06, -1.47
Forest	-15.55	+21.11	-1.71	-0.68, +0.92, -0.07
Water	-5.15	+15.70	+3.67	-0.22, +0.69, +0.16

Source: Bogdan, Nistor, Simion, 2012

The data analysis shows that the built-up area according to land use categories is quite relevant. The surface rapidly increased among 2003-2010 (Table 34).

Map 54 București Metropolitan Area



(Source: Simion, 2012)

After 1990 a period of reorganization followed, including the organization in terms of land areas of the București Metropolitan Area.

The impact of the recent crisis on the territorial and urban structure of the analyzed area

The nineties brought in București a change of paradigm regarding the idea of living. After the liberalization of the real estate market, the urban dynamics managed by the owners had a chaotic evolution. The individual houses looked like small fortresses, the houses being enclosed within their own limits. The real estate companies that have developed a lot of residential projects adapted to the upper-class's needs. The spatial segregation of the upper class is more obvious here than anywhere else inside București or at its outskirts. This fact is supported by both the price of land and houses and by the number of residential projects (houses, villas, blocks of flats, mixed residential areas, etc.). The price of the land and houses in this area is not even for the few people of the middle-class. The current crisis has a strong influence on the real-estate market; a 300 m² villa which cost about 370.000 Euro in 2008 costs about 200.000 Euro today. There is a tendency to extend the northern part and it is not a recent one; it started some time ago and is justified by the geographical potential: the Colentina lakes and Băneasa, Tunari and Andronache forests. The successful way in which this urban axis has developed lately is due to some speculation made on the real estate market. The price for a piece of land can be doubled or increased up to 100%. (Mionel and Mionel, 2012).

The links of the strategic national sectoral and spatial plans with the metropolitan planning, the metropolitan planning strategies, objectives and measures and the implementation of the latter

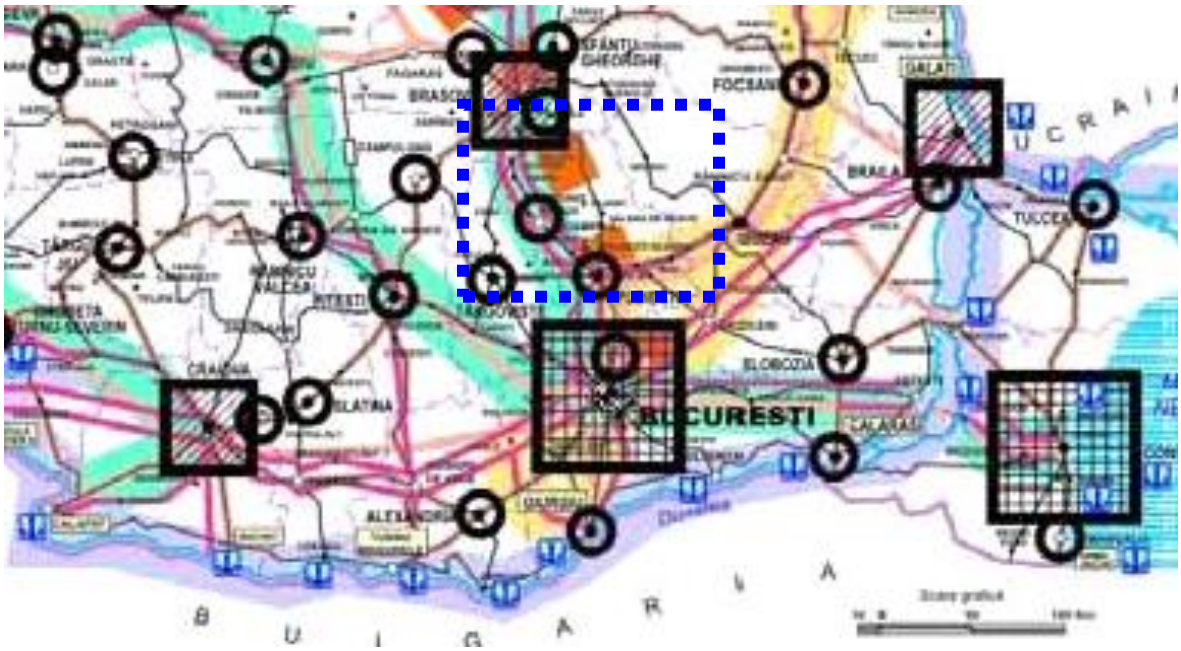
At national level there is number of sectorial strategies and spatial planning documents which are considering or influencing the development policies of metropolitan areas and in particular that of the capital region. The following could be mentioned:

- Regional Development Plans for the Sud-Muntenia and Bucureşti-Ilfov Development Region
- National Territorial Plan (PATN) and the Strategic Concept for Territorial Development
- National Development Plan 2007-2013
- County Spatial Development Plans (for Ilfov and the other counties of Region 3 – RO31)
- Integrated Development Plan for Ploieşti Growth Pole
- General Urban Plans for the capital and main towns and cities of the metropolitan area

- Studies for the metropolitan area of Bucureşti
- Studies for the periurban area of Ploieşti
- National Masterplan for Transports

The National Development Plan 2007-2013 (finalized in 2005) presents a map of the main development poles in Romania on 3 levels: metropolitan areas of European importance (Bucureşti, Constanţa, Iaşi, Timişoara), poles of national and transnational importance and regional poles. The MR (RO3) of the capital is dominated by the capital city, but includes a number of 9 poles with a regional influence (existent or potential ones).

Map 55 Indicative map of development poles



(Source: preliminary studies for the Strategic Concept for Territorial Development – Romania 2030, INCD Urbanproiect, 2006)

The Strategic Concept for Territorial Development (SCTD) finalized in 2008, is a document that connects the national spatial development strategies to the European principles and directions expressed by documents such as *European Spatial Development Perspective* (ESPD, 1999),

Guiding Principles for Sustainable Spatial Development (2000) and others. Among the main objectives set up by CSDTR are:

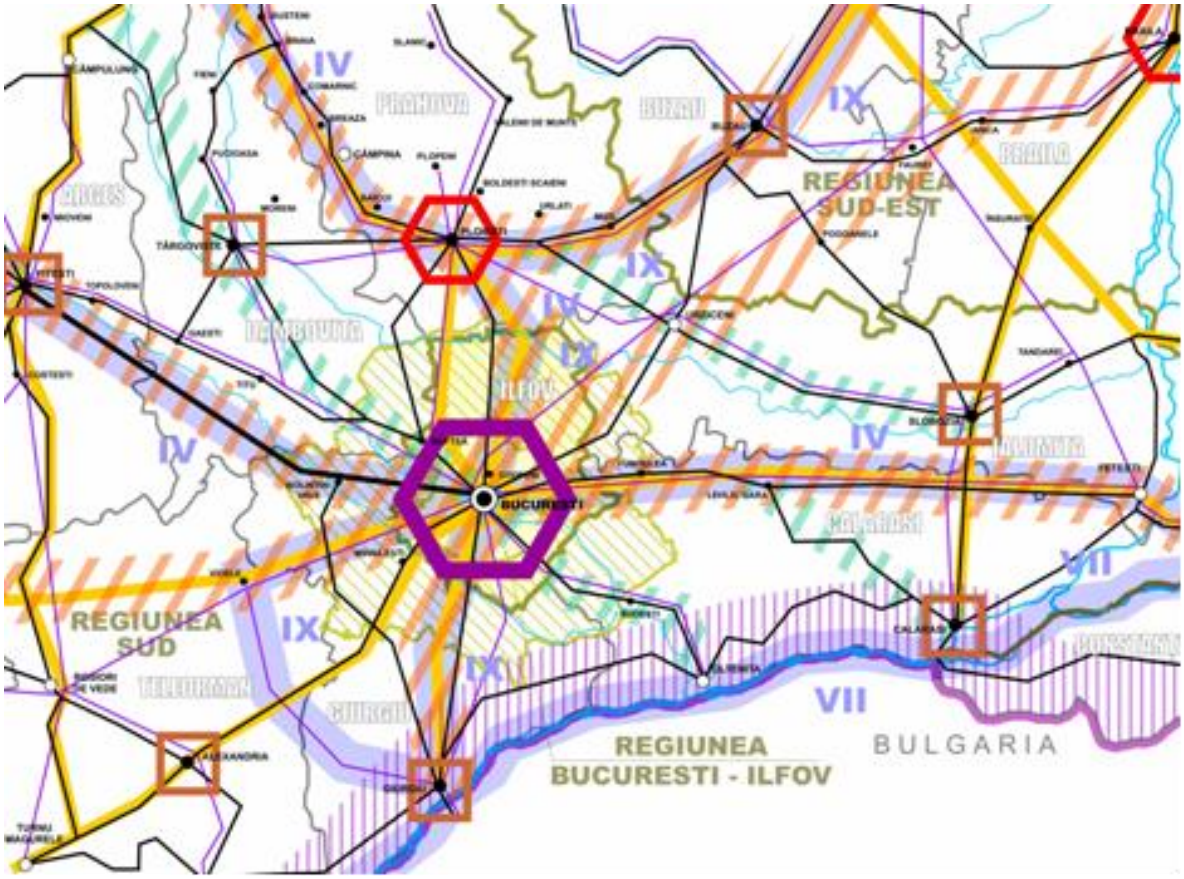
- *the integration of the Romanian metropolitan regions to the European network of poles and spatial development corridors*
- *a better structuring of the main urban system by a balanced development*
- the emphasizing of the urban – rural solidarity, especially at the urban agglomerations level

The National Territorial Plan has distinctive sections[8] for transport infrastructures, protected areas, human settlements networks, management of the water resources, natural hazards, tourism, rural development, major social infrastructures and others. The development vision for the transport infrastructure is placing the capital city and its surrounding area in a central position in relation to the major European corridors. The capital is crossed by corridors 4 and 9 and the MR is adjacent to the 7th corridor – the Danube – to the south. Direct links of the capital and its surrounding area to this latter water corridor are provided.

Map 56 Road and rail main development corridors in the MR of București reflected by Section I of the PATN

[8] Sections are approved by specific laws such as: law 363 / 2006 for the transportation network, law 351 / 2001 for the human settlements network, law 5 / 2000 for natural and built-up protected areas etc.

Map 57 A more detailed image of the capital and its surrounding area with the 3 pan-European corridors



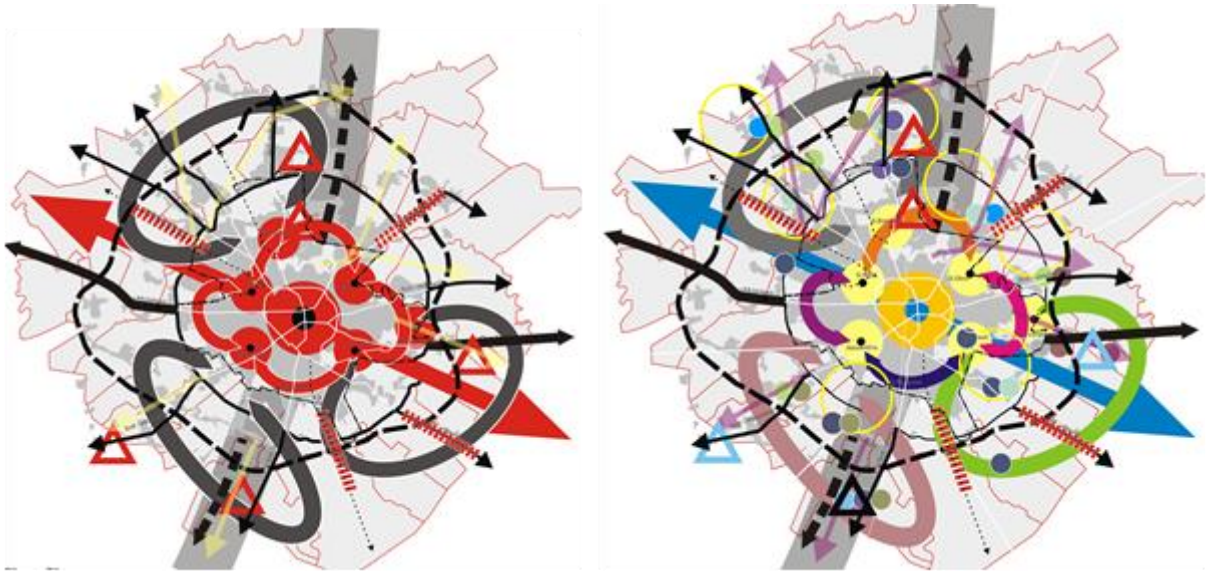
(Source: PATJ Ilfov, 2004)

At lower territorial levels, the capital's surrounding area is analyzed and development policies are formulated in spatial development plans or studies such as the Ilfov County Territorial Plan (2004) or the Strategic Concept for București 2035 (2011-2012). The first one proposes the development of a satellite system of 13 localities, in the immediate proximity of the capital where secondary and tertiary activities should be developed preferentially (the yellow area in the picture below).

Map 58 Human settlements network and population

(Source: PATJ Ilfov, 2004)

Map 59 Strategic areas and directions for București for the next 25 years



(Source: Strategic Concept for Bucureşti 2035, finalized in 2012)

The strategic concept presents the major directions and areas for the spatial development of the capital, underlining the importance of the North-South axis and the natural diagonal one of the Dâmboviţa river valley.

2.1.6. The role of București in the urban networks of the three capitals, Romania, SEE and Europe

The balanced development of the European territory is one of the European Union major objectives whose execution is conditioned by the creation of competitive economic spaces, equally distributed through EU, without differences between the centre and the periphery. This would be accomplished by building a hierarchical human settlements system according to their development potential and that would be interconnected in functional networks. This development model is considered to be the main objective of the European Union Territorial Agenda[i], through which territorial cohesion will be assured at the level of the entire economic integration area. București Municipality imposed itself at the level of the national and regional polycentric network through its superior capacity to structure the space and its functional complexity.

The Municipality of București, as a city with a capital function, occupies the most important position in the national human settlements hierarchy, from the entire Romanian urban system. By its geographic position, at the crossroads of European importance and at only 65 km away from the Danube River, the Municipality of București played and it might play an important role from a political, economic and cultural point of view at a national, as well as at the regional level. From the point of view of its position compared to the second city in the national urban hierarchy, it can be stated that the Municipality of București is the city with the highest degree of urban hypertrophy. This feature is accentuated on one side by the large number of residents and on the other side by the high level of concentration in terms of all economic activities. With the opening of the „internal borders" after 1989, the București metropolis attracted lately the most part of the human capital, both at regional and national level. In addition, the presence of all the institutions with politic and administrative function, but also the presence of subsidiaries of major European institutions, all located within its administrative limits justify the importance of this city in the national human settlements system. Besides the Capital that represents a rank 0 city, the Romanian urban system is composed of other 2 cities with over 300 000 inhabitants.

The adoption of coherent policies concerning the integrated development at a central level, focusing on balanced territorial development through the development of the national polycentric network, is recommended despite reducing disparities in terms of development at all levels between București and the other big cities, located after it in the Romanian human settlements system.

As it was mentioned before, the Municipality of București is situated on the first place in the national human settlements hierarchy, while having the highest polarization power and a high degree of functional complexity (it is an important industrial, business, cultural, educational, health, transport centre), and it concentrates a significant share of the human resource at the national level.

As a leading Romanian academic centre, in terms of human resources, the main leverage is represented by the educational system , fact stated also in the Final Report of one of the ESPON Projects (FOCI Final Report). Currently, at the level of the Municipality of București there are a large number of public educational institutions, as well as private ones that are well known at a national and international level.

The territorial development, in general, is influenced by the quality and the quantity of the human resources that belong to a territory. A territory that has a significant degree of qualified labour force (human resource) has all the chances to become a competitive one with real development chances, in contrast to the poor territories where such resources are condemned and doomed to extinction.

Socio-economic changes that occurred after 1990 and especially in recent years, led to a pronounced urban dynamics, which in the end has driven to a modernization process and the outlining of some emerging areas in the immediate vicinity. This trend was manifested in the economic development of the first ring of settlements located along the ring road, while the changes that followed have affected the social structure and their function. Currently, the ring road has turned into a genuine axis structure, which effectively determined the location of the numerous activities in this area.

These activities led to the emergence of new specific functions (logistics parks, storage areas, manufacturing, commercial areas, residential areas). This was accomplished by changing the dynamic of the administrative status of settlements in the immediate vicinity of the capital, the emergence of 7 new cities, which in turn can be considered true emerging areas of local importance (Voluntari, Popeşti Leordeni, Otopeni, Magurele, Bragadiru, Pantelimon or Chitila). The territorial development of these localities has not sought a logical algorithm, but was done more often in a hazardous way, which has had more negative effects, at a local level. One of

the most relevant examples can be considered achieving connectivity between the capital and the new structures emerging space.

Also this chaotic development has triggered a state of conflict between capital and its surrounding localities. These conflict situations are seen most often through the creation of temporary blockage of public transport between București and surrounding towns.

As for the connections with other European capitals on transport, these are not directly facilitated. Another essential aspect is the degree of development of the national road network, Romania possessing a less developed road infrastructure and occupying a not very high position concerning this aspect (here we refer to the national motorway, which is less developed).

As a viable opportunity for asserting București within the European polycentric network it should be considered the future PanEuropean corridor VII, which could be a strategic axis of development at local, regional or continental level if the project of transforming București into a port on the Danube would be completed. This project is an older one, pre-1989, and it aims to create a connection, the waterway between București and Oltenița.

The geopolitical potential available in București as an European capital determines the inclusion in the network of European urban centers of European and Southeast European importance, which could cause a future increase in its role concerning the European polycentric network. Its evolution over time in a centralized economic system and the advantages of its politic-administrative power from which it has benefited, all being complemented by the functional complexity that București has developed it, places it nowadays at the pinnacle of the Romanian human settlements system (nearly a quarter of the national GDP and concentrates almost 10% of the total population).

2.2 The metropolitan region of Sofia and its role in the European polycentric network

Since the start of the democratic changes in Bulgaria in 1989 the country went through deep political, economic and cultural transformations. The establishment of the new institutions of parliamentary democracy and the transition to a functional market economy were the two main objectives on the public agenda. As research has shown (Tchalakov, 2008) the economic changes were pushed to the background during the process of elaboration of the new democratic constitution and debates were centered on the political changes. Thus restitution and privatization – main tools for the restructuring of the economy, were delayed. The restitution of land in real borders and the chosen model for state governed privatization as opposed to privatization through a functioning stock market led to serious deformations in the structure of the economy. The low level of control over the banking system and the high share of bad credits led to a bank crisis and hyperinflation in 1996 and 1997. Thus a monetary fund was introduced in 1997, stabilizing the economy. Since then Bulgaria managed to achieve two main geopolitical priorities; joining NATO in 2004 and the EU in 2007. The EU accession of the country required numerous legislation changes aimed at the synchronization of national to EU law. As a new member of the EU the country saw a sharp rise of foreign direct investments and fast economic growth which was frozen at the start of the economic crisis. The stable financial system, the low level of public debt and the low budget deficit are major competitive advantages for the country.

Sofia was appointed for a capital city in 1879. Nowadays the capital comprises of 4 towns and 34 villages. The municipality of Sofia spreads over 134 168 ha area. The weight of the capital in the national economy has increased considerably in recent years. This creates opportunities for the future development of the capital and yet is problematic since it leads to widening regional disparities on national level.

2.2.1 Competitiveness and innovation

Competitiveness is a complex concept, which is affected by numerous variables. One of the most important variables is the geographical location of the studied area. As stated in the Integrated Plan for Urban Regeneration and Development of Sofia 2014 -2020 (IPURD), the positioning of Sofia as an intersection for three Pan-European corridors is favorable, but the

capital is relatively far away from the European core cities, which are main centers of competitiveness and innovation.

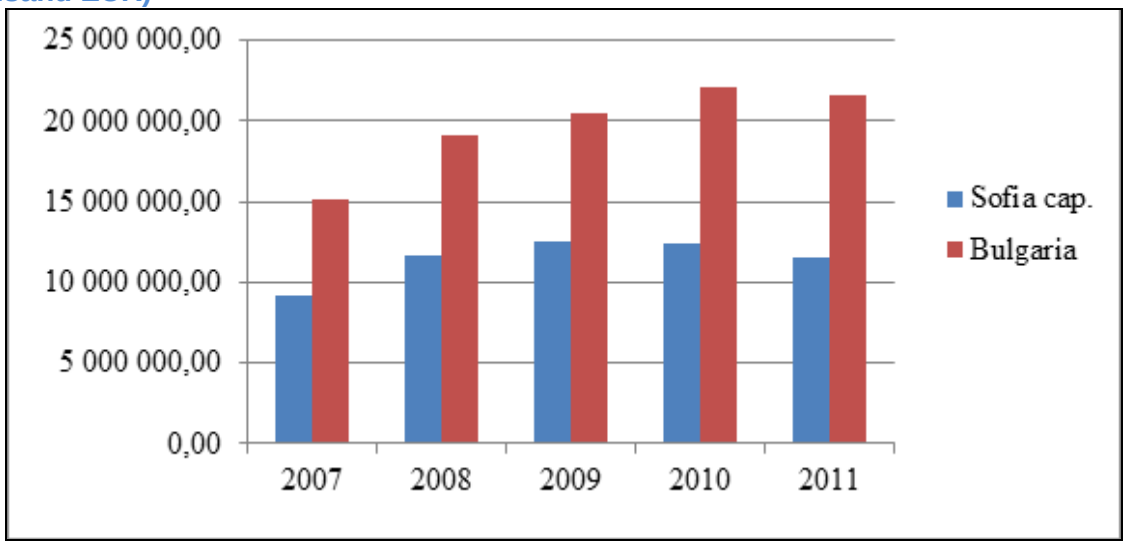
Regional disparities are growing despite EU accession

Sofia capital generates around 1/3 of the national GDP and ½ of the foreign direct investments (FDI). This reveals the huge economic importance of the capital and at the same time mirrors major disparities between Yugozapaden region (the region, to which Sofia capital belongs to) and the other regions of the country.

Regional disparities in Bulgaria have registered a sharp increase in the last decade. According to Eurostat data the differences between regions in terms of regional GDP were minimal in 1998. The dispersion of regional GDP at NUTS 2 level, which measures the gap between regions, was 18.7% of the national GDP per inhabitant in 1998. The value for the indicator in 2009 is 39.6%. This is well above the EU average of 27.2%. In 2009 the only country in EU with a higher value for this indicator is Hungary – 39.8%. Eurostat data also shows that the EU accession of Bulgaria didn't change the negative trend and regional disparities are widening. This can be explained by the higher administrative capacity in Sofia capital and structural imbalances in regional planning at national level. As of 2007 the dispersion of regional GDP at NUTS 2 level is 36.1%.

The FDI in non-financial enterprises did grow till 2009 (for BG 411) and slowly declined due to the world financial crisis (Figure 18)

Figure 18 Foreign direct investments in non-financial enterprises with accumulation (in thousand EUR)



Source: National Statistical Institute of Bulgaria

On the positive side, the decline was slower on NUTS 0 level, but still the steady growth, achieved during the first years after the EU accession did not continue after 2010.

The share of industry in the regional economy has decreased

In 2010 the economic sector with the highest Gross value added to the Bulgarian economy is the sector of services. With a share of 65.6% in the structure of the national GVA, in 2010 the sector of services generated 39 859 622 000 levs (20 379 901 116 euros) at current prices (National Statistical Institute). The share of services in the national economy is growing – in 2000 the Gross value added for the sector was 60.5% of the total. The sector of industry is also growing – in 2000 it produced 25.8% of the total GVA compared to 29.4% in 2010 (17 880 690 000 levs or 9142251627 in euros at current prices). The sector of agriculture and forestry registered a sharp decline in the past decade and in 2010 generates barely 4.9% of the total GVA.

The share of services in Yugozapaden region (BG41), to which Sofia capital belongs, is higher than that for the country – in 2010 the sector produces 76% of the GVA for the region. The share of industry is 22.5%. For Sofia capital (BG411) the share of services in GVA is 78.1% in 2009, industry contributes 21.5% of the GVA (Table 35). The share of industry has decreased compared to 2003.

Table 35 GVA by economic sector, national currency

GVA by economic sector – Sofia capital (BG411)	2003	2005	2007	2009
Total GVA, mil. levs	8596	10911	16900	22937,1
a) Agriculture and forestry	52	46	48	49,8
b) Industry	2416	2378	3578	4943,1
c) Services	6128	8487	13274	17944,3

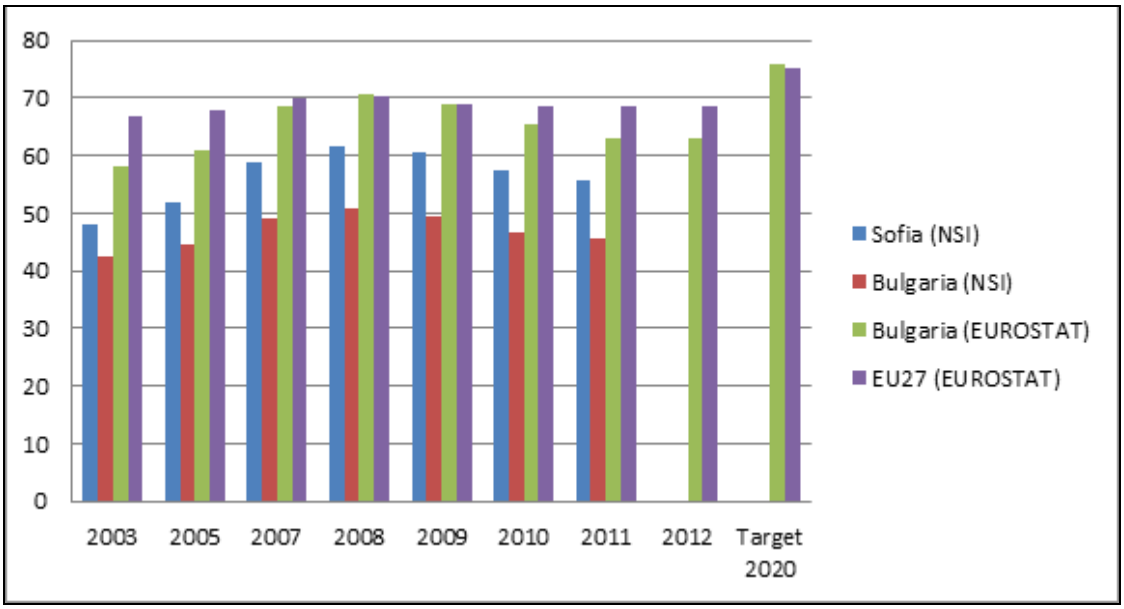
Source: National Statistical Institute of Bulgaria

The well-developed labor market is an advantage

The higher than average employment rates of Sofia and the major advantage in the knowledge intensive fields of economy (81% of all employees in “Information and communication” field in

the country) are the main reasons for the overall attractiveness of the city. According to data of the National Statistical Institute (NSI) for the time period 2003-2011 Sofia had steadily better employment rates than the country (Figure 19). Till 2008 the percentage of persons employed was increasing. This trend was followed by a decline until 2011 due to the impact of the economic crisis. The most recent data shows stabilization, mainly based on the overall performance of the EU economy.

Figure 19 Employment rates in %, Eurostat and NSI



**EUROSTAT is measuring the employment rate for the age group 20-64, while data of NSI is relevant for the age group 15- 64.*

The average annual number of employees under labour contract for Sofia capital in 2010 is 681 864 people – 30.4% of the employees under labour contract in the country (NSI). The activity sector with the highest number of employees is Wholesale and retail trade, repair of motor vehicles and motor cycles – 148 734 employees in 2010. Worth noting is the high share of employees in the activity sector "Information and communication" as well as "Financial and insurance activities". Sofia capital is concentrating 81% of all employees in "Information and communication" in the country. That gives the capital a competitive advantage in a knowledge base economy. 9.5% of employees in Sofia capital are working in the sector of Manufacturing. The share of "Manufacturing" in the national labour force is 22.2%.

The unemployment rate in Bulgaria has almost doubled from 2008 to 2011 (NSI). In 2008 the total number of unemployed people in the country, aged 15 years and older was 199 700 (5.6% unemployment rate). In 2011 the number of unemployed (aged 15 years and older) is 372 300

(11.2% unemployment rate). The unemployment rate for young workers (15-24 years) has increased from 12.7% in 2008 to 26.6% in 2011.

Yugozapaden region (BG41) has the lowest unemployment rate in 2011 compared to all other planning regions. With 75.1 thousand unemployed in the age group 15-64 the unemployment rate for the region is 7.3% in 2011 compared to 3% unemployment rate in 2008. In Sofia capital the unemployment rate is lower than that of the region – 6% in 2011 for the age group 15-64. Yet the rate has doubled since 2008 when unemployment in the capital was 2.5%.

EU 2020 Strategy sets as a national target for Bulgaria a minimum of 76% employment rate for the age group 20-64. This target could be achieved by implementing more effective policies and initiatives in the fields of entrepreneurship and education, as pointed out in Objective 3 of Priority axis 1 from the Plan for Development of Sofia Municipality 2007-2013 “Promotion of entrepreneurship and the development of small and medium sized enterprises”. The efforts for creating small businesses will result in an increase of the number working places and respectively lower unemployment rates. Additionally, this will lead to higher demand of better qualified workers with tertiary education, thus addressing the EU2020S target for participation in higher education.

The economic crisis has led to an increase of labour productivity

According to Eurostat, Bulgaria has the lowest labor productivity compared to all other EU countries. In 2011 the index of labor productivity per person employed in Bulgaria was 44.3 % of the EU27 average. There is a significant increase on this indicator since 2000, but the economy of the country is still relying mainly on mining and exporting raw materials and products with low added value.

It is important to notice that during 2010 and 2011 the labor productivity index of Bulgaria registered a 5-6% growth which in the beginning of 2013 slowed down to 0.7%. The above stated data is a result form the combined impact of the employment decrease and production optimization in 2011 and 2012. In the beginning of 2013 the service industry registered a 2.4% decrease on year to year basis, while the industrial and agricultural sectors increased respectively with 5.3% and 7.5%. Furthermore, it should be taken into account that real increase of labor productivity can be achieved by investments in human and industrial capital.

The education structure of the population is favorable

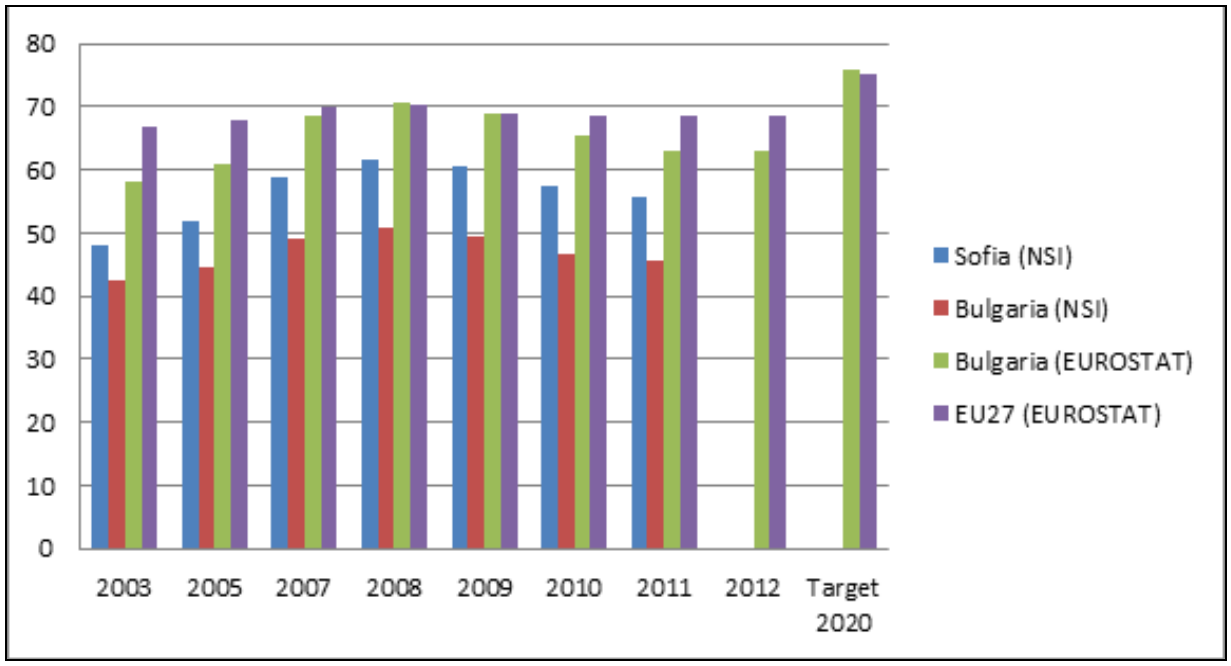
The national demographic strategy evaluates as favorable the overall educational structure of the population in Bulgaria compared to the EU averages. As of 1.02.2011 the number of people with tertiary education in Bulgaria is 1 348 700 or 19.6% of the total population aged 7 years and older – a 5.5% increase compared to Census 2001. A 5.5% increase is also recorded in the number of people with upper secondary education who reach 2 990 400 – a 43.3% share of the age cohort.

Among all regions Sofia capital has the most educated residents. The share of people aged 7 and over with tertiary education (ISCED 5-6) reached 36.8% in Census 2011 compared to 28.8% in Census 2001 – a remarkable increase. This is explained by the concentration of institutions of higher education – 22 out of 51 public and private universities and colleges are based in the capital, and the higher intake of students as a result of the national policy for raising the share of tertiary educated people. The share of population with upper secondary education in the capital is also rising and in Census 2011 reached 44.9% of people aged 7 and over.

The R&D potential should be further utilized

There is an impressive increase in the total intramural R&D expenditure (GERD) between 2004 and 2010 - 114%, which is significantly higher than the EU-27 average of 23.91%. Although in Yugozapaden region (BG41) the values of GERD per capita is 3 times higher than the average for Bulgaria, the value of the expenses are very low compared to the EU average (EUR 84.7 vs. EUR 491.8). Bulgaria is far away from achieving the EU 2020 national target of 1.5% of GDP invested in R&D, as this percentage was only 0,6% of GDP in 2010.

Figure 20 Total intramural R&D expenditure (GERD) by NUTS 2 regions, euro per inhabitant, all sectors, in EUR



Source: Eurostat Database

In regard to this there should be efforts for facilitating the development of R&D sector in order to meet the EU 2020 target. Judging by the structure of the economically active population the potential for development is considerable. Yugozapaden region (BG41), to which the capital belongs, has the highest share of human resources in science and innovation as a % of the economically active population compared to all other development regions in the country. According to Eurostat in 2011 the share of active population in science and technology is 40.9% compared to 38.4% in 2003.

In 2010 63.38% of the total R&D personnel and researchers in Bulgaria were in the Yugozapaden region. Between 2003 and 2010 the number of R&D personnel in this region increased with 6.37%. All regions in Bulgaria recorded an increase in the total R&D personnel and researchers for the period 2003-2010. The highest increase in the R&D personnel was registered in Severen tsentralen region – 88.79% for the same period, but this region had only 6.79% of the total R&D personnel or 1 414 people in 2010.

According to Eurostat, in 2012 the individuals regularly using the Internet in Yugozapaden region (BG41) is 61% which is the highest value in the country, as well as close to the EU27 average. The individuals who ordered goods or services over the internet for private use in

Yugozapaden region (BG41) in 2012 was just 15%. We can argue that this is a result of combined impact of different factors such as low income, conservative consumer profile and etc.

2.2.2 Demographic and social structure, well being

The demographic processes predetermine the development of all public policies. Addressing the problems of demographic aging and declining populations has been for years a key political priority of EU. The National strategy for demographic development of the population of Bulgaria 2012-2025 stresses that for Bulgaria the challenge is even greater since it stands out as the country with the fastest decline of population not only in EU, but in the world. According to the World population prospects of the United Nations (World Population Prospects: The 2012 Revision) Bulgaria will see the highest population decrease in the world in the period 2013-2050 with a population shrinking from 7.223 mil. in 2013 to 6.527 mil. in 2025 and down to 5.077 mil. in 2050.

Slowing down the projected population decline is a major priority of the national policy. This has to be combined with multisectoral measures for raising the quality of human capital and the state of well-being. As reminded in the National strategy for demographic development, the accomplishment of 4 out of 5 targets on the EU 2020 agenda will depend on the ability of institutions to adapt the relevant policies to the demographic tendencies.

Sofia capital has yet not adopted an integrated strategy for demographic development, as advised by the national strategy. The demographic problems have been addressed within the municipal plan for development of Sofia 2007-2013 and within the new integrated plan for urban regeneration and development 2014-2020. Apart from these documents the municipal authorities have elaborated a series of strategic documents on different aspects of social policy as the strategy for the prevention of social exclusion 2011-2015, the strategy for the implementation of the decade of Roma inclusion 2007-2013, five strategies for the provision of social services to different underprivileged groups with a time horizon 2013. These strategies are already out of date. Their implementation within the relevant periods has not been evaluated. They were not accompanied by indicative financial estimates and there has been no linkage between the anticipated measures and the annual budgeting of the municipality.

The population change – driven by economic migration

The development of demographic processes in Sofia capital for the last decade mirrors the imbalances in the regional development of Bulgaria. Sofia capital and Varna are the only NUTS 3 regions in Bulgaria, which registered an increase in the number of population between the two censuses 2001 and 2011. Since 2001 the population of Sofia capital has increased by 10.3% to reach 1 292 591 persons – a 17. 5% share of the total population in the country. Respectively the total population of Bulgaria has decreased in this period by 7.1%.

Statistical data shows that the rate of increase in the number of population has been similar for both the towns and the villages within the boundaries of Sofia capital (the capital comprises of 4 towns – Sofia, Bankya, Buhovo and Novi Iskur and 34 villages). Yet 93% of the population of the capital in 2011 was concentrated in the city of Sofia as opposed to the desired scenario, described in the "Integrated plan for urban regeneration and development of Sofia 2014 – 2020". The concentration of population in the city of Sofia compared to a lower population density for the surrounding towns and villages is evaluated as unfavorable since the potential of the outer territories is considered crucial for the balanced development of the region.

Economic migration has been the main driver of the population change in the capital. As highlighted in the Eurostat regional yearbook 2013, Sofia capital was among the EU regions where the relatively high positive rates of net migration did offset smaller negative rates of natural change. National data shows that Sofia capital was the main destination for internal migration. Within the period between the two censuses the number of people who changed their residence in the country is 379 181 persons. Of them 32.1% migrated to Sofia capital. As a main reason for migrating to Sofia the respondents in surveys of the National Statistical Institute point out education and career.

The future population growth in the capital will be indicative for the success or the failure of the national policy for regional development. The master plan of Sofia envisages as a realistic and desired scenario a slower population growth till 2030, with 1 485 000 permanent population in the capital at the end of the period. As highlighted in the plan, the pessimistic scenario for faster growth till 2030 (up to 1.625 mil. people) will be disastrous both for the country and for the capital which is already close to the population threshold in terms of infrastructure capacity.

The educational system is not immune to imbalances

As already highlighted, the overall educational structure of the population in Bulgaria is evaluated as favorable compared to the EU averages. Sofia capital stands out with a favorable

position on another key educational indicator – the share of individuals aged 18-24, who have finished no more than lower secondary education and who are not involved in further training. As pointed out in the Eurostat regional yearbook 2013 Yugozapadna Bulgaria, to which the capital belongs, is among the EU NUTS level 1 regions with less than 1 in 10 early school leavers.

Yet the education system is not immune to imbalances. There is a clear gap in the educational attainment of the Roma minority in the capital compared to the average level. In Census 2011 18 284 people in Sofia capital defined themselves as representatives of the Roma ethnic minority, but the actual number of the representatives of this minority is supposedly higher since 9% of the total respondents in the country refused to answer to this question. Only 1% of this ethic group in the capital (aged 7 years and older) has completed tertiary education. 8.4% have never visited school. Regional imbalances in the educational structure are also characteristic. The cities of Novi Iskur, Bankya and Buhovo (which falls within the borders of Kremikovtzi region) register lower values of tertiary educated people – respectively 11.8%, 26.9% and 8.7% for Kremikovtzi, compared to a 36.8% average for the capital.

The favorable position of Sofia capital in education is a major competitive advantage. Higher educational levels are precondition for the development of knowledge based economy. Yet authorities have to make further efforts for raising the quality of education since the results of Bulgaria in international programs for evaluating the knowledge of pupils such as Pisa, PIRLS and TIMMS in recent years have been deteriorating.

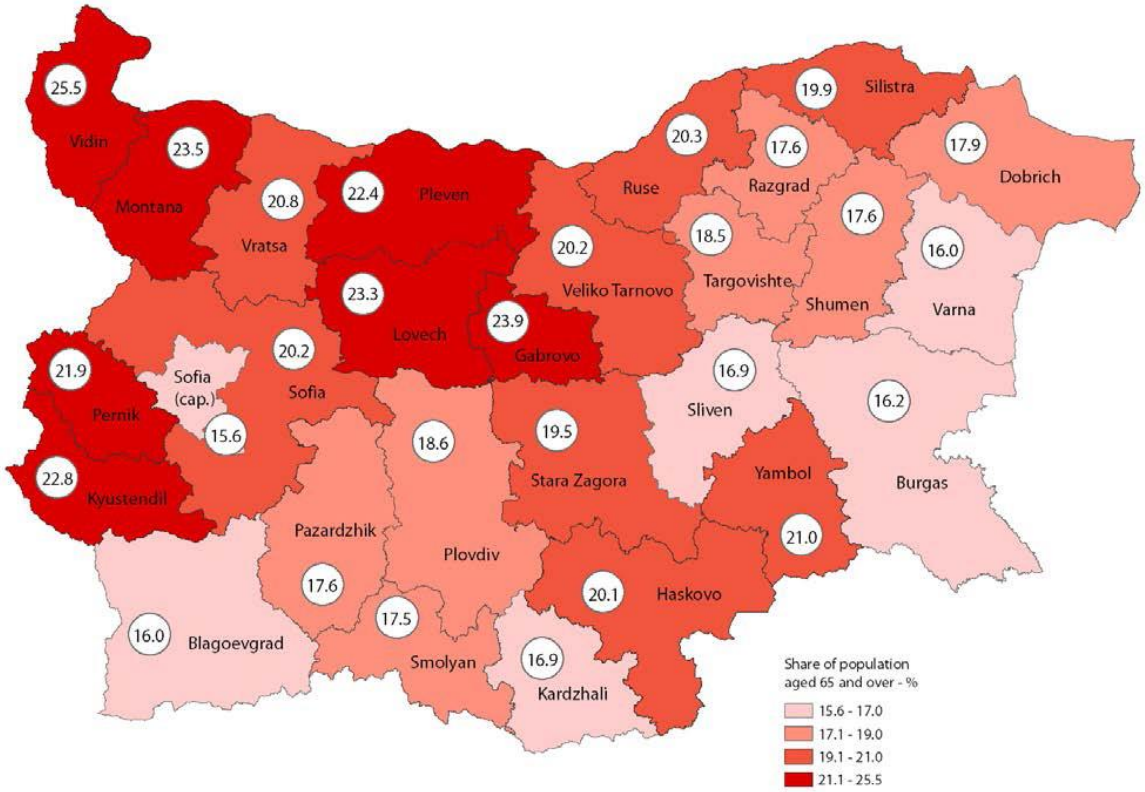
The state of well-being of vulnerable groups is a problem

As an economic and administrative center, Sofia capital stands out with a higher living standard compared to all other regions. This is mirrored by a variety of indicators. The capital has the highest life expectancy at birth in the country (NUTS 3 level) with 72.54 years for the male group and 79.01 for the female group (NSI, 2010-2012). For the last ten years life expectancy at birth in the capital has been increasing but yet the rate of increase is low, and the gap between males and females is still wide. Sofia capital still does not reach the EU28 average on this indicator – 77.4 years for the male population and 83.2 years for the female population (Eurostat, 2011).

With one of the highest crude birth rates in the country – 10.5 ‰ for 2012 and the inflow of internal migrants, Sofia capital has a more favorable age structure of the population than the

national one. The number of young people under 15 years of age increased by 8.8% from 2004 and reached 163 617 by the end of 2011. In addition to this in Census 2011 Sofia capital registered the highest share of population in the age group 15-64 compared to all other districts in Bulgaria – 72.1% (68.3% average for the country) and the lowest share of people aged 65 and over – 15.6%. Yet the demographic group that is growing fastest is the old age group. To this tendency contributes the comparatively low fertility rate in the capital - 1.28 children per woman in 2011.

Map 60 Share of the population aged 65 years and older by districts as of 1.02.2011



Addressing the problems of poverty and social exclusion will be one of the hardest challenges for Bulgaria in 2014-2020. According to Eurostat data for 2012 49.3% of the population in Bulgaria is at risk of poverty or social exclusion – the highest value on this indicator in EU. National data shows that poverty is a problem even in the capital despite the economic advantages, which the region offers. In 2010 the poverty line in Sofia capital (calculated as 60% of the average disposable net income of the households) was BGN 451 per person (€ 230.6)

compared to a national average of BGN 283.75 (€ 145). Below this line in Sofia capital, at risk of poverty, is 18.8% of the population (the share on national level is 22.3%).

Social inclusion of vulnerable groups is also problematic. Access to social services for people with special needs in Sofia capital has been strongly criticized by different non-governmental organizations. According to municipal data the number of people in need of such services is rising – the number of people with disabilities has increased from 9 507 in 2008 to 10 859 in 2010 (persons aged 16 and older), the number of young people with disabilities is also rising. Although the system of social services is undergoing a major change with attracting private actors as service suppliers, the capacity of the existing social services is low compared to the needs. As an example there are only 7 municipal specialized institutions for old people with a total capacity of 1 016 places and 6 homes for children without parents with a capacity of 423 places. Although the Municipality is planning to substitute the services of such specialized institutions with more personal and integrated care, the capacity is yet insufficient.

Access to health care in the capital is considered good although the number of hospital beds is decreasing. This decrease is an outcome of purposeful policy for optimizing the health system, followed both on national and municipal level. The most problematic branches in the health sector are urgent health care and care for terminally ill. The capacity of the urgent health care sector in the capital is insufficient, especially concerning the supply of this service for suburban areas.

The population increase in the young age cohort in recent years has led to a serious shortage in the supply of municipal kindergarten care in the capital. According to unofficial estimates over 14 000 children in the relative age group remained out of the municipal gardens in 2013 due to a lack of capacity. There is no data how this problem affects the Roma ethnic minority.

2.2.3 Internal connectivity

The metropolitan region of Sofia is a transport hub of major national and European significance. Three national highways converge in the region, coinciding with three Pan-European transport corridors pass through (IV, VIII, XC,). The proximity to Pan-European transport corridors and the geographic location of the capital are considered in the new “Integrated plan for urban regeneration and development of Sofia 2014-2020” as a key strategic factor, which will influence the competitiveness of the region. The potential of the capital as a transport hub of national

importance is further determined by the development of the railway network and the leading role of Sofia airport as the major air traffic junction in the country.

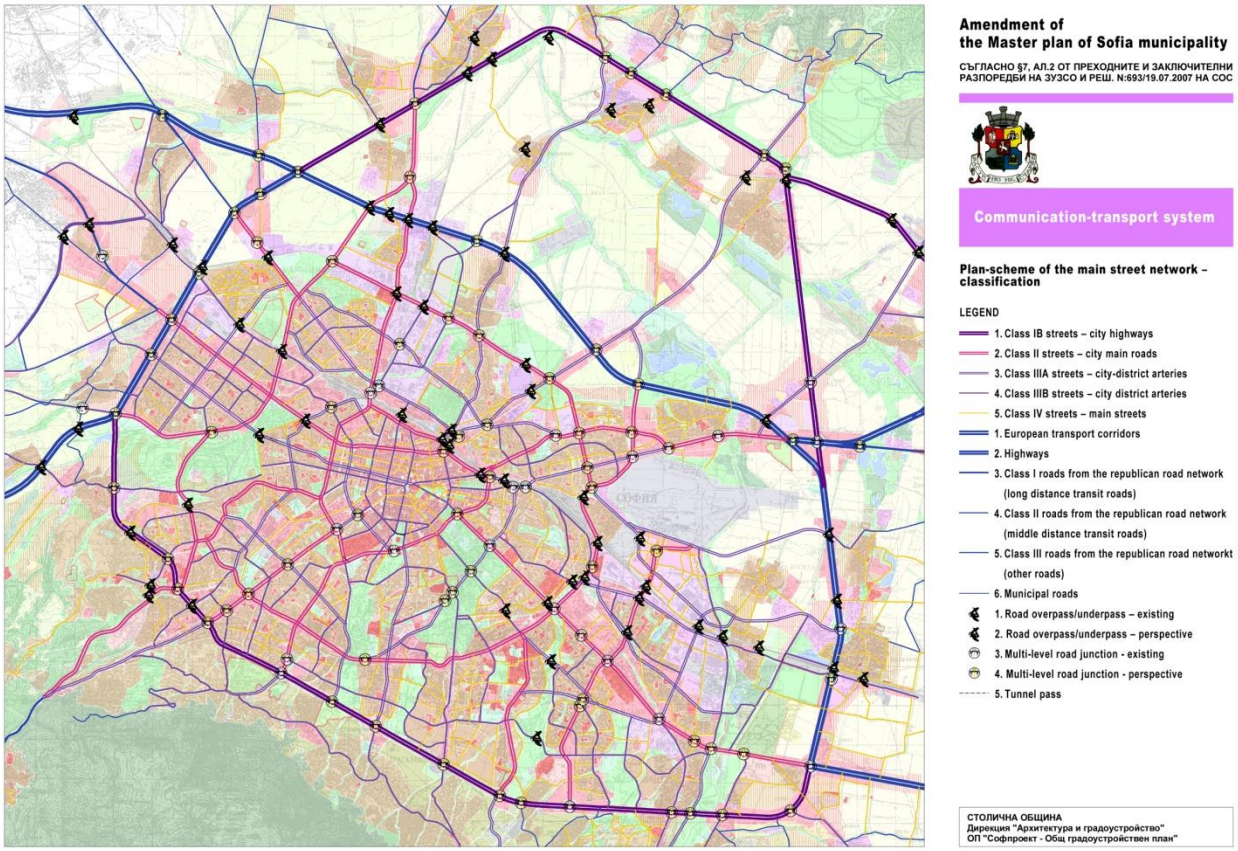
Alongside the impact on regional and national accessibility and connectivity, the development of the transport communication system of Sofia is of significant importance for the smooth functioning of the capital economy, enhanced environmental protection and well-being. Improved internal connectivity will have a positive impact on many public systems and is crucial for overcoming the territorial imbalances between the core city and the surrounding area.

In recent years there has been a major improvement in long term strategic planning for this sector. In 2010 the Municipality elaborated a new Master plan for traffic management. The development of the communication-transport system has been further analyzed within the amendment of the Master plan of Sofia (2009), the regional impact of a number of transport infrastructure projects has been evaluated, measures for integrated action are defined in the Integrated plan for urban regeneration and development of Sofia 2014-2020. Yet providing the necessary financial resources, subordination between institutions and project readiness will be a major challenge for implementing the anticipated measures.

Road traffic and saturation – main problems of the performance of the road network

As pointed out in the Master plan of Sofia and the new Master plan for traffic management, the development of the transport communication system is critical for overcoming existing territorial imbalances in the capital. In the last two decades the southern territories of the city have gained precedence over the northern parts despite plans for reversing this tendency. This leads to excessive concentration of population and activities in the core city area, thus diminishing the quality of public services and the state of well-being. For overcoming these imbalances different interventions have been planned. A major transport axis for the future development of the northern territories will be the northern high-speed tangent, which is to be constructed in the next programming period 2014-2020 as part of the Republican road network along Trans-European Transport Corridors No. 8 and No. 10. Furthermore the northwest territories of the city have been approved as an impact zone for integrated investments in the new Integrated plan for urban regeneration and development of Sofia 2014-2020, including investments in the transport communication system.

Map 61 Plan-scheme of the main street network – classification



(Source: Master plan of Sofia)

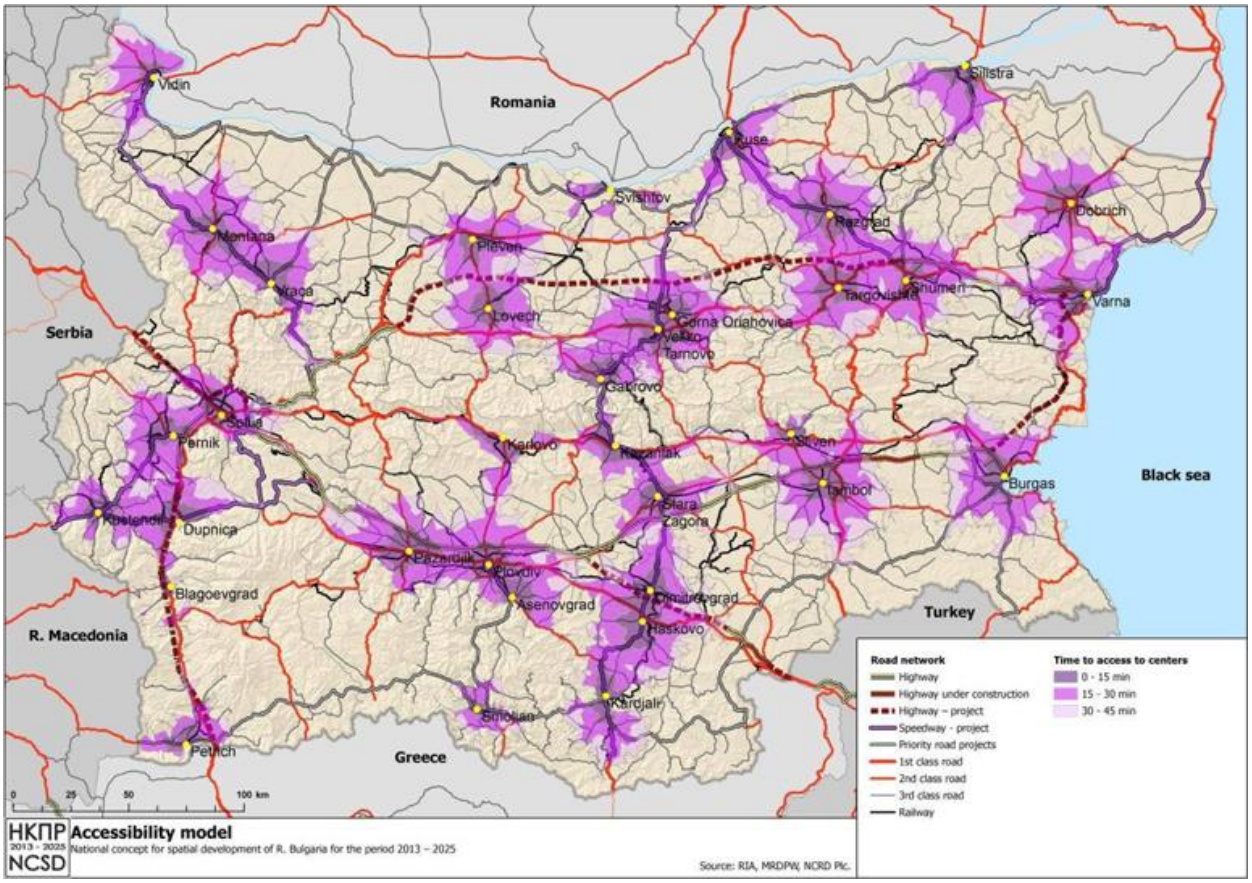
Generally the slow pace of construction of new routes/streets has been typical for the incorporation of new territories to the compact city of Sofia in the last 10 years. The synchronization between the institutions involved in urban planning has been undermined, as admitted in the Municipal plan for urban development. The failure to implement some routes of structural importance for the city holds up the smooth conducting of the traffic flows and obstructs the normal functioning of the capital. In addition to this a large number of main streets are not built to the necessary dimensions (especially the cross sections) as their functional designation suggests.

Indicative of the problems with road infrastructure is the fact that as of 2009 there are no Class I routes (long distance transit routes) in Sofia. It is forecasted that with the completion of the northern high speed tangent and the reconstruction of the Eastern, Southern and western arches of Sofia ring road the Class I routes will reach a 61.8 km length. According to the Master Plan of Sofia (2009) the current length of the main street network – Class I – Class IV roads is

428 km and is forecasted to reach 853.6 km, which requires huge investments in road infrastructure.

The poor state of the pavements causes additional diminishing of the throughput capacity of the main street network. The absence of widening at the funnel part of the crossroads and lay-byes at the stops for the mass public transport also has a negative impact on the throughput capacity.

Map 62 Accessibility model, National concept for spatial development



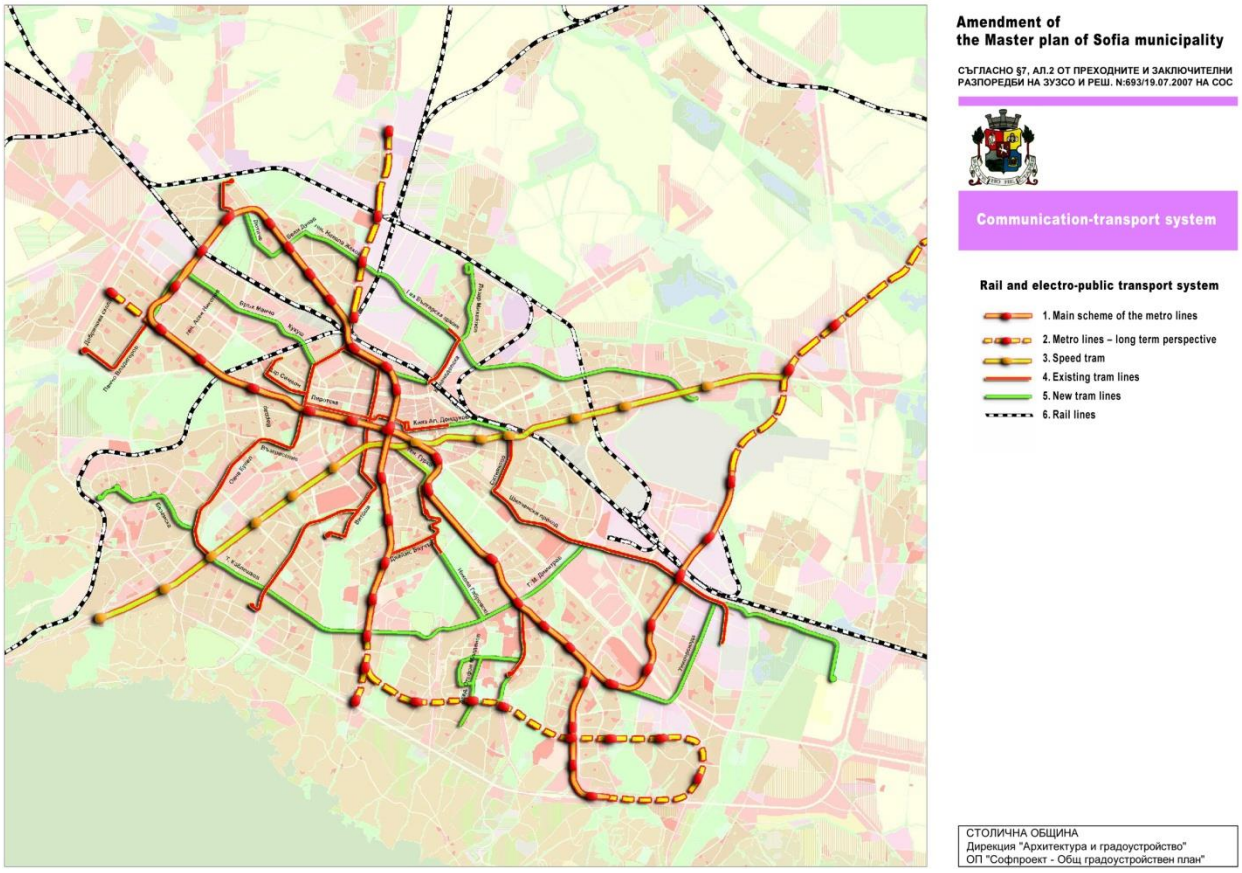
(Source: Ministry of regional development)

Well-developed public transport network, low satisfaction with the service

The public transport system in Sofia includes a network, comprising of suburban rail and bus network, metro, many tram lines and a well-developed network of bus and trolley routes. However, the street transport reliability suffers due to the poor traffic conditions in the central city area. The most recent elements of the transport network are the metro lines which are under construction since 1998. Currently (2013) two of the three main lines are almost complete – the first metro line, with a total length of 29 km and the second metro line, with a length of 17

km. The 19 km long third metro line is still in an early planning stage and is being debated by the local authorities and the community. The aim of the Municipality is to put the 3d line into service by 2018.

Map 63 Rail and electro-public transport system



Source: Master plan of Sofia

Public transport is the main mean of transportation in Sofia. The "Survey on perception of quality of life in 75 European cities", published in 2010 by the European commission, shows that 64% of the population in Sofia capital travel to work by public transport, bicycle or on foot (the percentage for Vienna, Austria – a capital with a similar population, is 66%), compared to 33% traveling by car (in Vienna the share is 34%). Yet the share of car trips is rising impressively. According to data in Master plan for traffic management the share of car trips has increased from 17.4% in 2000 to 30.5% in 2009.

In recent years the share of tram and bus usage has declined on account of the new metro lines. This requires rethinking of the existing public transport routes so they complement each other. According to the above mentioned European survey only 43% of the citizens are satisfied

with the quality of public transport (in Vienna the respective share is 90%). Moreover, poor traffic conditions during rush hour hinder public street transport mobility, making travel from and to work more than 30 min for 54% of the population (34% for Vienna). In a replacement of the fleet of buses and trolleys is needed in order to offer greater comfort and higher level of satisfaction; the bus and trolley routes should be better organized so they complement efficiently the newly built metro lines; the creation of separate bus lanes to improve time to travel is advised (Master plan for Traffic management).

Chaotic parking and lack of adequate road signalization

The sporadic parking in the active lanes of the streets and the lack of park and ride spaces further diminish the traffic conditions in the capital. According to Urban audit data in 2007-2009 time period the parking spaces are 18.3 per 1 000 cars or 9.5 per 1 000 residents. The municipality has taken steps in order to provide additional parking spaces in the broad central part of the city. The area for short-stay paid parking scheme has been expanded and now the blue zone – the short term parking zone in the core city center, comprise of 4 075 parking spaces. A green zone for the broad center has been established which comprises of 10 382 parking spaces. The price for paid stay in the core city center has doubled from 1 to 2 levs per hour. Generally the prices for paid parking in Sofia are very high. The global parking rate survey of "Colliers international" traditionally places Sofia in leading positions in terms of high prices for paid private parking due to a lack of sufficient parking capacity in the center of the city. Recently the government has started to tighten the requirements for parking and garage spaces in newly built commercial and residential buildings. New underground parking lots have also been constructed as part of the metro-line network.

The horizontal and vertical road signalization is a precondition for safe journey. Typical for Sofia are both the abundance of signs for road signalization, especially in the center of the city and the lack of signs at key crossroads. The signs have been manufactured in different periods, by different private companies, without common technical specification. The horizontal signalization usually has a short duration in time, due to outworn pavements.

In response to these problems the new Master plan for traffic management sets as a main priority the establishment of a multimodal macro model of the transport system of the capital. Such model should allow computer modeling of different alternatives for the development of the

transport communication system. This requires the introduction of a set of obligatory and periodical inquiries in the field of transport.

2.2.4 Environment

The need to better ensure and subordinate the environmental and climate change policy is a major priority of EU for the next programming period 2014-2020. As set out in the Common provisions regulation, the objectives of the Cohesion and Structural funds shall be pursued in the framework of sustainable development and the aim of protecting and improving the environment. The regulation further imposes that at least 20% of the Union budget for the period 2014 — 2020 should be devoted to support for climate change objectives.

In compliance with these new requirements the Bulgarian ministry of environment and water has issued common guidelines for integrating the environmental and climate change policy in the preparation of all operational programmes. In addition to this a new national strategy for adaptation to climate change is under preparation.

The subordination of strategic plans and actions in terms of environmental protection and climate change policy will be even a greater challenge on regional and municipal level. A serious obstacle for achieving this goal is the lack of comparable data on NUTS 2 and NUTS 3 level for a variety of indicators in the field of climate change. This problem was highlighted in the pilot project for establishing a regional index for climate security, financed by INTEREG IVC ("Regions for sustainable change", RSC 0301R1). The pilot study illustrated as well problems with the specific administrative capacity needed for implementing the climate change policy.

On municipal level environment protection and adaptive capacity to climate change have been addressed only partially in the Municipal plan for development of Sofia municipality 2007-2013. A future strategic document for the development of the municipality should overcome such shortcomings since the implementation of such programmes requires long term planning, multisectoral measures and serious investments – both public and private.

Air pollution continues to be a problem despite some improvements

As pointed out in the regional plan for development 2014-2020, Yugozapaden region faces continuous problems with air pollution. One explanation for this trend is the intensive economic development of the region and the functioning of heavy industry enterprises. The dense urbanization also contributes to air pollution. Data on NUTS 3 level shows that in recent years Sofia capital has seen a significant improvement for most air pollutants. Yet the capital continues to exceed the thresholds for some indicators.

In terms of air quality one of the most significant problems in Sofia capital is the high content of **Particulate Matter (PM-10)**. Particulate matter is divided in two types – coarse particles, formed from sources like road dust and construction, and fine particles, formed when fuel is burned in automobiles and power plants. Medical studies show that high concentration of PM2.5 (particulate matter bigger than 2.5 microns) increases the risk of death from heart attack and other cardiovascular diseases. According to Urban audit data in 2007-2009 the threshold for particulate matter in the air - 50 μg /m^3, in Sofia was exceeded on average in 176 days. Registered levels for București are similar to those for Sofia - (167 days per year, 2007-2009). The Urban Audit shows that in Athens the number of days with PM levels exceeded is 174 days (1999-2002).

In recent years emissions of **sulphur oxides** in Sofia capital have registered a major decrease. This development is associated with the reduction of sulphur content of diesel, heating and unleaded gasoline. For 2007-2010 the total volume of **sulphur oxides** emissions in Sofia decreased from 7 148 to 407 tons - more than 17 times. In 2010 Sofia produced 0.1% of Bulgarian's emissions.

Emissions of **nitrogen oxides** are also decreasing. This gas is not harmful to people but in reaction with other gases it forms nitrogen dioxide. High concentrations of nitrogen dioxide can lead to respiratory infections. In 2010 the total measured amount of NO_x in Sofia was 1 245 t (1.6% of Bulgarian's emissions) compared to 6 019 tons in 2005. Yet the value on this indicator is higher compared to other EU capitals. The value for București in 2010 was almost 5 times less than that for Sofia - 292 tons per year.

In 2010 the atmosphere above Sofia was polluted with 21 102 tons (5.3% of Bulgarian's emissions) of **methane** compared to 990 tons for București. Therefore in 2007 - 2011 investments were made by the Municipality of Sofia to reduce methane emissions in the

treatment of waste and waste water and in the production of renewable energy. The main source of methane in Sofia is waste.

The better utilization of water resources is a must be

Better utilization of water resources is a must be for Sofia capital. The capital is characterized with high consumption of water both on national and EU levels. In 2010 the capital registered a 140 l/per capital/day consumption of water compared to 97 l/day average for the country. Statistical data shows that there has been no improvement on this indicator over a 10 year period.

Urban Audit data shows that Sofia is among the EU capital with the highest values on this indicator. The registered consumption of water per inhabitant for the period 2003-2006 in the Sofia Core city area was 125.4 m^3/year, compared to much lower levels for București and Athens – with respectively 55.2 m^3/year and 57.6 m^3/year.

According to the Integrated plan for urban regeneration and development of Sofia capital the utilization of existing mineral water sources has a serious economic potential for the development of tourism. There are 30 sources of mineral water on the territory of the capital. 10 of them are evaluated as having a national potential.

In 2011 Sofia capital has 100% coverage with a public water supply network. The share of population, connected to urban wastewater collecting system is the highest compared to other regions – 95.6% (74% average for the country). The share of population, connected to wastewater collecting system without treatment has decreased from 0.8% in 2010 to 0.1% in 2011. This leads to a low negative impact on the underground water in the Sofia plain. Yet the state of the underground infrastructure is not satisfactory, explaining high loses in the water supply network. Rehabilitating the infrastructure requires serious investments and will lead inevitably to a higher price of water.

Eurostat data shows (2003-2006) that Sofia is among the top five capital cities registering lower amounts of waste per capita. National data for 2011 (NSI) shows even lower level – 0.238 tons per capita per year. Yet a serious problem is the low share of waste recycling. Less than 5% of the municipal solid waste in Sofia is recycled (2011), the rest is deposited on local landfills. Sofia went through a series of crises due to insufficient landfills capacity and was forced to transport its waste to other nearby cities. The completion of the ongoing construction of an integrated system for waste managements is of crucial importance for the city.

Yugozapaden region is in a favorable position in terms of preventing the negative impact of climate change

South-Eastern Europe has been identified by the Intergovernmental Panel on Climate Change (IPCC) as one of the areas of Europe, most vulnerable to the effects of climate change (see "*Climate change, impacts and vulnerability in Europe, 2012"*). Some predicted changes over the coming century include higher temperatures with risks of droughts and more forest fires, less precipitation and a higher risk of floods and heat waves with unpredictable impact. According to data form "Regions 2020" (DG Regio, 2010) the climate index, measuring vulnerability to climate change, ranges from 39 for București (RO32 Bucureşti – Ilfov) to 46 for Sofia (BG41 Yugozapaden) and 50 for Attiki (GR30 Attiki). The Espon Climate project also shows that the metropolitan region in Bulgaria lags behind most EU capitals in terms of adaptive capacity to climate change.

In regional perspective, as shown by the pilot project for compiling a regional index for climate change security, Yugozapaden region, to which the capital belongs, has a favourable position compared to other NUTS 2 regions. The index (based on data for 2008) measures 7 indicators. Three of them are qualitative – greenhouse gas emissions per capita, intensity of greenhouse gas emissions measured versus the regional GDP, volume of renewable energy. The four qualitative indicators are based on self-evaluation and measure the political frame, the institutional capacity, the socio-economic aspects and existing financial instruments for implementing climate change policy. With a 15.2% of the total greenhouse gas emission and a 50% share of the production of renewable energy the region is ranked with the highest climate change security index. Yet as pointed out in the pilot study part of the data has been compiled especially for the project and cannot be used for international comparison.

Natural protection, risks and hazards

The national and regional assessment of risks has been adopted as an ex ante conditionality for Bulgaria for the next programming period. In compliance with this a new strategy for the prevention of disasters is under preparation. The draft document stresses the need for better coordination between the relevant authorities, strengthening the institutional capacity at municipal and regional level, efficient integration of the assessment of risks in all relevant public

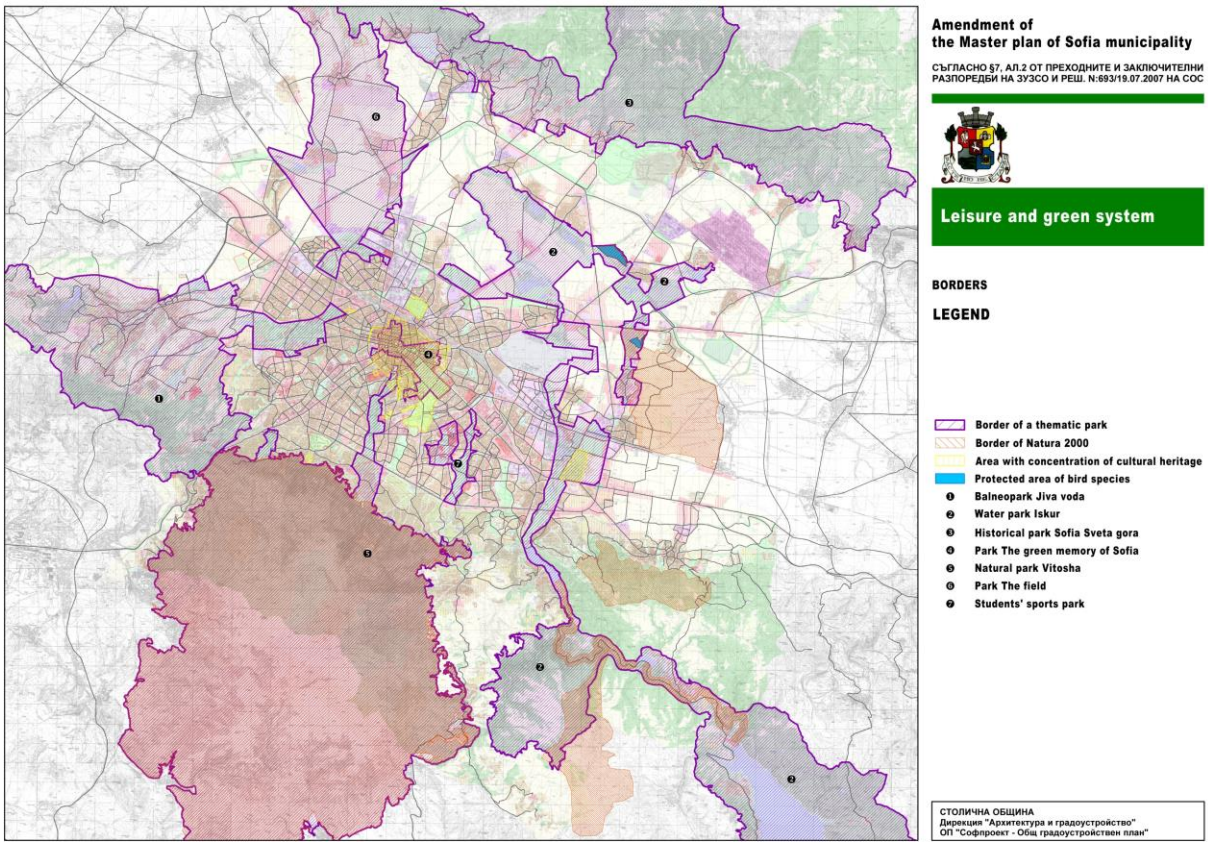
policies. Future regional and municipal strategic documents will build on this framework strategy and the anticipated new strategy for adaptation to climate change.

In compliance with national law Sofia has elaborated an updated plan for protection of the population in case of disasters. The major risks for Sofia capital are floods, occurring also because of bad technical infrastructure around the rivers, earthquakes, soil erosion, emergence of swamps and landslides and contamination of soils. There are a number of active and latent landslides, located in Lagera Housing Estate, Lozenets quarter, Reduta Quarter, Kokalyane, Pancherevo, Bistritsa, the northern slope of Losenska Mountains and the Western Park Housing Estate. Several zones with increased seismic activity have also been mapped. It is assumed that the seismic coefficient (Kc) for these zones exceeds 0.30 and reaches up to 0.35. This corresponds to possible earthquakes of IX – IX+ degree on the Medvedev scale *(Sofia master plan, Synthesis report, 2009)*. Another potential risk for Sofia's population is the high ground water levels. This applies to zones, in which the ground water levels reaches permanently or seasonally the ground surface or a depth of up to 2 m below it. The most vulnerable districts are located in the western and southern parts of the municipality.

Against these risks more investments in prevention measures are needed and this should be taken into account in the long term budgeting frame of the municipality. Regional data shows that in 2010 Sofia capital spent 154.39 million euro on environment – nearly one quarter of the total expenditure on environment in the country (0.65 million euro). Yet, according to Eurostat data from 2009, the annual expenditure on environment per capita in Bulgaria remains low - 37.8 euros.

The preservation of protected sites is both a challenge and an opportunity for the capital. "Natura 2000" sites represent 31.6% of total surface of the metropolitan region(the mountainous areas around the capital). Of highest importance for the city is the national park Vitosha, where development of ski tourism should be carefully balanced with the preservation of nature.

Map 64 Leisure and green system of Sofia



Source: Master plan of Sofia

2.2.5 Territorial and urban structures and policies

Sofia city was declared the capital of Bulgaria on the 22th of March, 1879. A small oriental town at that time with a population of 18 000 and an area of just 250 ha the city started to develop fast and went through a series of urban planning phases. The city saw a remarkable construction in the beginning of the 20th century, but had to cope with a heavy post-war crisis after 1919 and chaotic urban development. This period gave birth to a phenomenon that is still present – the small-size lot, introduced to uptake a big number of refugees.

The consequences of chaotic development were addressed systematically in the period between 1934 and 1938 – considered to be the most fruitful period for the urban development of the city. The famous Musman plan was introduced, embarking the concept of the garden city. The green system of the city was organized in a system of green belts and green wedges,

penetrating the city fabric and reaching the boundary of the second central zone. Special attention was paid to public spaces; transit traffic was reorganized, etc.

The period after 1945 is characterized by fast industrialization and urbanization. In this period Sofia city saw a fast demographic and territorial growth. Several urban planning phases were undertaken and in the period between 1972 -1979 the structure of the city was planned as polycentric with 5 macro-units and a tangential transport scheme.

After the start of democratic changes in 1989 Sofia saw another crisis in urban planning. The need of new Master plan and new building regulations was felt urgent right at the start of this period but the Master plan was completed with a great delay in 2003 and finally adopted in 2006 alongside with a specialized law on regulation and build up of Sofia municipality. Meanwhile the development of the city was governed by partial amendments of the existing plan which lead to a diminishing of green areas and chaotic new building erection. Indicative of these problems is the ordered amendment of the new Master plan, completed in 2009. One the main goal of the amendment was better protection of existing green areas.

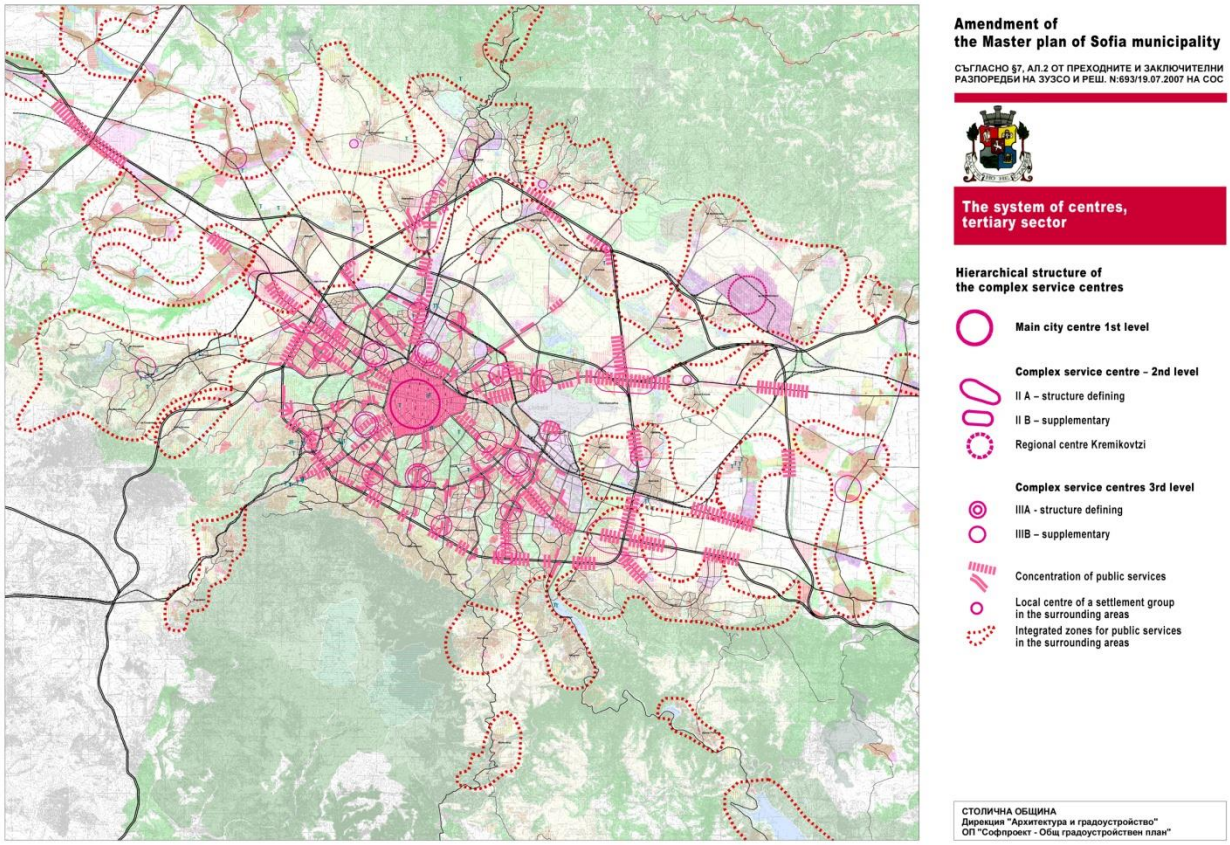
Zoning of the metropolitan region and urban development patterns

Sofia capital is spatially and administratively organized in two main types of zoning systems – administrative zoning and zoning by the dominant functional characteristics of the areas. The administrative division sets 24 city regions, 2 of them have in addition a separate city status. All regions are subjected to the decisions approved by the city council of Sofia municipality. All regions have regional mayors, appointed by the mayor of Sofia. Regional mayors used to be chosen through local elections until 2010, when a change in legislation was. This decision has been criticized as contradicting the idea for decentralization. The borders of the administrative regions follow the geographical borders of traditionally formed neighborhoods and have a radial and concentric linage towards the city center.

According to its' dominating functional characteristics the territory is divided into 10 types of functional zones: 1.residential zones; 2. zones for public services; 3. Mixed multi-functional zones - for the development of trade, business, residence, green system; 4. Industrial zones; 5. Green areas; 6. Zones for sport and entertainment; 7. Agriculture areas; 8. Forest areas; 9. Areas for protection of nature; 10. Areas for long-term perspective development; 11. A separate zone with a special influence is defined – the Vitosha National park, definitive for the spatial development and the climate of the capital.

The Master plan of Sofia defines two main principles for spatial planning and structuring – 1. planning at macro-spatial units level and 2. developing the system of centers. As laid down in the conceptual framework of the Master plan, the city is viewed as a functioning system of six macro-spatial structural units – central one and five other units, situated along the main radial transport axes. Balanced development of the major urban functions – residence, work, recreation and services – is sought in each macro-spatial unit. At the same time every macro-spatial unit features its own specifics and priority directions for development at the urban and supra-urban level. The defined macro-units for urban planning are as follows: Central macro-unit – comprising of the Central city area, Northwestern – following Slivnitsa Blvd. as a structuring axis, Northern – following Rozhen Blvd., Northeastern – with Botevgradsko shosse Blvd., Southeastern, with Tsarigradsko shosse Blvd., Sothwestern – with Tsar Boris III Blvd.

Map 65 The system of centers, tertiary sector



Source: Master plan of Sofia

In addition a policy of developing a hierarchic system of centers is followed as an alternative to the mono centric system of urban development. The idea is to balance the still dominant

position of the city of Sofia compared to the settlements in the periphery of the capital, improving the access to public services and reducing the pressure on the compact city. For achieving this goal the concept of second and third level centers has been developed. According to this model the historical core of the city forms the main city center – 1st level center. The system of second level complex service centers follows the grid of the 5 macro-units for spatial development – Northwestern, Northern, Northeastern, Southeastern, Sothwestern. The main functional role of the second level centers is the structuring of new sites for trade and services (large-scale retail and business centers, wholesale complexes, market places, etc.), providing services for the transit transport flow, etc. The Southeastern and Northwestern 2-nd level centers are views as most influential for future development. The main characteristic feature of the 3rd level centers is the complexity of the services, irrespective of their market or public nature.

The reorganization of industrial zones remains a challenge

In recent years the share of industry in the GVA of Sofia capital has been steadily decreasing due to problems with industry reorganization in a post-industry economy, in a post-communist country. From 1950 to the end of 1980 a large number of industrial sites have been developed and nowadays the number of industrial zones in Sofia is 26, covering a territory of 2 711 hectares. The territory of industrial centers exceeds by far the needs and goes hand in hand with inefficient land use. According to research (amendment of the Master plan of Sofia, 2009) the existing facilities in the industrial zones operate at 40 to 60% capacity loading, with much less employees than the period before the democratic changes. Most of these industrial zones are located near railway stations and the enter/exit highways. Besides them a system of transport-communication zones is functioning, including the airport complex, six large railway stations, and eight bus terminals. There are also several zones with concentration of specific service activities – Studentski grad, which houses the campuses of most universities, the Bulgarian academy of science complex at the 4th city km, the medical academy complex, etc. Along with these larger plots the urban fabric is pierced with smaller industrial areas and micro enterprises, making it difficult to undertake a coherent spatial planning.

The reorganization and renewal of the industrial zones is a key priority in the Municipal plan for development and the Master plan of Sofia since some of the industrial plots offer a serious potential for the development of other urban functions. In line with this priority the industrial territories have been divided in three groups – production zones for restructuring and functional

re-designation, industrial zones for reconstruction and modernization, new industrial and logistics zones. The first group comprises of industrial plots near the city center, where production is deemed unsuitable – like Sredets, Vitosha, Orion, Zaharna fabrica, etc. The Master plan of Sofia envisages a functional re-designation of these zones into mixed multi-functional zones. The group of industrial zones for modernization includes industrial enterprises that are still operating and will retain their spatial planning status. A serious renewal of the infrastructure of these areas is needed. The new industrial and logistics zones are being planned in proximity to the outer city ring road and the exits of highways. Mainly warehousing-logistic and service activities are envisaged.

Quantitative data for the balance of territory shows that there is a certain progress in the restructuring of the industrial areas. Since 2003 the industrial areas have decreased from 5 377.6 hectares (4% of the total territory of Sofia municipality) to 4701.55 ha in 2009 (3.5%). This process has been more intensive for the compact city of Sofia where the share of industrial plots decreased from 10.3% in 2003 (2 115.3 hectares) to 7.7% in 2009 (1609 ha). Yet the change for the surrounding areas is negligible – the share of industrial plots there decreased by only 0.2% from 2.9% in 2003 to 2.7% in 2009.

The capacity of the residential areas is enough to meet the housing demand

Albeit official forecasts and the advised development of the surrounding areas outside the core city, the concentration of dwellings in the compact city of Sofia continues. According to the National Statistical Institute the number of dwellings in the four cities in Sofia capital (NUTS 2) is rising – 573 873 dwellings in 2011 compared to 486 848 dwellings in 2004. Meanwhile the share of dwellings in the villages remains stable– 34 311 dwellings in 2004 and 34 553 in 2011. The total area, allocated for residential needs in the Master plan of Sofia is also rising – from 13 955 ha in 2001 to 16 821 ha in 2009. This increase has affected both the compact city and the surrounding area. The residential areas in the compact city increased for this period from 7 115 to 8 753 ha, the surrounding areas saw an increase from 6 840 to 8 067 ha. According to studies conducted during the amendment of the Master plan of Sofia the fast increase is mainly due to unexpected high levels of migration to Sofia capital.

The population growth and the increased housing demand go hand in hand with major changes on the land market. The last 10 years saw a sharp increase of prices with prices of land lots going up more than 10 times. During this period the quantities of lots in the compact city were

almost fully exhausted. Demand in the central part of the city is oriented towards lots for non-residential needs. The lack of free lots in the compact center has driven demand mainly to the southern and eastern territories of the city, holding the highest prices. The envisage potential of the northern direction has not yet materialized – offers are at low levels and one of the main reason is the lack of adequate infrastructure and the negative impact of the Kremikovtzi Metalurgical enterprise (although closed) on the surrounding territory.

According to official estimates of Sofia municipality the unmet demand of housing is measured to be 60 000 dwellings. To this background the potential capacity of the residential areas allows the construction of more than 300 000 new dwellings. As pointed out in the new Integrated plan for urban regeneration and development of Sofia 2014-2020 this capacity exceeds the solvent demand more than three times since despite the downturn on the market the prices of dwellings continue to be high compared to the income of the population. As pointed out in the Master plan of Sofia the municipal policy in the housing sector is almost absent with total expenditure for this sector below 1% of the total municipal budget. There is a big need for dwellings for poor people and for special care for the housing conditions in some neighborhoods, inhabited by representatives of the Roma ethnic minority.

The Master plan of Sofia maps three major priorities in regard to the l housing policy– necessity of mass renewal of the prefabricated panel dwellings – more then 230 000 dwellings with a 48% share of the total housing stock, necessity of large scale program for construction of social dwellings and necessity of restructuring the municipal housing stock.

The protection of the green system has been improved

The protection of the green system was one of the main requirements in the course of the amendments of the Master plan of Sofia (2009). The preservation of existing green plots as elements of the green system was specifically required by the Law on regulation and build up of Sofia municipality. As a result a serious effort with the active participation of non-governmental organizations was undertaken for mapping all green plots, especially inside residential areas. In this course Natura 2000 sites were also mapped. As a result the majority of big city parks retained their boundaries and new green territories for long term development were reserved. The realization of these long term green territories is bound by law with concrete investment incentives and provided private financial resources, including resources for constructing the necessary technical infrastructure.

After the amendments of the Master plan of Sofia the quantity of all types of green areas according to the norm settings is measured at 9 792.45 ha for the city of Sofia or 46.8% of the total area of the city or 71 m2 per inhabitant (in case of compliance with the percentage of greenery for all planning zones). For Sofia municipality with an area of 134 168 ha, including 88 507 ha of forests, the green areas comprises 66% of the total.

A serious problem of the green system in the capital is the land ownership since after the restitution huge parts of some of the city parks have passed in private hands. Compensating these owners will be expensive and the municipality has to find alternative solutions. Such a solution can be the creation of a municipal land bank for compensation such owners with municipal plots.

Integrated actions are planned for 3 impact zones in 2014-2020

In compliance with the new Cohesion policy of the EU for the next programming period a new Integrated plan for urban regeneration and development of Sofia 2014-2020 was elaborated. After an in-depth analysis and territorial evaluation of the state of well fare of all public systems in the capital 3 impact zones for integrated investments were defined – one zone with predominantly social functions, one zone with a potential for economic development and one zone with public functions of high significance. The zone with predominantly social functions which has been evaluated as most problematic on all studied indicators and with highest possible positive impact from the integrated interventions is located in the Northwest part of the city. It covers 23 residential neighborhoods, with a total population of 189219 people, and 2 city parks – the Western and the Northern parks. An integrated renewal of all elements of the urban surroundings in this zone is envisaged, including rehabilitation of street infrastructure, construction of new social infrastructure for health, education, sport, culture. New services for people in need of special care are planned as well as measures for improving public security. Improving the energy efficiency of buildings is also a priority.

The zone with the highest potential for economic development Iztok is situated in the Eastern part of the capital, with a total area of 1168 ha and incorporates parts of 3 city regions. The zone is situated close to the Sofia airport and includes the Bulgarian academy of science complex at the 4th city km and the 7-11 city km. This subzone is characterized by a concentration of high-tech and research activities. A major role in the future development of this potential will play the

new Sofia Tech park, situated in the subzone. The project is already in progress and is being financed under OP “Competitiveness”.

The zone with public functions with high significance covers the center of the city, or 8% of the territory of Sofia, with total population of 116 312 people. The boundary of the zone coincides with the second transport ring of the transport communication system of the city, including most public institutions, cultural institutions of national significance, higher education institutions, the national stadium, a number of city parks and gardens, etc.

For all three zones a detailed list of projects has been elaborated. All projects have been budgeted in line with the rules of the future operational programmes, a time table for their implementation has also been approved. However financing these projects will not be an easy task, since the resources available for integrated urban regeneration for 2014-2020 will hardly cover the needs. An alternative financing should be proposed. More over the prioritization of the three impact zones should not be at the expense of other territories. The integrated plan for urban regeneration and development covers only the city of Sofia. Hence a careful budgeting and planning is needed in order to guarantee, that the new tool does not further widen the existing regional disparities.

2.2.6. The role of Sofia in the urban networks of the three capitals, Bulgaria, SEE and Europe

The geopolitical positioning of Sofia capital is a strategic factor of crucial importance for the development of both the city and the Republic of Bulgaria. The peripheral location of the country and the capital to the European core area is considered unfavorable, since it limits the flow of capital, goods and people. Yet the enlargement of the EU and the anticipated EU integration of new countries from the Balkans open new opportunities for accelerated development of the region. The role of the capitals as drivers of growth will be decisive for utilizing the potential of the emerging new development axes in the region.

The municipal plan for development of Sofia highlights the potential of the cross-road positioning of the capital in the flow of investments between Western Europe and Russia, Ukraine and Middle Asia. Yet the tight competition between the capital cities of the Balkans for

lead position in the region is acknowledged, as well as the negative impact of turbulent political processes in the last two decades. Building added value from cooperation at this competitive background and the existing historical constraints is of major importance for the future development of the region. The transfer of knowledge and technologies and the development of the transport and communication networks are seen as the main drivers for better positioning of Sofia capital in Europe and the region. The potential for intense transfer of technologies in the north-east direction and with neighboring non-EU countries as FYROM, Albania, Serbia is highlighted. In this regard the cooperation with Greece and Romania as EU member countries has been so far underestimated in strategic documents. The municipal plan for development of Sofia mentions only briefly the Danube-Aegean polycentric corridor București-Sofia-Thessaloniki-Athens (Istanbul) as a potential for development.

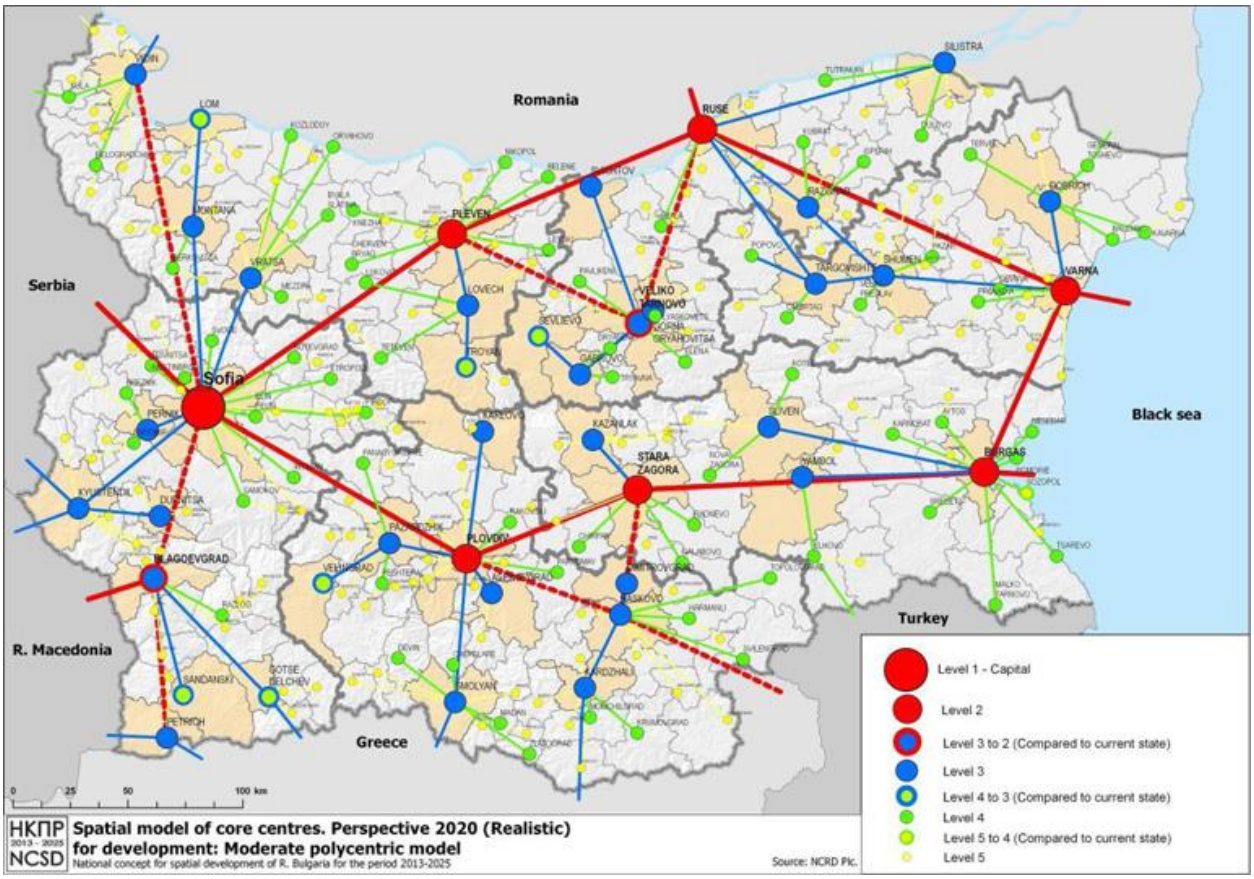
Raising the statute of Sofia capital as the only Metropolitan European Growth Area (MEGA) in Bulgaria is a key priority in national and regional strategic documents. Sofia capital has been evaluated as a category 4 MEGA. Together with 22 other European cities Sofia has been placed in the lowest category 4 of MEGAs with low values on all indicators – mass, competitiveness, connectivity and knowledge basis. One other maritime city is considered in NSDC as having potential to enter the list of MEGAs – the city of Varna. As pointed out in the Integrated plan for urban regeneration and development of Sofia, the utilization of the territorial and economic potential of all municipalities within the boundaries of the agglomeration area of Sofia will be a major importance. Yet this goal should not be pursued at the expense of widening regional disparities.

From a mono-centric towards a moderate polycentric model of spatial development

The national concept for spatial development evaluates the current model for urban development of Bulgaria as mono-centric, with imbalanced development in favor of the capital. The capital has few levelers in the face of second tier cities as Varna, Bourgas, Plovdiv, Stara Zagora, Ruse, Pleven. These cities, taken altogether, are commensurable with the capital in terms of population size and economic input. If not addressed properly, the existing imbalances will lead to further extremes in regional development. According to the negative scenario for urban development the disparities will continue to grow, the agglomeration areal of the capital will further expand to include more municipalities at the background of deteriorating smaller cities and vulnerable national peripheries. The realistic and desired scenario is the move to a

model of moderate polycentrism, with well developed second tier cities and reduced peripheral territories.

Map 66 Moderate polycentric model of spatial development



Source: Ministry of regional development

The development of the agglomeration area of the capital and the other big cities is considered of key importance for the future development of a polycentric urban network. Although the municipalities within the agglomeration area of Sofia are already associated with one another, new instruments for integrated actions are needed, as concluded in the national concept for spatial development. The attempt to regulate by law the scope of the agglomeration of the capital within the elaboration of the new Master plan has failed due to concerns of the relevant municipalities that their position will be undermined by the dominance of the capital. The proposed definition of the areal included 11 municipalities – Bojurishte, Godech, Gorna malina, Dragoman, Elin Pelin, Ihtiman, Kostinbrod, Pernik, Samokov, Svoge and Slivnitza, but the relevant texts were dropped during the final elaboration of the law on regulation and build up of Sofia municipality. Thus the idea for setting a new coordination body for economic and social

development of the municipalities in the agglomeration area was not enforced. In regard to this the National concept for spatial development advices that in future an integrated approach should be applied, including the elaboration of new master plans, covering all municipalities within the borders of the agglomeration.

The potential for territorial cooperation should be further exploited

The development of trans-regional and trans-national cooperation is a main priority in the Municipal plan for development of Sofia. In compliance with this a list of priority measures has been elaborated, including participation in twin and sister cities initiatives, partnership with other EU capitals, better representation of Sofia capital in Brussels, opening of offices of international organizations in Sofia, etc. The implementation of these measures has not been evaluated and it is difficult to judge the success towards achieving the desired goals.Partial information on territorial cooperation can be found in the regional plan for development of Yugozapaden region. As pointed out in the document, the region borders with three neighboring countries – Greece, Serbia and FYROM and these opens many opportunities for cooperation. Qualitative data shows that Sofia capital has participated in 14 projects under the trans-border cooperation programme Bulgaria-Serbia (2007-2013) as Sofia capital is defined as an eligible area for this programme. No projects were implemented within the trans-border programme Bulgaria-FYROM (2007-2013) since the capital is outside the eligible area, 3 projects have been realized within the trans-border programme Bulgaria-Greece (2007-2013).

The participation in the transnational cooperation programme “South East Europe” has also been modest. 27 projects were improved for Sofia capital, yet Bulgaria is a lead partner in only one project. The situation is similar for the Interreg IVC programme. Yugozapaden region is covered in 36 projects. The municipality of Sofia has been more active in the programme, participating s a project partner in 11 projects. The municipality is a lead partner in 1 project.

Since the new programming period of EU for 2014-2020 goes hand in hand with new rules and programmes for transnational and trans-border cooperation and such projects usually require longer preparation, timely planning and mapping of possible projects and partners is crucial for the efficient utilization of the potential for cooperation. As of today such projects have not been included in the indicative table of projects for territorial cooperation in the regional plan for development of Yugozapaden region. Only four projects for territorial cooperation are included in this list, none of them including Sofia capital.

2.3 The metropolitan region of Athens and its role in the European polycentric network

2.3.1 Competitiveness and innovation (PP2)

Literature and methodology

The competitiveness of the territorial units and, particularly of the cities, is a very complex concept. Therefore, it is difficult to understand its underlying factors as well as to measure it. A first aspect of the concept refers to the cities' competitiveness as single entities. A second aspect is the integration of cities into economic and urban networks.

A large part of the relevant recent literature is covered by ESPON projects, because the latter have examined many features of all EU cities. Researches and publications outside ESPON usually refer only to a few countries or a few characteristics of all cities across the EU. Specifically, the project ESPON 3.4.2 "Economy" (2006) defined as key drivers of territorial competitiveness, the economic structure / specialization, the technology and innovation and the human resources, as well as the accessibility and the institutional /governance factors. The ESPON projects on cities in relation to polycentricity ESPON 1.1.1 (2005), 1.1.3 (2006) and ESPON 1.4.3 (2007) as well as other relevant ESPON projects as, indicatively, FOCI (2010) and ATTREG (2011) have adopted more or less, the same line of analysis. According to several relevant studies, the various economic branches are not of the same significance regarding the cities' competitiveness. Some, such as Advanced Producer Services (APS) and HT (High Technology) activities are of strategic importance, thus they should be specifically analysed (Goebel, Thierstein and Lüthi, 2007, Thierstein and Droß, 2008, Angelidis et al., 2011). Also, some EC reports are of particular interest, which discuss inter alia the changes in the factors that impact territorial competitiveness in the current globalisation frame. See indicatively the EC 5th Cohesion Report (2010) that brings evidence on the fast growing influence of innovation and "Europe 2020" (EC 2010) that underlines the importance of "smart development".

Appropriate indicators have been chosen through wider lists drafted in the frame of the ESPON projects FOCI (2010), INTERCO (2012), SIESTA (2011), POLYCE (2011) and METROBORDER (2010) or have been used in the EC 5th Cohesion Report (2010) or in "Europe 2020" (2010) and "Lisbon strategy" (2000). We have used both appropriate simple indicators and some already commonly used composite indicators of competitiveness, such as

labour productivity. We aimed at using the indicators not in a static and fragmentary manner, but as evaluation criteria of the competitiveness of global patterns (types) of spatial development in the three capitals and countries and the identification of the drivers of change for these patterns. This approach, which has been adopted by several ESPON projects (see indicatively in ESPON FOCI (2010) and ESPON Spatial Scenarios (2006) allows us to proceed in more reliable analyses of the future perspectives and, therefore, in more appropriate policy recommendations for cities and regions.

Given the fact that the recent crisis created a new context for territorial development, we considered as being very important to examine in depth the impact of the crisis in the cases of the three capitals compared to the respective changes in the rest EU cities and regions (see, among others: EU 2010 / URBACT and ESPON ECR2, 2012). Finally, we have focused on the changes 'trends in the competiveness of the three capitals in order to better define their future perspectives, on the basis of which appropriate planning proposals might be drawn.

The whole analysis was structured around the following hypothesis: the reinforcement (emergence) of the development axis Athens - Sofia - București can act as a catalyst for increasing competitiveness through the spatial integration of the entire SEE.

Specific characteristics of the three Capitals

Apart from general factors of the competitiveness of the three metropolitan regions (see paragraphs below), specific geographic features of each one have also a considerable impact. The population potential of Athens / Attiki (3.8 billion inh. at FMA level in 2011) is considerably bigger than that of București and Sofia (1.9 and 2.3 million, respectively). In addition, Athens das a considerably more extended area densely populated and occupied by premises of economic activities compared to the other two capitals. Also, the existence of the Athens basin, which is surrounded by mountains, hampered the expansion of economic activities in the rest of the Attiki region, which neither applies for București that is situated in a lowland area, nor for Sofia.

Economic factors of competitiveness and indicators of economic performance

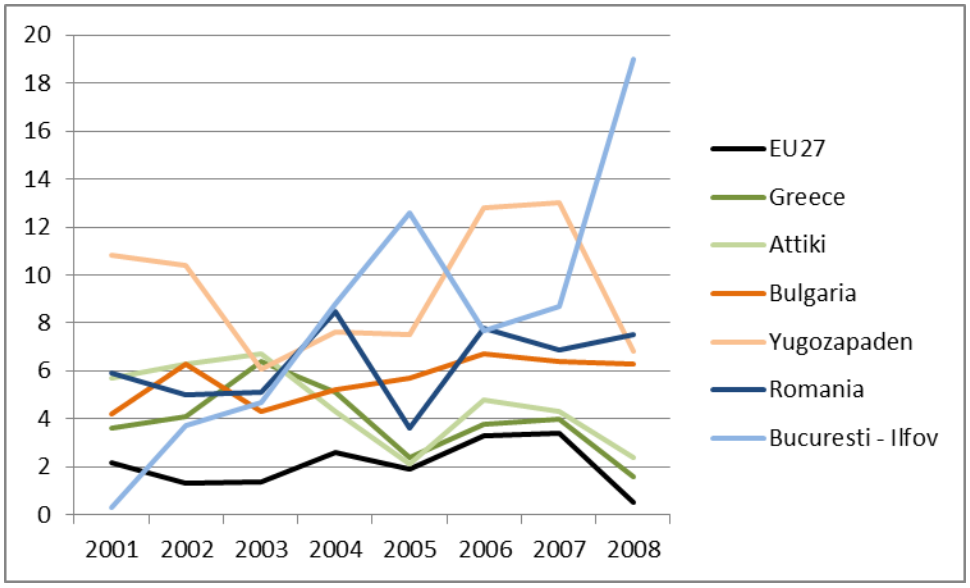
Regional competitiveness analyses give often an excessive importance to the purely economic aspects of competitiveness as GDP, income, economic activities, productivity. However, in the line of more global competitiveness approaches, we will also examine in detail the role of other factors such as the labour market, the human capital and the technological readiness. While we

emphasise the analysis of the three capitals, we will also discuss their role in the context of their countries' economy, SEE and Europe that was analysed in previous projects in more detail. Also, we clearly discern the trends observed before the recent crisis period from that observed during the crisis (from 2008 until today) because, as we will see, the crisis has changed significantly the development patterns of the three capitals and their countries.

Regarding **economic performance**, we start with the GDP analysis which is the most usual measure for the regional economy competitiveness. However, we should also examine other measures defining the performance profile as well as the wider economic profile of the three capitals such as the Gross Fixed Capital formation (GFCF), the Gross Value Added (GVA), the Foreign Direct investments (FDI) and the population income.

During the pre-crisis years 2000-2008 **GDP in PPS per capita** in Attiki approached the EU27 average, but thereafter, it recorded a significant decrease. București and Sofia showed a remarkable increase in GDP per capita before crisis, while the decrease in the crisis period was lower than in Attiki. **FDI** (Foreign Direct Investments) were clearly focused on the three capitals compared to their countries. The **real growth rate of regional GVA** during 2001-2008 was, in general terms higher than the EU27 average.

Figure 21 Real growth rate of regional GVA rate in the three countries and capitals 2001-2008



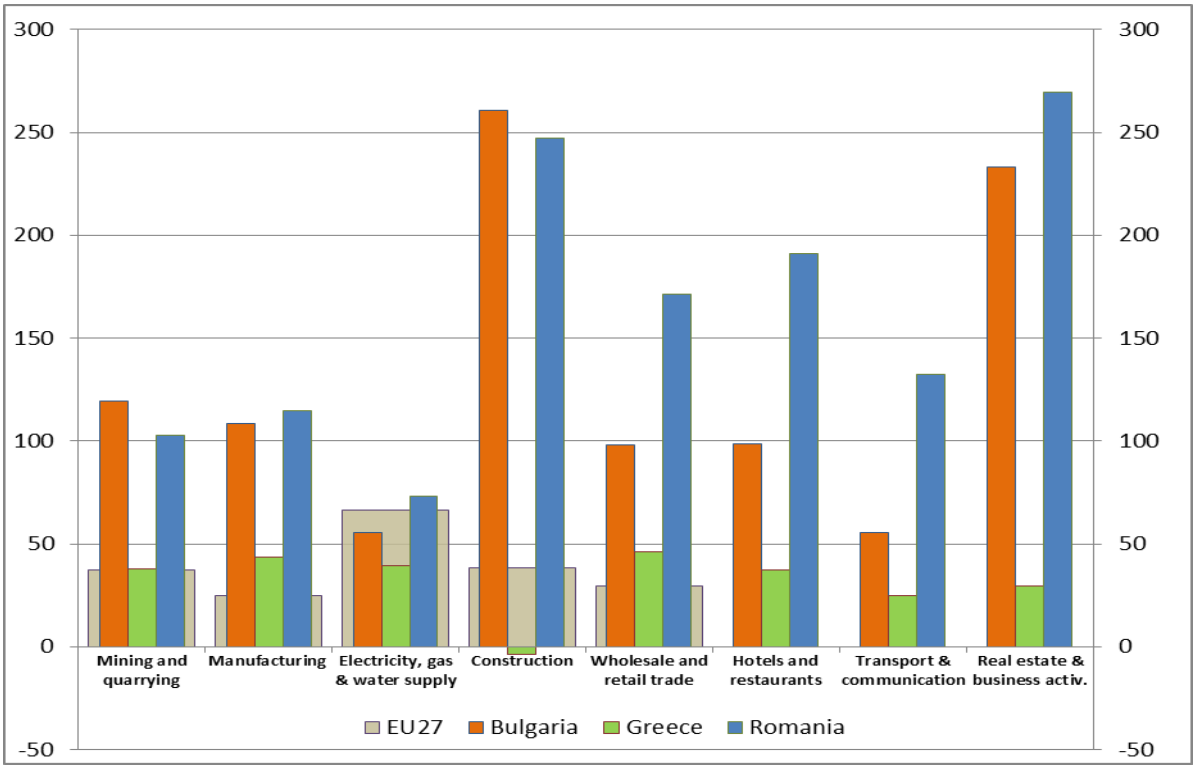
Own elaboration (NTUA team), based on Eurostat data

Table 36 GDP in Euros per capita- % of the EU average 2001-2009										
Code	Region	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU27	EU-27	100	100	100	100	100	100	100	100	100
BG	Bulgaria	10	11	11	12	13	15	16	19	20
BG41	Yugozapaden	14	15	16	18	20	23	27	31	34
BG412	Sofia	8	9	10	12	13	15	15	14	21
GR	Greece	68	70	75	77	78	80	81	84	87
GR30	Attiki	78	83	89	91	92	95	97	101	115
RO	Romania	10	11	12	13	16	19	23	26	23
RO32	București-Ilfov	21	22	23	26	36	42	51	63	55
RO321	București	22	23	24	27	37	43	53	47	41
Own elaboration (NTUA team), based on Eurostat data										

Table 37 Direct investment stocks - Million ECU/EUR, PARTNER: European Union - 27							
Code	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**%2006-2010**
EU27	3.878.91	4.437.986	5.187.743	5.579.730	5.787.7	6.347.674	43
BG	42	213	277	665	519	637	199
EL		10.487	14.090	16.798	18.361	18.150	73
RO	134	283	353	472	378	545	93
Own elaboration (NTUA team), based on Eurostat data							

The **turnover for enterprises** during the period 2003-2007 was more dynamic in Romania and Bulgaria compared to Greece (data available only at country level).

Figure 22 Turnover for enterprises by activity sectors at national and EU level - % change 2003-2007



Note: Last data available at EU level in 2004 for specific categories
Own elaboration (NTUA team), based on Eurostat data

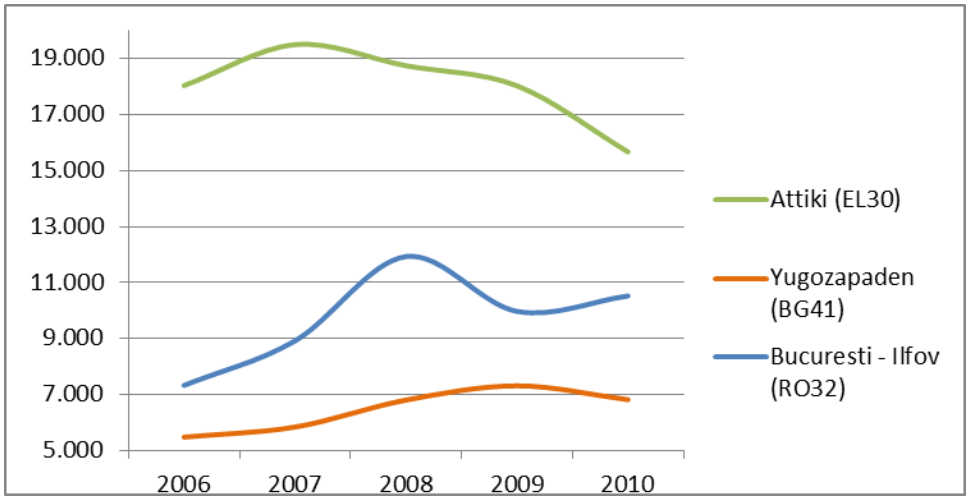
Gross Fixed Capital Formation (GFCF) in Euros amounted in 2005 in Greece to 40 billion and rose up to 53 billion in 2007 (Table 38). In Romania the increase was more important: from 18 to 38 billion (there are no comparable data for Bulgaria). During the first year of the crisis (2008), while GFCF in Greece decreased slightly, it continued to increase in Romania. In both countries there was a sharp decrease during the second year of the crisis (2009).

Table 38 Gross fixed capital formation (GFCF) by NUTS 2 regions in million EUR 2005-2010

Code	Region	2005	2006	2007	2008	2009	2010
EL	Greece	40.020	47.180	59.368	52.607	45.932	39.185
EL30	Attiki	15.330	17.981	21.600	21.949	19.713	15.348
RO	Romania	18.367	25.121	37.671	44.610	28.879	30.726
RO32	București-Ilfov	6.352	8.337	13.847	19.440	11.471	12.624
Own elaboration (NTUA team), based on Eurostat data							

The **disposable household income** during 2006-2010 (Figure 23) presented a significant increase in București and Sofia, while the respective change was less intense in Attiki. Hence, the growth rates of the previous economic indicators in the three capitals had an almost similar response in household incomes.

Figure 23 Disposable household income in the three capitals 2006-2010 - PPS based on final consumption per inhabitant



Own elaboration (NTUA team), based on Eurostat data

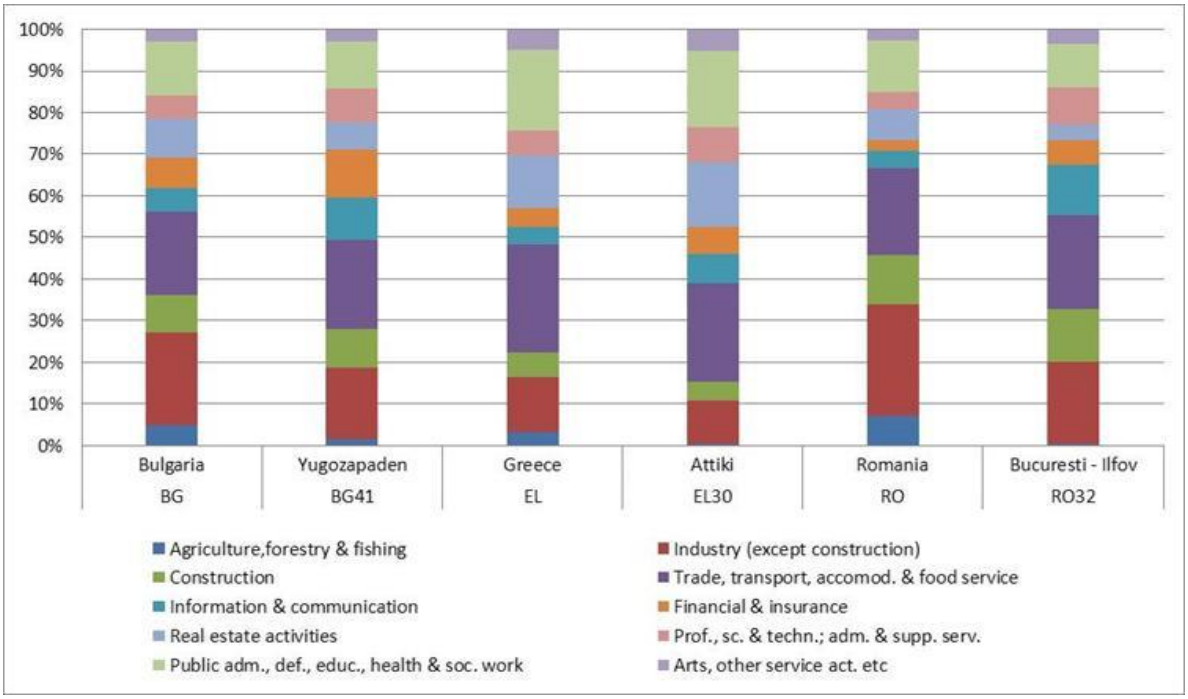
Economic structure per sectors of activities

The economic structure of cities and regions per activity sectors is a crucial aspect of their competitiveness.

As it results from the analysis of **Gross Value Added (GVA) per activity sectors** in 2009 (

Figure 24) the economies of all three capitals present higher shares in a broader sector including trade, transport, hotels and restaurants (Table 39).

Figure 24 GVA per economic sector in 2009 in the three countries and capitals



Own elaboration (NTUA team), based on Eurostat data

Table 39 GVA per economic sector % in the three countries and capitals in 2009						
Country/capital (NUTS 2)	**Bulgaria**	**Sofia**	**Greece**	**Attiki**	**Romania**	**București**
Agriculture, forestry & fishing	4.8	1.5	3.1	0.3	7.2	0.3
Industry (except construction)	22.1	17.2	13.4	10.4	26.8	19.7
Construction	9.2	9.2	5.8	4.6	11.7	12.9
Trade, transport, accommodation & food service	20	21.5	26	23.8	20.9	22.6
Information & communication	5.7	10.3	4.3	6.9	4.3	11.9
Financial & insurance activities	7.1	11.4	4.4	6.4	2.5	5.9
Real estate activities	9.4	6.6	12.5	15.5	7.3	3.8
Professional, scientific & technical, administrative & support services	5.5	8.1	6	8.7	4.4	9.1
Public administration, defence, education, health & social work activities	13.2	11.2	19.5	18.2	12.3	10.2
Arts, other services, activities of households & extra-territorial organizations	2.9	3	4.9	5.3	2.6	3.6
Own elaboration (NTUA team), based on Eurostat data						

However, București and Sofia record also high shares in industry and construction, while in Attiki there is an increased participation of the wider sector of public administration, defence, education and health, as well as real estate activities. Regarding financial activities (banks) and insurance, as well as information and communication branches, which are of strategic importance for competitiveness, Attiki presents a more important volume of GVA in comparison with the two other capitals (the latter present bigger shares % than Attiki.

The **division of GFCF by activity** (Table 40) there are not comparable data for Sofia) is similar in general terms to that of GVA. The same division pattern is more or less reflected also in the sectoral structure of employment in 2011 (except for Real Estate activities in Attiki which had a lower share in employment than in GFCF).

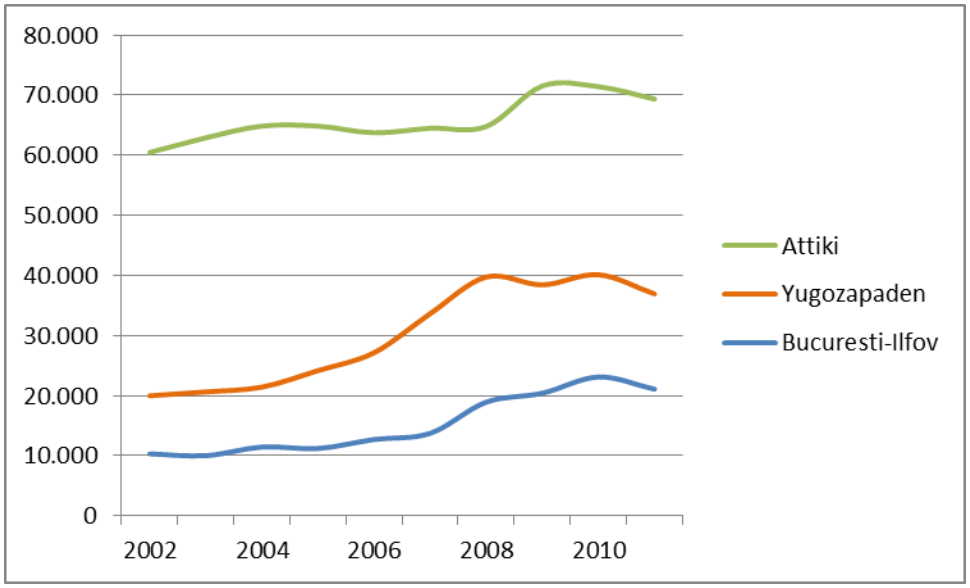
Table 40 Gross fixed capital formation by activity and NUTS 2 regions in % - 2009

Country/capital (NUTS 2)	Greece	Attiki	Romania	București
Agriculture, forestry & fishing	4	0	3	1
Industry (except construction)	7	5	28	10
Construction	4	4	16	5
Trade, transport, accommodation & food service	3	4	20	42
Information & communication	24	42	12	12
Financial & insurance activities	3	5	2	6
Real estate activities	1	2	1	1
Professional, scientific & technical, administrative & support services	31	17	4	7
Public administration, defence, education, health & social work activities	6	10	2	3
Arts, other services, activities of households & extra-territorial organizations	14	8	11	12
Own elaboration (NTUA team), based on Eurostat data				

Specific attention should be paid to **tourism** because it is a sector in which all three capitals have an important comparative advantage (in comparison with other EU MRs), not enough exploited so far. In the economic analysis of tourism, **demand and supply** (accommodation infrastructure) are of crucial importance. From the demand side (arrivals) Attiki presents in 2010 a clearly higher tourism intensity index (nights spent in collective tourist accommodation per 1000 inh.) than Sofia and București. Arrivals in the three capitals increased before the crisis and decreased slightly in Athens and Sofia during the crisis.

Supply, as for the number of bed places offered, has been rising continuously during 2002-2011 in all three cases, with the exception of a small decrease in Attiki after 2009 (Figure 25).

Figure 25 Number of bed places in the three capitals 2002-2011



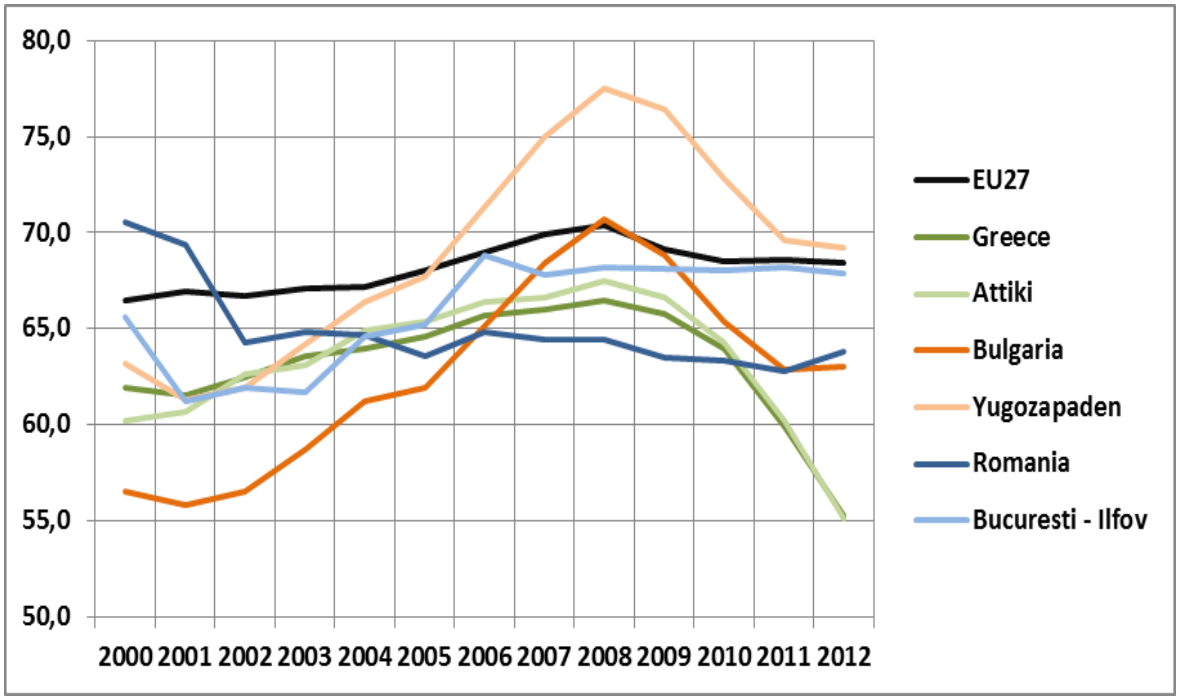
Own elaboration (NTUA team), based on Eurostat data

Employment and unemployment, labour productivity

At first, Attiki presented before the crisis both a lower **employment rate** (Figure 26) and a higher **unemployment rate** (Figure 27) in comparison with București and Sofia.

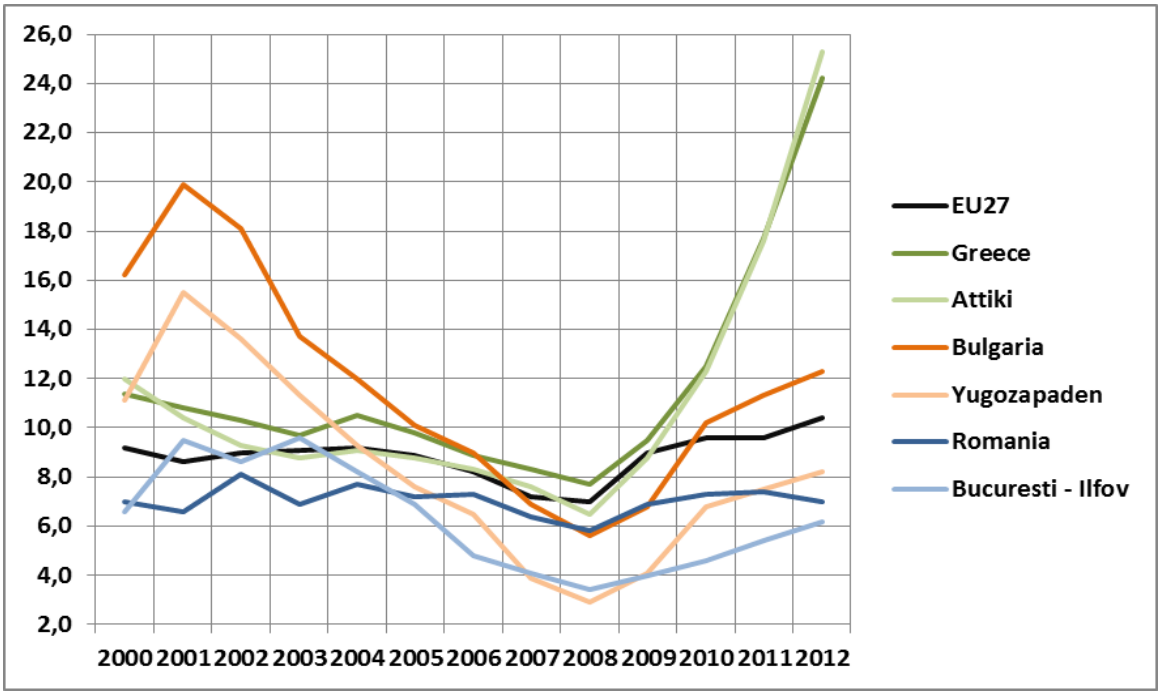
During the crisis years 2008 to 2011, the employment rate of all three countries and the FMAs of the three capitals decreased, except for București. Sofia had in 2011, within the crisis, a higher rate (71%) than the EU27 average (68%) while the București rate was similar to the EU27 one.

Figure 26 Employment rate % (20 to 64 years) in EU-27 and the three countries and capitals 2000-2012.



Own elaboration (NTUA team), based on Eurostat data

Figure 27 Unemployment rate in the three countries and capitals 2000-2012



Own elaboration (NTUA team), based on Eurostat data

Inversely, the rates of Attiki (60%) as well as of the three countries were much lower than the actual EU27 average; this means that they should make greater efforts to reach the Europe 2020 target regarding the employment rate (75%).

We should stress that the female employment rate was in 2002 and continue to be in 2012 higher in Bulgaria / Sofia and Romania / București than in Greece / Attiki (Table 41); this explains to certain extent the higher employment rates in the two first countries / capitals than in Greece / Attiki

Table 41 Female employment rate % (20-64 years) in SEE countries and capitals 2002-2012

Code	Region	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012–2002 (diff. in perc. points)
EU27	European Union 27	58,1	58,8	59,2	60,1	61,2	62,2	63,0	62,4	62,1	62,2	62,4	4
BG	Bulgaria	53,2	54,7	57,2	57,1	60,4	63,5	65,4	64,0	61,7	59,8	60,2	7
BG41	Yugozapaden	58,8	61,1	63,3	63,3	67,6	71,3	73,4	72,9	70,1	67,4	66,4	8
GR	Greece	46,6	47,9	48,8	49,6	51,2	51,6	52,5	52,7	51,7	48,6	45,2	-1
GR30	Attiki	48,2	48,5	51,2	51,8	53,7	53,5	55,5	55,6	54,0	50,6	47,0	-1
RO	Romania	57,8	58,3	58,9	56,9	58,5	57,9	57,3	56,3	55,9	55,7	56,3	-2
RO32	București-Ilfov	54,9	54,2	58,6	58,4	62,0	60,5	60,3	60,8	61,5	61,4	61,4	7

The **unemployment rate** has risen impressively during the crisis period in Attiki (Figure 27), reaching 28% in October 2012. It is the first time that Attiki records the highest unemployment rate among the Greek regions.

Unemployment rates in Sofia and București also increased, but with clearly lower rates than in EU27 and Attiki. It should be stressed for București that during 2000-2009, the raise in the number of employees in FMA (București-Ilfov) replaced only a part of the jobs lost in the OMR (Sud-Muntenia).

During the crisis period 2008-2011, the decrease in the employment rates was more significant in specific sectors; primarily, in the construction sector, this is mainly linked to domestic demand; EU-27 experienced a high percentage of employment decrease in construction (13%), but the decrease in Attiki and Sofia was considerably higher (37% and 32% respectively), while in București it was significantly lower (11%). High percentages of employment decrease for the three capitals were also recorded in the industry sector.

Labour productivity is a very important factor of competitiveness. There are different measures of labour productivity which correspond to different simple indicators (for example: GDP, GVA etc.) or combinations of indicators and therefore to different competitiveness aspects.

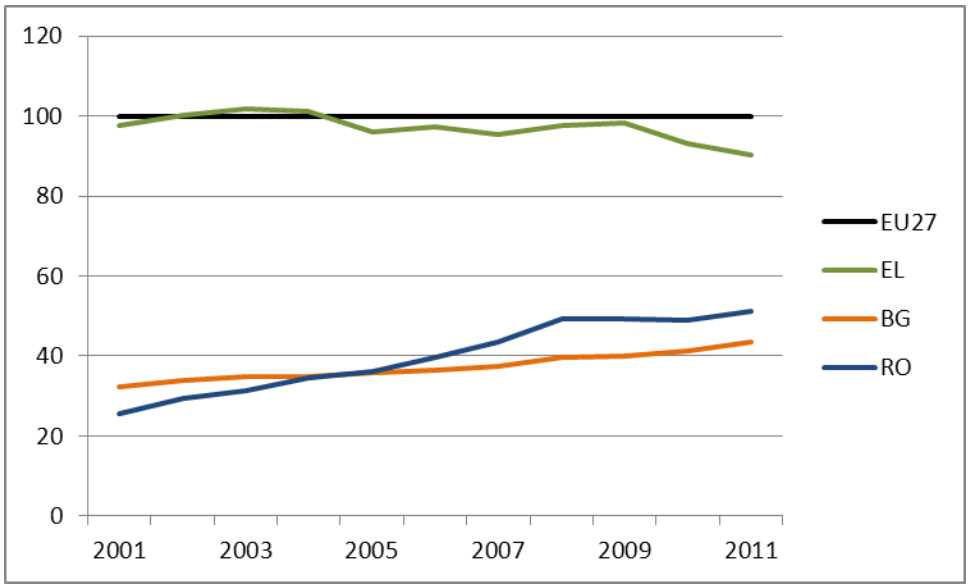
The labour productivity index of Eurostat corresponding to GDP as PPP per person employed as for the EU27 average (=100) is of particular interest to our subject. The value of this index was very high for Greece in 2001 of 98 (Table 42 and Figure 28), while it was much lower in Bulgaria 32 and Romania 26. During 2001-2008 it remained stable in Greece and increased very considerably in Bulgaria and Romania. During the crisis period 2008-2011, the value of the index decreased in Greece (90 in 2011) and increased slightly in Bulgaria and Romania (44 and 51 respectively).

Table 42 Labour productivity / GDP as PPP per person employed in percentage of the EU27 average (=100)

geo\time	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU27	100	100	100	100	100	100	100	100	100	100	100
BG	32,2	34	34,8	34,8	35,8	36,4	37,5	39,6	40,1	41,3	43,5
EL	97,7	100,2	101,9	101,2	95,9	97,2	95,5	97,7	98,2	93,2	90,1

RO	25,7	29,4	31,3	34,6	36,1	39,7	43,4	49,2	49,2	48,9	51,1
Own elaboration (NTUA team), based on Eurostat data											

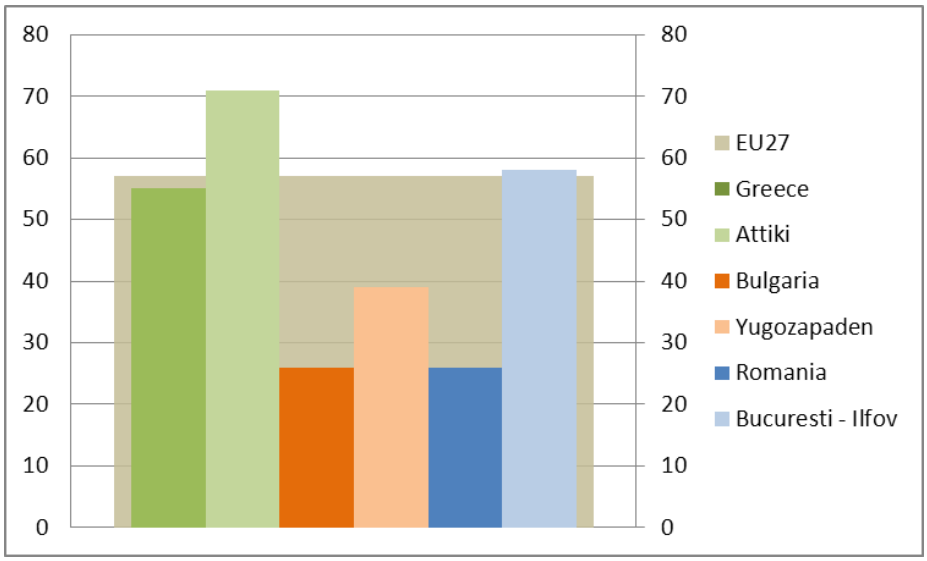
Figure 28 Labour productivity / GDP as PPP per person employed in percentage of the EU27 average (=100)



Own elaboration (NTUA team), based on Eurostat data

As the above indicator corresponds only to national and not regional level, we elaborated data from Eurostat on GDP and employment in order to calculate the values in regional level of another commonly used index: labour productivity as GDP (in millions of PPS) / employment (in thousands, people 15 years or over). The index values analysis for 2010 (Figure 29) indicates that only the FMA of Attiki (with 71) surpassed the EU-27 average (57) while the index value for București (58) was roughly equal to the EU average and Sofia scores much lower (39).

Figure 29 Labour productivity as GDP in millions of PPS / employment in 2010 (in thousands, people 15 years or over)



Own elaboration (NTUA team), based on Eurostat data

The index of European Commission's Directorate General for Regional and Urban Policy (DG REGIO) regarding the **productivity growth through employment shifts between economic sectors** (Eurostat data) is also interesting. During the period 2000-2007, while the productivity growth due to the above factor, amounted to 0,40 for the entire EU-27, it was much higher in Sofia (0,82) and much lower in Attiki (0,23), while in București there was a small decrease (-0,02) (Table 43).

Table 43 Productivity growth through employment shifts between sectors, 2000-2007 / Increase in average productivity due to employment shifts to more productive sectors – EU27, Sofia, Attiki and București

Code	Region	Productivity growth through employment shifts between sectors, 2000-2007
EU-27	European Union	0.4
BG41	Yugozapaden	0.8
GR30	Attiki	0.2
RO32	București-Ilfov	-0.02

Own elaboration (NTUA team), based on Eurostat data

In summary, the improvement in employment and unemployment rates before the crisis in all three countries and capitals was followed by an extreme deterioration, particularly in Athens and Sofia, with emphasis on the construction sector, but also in industry and specific branches of services. Labour productivity was relatively high in Greece and Athens, but decreased in the period of crisis, while it was quite lower in the other two countries and capitals.

Therefore, this aspect of the competitiveness pattern of the three capitals showed improvement before the crisis, but registered a decline in the crisis period.

Technological and innovation readiness and specific branches dynamics

Technological and innovation readiness is generally lower in the three countries than in the more competitive EU countries. However, this weakness regards more the expenditure and investment in R&D and much less the readiness of the Research and Development (R&D) human potential.

More specifically, regarding the **total expenditure in R&D as % share of regional GDP** in 2007 (Table 44), the three capitals were more distant from both the EU average and the Europe 2020 target, with București performing higher than Attiki and Sofia.

Table 44 Total expenditure on R&D_2007 - % of regional GDP		
GR30	Attiki	0,71
RO32	Bucureşti - Ilfov	1,31
BG41	Yugozapaden	0,85
BG42	Yuzhen tsentralen	0,23
Own elaboration (NTUA team), based on Eurostat data		

The **total intramural R&D expenditure** (GERD) in millions of PPS (Table 45) -a main indicator on this issue- was in 2005 much higher in Greece and Attiki than in the other two countries and capitals. In 2011, a year in the crisis period, Greece and Attiki remain at first place, however their distance from the other countries and capitals decreased. GERD per inhabitant in 2011 (Table 46) was much higher in Greece than in Bulgaria and Romania, but while the progress in Attiki from 2006 to 2012 was slow, it was intense in Sofia and București. The difference of the two last from their countries was very high in 2011; this shows that expenditure on R&D was highly concentrated in the capitals: Sofia and București.

Table 45 Total intramural R&D expenditure (GERD) in Millions of PPS (Purchasing

Power Standard)									
Code	Region	2005	2006	2007	2008	2009	2010	2011	2012
EU27	EU27	192249	206108	219299	229190	225299	235300	247365	254465
BG	Bulgaria	291	318	348	390	413	482	486	565
BG41	Yugozapaden	244	256	278	296	330	400	408	
EL	Greece	1352	1424	1516				1498	1499
EL30	Attiki	798						835	
RO	Romania	696	889	1169	1459	1120	1127	1265	1126
RO32	București-Ilfov	413	544	673	909	645	669	730	
Own elaboration (NTUA team), based on Eurostat data									

Table 46 Total intramural R&D expenditure (GERD) Purchasing Power Standard (PPS) per inhabitant at constant 2005 prices

Code	Region	2005	2006	2007	2008	2009	2010	2011	2012
EU27	EU27	392	411	425	443	441	448	463	464
BG	Bulgaria	38	40	43	48	51	59	57	65
BG41	Yugozapaden	115	118	123	129	144	171	166	
EL	Greece	122	126	133				127	123
EL30	Attiki	201						191	
RO	Romania	33	39	48	59	45	44	49	42
RO32	București-Ilfov	187	230	263	337	235	234	252	
Own elaboration (NTUA team), based on Eurostat data									

While the distance of the three capitals from the EU average in GERD remains high (Attiki shows higher scores than the two other), all three record high percentages concerning **Human Resources in Science and Technology** (% of active population) in 2011 (Table 47 and Figure 30), with București surpassing significantly the EU27 percentage.

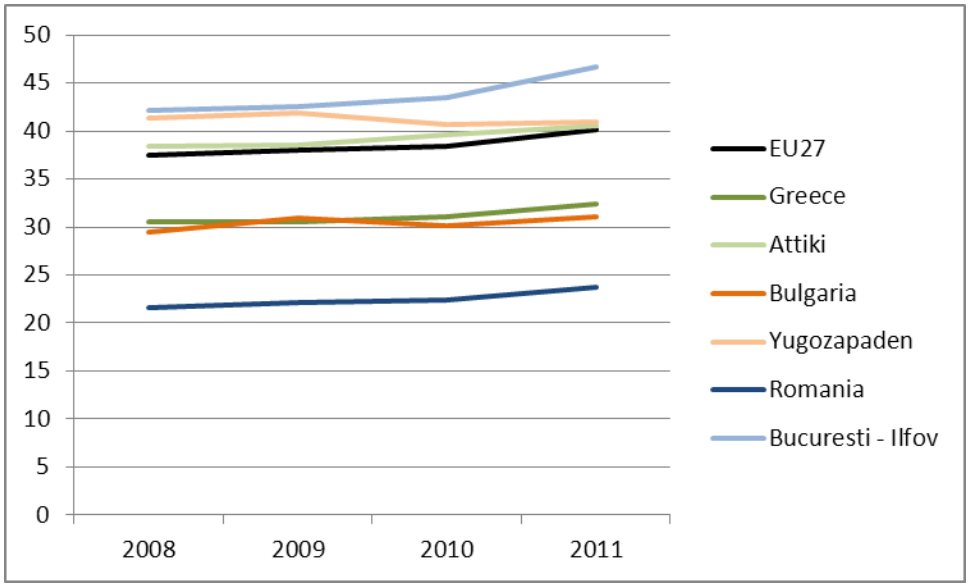
Table 47 Human Resources Science and Technology by NUTS2 regions (in % of active population)

Code	Region	2005	2006	2007	2008	2009	2010	2011	2003-2011 differences in % points	2012 *
EU27	EU27	35,6	36,3	37,0	37,5	38,0	38,4	40,1	6,4	31
BG	Bulgaria	29,8	28,9	29,5	29,5	30,9	30,2	31,1	1,4	39
BG41	Yugozapaden	40,1	38,3	40,4	41,3	41,9	40,7	40,9	2,5	33
EL	Greece	27,8	29,4	29,9	30,5	30,5	31,1	32,4	7,0	42
EL30	Attiki	35,2	37,0	37,5	38,4	38,6	39,6	40,5	6,2	24
RO	Romania	19,7	20,6	20,6	21,6	22,1	22,4	23,7	5,7	47

RO32	București-Ilfov	39,5	41,6	41,3	42,2	42,6	43,5	46,7	10,1	31
Own elaboration (NTUA team), based on Eurostat data										

* Different set of Eurostat data from that of the period 2006-2011

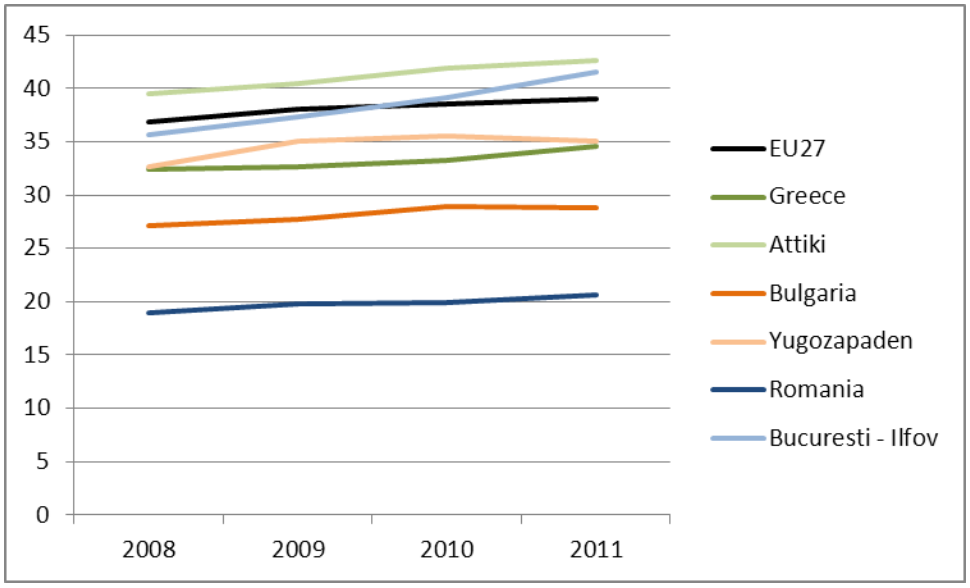
Figure 30 Human Resources Science and Technology by NUTS2 regions in % of active population



Own elaboration (NTUA team), based on Eurostat data

High performance is also observed in **employment in technology and knowledge - intensive sectors** for Attiki (Figure 31), and București in 2011 which exceeded the EU27 average, while Sofia performed lower. However, the share of enterprises with innovation activities in 2006 was in Greece marginally higher than the EU27 average and by far higher than in Bulgaria and Romania.

Figure 31 Employment in technology and knowledge-intensive sectors by NUTS 2 regions in % of total employment



Own elaboration (NTUA team), based on Eurostat data

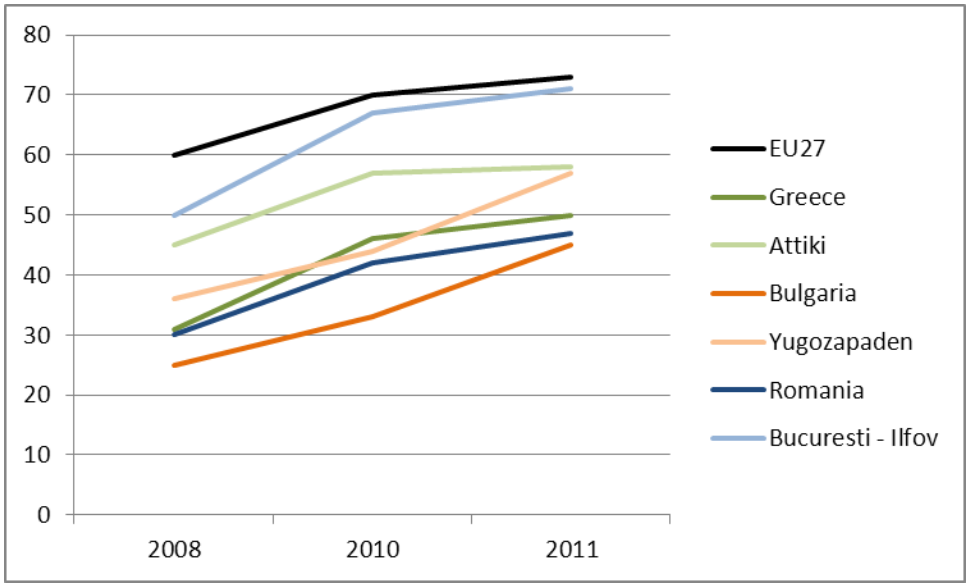
Regarding also the number of **patent applications** (to the European Patent Office) per million of inhabitants, Greece exceeded significantly in 2010 the respective index of Bulgaria and Romania, although it performed lower than the EU27.

Concerning the share of **households with broadband access** the three capitals perform the same, all lagging behind EU27 (Table 48). The share of **households with access to the internet at home** is higher in București in 2011, approaching the EU27 average, while Attiki and Sofia perform significantly lower.

Table 48 % of households having broadband access

Code	Region	2008	2009	2010	2011	Differences in % points 2008-2011
EU27	EU27	49	57	61	67	18
BG	Bulgaria	21	26	26	40	19
BG41	Yugozapaden	31	36	37	54	23
EL	Greece	22	33	41	45	23
EL30	Attiki	34	46	51	53	19
RO	Romania	13	24	23	31	18
RO32	București-Ilfov	21		33	54	33
Own elaboration (NTUA team), based on Eurostat data						

Figure 32 Households having access to the Internet at home as % of households



Own elaboration (NTUA team), based on Eurostat data

It is particularly important to examine the contribution of the **Advanced Producer Services (APS**) and **High Technology (HT)** branches in the competitiveness of the three capitals and countries, as well as whether relevant firms' clusters are formed among the three capitals. We limit ourselves here to mention the relevant conclusions of ESPON FOCI (2010) (see also in Angelidis et al., 2011). APS and HT are highly developed and spatially integrated in the "pentagon" of the EU, while in Southern and Eastern Europe, these activities, as well as the spatial links among them remain weak. Most of APS and HT activities are integrated in EU level clusters. However, the "strong points" of the latter remain particularly in the "North" EU. Only a few units of these clusters are located in the rest of the EU space; so there, the clustering at national or regional level is weak. This is obvious in the case of SEE and the three capitals. Attiki includes comparatively more of these strategic activities, but they are largely "dependent" on the similar activities of the major cities of the "North". The corresponding integration among Athens - Sofia - București is growing, but still remains limited. The update of this analysis in the context of GROSEE, basically confirmed these findings.

The analysis of the **share of enterprises with innovation activities** in the three countries in comparison with EU27 demonstrates that the share of Greece is roughly equal with the EU27 rate while the share of Bulgaria and Romania are clearly lower, amounting to half of the EU27 rate (Table 49).

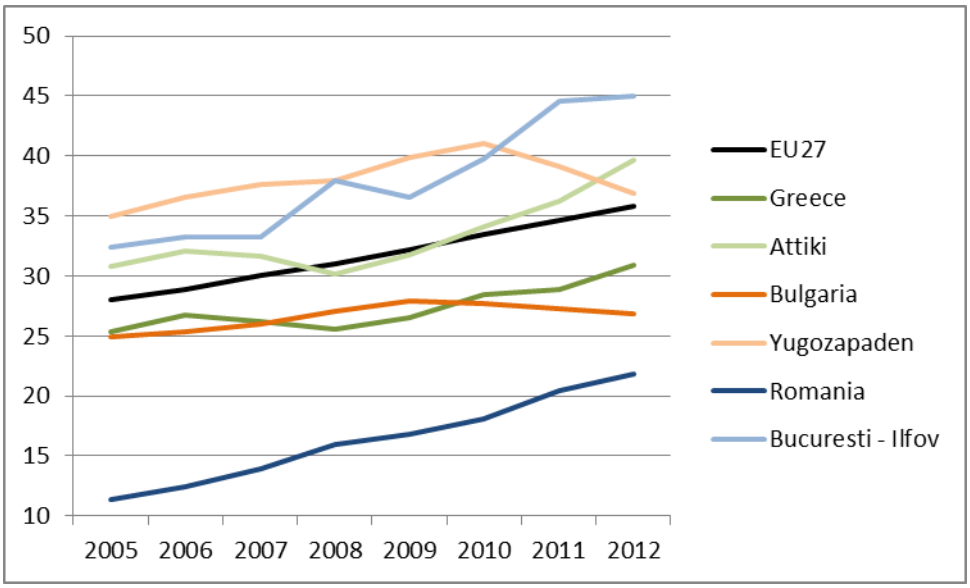
Table 49 Share of enterprises with innovation activities in the three countries and EU 27, 2004 and 2006

Code	Region	2004	2006	Change 2004-2006 in percentage points
EU27	EU27	39,5	38,9	-0,5
BG	Bulgaria	16,1	20,2	4,1
EL	Greece	35,9	40,9	5,0
RO	Romania	19,5	20,7	1,2
Own elaboration (NTUA team), based on Eurostat data				

The quality of the available human potential

The quality of **human potential** as for the share of **tertiary educated people** (30–34 years) to the total population in 2012 was higher in Attiki and București, exceeding the EU27 average and approaching the target of Europe 2020, while Sofia had lower share (Figure 33).

Figure 33 Persons aged 30-34 with tertiary education attainment by NUTS 2 regions



Own elaboration (NTUA team), based on Eurostat data

Regarding the **share of persons aged 25-64 with tertiary education attainment** (Table 50) the rates for the three capitals in 2012 were satisfactory (32-32%) while the rates for Greece and Bulgaria were lower (24-26%) and for Romania much lower (15%).

Table 50 Persons aged 25-64 with tertiary education attainment and NUTS 2 regions (%) 2005-2012

GEO	GEO / TIME	2005	2006	2007	2008	2009	2010	2011	2012
EU27	EU (27 countries)	22,5	23,0	23,5	24,3	25,1	25,8	26,7	27,7
BG	Bulgaria	21,6	21,9	22,4	22,8	23,0	23,2	23,6	24,0
BG41	Yugozapaden	31,5	31,9	33,2	33,6	33,7	33,1	32,8	33,0
EL	Greece	20,6	21,5	22,0	22,6	22,8	23,9	25,4	26,1
EL30	Attiki	25,3	26,4	26,9	28,0	28,1	29,6	31,5	33,1
RO	Romania	11,1	11,7	12,0	12,8	13,2	13,8	14,9	15,4
RO32	București-Ilfov			26,3	27,7	27,7	28,6	31,4	32,0
Own elaboration (NTUA team), based on Eurostat data									

A low share of **early school leavers** shows that the local education system succeeds to integrate a big share of young people in the high quality human potential for competitiveness.

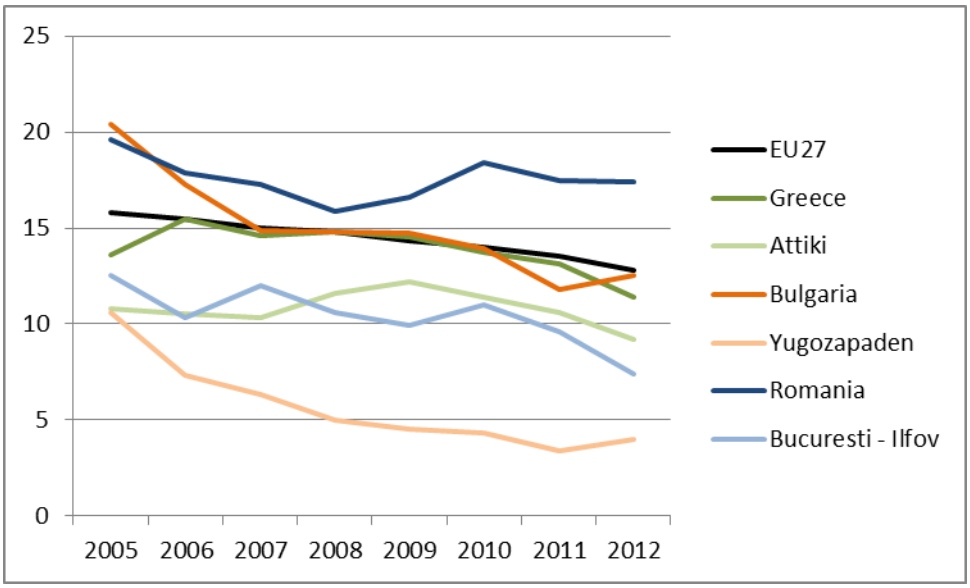
From this scope, Sofia and Attiki performed well in 2011 (Table 51) as their shares were lower than the EU27 average, while București recorded a much higher share (but this correspond to NUTS1 RO3, a larger area than the capital).

Similar conclusions are reached from the analysis of the **shares of the population aged 18-24 with at most lower secondary education** and not in further education or training; the shares for the three countries and capitals were in 2012 lower than the EU27 average (Figure 34)

Table 51 Early school leavers aged 18-24-%

NUTS1	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU27	17,6	17,2	17	16,6	16,1	15,8	15,5	15,1	14,9	14,4	14,1
BG		20,5	20,7	21,9	21,4	20,4	17,3	14,9	14,8	14,7	13,9
BG4				18,4	17,6	17,1	13,4	10,1	9,6	10,1	9,4
GR	18,2	17,1	16,5	16,0	14,7	13,6	15,5	14,6	14,8	14,5	13,7
GR3	11	12	11,3	10,5	11,4	10,8	10,5	10,3	11,6	12,2	11,4
RO	22,9	21,7	23	22,5	22,4	19,6	17,9	17,3	15,9	16,6	18,4
RO3								17,9	16,5	16,3	17
Eurostat Data											

Figure 34 Early leavers from education and training (%) by NUTS 2 regions 2005 – 2012



Note: Percentage of the population aged 18-24 with at most lower secondary education and not in further education or training
Own elaboration (NTUA team), based on Eurostat data

Healthy life expectancy, measured by the number of years of healthy life expected, is a good index for the potential labour productivity. This index amounted in 2007 to 62 in EU 27, 66 in Attiki and 62 in București and Sofia (Table 16) (DG Regio 2010).

Table 52 Healthy life expectancy 2007	
GEO	Number of years of healthy life expected
BG41	61,7
GR30	66,4
RO32	62,4
	Source of data: DG REGIO 2010

Overall conclusions on human potential and technological readiness

In summary, for the two last sections: The three countries and capitals have a considerable human potential in R&D. Their share in the total employment is growing and does not differ so much from the EU average. The low expenditure in R&D despite its increase (a slow one) remains much lower than the actual EU average as well as the Europe 2020 target. Athens performs better than the two other capitals. In all the issue aspects (expenditure, introduction of R&D in enterprises and human potential, the three capitals perform much better than the rest of their countries, raising the distance between them). They function as a type of “island of high technology and innovation” in their countries or, in other words, they do not redistribute enough

innovation and technological readiness to their countries. However, they also have a good position in comparison with other EU metropolises and the potential to compete satisfactorily at EU level if they succeed in increasing their expenditure in R&D.

Before going to more general conclusion, it is worth mentioning the differences within the three Metropolitan Regions (MRs). The main finding is that the "Core Cities" / CC of București and Sofia presented before the crisis higher competitiveness dynamics, thereby acting as cores which spread growth and enhance the competitiveness of the other areas in the corresponding MRs, especially the suburban areas included in the respective Functional Metropolitan Areas (FMAs). Such dynamics have been also developed regarding the Attiki's FMA (as defined herein), except that it occurred much earlier.

2.3.2 Demographic and social structure, well being (PP2)

Characteristics of the study area

Athens / Attiki is the Hellenic Capital with a population of 3,828 million of inhabitants in 2011 (census data for EL300 / Attiki), roughly the same as for 2001 (3,895 million). We should note that data of censuses of 2001 and 2011 are note fully compatible. See in the ELSTAT website / census of 2011. A more detailed discussion will be presented for the SR of the Final Report.

The total area of the region amounts to 3.808 km^2 and its population density in 2011 amounts to 1.005 inh./km^2.

Athens was developed by the late 1970s in successive perimeter zones of its centre. Since the 70s, the urban fabric, starting from the Athens basin, an area surrounded by mountains, is extended to other peri-urban parts of the Athens basin. In next, the urbanisation extends until today out of the basin, in the East part (mostly), but also in the West part of Attica.

We should stress that the population potential of Athens is considerably greater than that of București and Sofia. Thus, Athens has a considerably more extent area densely populated than București and Sofia. This leads to a more intense concentration of population and economic activities in Athens in comparison to the two other capitals.

Nowadays, the Attica Region (NUTS2 and NUTS3 level) contains the larger part of the contiguous built up urban area of the Greek capital. However, the more densely populated part of the Region is contained in the Athens Basin, the "kernel" area of the division of the city by Urban Audit. The Attica Region contains 8 "new" regional units (five are located inside the Athens

Basin) and 35 “new” municipalities (after the administrative reform of 2011). It comprises the Athens metropolitan area and is equivalent to NUTS2 (GR30) but also to only 1 NUTS3 level unit (GR300).

Demographic trends

Total population, population growth rates and changes in the territorial division of the population

According to Eurostat data (Total population on 1st January – Table 53) the resident population of Greece, Bulgaria and Romania amounted in 2011 in 11.3, 7.4 and 21.4 millions of inhabitants respectively.

During 2001-2011, while the population of EU27 increased by 3.8%, the population of Greece increased a bit lower: by 3.5%, while the population of Bulgaria and Romania decreased by 9.6% and 4.5% respectively. We should note for the case of Greece that the results of the population census 2011 refer a resident population of 10.815.197 which is clearly lower from the number referred by Eurostat. Taking into account the resident population of Greece according to the results of the population censuses (published by ELSTAT, the Greek Statistical Inst.) for 2001 and 2011: 10.93 and 10.81 millions of inhabitants respectively, the population of Greece remained stable in general terms. See also for this issue our previous note.

According to the above Eurostat data, the population of Attiki increased by 5.7%. However, according to the censuses data (for 2011 see previous note) the population of Attiki decreased by 1.7%.

For comparison, we note that according to the same data, the population of Sofia NUTS2 (BG41) decreased during 2001-2011 by 1.4%; while population of Sofia stolitsa (BG411) increased by 3.0%, the one of “Sofia” (BG412) decreased by 2.3%.

The population of NUTS2 București–Ilfov (RO32) decreased slightly by 0.2%. While the population of București decreased by 3.0%, the population of Ilfov increased by 19.4%.

Table 53 Total population on 1st January in EU27 and the three countries and capitals, change 2001-2011 %

CODE		2000	2001	2010	2011	change 2001-2011 %
EU 27	EU27	482.767.512	483.797.028	501.120.157	502.406.858	**3.8**

EL	Greece	10.903.757	10.931.206	11.305.118	11.309.885	**3.5**
EL300	Attiki	3.878.199	3.892.519	4.109.748	4.113.979	**5.7**
BG	Bulgaria	8.190.876	8.149.468	7.563.710	7.369.431	**-9.6**
BG41	Yugozapaden	2.142.700	2.143.110	2.112.519	2.113.555	**-1.4**
BG411	Sofia (stolitsa)	1.211.531	1.222.180	1.249.798	1.259.446	**3.0**
BG412	Sofia	262.151	256.270	253.010	250.464	**-2.3**
RO	România	22.455.485	22.430.457	21.462.186	21.413.815	**-4.5**
RO32	București-Ilfov	2.285.544	2.272.972	2.261.698	2.267.419	**-0.2**
RO321	București	2.010.050	1.996.612	1.944.451	1.937.421	**-3.0**
RO322	Ilfov	275.494	276.360	317.247	329.998	**19.4**
					Source of data: Eurostat – Elaboration of data: NTUA team	

The data of Urban Audit on the Total annual population change over approximately 5 year (Urban Audit / LUZ level) confirm more or less the observations presented above.

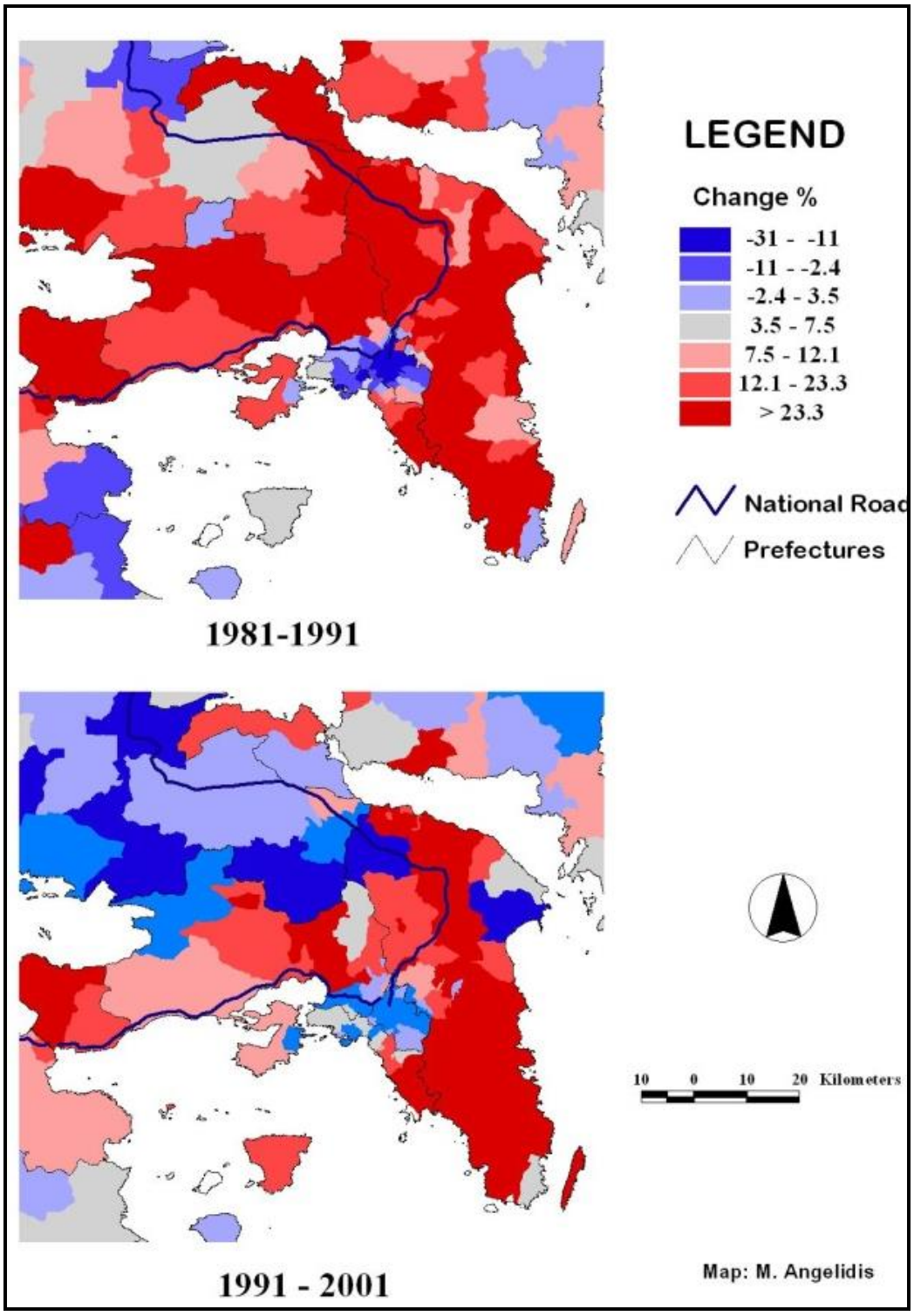
Especially for the total population territorial changes in Attiki:

There are not Eurostat data for the different parts of Attiki. According to ELSTAT data (censuses data for 2011 see previous note), the resident population of the Athens basin (including Athens and Piraeus areas) as well as the population of western Attiki decreased, while the population of the Eastern Attiki increased impressively.

This follows a more general pattern of change of the population territorial division in Attiki. During the last thirty years, this change is impressively intense but also accelerating. As we will see it is associated with other important socio-economic changes.

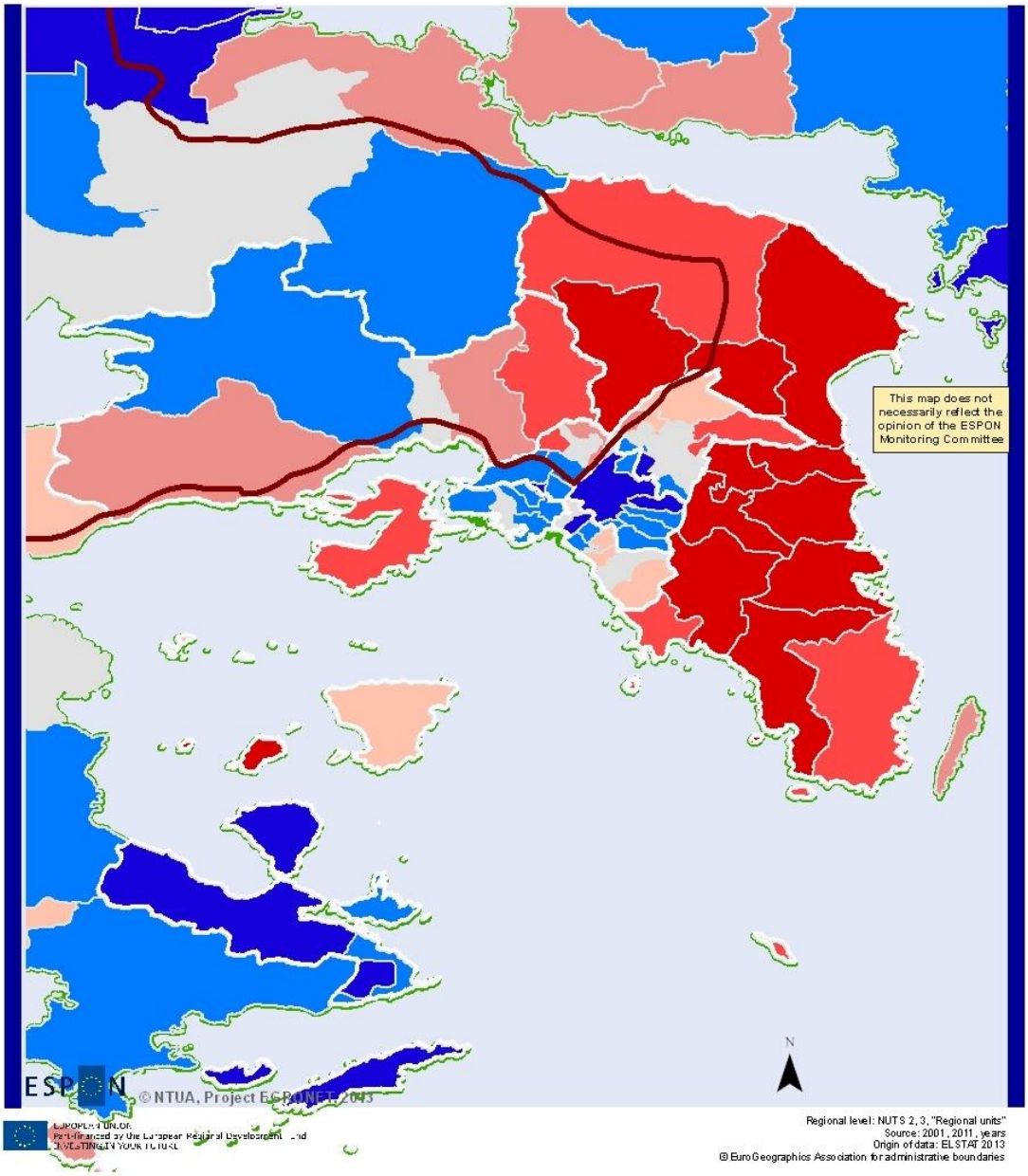
In general terms, while the movement of population from the Basin of Athens to the eastern Attiki was very important, the total population of the Basin remains stagnant at the beginning and decreases in next; this reduction is the result of an intense decrease of the population in the wider central zone of the city (central neighbourhoods: Municipality of Athens and closer municipalities to it) together with intense shifts of population (and economic activities) towards the North-eastern and the South-eastern zones of the Athens basin (see Map 67 for the periods 1981-1991 and 1991-2001 and Map 68 for the 2001-2011 population change).

Map 67 Population change per municipality, in Attica 1981-1991 and 1991-2001



Note: Municipalities before the reform of administrative division 2011 ("Kallikratis" plan)

Map 68 Population change % per municipality of Attiki 2001-2011



Note: Municipalities after the reform of administrative division 2011 (“Kallikratis” plan)

Population density

According to Eurostat data, population density in the SEE countries in 2009 scored in GR: 85.9 inhabitants per km^2, in BG: 69 and in RO: 93.6 (Table 54), clearly lower than the EU27 average: 116.

Population densities inside all three capitals' administrative borders in 2009 were very high: 1071 for Attiki, 922 for Sofia stolitsa / BG411 (36 for "Sofia" / BG422), and 8490 for București / RO321.

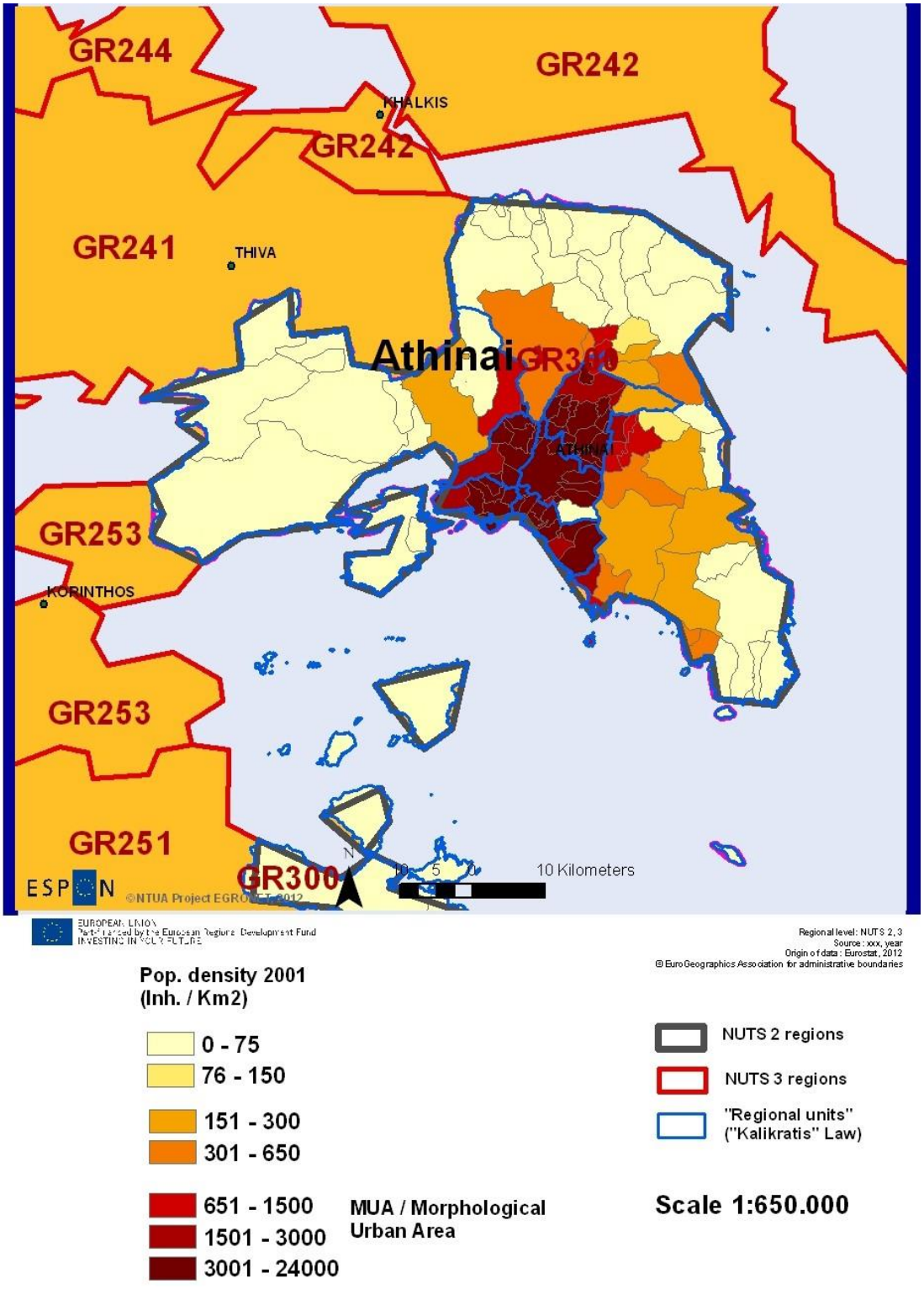
Table 54 Population density by NUTS2 regions – Inhabitants per km^2

CODE	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU27	112,3	112,5	112,8	113,3	113,9	114,3	114,8	115,5	116,0	116,0
GR	83,5	83,8	84,1	84,3	84,6	84,9	85,2	85,6	85,9	85,9
GR300	1020,9	1024,3	1027,4	1032,1	1039,6	1047,7	1055,5	1063,3	1070,6	1070,6
BG	73,6	71,3	70,9	70,5	70,1	69,7	69,4	69,0	68,7	68,7
BG411	905,1	870,5	880,6	890,8	900,8	909,2	915,4	918,8	922,2	922,2
BG412	36,7	38,4	38,2	37,7	37,3	37,0	36,7	36,5	36,2	36,2
RO	97,6	97,5	94,8	94,5	94,3	94,1	93,9	93,7	93,6	93,6
RO321	8748,2	8703,5	8447,3	8433,4	8423,1	8423,2	8459,5	10504,8	8489,8	8489,8

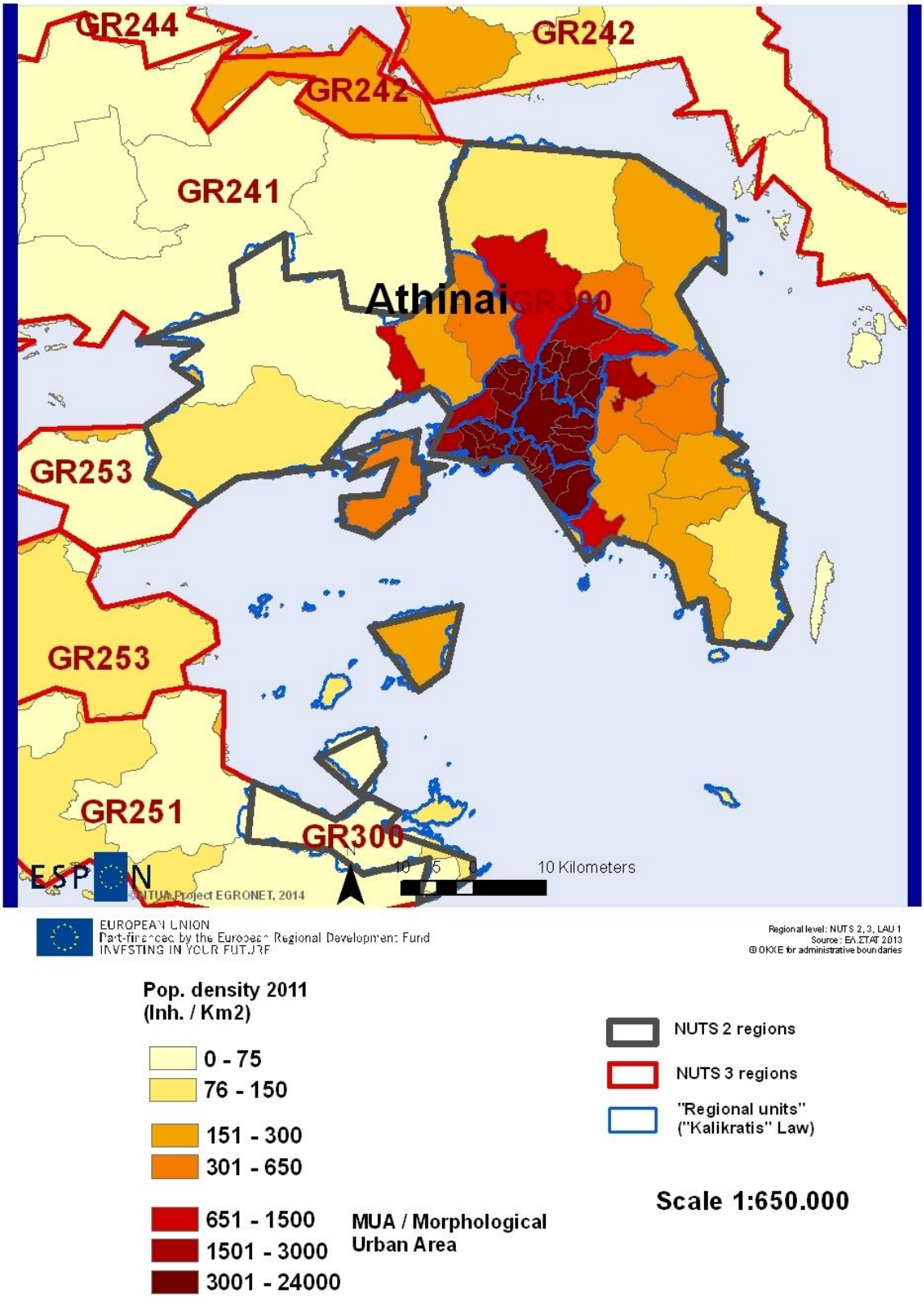
Source of data: Eurostat – Elaboration of data: NTUA team

Population density of the municipalities of the Core City (CC) of Attiki (inh./km2) was already in 2001 very high while it was of moderate size for those of the rest of the FMA (Map 69). The density of the municipalities of FMA where the expansion of the urban area was very intense was very high in 2011 (Map 70). Therefore it is clear that the dense urban area surpassed the limits of the Athens basin (CC).

Map 69 Population's density of Athens at LAU-2 level, 2001



Map 70 Population's density of Athens at LAU-2 level, 2011



Crude rate of population change

The respective rate for Attiki (EL30) decreased during 2000-2010: from 3.7‰ in 2000 to only 1.0‰ in 2010.

To compare with the two other capitals: The highest crude rate of population change (per 1.000 inhabitants) in 2010 was recorded in București (RO32) 2.5‰. There was a very important improvement from 2000 when this rate was clearly negative: -5.5‰. The rate for Sofia increased from 0.2‰ in 2000 to 0.5% in 2010. However, it remained lower than in the two other capitals in 2010.

Table 55 Crude rates of population change by NUTS 2 regions - per 1 000 inhabitants

Code	Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EL30	Attiki	3,7	3	3	6,2	8,4	7,2	7,6	7,1	6,7	5,2	1
BG41	Yugozapaden	0,2	-21,4	3,1	2,8	2,3	1,9	-1	-1,1	0,2	-1,2	0,5
RO32	București-Ilfov	-5,5	-26,4	-2,5	0	0,7	2,7	7,4	4,4	4,9	3,8	2,5

Source of data: Eurostat – Elaboration of data: NTUA team

Fertility rate

In 2010 the highest fertility rate was observed in Attiki 1.43, while Sofia recorded marginally the same (1.4) and București roughly lower (1.25) (Table 56).

In total, fertility rate in the 3 capitals during the period 2000-2010 is lower comparing to their respective countries. However, in the same period the percentage change of fertility rate is higher in the 3 capitals (than countries).

For the case of Attiki, this is the result of enter of younger population of foreign migrants.

Table 56 Fertility rate by NUTS 2 regions - Number of live births per woman

Code	Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	% 2010 - 2000
EU27	EU27	:	:	1,46	1,47	1,5	1,51	1,54	1,56	1,6	1,59	:	:	
EL	Greece	1,26	1,25	1,27	1,28	1,3	1,33	1,4	1,41	1,51	1,52	1,51	1,43	19,8
EL30	Attiki	1,18	1,17	1,19	1,22	1,24	1,25	1,32	1,35	1,4	1,44	1,43		21,2
BG	Bulgaria	1,26	1,21	1,21	1,23	1,29	1,32	1,38	1,42	1,48	1,57	1,49	1,51	18,3

BG41	Yugozapaden	1,14	1,06	1,07	1,09	1,11	1,18	1,23	1,29	1,37	1,46	1,4		22,8
RO	Romania	1,31	1,27	1,25	1,27	1,29	1,32	1,32	1,3	1,35	1,38	1,33	1,25	1,5
RO32:	București - Ilfov	0,98	0,92	0,9	0,94	1,03	1,11	1,15	1,15	1,24	1,31	1,25		27,6
Source of data: Eurostat – Elaboration of data: NTUA team														

Life expectancy at birth

Among the three capitals life expectancy at birth in 2008 was higher in Attiki - 80.4, while the recorded values for București and Sofia were 75.1 and 74.1 respectively (Table 57), Eurostat data).

Table 57 Life expectancy at birth

Code	Region	2000	2001	2002	2003	2004	2005	2006	2007	2008
GR30	Attiki	77,8	78,3	78,5	78,8	78,8	79,1	79,6	79,4	80,4
BG41	Yugozapaden	72,4	72,6	72,7	73,1	73,2	73,2	73,4	73,6	74,1
RO32	București-Ilfov					74,1	73,7	74,1	74,5	75,1
Source of data: Eurostat – Elaboration of data: NTUA team										

Population by age groups

Young people - less than 15 years old - made up 14.4% of the Attiki's population in 2011, which is lower than the EU27 percentage (15.6).

Population of working age (15-64 years old) accounted for 68.3% in Attiki which is higher than the respective percentage of Greece (66.4) and EU27 (66.9) in 2011.

Older people -65 years old or over- had a share of 17.5 in Attiki (same percentage for EU27), while Greece recorded a higher percentage (19.3).

In total, regarding the change of the age structure of the population in Attiki during the period 2001-2011, according to Eurostat data there was a marginal decline in the share of young people (0.7 percentage points), while for the working age population the percentage of decrease was higher (2.6). On contrary, the share of older people increased by 2.6 (1.7 for EU27) (Table 58).

Table 58 Population change by age groups 2002-2011							
Code	Regions	Total pop. Change 2002-2011	Change in Pop. Age: 0-14 years 2002-2011	Change in pop. Age: 15-64 years 2002-2011	Change in pop. Age: 65 or over 2002-2011	% Share of the pop. that is aged 15-64 years 2002-2011	% Share of the pop. that is aged 65 or over 2002-2011
	EU27	17.771.739	-3.028.022	10.318.625	10.481.462	-0,3	1,5
EL	Greece	341.177	1.355	49.201	290.621	-1,6	2,0
EL30	Attiki	209.687	40.896	45.919	122.872	-2,5	2,2
BG	Bulgaria	-521.664	-206.225	-340.375	24.936	0,2	1,5
BG41	Yugozapaden	15.774	-13.060	20.842	7.992	0,4	0,3
BG412	Sofia	-19.995	-7.437	-11.677	-881	0,6	1,2
RO	Romania	-419.668	-618.142	55.662	142.812	1,6	0,9
RO32	București-Ilfov	53.637	-4.957	50.928	7.666	0,5	0,0
RO321	București	697	-5.442	1.991	4.148	0,1	0,2
						Source of data: Eurostat – Elaboration of data: NTUA team	

Demographic dependency rate

We have used the Eurostat definition of old-age-dependency ratio:

“This indicator is the ratio between the total number of elderly persons of an age when they are generally economically inactive (aged 65 and over) and the number of persons of working age (from 15 to 64)”.

According to the respective data (Table 59), Old age dependency ratio in Attiki in 2011 accounted for 25.5%, which is the highest between the three capitals -23.6 and 19.2 for Sofia (NUTS2: BG41) and București (RO32) respectively.

However, the ratio recorded in Attiki was roughly lower comparing to EU27 (26.2). It was also significantly lower than total Greece (29.0) as well as the peripheral parts of the Metropolitan Region (MR) of Athens: Sterea Ellada (EL24) 34.0 and Peloponnisos (EL25) 36.1.

During the period 2001-2011 the old age dependency ratio increased in Attiki by 4.5. The increase was significantly lower for EU27 (2.7) as well as Sofia (BG41)1.2, while in București (RO32) almost remained the same as 2001 (0.1) (Eurostat data).

Table 59 Old age dependency ratio by NUTS2 regions 2009 (%)	
NUTS/REGION NAME	Old age dependency ratio (%)
GR 30 Attiki	24,0
BG 41 Yugozapaden	23,0
RO 32 București	19,2
Source of data: Eurostat – Elaboration of data: NTUA team	

Demographic ageing

We present firstly relevant results of Angeldis et al 2007 which has used data for municipalities from 2001 census.

Regarding the differentiation of the demographic ageing inside Attiki we have used the index: number of persons 65 years + / number of persons 0-14 years.

The population of the Athens basin was in 2001 was comparatively more aged than that of Greece.

The population of the central neighbourhoods of the Athens basin was significantly more aged than the population of the North-West and North-East zones of the basin.

In addition: while the population of Western Attiki was in 2001 relatively more aged, population of the Eastern Attiki is much less aged than the population of the Athens basin.

Data for 2011 census have been very recently made available. First results:

Regarding the average age: Greece: 41.9 years, Attiki: 41.3 years

Using the demographic ageing index: number of persons 65 years + / number of persons 0-14 years, we conclude the following:

- The population of Attiki was younger than that of Greece (respective values of the index: 1.25 and 1.34).
- The population of the central part of the Athens basin was very significantly more aged than the population of the North and South zones of the basin (1.62, 1.25 and 1.33, respectively). The population of the West zone of the basin was clearly younger (1.08).
- The population of the more recently developed zones of Eastern Attiki and Western Attiki was even more young (0.90 and 0.75, respectively)

Therefore, in general lines, the territorial structure of Attiki per age did not change: the population of the central part of the Basin remains much more aged than the population of the rest of the basin while the population of the rest Attiki (Western and eastern Attiki) remains younger than the population of the rest of the basin.

Gender imbalances

According to Urban Audit data, during the period 2007-2009 the proportion of females in the total population was greater than that of males in all three capitals. The rate females / males (x100) (LUZ level) was lower in Attiki 105.1 (107.6 for Kernel Athina) and Sofia 109.9 and higher in București (113.2).

In the same period in all three capitals the proportion of females was higher comparing to their respective countries (Urban Audit data).

According to the data of 2011 census (ELSTAT), the share of women in the total population of Greece 51.0 % was greater than for men 49.0%. The share of women was even greater in Attiki: 51.8% (48.2% for men).

Migration flows

Immigration

According to Eurostat data, the number of foreign immigrants for Greece is much higher than for Bulgaria and Romania.

Especially for Greece during the period 2006-2010 accounted for 433.726. The number of immigrants from EU27 in the period 2008-2010 was 73.974. More specifically in 2006-2007 there were 21.298 immigrants from Bulgaria and 11.274 from Romania, while from Albania the number was by far higher (136.808). For the same period lower flows were recorded from Ukraine (4.112), Russia (4.035) and Moldova (1.788).

International migration[9] flows to Greece and Attiki: intensity, provenance and impact to the change of the demographic pattern in Greece and Attiki

In next, we mainly used the report: Angelidis M. - G. Karka (2010) Thessalia (Greece) - "Challenge of decline" poorly faced by immigration, ESPON 2013 Programme DEMIFER.

[9] Migration from abroad

Since the ‘90s Greece changed from a country of emigration into a country of immigration. While the share of foreigners in the total Greek population was less than 2% until the mid- ‘90s, in 2001, foreigners constituted already 7.0% of the recorded population (census). This share continued to rise considerably: it increased to 7.9% in 2006 to 8.1% in 2008 and 8.3% in 2009.

In reality this share is higher because an important number of migrants who entered Greece illegally are not recorded by the Greek Statistical Authority (ELSTAT). The number of illegally entered migrants who were not granted a provisional permit (card) of residence in the country, therefore they were not recorded by ELSTAT, is unknown. From the other hand, the number of persons who entered the country illegally raised impressively during the last years: from 51,000 in 2003 to 146,000 in 2008.

The participation of foreign immigrants in the total population of Attiki increased significantly since the beginning of the ‘90s: from 2.6 % in 1991 to 10.0 % in 2001 and even more, very probably, in 2011-2012.

Regarding the most important foreign communities in Greece:

In 2008, the share of citizens of Albania in the total foreigners in Greece has roughly increased to 73% (ELSTAT 2009). The share of EU27 citizens amounted at 4.8% of the total, including citizens of Bulgaria (0.95 of the total foreign population 7.270 inhabitants), Romania (0.7% - 5.119 inhabitants) and UK (1.0%). The share of the rest Western Balkans (except Albania) amounted to 0.9%. The total share of the foreign population from the ESPON space amounted in 4.9% of the total foreign population.

The contribution of foreign migrants in the increase of the population of Greece was crucial during the period 1991-2001: the natural balance was positive by 13,000 persons while the total (resident) population increased by 704,000 persons. Therefore, the Greek population increase during the ‘90s is due almost totally (98%) to the raise of the number of foreigners in this period.

The entry of numerous foreign migrants from the beginning of ‘90s combined with the evolution of fertility (decrease of the rates of natives since the beginning of ‘80s) had an important impact on the change of the population pattern in Greece and Attiki.

Undoubtedly, the inversion in the natural change in Greece and, according different sources, in Attiki, from the mid-90s until our days, is very closely related to the entry of a very important number of foreign migrants much younger in average than the nationals.

The contribution of foreign migrants to the raise of the birth rate and the fertility rate of the population of Greece since 1990 was very important. 45% of the migrants in 2001 were women, the large majority of which were in childbearing age (75% of the female foreign migrants are 15-49 years old). For 100 foreign women 15-49 years old there was recorded twice the number of births than in Greek women (66 compared to 33), while in the respective two years 2004-2005, a total fertility rate of an average of 2.21 children corresponds to each foreign woman and only 1.20 for Greek women. This change becomes even clearer from the analysis of the births and deaths during the period 2004-2008 per nationals (Greeks) and foreign migrants in Greece.

In Greece, natural change was positive during this period (Drettakis 2010, using ELSTAT data): +22,088 inhabitants because the positive natural change of the foreign population counter-balances the negative natural change of the national population.

In 2011, according to the census data, the total of the resident foreign population and the persons without nationality or with unclear nationality amounted to 911.929 corresponding to 8.4% of the total resident population of Greece. The share of the resident population with foreign nationality (see previously) was more important in Attiki: 10.6% of the total.

The most important community of foreigners was in 2011 by far that of Albanians (52.7% of the total of foreigners); the shares of the persons with Bulgarian (8.3%) and Romanian (5.1%) nationality are important, followed by the shares of migrants from Pakistan (3.7%) and Georgia (3.0%).

In Attiki, the shares of Albanians, Bulgarian and Romanians were less important than in the country (47.7%, 4.65 and 4.8%, respectively) while the share of migrants from Pakistan (5.8%) was higher than in the country.

The spatial division of foreign immigrants inside Attiki

According to the results of the 2001 census, analysed, among other, in Angelidis et al 2007, a very high concentration of immigrants was presented in certain areas of the central zone of Athens (because of the high accessibility, the "anonymity" offered etc.) but also in low income zones inhabited by people working in industry.

Net migration rate

The higher net migration rate among the 3 capitals during the period 2001-2007 was recorded in Sofia (BG412), 8.20, which by far exceeded the rate for Attiki (GR300) corresponded to 4.89 and the rate of București (RO321) 3.62, all significantly higher than the rate of EU27 (2.9) (Table 60 Eurostat data).

Table 60 Net migration rate 2001 – 2007 per Nuts 3 regions	
NUTS3	**NMR 2001-2007**
EU-27	2,9
GR300	4,89
BG411	5,18
BG412	8,20
RO321	3,62
Source of data: Eurostat – Elaboration of data: NTUA team	

Level of education

Students in higher education

The number of students in higher education per 1000 resident population in 2008 (ISCED levels 5 and 6 in Urban Audit core cities) was by far higher in București (RO001C), corresponding to 242, while the respective numbers for Sofia (BG001C) and Athina (GR001C) was 87 and 29 respectively (Table 61).

Table 61 Number of students in higher education (ISCED levels 5 and 6) in Urban Audit core cities- 2008 (per 1 000 resident population)		
Code/city	**Students in higher education**	**Population in the core city**
GR001C: Athina	29	796442
BG001C:Sofia	87	1138950
RO001C:București	242	1944367
Source of data: Eurostat / Urban Audit/CC level		

Disparities of levels of education inside Attiki – according to ELSTAT data 2001

The spatial distribution on the basis of the index: Level of education: Rate (%) of the University graduates or M.Sc or Ph.D in the total of Population 2001 - per Municipality of the Athens Basin was highly polarised (Angelidis et al, 2007).

In 2001, in the poorer and presenting deficit of development areas of the Athens Basin (West and South west) the level of education of the human potential was very low (Map 71).

There was an impressively high correlation of the "share of the people with high level of education (counted as above) / total population per municipality (correlation rate: 0,975) (Angelidis et al, 2007).

Again, the rate of the correlation of the values of the index of “highly educated people” with the income per municipality of the basin was very high.

This polarisation was also observed at very low territorial level (using data (at building block level) These disparities were very important, indicatively, in the case of the Western and the Eastern parts of the municipality of Athens (“Demos Athinaion” in Greek) which covers the main part of the central area of the city.

Early school leavers

The share of early school leavers (in % of the people aged 18-24)[10] gives an indication on the efficiency of the respective society and the education system in further improving the efficiency of the young human potential.

In 2003 this share was relatively high (greater than the EU27 average) in Bulgaria (21.9) and Romania (22.5) while it was lower in Greece (16.0) (Eurostat data for NUTS1 regions).

In the NUTS1 region in which Sofia belong (BG4) as well as in Attiki it was lower than the national average (which is positive for the two capitals).

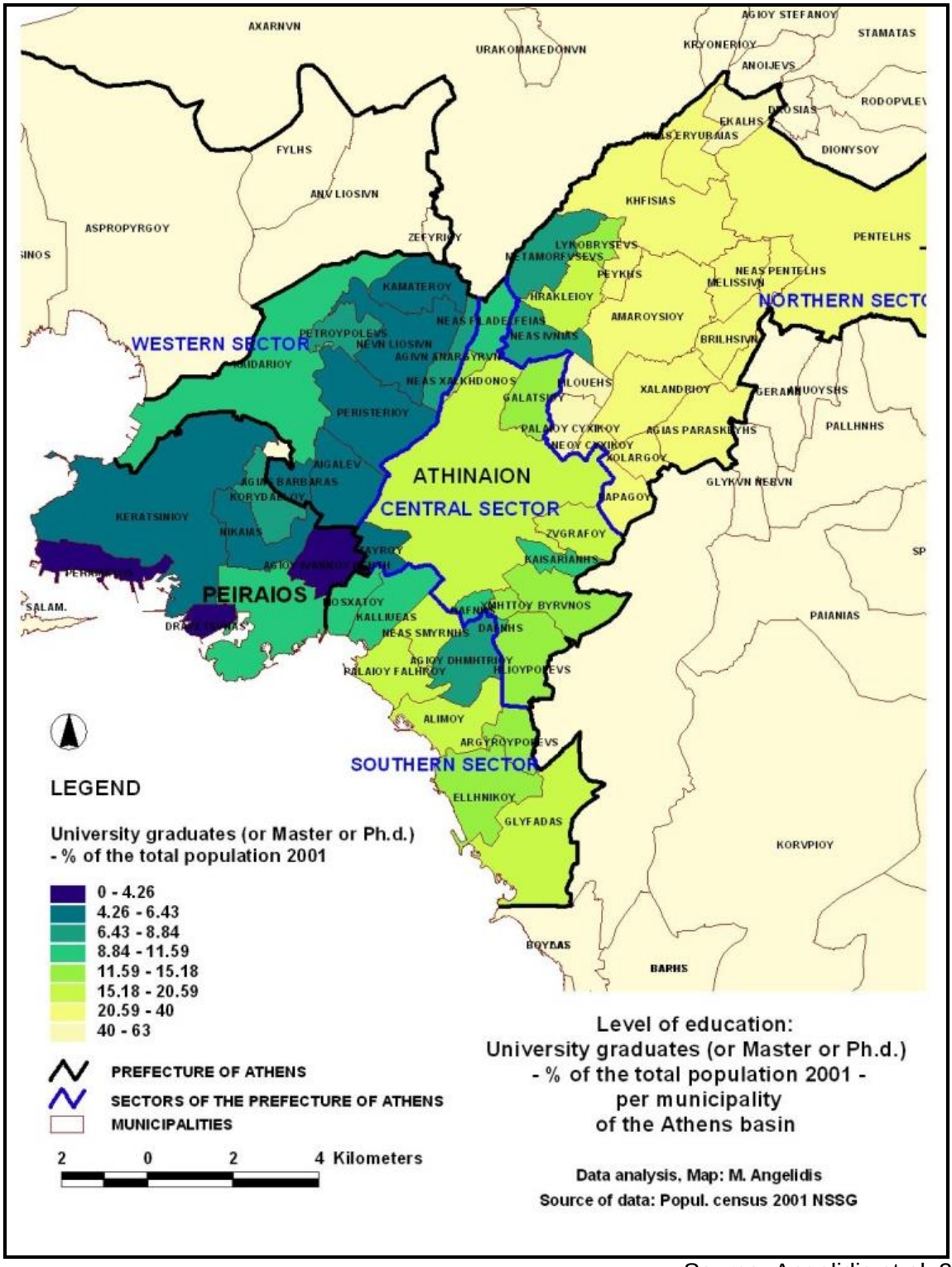
These shares decreased considerably in Bulgaria and Sofia until 2010 as well as in Greece and Romania.

In 2011 the rates for Bulgaria and Sofia (BG4) were lower than the EU27 average while they were higher than the EU27 rate in Romania and București.

The rates for Attiki and Sofia were in 2011 very low – what reinforces the hypothesis of the existence of a high quality human potential (Eurostat data).

[10] Definition of the indicator by Eurostat: Percentage of the population aged 18-24 with at most lower secondary education and not in further education or training

Map 71 Level of education: Rate (%) of the University graduates or M.Sc or PhD in the total of Population 2001 - per Municipality of the Athens Basin



Source: Angelidis et al, 2007

Well-being

At risk of poverty or social exclusion

In 2010 București (RO32) recorded a significantly higher percentage (34.3) comparing to Attiki (23.1). The values are even higher for Romania (41.4) and Bulgaria (41.6), while Greece performs lower (27.7) (Table 62)

Table 62 People at risk of poverty or social exclusion by NUTS2 regions - % of total population

	2004	2005	2006	2007	2008	2009	2010	2011
BG	n/a	n/a	61,3	60,7	44,8	46,2	41,6	49,1
EL	30,9	29,4	29,3	28,3	28,1	27,6	27,7	n/a
EL3	24,0	21,2	21,8	22,7	22,4	21,2	23,1	n/a
RO	n/a	n/a	n/a	45,9	44,2	43,1	41,4	40,3
RO32	n/a	n/a	n/a	35,1	36,2	41,9	34,4	28,4
Source of data: Eurostat – Elaboration of data: NTUA team								

Homicide rate

According to Urban Audit data, in 2009 the number of homicides in Athens (EL001C) accounted for 70, which exceeds by far the number of homicides in Sofia (BG001C) and București (RO001C) (Table 63).

Table 63 Number of crimes recorded by the police: homicide in cities

CITIES/TIME	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
BG001C	39	55	45	46	37	38	27	24	27	26
EL001C	52	47	46	47	41	49	43	68	69	70
RO001C	27	31	33	25	24	27	25	22	17	20
Source of data: Eurostat/ Urban Audit/ CC level										

Medical-sanitary staff

According to Eurostat data, the index of the health care personnel – number of practicing physicians per 100 000 inhabitants in 2009 was higher in Attiki (848) and lower in București – Ilfov (482) and Sofia (394) (Table 64).

Also, the number of physicians or doctors per 100 000 inhabitants in 2010 was higher in Attiki (EL30 - 830) and lower in București – Ilfov (RO32 – 517) and Sofia (BG41 – 394). During the period 2000-2010 this index increased considerably in Attiki (from 577 to 829); it has increased

moderately for București (from 395 to 517) and remained roughly the same for Sofia (from 411 to 394).

Table 64 Physicians or doctors by NUTS 2 (per 100 000 inhabitants)											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BG 41	411,9	408,3	421,3	422,5	413,6	419,6	406,5	400,4	404,7	393,9	394
EL30	576,6	580,7	598,9	616,7	632,6	649,7	687,3	715,3	834,3	847,6	829,3
RO32	395	414,7	411,8	452,6	487,1	516,2	508,6	484,5	485	481,9	517,4
Source of data: Eurostat – Elaboration of data: NTUA team											

Hospital beds

According to Eurostat data, the number of hospital beds per 100 000 inhabitants in 2009 was lower in Greece (489) and clearly higher in Bulgaria (662) and Romania (662) (Table 65). During the period 2000-2010 this index increased moderately in Greece (from 471 to 485); it has decreased in Bulgaria and Romania.

The value of the same index in 2009 amounted in 988 in București –much higher than the country' index-, in 692 in Sofia–roughly the same as for the country- and 584 for Attiki – considerably higher than the national average.

During 2000-2010, in general terms, the number of hospital beds (per 1.000 inhabitants) decreased slightly in Attiki and in București; it decreased considerably in Sofia.

Table 65 Available beds in hospitals in NUTS2 regions per 100,000 inhabitants											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EL30:Attiki	592,5	608,8	605,2	591,4	588,5	581,7	584,7	582,7	573,3	583,7	n/a
BG 41: Yugozapaden	813.2	763.9	702.1	683.9	668.0	664.7	643.7	661.5	688.0	691.7	667.8
RO32: București-Ilfov	1068	1084,7	1111,8	1050,6	1042,8	1045,1	1021,1	972,9	996,3	988,2	990,1
Source of data: Eurostat – Elaboration of data: NTUA team											

Again, the correlation rate of the values of the index of "highly educated people" with the income was very high.

2.3.3 Internal connectivity

General approach

Intra-urban connectivity and accessibility are of major importance for the improvement of territorial cohesion and reducing inequalities inside a city. It includes aspects such as: accessibility to services of public interest (health care, education, public transport, etc.), accessibility to work, accessibility to leisure activities, access to green areas, connectivity of different areas inside the city, Internet access etc.

This Section examines the current infrastructures of Athens / Attiki in comparison with those of the other two SEE capitals in respect of transportation and road network, the level of accessibility to public services, the connectivity to airports, motorways and railway stations but also the connectivity through broadband and Internet access.

Within this framework, we also examine the existing daily tensions between centre and periphery, between residential and industrial/services areas, between peripheral areas and suburban ones as well as how the local authorities solved the critical points / issues concerning the intra-urban traffic flows fluency.

All these are of high importance for GROSEE which aims to propose policies and specific projects improving among others, the attractiveness of the three capitals for investment together with the improvement of the quality of citizens' life and of the urban environment.

In next, internal connectivity of the three capitals is examined at different spatial levels and by different transport modes: road, air, rail / public transport, sea (ports), water.

Literature review

Good Intra-urban connectivity and accessibility is necessary for ensuring high life quality for all the citizens together with high attractiveness for investments. It includes aspects such as: accessibility to services of public interest (health care, education, public transport, etc.), accessibility to work, leisure activities and green areas and connectivity of different areas inside the city.

The relevant recent literature as well as the EU policies focuses on sustainable urban mobility, improvement of the public transport and access to services and better coordination of urban and

transport planning. See indicatively: EC 2007 / Green Paper and EC / 2007 / Sustainable Urban Transport Plans, Wickham and Lohan, 1999, Crampton, 2008, ESPON ATTREG 2010, ESPON TRACC 2011 and for the data and documentation: EU/Transport, 2012, Athens UTO2012, Angelidis et al., 2006, Milakis, 2006.

Road transport: infrastructure, capacity, flows

The three capitals have extensive networks of motorways and road lines significantly improved before the crisis

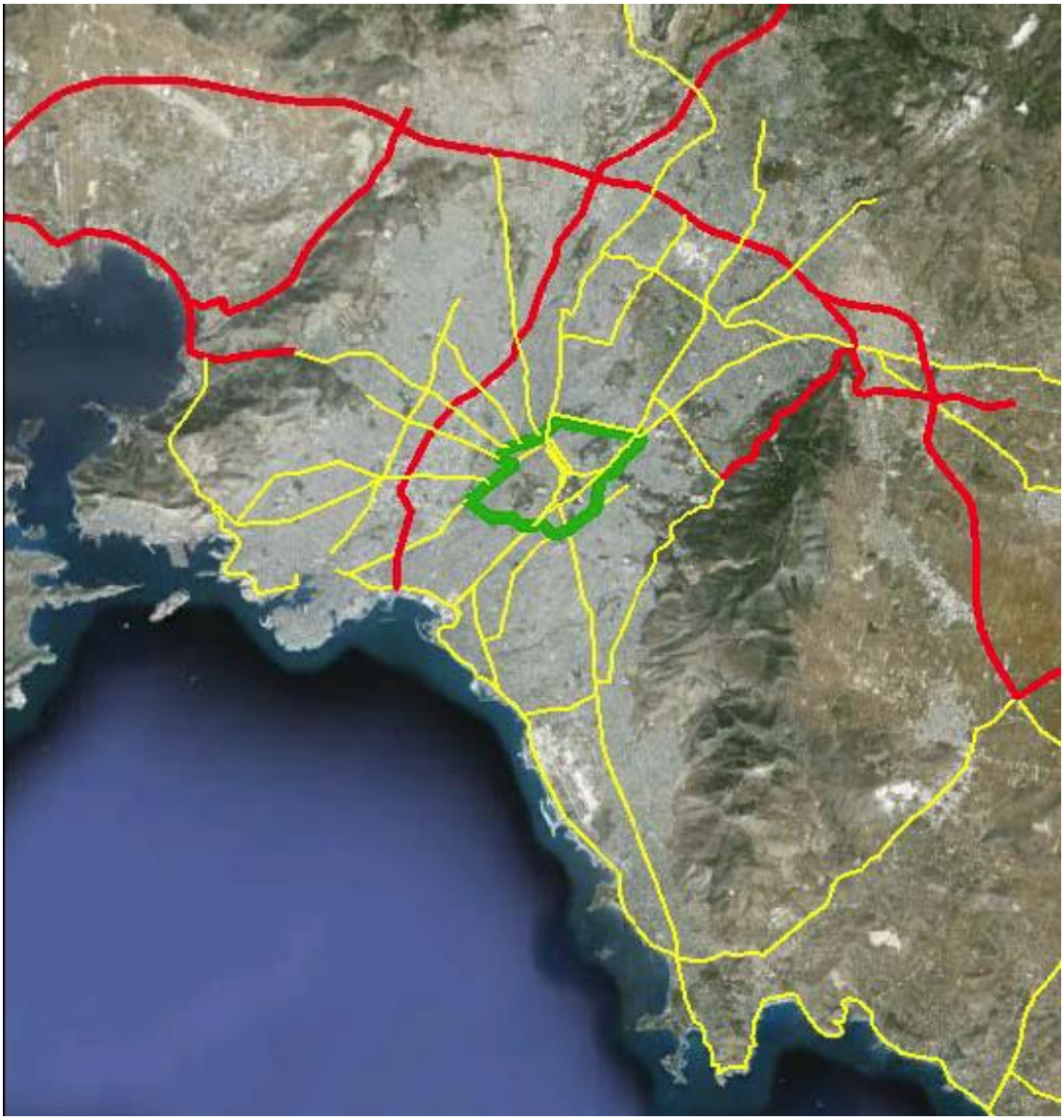
The three capitals have extensive networks of motorways and road lines while Attiki has a more developed network of motorways per inhabitant than București and Sofia. The Attiki road network has been significantly improved during the period before the Olympic Games of 2004 while the road system of București has mainly been improved during the recent years. Both road networks of București and Attiki are mainly based on radial axes.

In Attiki since the '70s, the road rings were planned and gradually implemented (Map 72 and Map 73). Specifically, a first inner road ring has been finalised, while two others have partially been implemented and a fourth additional extra outer ring is under implementation. We should also mention that the motorway Attiki Odos connects the two National Roads and the city of Athens with Western and Eastern Attiki in which the International Airport El. Venizelos is located.

Map 72 The main road network of Attiki

(Source: Papathanassopoulos, 2012)

Map 73 The main road network in the Athens basin and the Inner Ring Road



(Source: Papathanassopoulos, 2012)

For comparison: In București, the road network has a radial pattern, nine main roads converging to the central part of the city and a circular pattern surrounding the city as a result of the two circular roads. The enlargement of a ring-road has been initiated in 2010. In Sofia the main motorways and roads are connected to the Sofia Ring Road. In addition, the Yugozapaden Region road network is branched to a grid of secondary roads, connecting the small villages and towns in the region.

The **motorisation rate** (ratio of passenger cars per 1.000 inhabitants) in 2010 was clearly greater in **Attiki** than in București and Sofia (672 against 444 and 432), as well as the EU27 average (473). (Table 66)

Table 66 Registered cars per 1.000 inhabitants in the three countries and capitals (NUTS2) 2000-2011 – Eurostat

	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	2005-2010 %	Att/Buc. 2010	Att./Sof. 2010
EL	466	464	457	446	428	407	387	368	348	331	312	292	**20**		
EL30	**670**	**672**	**661**	**647**	**622**	**593**	**565**						**19**	**1,5**	**1,6**
BG		353	331	311	272	230	329	314					**7**		
BG41		**432**	**420**	**400**	**354**	**301**	**424**	**403**					**2**		
RO		202	198	187	165	149	156	149	142	137	132	124	**29**		
RO32		**444**	**464**	**465**	**409**	**361**	**317**	**285**	**260**	**246**			**40**		

Source of data: Eurostat and NSI for Greece (ELSTAT)

Regarding the road safety, the number of deaths in road accidents per millions of inhabitants (road fatality rate) (Table 67) decreased in general from 2005 to 2011 in all three countries and capitals, while it was lower in the three capitals than in their respective countries in 2008, with Attiki performing better than București and Sofia, as well as EU27.

Table 67 Number of deaths (persons killed) in road accidents in the three countries and capitals (NUTS2) 2000-2011 – Eurostat

		2005	2006	2007	2008	2009	2010	2011	2005-2010 (%)
EL	Greece	1.658	1.657	1.612	1.553	1.456	1.265		**-24**
EL30	Attiki	393	385	372	325	321	313		**-20**
BG	Bulgaria	957	1.043	1.006	1.061	901	776	657	**-19**
BG41	Yugozapaden	253	264	265	294	189	199	133	**-21**
RO	Romania	2.641	2.587	2.800	3.065	2.797	2.377	2.018	**-10**
RO32	București - Ilfov	225	211	248	278	243	212	170	**-6**
RO31	Sud - Muntenia	466	438	470	535	463	375	338	**-20**

Source of data: Eurostat Database

Attiki as well as the other SEE capitals face important problems of the road network performance which result mainly from the rapid increase of the road traffic during the last 20 years and lead to the saturation of many motorways and to the decrease of the average speed on the entire road network. In Attiki, the population growth together with the increase of the

motorisation rate (number of cars per 1.000 inhabitants), until at least 2010, as well as the low use of the public transport have contributed to the rapid increase of the road transport demand. On the other hand, the road transport supply has increased less than the road transport demand. We should note that illegal parking in the roads area reduces the capacity of a great number of city roads.

In addition**,** poor planning and incomplete infrastructure of the main road network and, even more, the lack of proper management, further reduced the network effectiveness and increased the number and the gravity of road accidents.

Air transport – access to the capitals

Attiki and the two other capitals have by far the most important airports of their countries serving national and international trips. The respective airports have been upgraded recently. The new international airport El. Venizelos of Attiki, opened before 2004, is located in East Attiki and is the most important one in SEE as far as it considers its capacity and the traffic volume.

The three capitals are very important nodes of the national air transport networks.

Attiki is directly connected with almost all the 38 Greek airports; the airport of Thessaloniki is also an important hub at national (and international) level. The strongest linkages are between Athens and Thessaloniki, Herakleion, Chania, Rhodos and Kyklades.

The air transport flows among the SEE countries, capitals and cities have been developed considerably from 2000 to 2010, while they have roughly stagnated from 2010 to 2011.

The air transport flows between the SEE and the rest of Europe have been also developed during 2000-2010. Specifically, the flows between Athens and London, Rome and Paris as well as between București and Vienna, Paris, Munich and Amsterdam are more significant.

Ports – access to the capital

Attiki has four main ports (Piraeus, Lavrio, Rafina, Elefsina). The port of Piraeus, one of the four largest in the Mediterranean, constitutes a commercial, passenger and watercrafts' repair port and a major hub of international freight. The port of Lavrio has much less traffic, mainly passenger, but also commercial. Rafina serves limited domestic commercial traffic.

The public transport system (PTS)

PTS in **Attiki** includes an important track based transport network comprising three metro lines, tram lines and suburban railway lines, of which an important part was constructed after 2000, while extensions of the existing metro lines are under finalization and new metro lines and important extensions of the existing lines are previewed. There is also a large bus and trolley lines network.

In Attiki, the fleet of public transport vehicles increased considerably during the last 10 years (same for București).

In Attiki as well as in București, the number of public transport passenger movements recorded an increase from 1999 to 2008 (before the crisis) and a slight decrease from 2008 to 2011.

According to the people's index of satisfaction with public transport in 2009 (UA data), Athens performs higher (69) than București (52) and Sofia (50) (Table 68)

Table 68 Satisfied with public transport (synthetic index 0-100)

CITIES/TIME	2004	2006	2009
Athina	69,0	77,6	68,8
Sofia		25,8	49,9
București		42,7	52,1

Source: Eurostat/ Urban Audit/ Perception Survey Results- our own elaboration of data

The share of passenger trips by public transport in the total of passenger trips is lower in Attiki than in București and Sofia.

Accessibility to airports, basic urban functions and services

In all SEE capitals, **access to airports** has been considerably improved during the last decade.

In the case of Attiki, access to the El. Venizelos airport is very satisfactory. The airport is firstly well linked to the metro and to the suburban railway networks. A trip from the city centre to the airport lasts about 30 minutes. Also, there are two express bus lines from the airport to the city centre.

The access to industrial zones is, in general terms satisfactory in all three cases.

In Attiki, the access to the majority of the Basin's industrial zones through public transport (metro and suburban lines) is generally good while the access to several zones of Eastern Attiki through suburban railway lines and the road system is quite good.

The location of **commercial centres** in all three capitals is continuously changed; new trade centres are built in more peripheral areas.

In the case of Attiki access to commercial centres is quite satisfactory. Big grocery stores were initially developed in the central area. New commercial centres have been developed mainly along the main roads of the Basin as well as in West and East Attiki. The more recently built commercial centres were often installed near metro stations.

Conclusions

The fast growth of the population and of the activities in the gradually enlarging three SEE capital city regions during the last 20 years increased considerably the transport demand and the respective pressures both on the road and public transport networks. The latter have been considerably upgraded and meet better the actual demand.

Motorisation rate is clearly higher in Attiki, resulting, to a comparatively higher share of passenger trips by private car in the total. In this respect, the challenge for Attiki is to further develop public transport.

Attiki as well as the other two SEE capital city regions constitute the most powerful transport hubs in their countries and at SEE level and the most important SEE nodes of European transport networks. The access from the urban area of Attiki to the major external transport nodes is now improved but needs specific additional works. The same apply for the other two SEE capital urban areas.

By evaluating all of the above, the level of both the internal connectivity and the access to external nodes which count as important factors of competitiveness and accessibility of Attiki is nowadays close to the level of the more developed EU metropolitan regions. The same apply for the two other capitals.

2.3.4 Environment

General approach

The environmental protection and the reduction of climate change risks are key objectives of the EU policy. They underpin the concept of sustainable development - fundamental policy goal on the Europe 2020 Strategy which suggests that economic growth (smart), social cohesion (inclusive) and environmental protection (low carbon economy) should go hand in hand and complement one another. Also, a new Environment Action Programme for the EU, entitled *Living well, within the limits of our planet*, proposes to enhance Europe`s ecological resilience and transform the EU into an inclusive and sustainable green economy.

We should remark that the environmental analysis of Attiki in the frame of GROSEE encountered important difficulties due to the scarcity of the statistical data at city level from official sources. We have tried close this gap using as much as possible additional data from less usual sources and relevant literature.

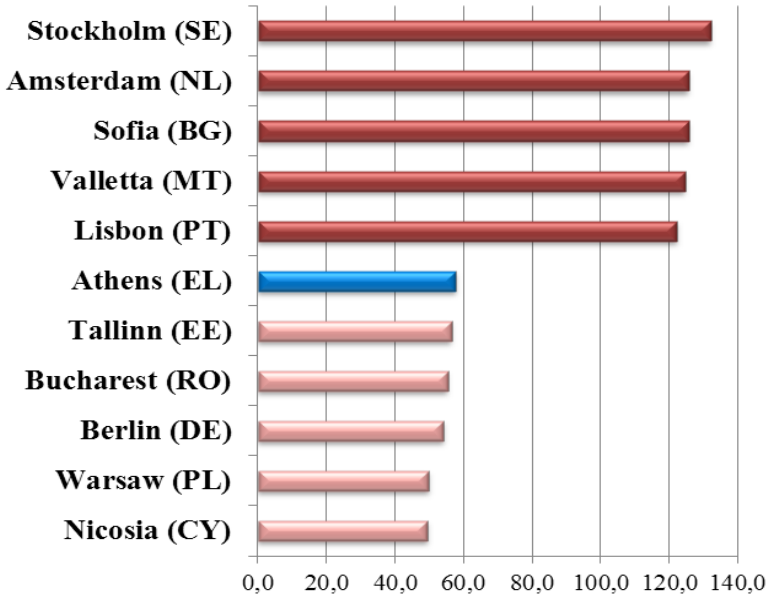
Some of the environmental problems, faced by Athens as well as Sofia and București are an outcome of the natural conditions typical for the three regions.

Typical for Athens is the higher population potential and a considerably more densely populated area than that of București and Sofia. This leads to higher concentration of gaseous pollutants in the Athens atmosphere in comparison to București and Sofia.

Water and waste

According to the most recent Urban Audit data, the **consumption of water** per inhabitant shows a considerable difference between Athens and București on one side and Sofia on the other (Figure 35). So if București is ranked between the first 5 capital cities with a low consumption, and Athens ranks 7th, Sofia is among the last five European capitals in this perspective.

Figure 35 Consumption of water (cubic metres per year) per inhabitant: Athens and the capital cities of EU countries with the 5 top and 5 bottom values 2007-2009



Note: most recent data for Valletta is 1989-1993, for Nicosia 1999-2000, for București, Tallinn, Athens and Sofia 2003-2006. Source of the data: Eurostat. Elaboration of the Figure: NTUA team

According to the Strategic Positions and Priorities of Attica Region for the Programming Period 2014-2020 (2013) regarding the management of water resources the Master Plan for Implementation of the Directive 2000/60 will be applied in the Region, covering all actions required (the necessary studies on local level, financing infrastructure etc.).

According to the latest Eurostat data (Energy, transport and environment indicators, 2012) SEE countries continue to demonstrate poor results in the field of **waste management**.

The percentage of resident population connected to **wastewaters collection and treatment systems (UWWTP) (**treatment of urban wastewaters %) in 2009 was much higher in Greece - 87%, than in Bulgaria (45%) and Romania (29%).

The improvement of infrastructure of wastewater management is included in Objective 3 (Improving quality of life and protection of the environment) in the frame of Regional Operational Programme of Attiki for the programming period 2007-2013. Furthermore, during the period 2014-2020 the construction of sewerage networks and the corresponding wastewater treatment will be promoted in eastern Attiki, where the urban wastewater treatment system is insufficient.

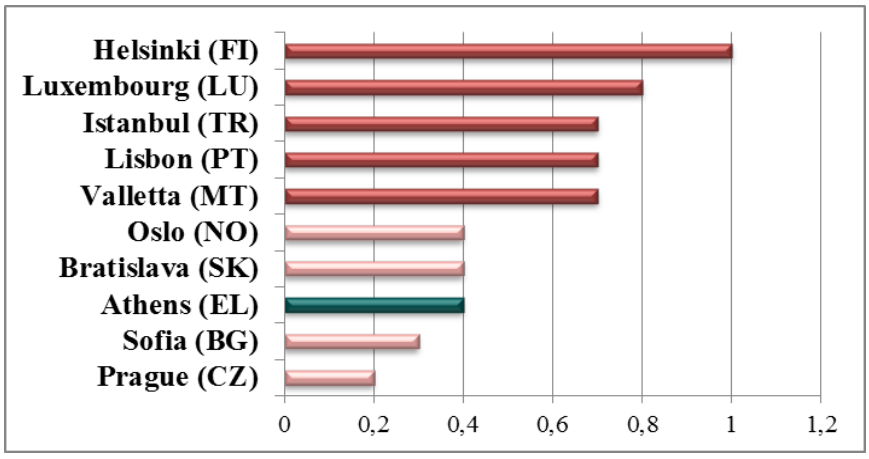
Athens as well as Sofia find themselves in the top five capital cities registering lower amounts of waste per capita in the period 2007-2009 (Table 69 Eurostat / Urban Audit data).

Table 69 Collected solid waste in Urban Audit cities - tonnes per inhabitant and year. Capital cities of EU and candidate countries with the 5 top and 5 bottom values 2007-2009	
5 top and 5 bottom capital cities	**2007-2009**
Prague (CZ)	0,2*
Sofia (BG)	0,3*
Athens (EL)	0,4*
Bratislava (SK)	0,4*
Oslo (NO)	0,4
Valletta (MT)	0,7
Lisbon (PT)	0,7
Istambul (TR)	0,7
Luxembourg (LU)	0,8
Helsinki (FI)	1,0*

Athens shows 0.4 tonnes of solid waste collected per inhabitant/year in the period 2003-2006 (Urban Audit data). The rate for 1999-2002 was the same.

In recent years Athens is facing serious problems in all phases of municipal waste management due to over-concentration of population and lack of appropriate measures for efficient collection, transport and waste disposal.

Figure 36 Collected solid waste in Urban Audit cities - tonnes per inhabitant and year. Capital cities of EU and candidate countries with the 5 top and 5 bottom values 2007-2009



Note: Most recent data for Bratislava is 1994-1998, for Prague and Helsinki 1999-2000 and for Sofia and Athens 2003-2006. Source of the data: Eurostat / Urban Audit

Land use / environment quality

The ESPON FOCI project (2010) identified high homogenisation of the landscape and urban sprawl over lost agricultural land, also due to the increase in terms of population for all the SEE capitals.

The used agricultural area of Attiki amounted to 127.700 ha and covered 33.5% of the total area of the region (Eurostat, 2002). The arable land area of Attiki increased to 127.700 hectares and covered 3.5% of the total area of the region (10.4% of the agricultural area).

All SEE capital city regions face environmental problems due to the deficit of **green spaces** in their core areas. In Athens green areas represent 10% of the total city area. The green area per inhabitant amounts for the Athens Core city to 2.5 m^2/ inhabitant.

Outside of the core areas, all SEE capital city regions have important forest surfaces.

Specific features for the natural environment in Attiki

The natural environment of Attica is very rich. It is characterized by high biodiversity and includes many endangered species habitats of flora and fauna, which have been identified as priority habitats by European Union legislation, as well as many precious natural and cultural landscapes.

The current state of the natural landscape remains good, despite repeated disasters and interventions.
Forests still cover a percentage of about 14% of the Attica region, the coast, with a total length of about 1.000 kilometers, retain at least 90% of their physical condition.

Relatively few streams retain their natural watercourse, while mountains keep enough natural features, although they have lost some of their natural vegetation.

In contrast, the urban green space is very limited (see before).

Protected areas

The main target of the EU conservation policy is to create a pan-European protected areas network – the **"Natura 2000" network** – that will facilitate the protection of species and habitats of European conservation interest (Fontaine et al., 2007). However, "Natura 2000" sites do not act as wildlife or sanctuaries or strictly protected areas. Anthropogenic activities that do not

affect but rather facilitate the protection of species and maintenance of habitat integrity, such as traditional agricultural, gathering of non-timber forest products etc. are supported.

”Natura 2000” sites are in all three metropolitan regions. In Attiki metropolitan region 6.4%of the total area is included in ”Natura 2000” network (Mediterranean forests and shrubs). This rate is clearly lower than in București and Sofia.

”Natura 2000” areas in Attiki

According to EU and national data, the coverage rate of 11 NATURA areas (Map 74) located in Attiki (13%) is comparatively smaller in Greece, due to the impressive extension of economic activities’ zones and, in more general, of the urbanised areas in the region.

Furthermore, the intense development of tourist / second residence zones led to the degradation of the natural environment and reduced the coverage of NATURA areas.

Map 74 Natura 2000 area in Attiki

Source of map and data: GEODATA (2013), EEA (2012).
Adjustment of the map: NTUA team / M. Angelidis

Air pollution

Despite the progress achieved in controlling air pollution, the three SEE capitals show signs of serious environmental stress. In all three cities, the main sources of air pollution are motor

vehicles, industry, power stations and open fires. The major air pollutants in Athens, Sofia and București are carbon monoxide (including carbon dioxide as a main green-house gas), nitrogen oxides (including nitrogen dioxide), ground-level ozone concentration, particulate matter (PM), sulphur dioxide and methane.

In terms of air quality one of the most significant problems is the high presence of **Particulate Matter PM-10** in Athens. Urban Audit data shows that for the ref. period 1999-2002, the number of days with high level of PM-10 for Athens amounted in 174 days. Sofia and București face similar problems. They present similar scores but for more recent periods. These scores are from the higher among the capitals of EU countries.

More recent data, regarding this time the concentration of particulate matter (PM10) at surface level, in 2009 (Table 70) show a relatively low score for Attiki which is similar with Sofia, while the score for București was much higher.

Table 70 Concentration of particulate matter (PM10) at surface level, 2009

NUTS CODE	NUTS NAME	Concentration of (PM10) at surface level
GR300	Attiki	13
BG411	Sofia (stolitsa)	12
BG412	Sofia	12
RO321	Bucureşti	56

Note: Yearly average (µg/m^3), population – weighted average at NUTS 3 level
Source of data: GMES Promote project, JRC, EFGS, REGIO-GIS

Athens presented in 2008 high levels of O3 exceedances of EU target value of 120 ug / m3 (maximum daily 8 hours mean) as well as NO2 annual mean concentrations in ug/m3 (Table 71).

Table 71 The 10 most polluted cities for daily PM10, O3 concentrations and NO2 annual mean concentration in the urban background, 2008

Number of days of PM10 exceedances of EU limit value of 50 ug/m3 (daily mean)		Number of days of O3 exceedances of EU target value of 120 ug/m3 (maximum daily 8 hours mean)		NO2 annual mean concentrations in ug/m3 (the EU limit value is 40 ug/m3)	
Plovdiv, Bulgaria	208	Turin, Italy	77	Brescia, Italy	62
Pleven, Bulgaria	185	Campobasso, Italy	74	Turin, Italy	60
Sofia, Bulgaria	176	Bologna, Italy	72	Brasov, **Romania**	58
Krakow, Poland	152	Bergamo, Italy	69	Modena, Italy	50
Timisoara, Romania	136	**Athens, Greece**	**68**	Milan, Italy	49

Rybnik, Poland	122	Novara, Italy	65	Trieste, Italy	48
NowySacz, Poland	116	Cremona, Italy	64	Rome, Italy	43
Craiova, Romania	112	Brescia, Italy	64	**Athens, Greece**	**42**
Zabrze, Poland	108	Milan, Italy	62	Padua, Italy	41
Turin, Italy	106	ReggionellEmilia, Italy	61	Genoa, Italy	41
Source of data: EEA, 2010, The European Environment, state and outlook 2010, Urban Environment					

Climate change

Research has shown that Greece as well as Bulgaria and parts of Romania are among the EU regions with a high **climate change** vulnerability index (EC DG Regio 2009) (Table 72).

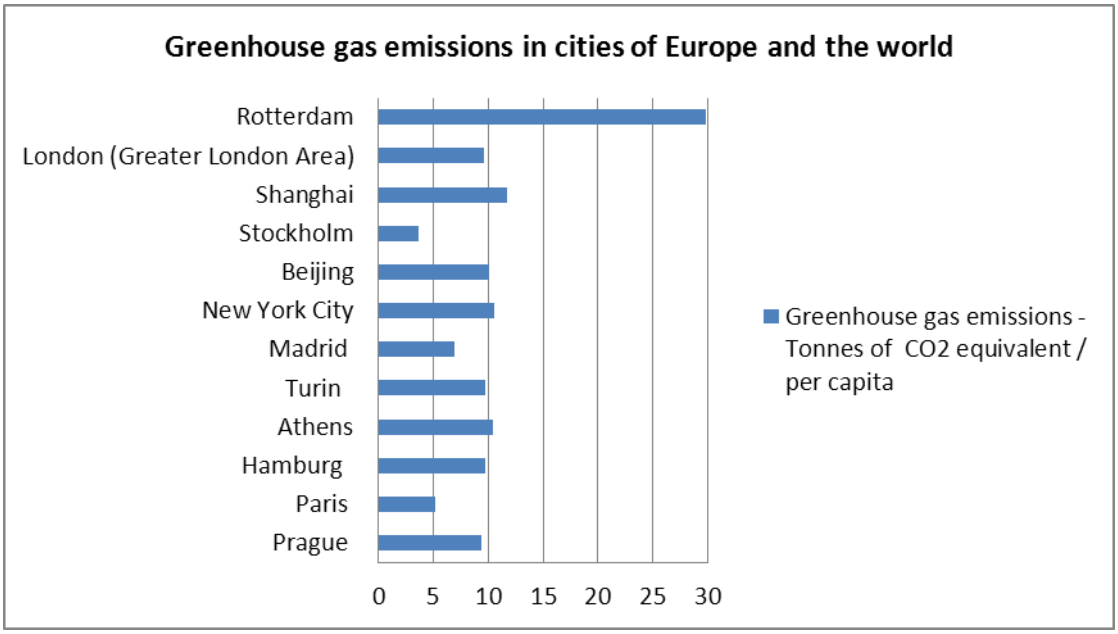
Table 72 Vulnerability of NUTS 2 regions to climate change (from "Regions 2020")

NUTS ID	NUTS NAME	Climate index	Population 2005 in thousands
GR30	Attiki	50	3.980
GR24	StereaEllada	76	557
GR25	Peloponnisos	73	596
RO32	Bucureşti - Ilfov	39	2.212
RO31	Sud - Muntenia	56	3.328
BG41	Yugozapaden	46	2.111
		Source of data: DG Regio, Regions 2020, 2010	

Furthermore, the ESPON Climate project (2011) shows that the metropolitan regions in Greece, Bulgaria and Romania lag behind most EU capitals in terms of adaptive capacity to climate change.

Specifically, Athens appears to emit a high level of pollutants (10.4 tonnes of carbon dioxide equivalent) which is exactly a double compared to the much larger Paris (5.2 tonnes), more than Beijing (10.1 tonnes) and marginally less than New York (10.5 tonnes) and Shanghai (11.2 tonnes), the latter representing some of the most important global metropolises (Figure 37).

Figure 37 Greenhouse gas emissions in tons of CO2 equivalent per capita - for some European and international cities (indicatively) 2007



(Source of data: Hoornweg, Sugar and Trejos Gomez 2011. Elaboration of the Figure: NTUA team)

For Greece, the total greenhouse gas emissions are slightly larger than those of Athens - 11.78 tons of carbon dioxide equivalent (data 2007).

Expenses for environment protection

Environmental protection requires serious investments in all SEE capitals.

According to Eurostat data for 2009 the annual expenditure on environment per capita in Greece -73 euros- was considerably higher than in Bulgaria and Romania (respectively 37.8 euros and 38 euros).

According to the National Strategic Reference Framework (NSRF) for Greece and, specifically, the environmental axis of Regional Operational Programme of Attiki the budget for environmental actions and works until 2009 amounted to 278,3 millions of Euros (legal commitment).

In addition, various environmental projects have been funded by the Operational Programme "Environment and Sustainable Development" for Greece.

Risks and hazards

Regarding natural risks and hazards, the region of Attiki is characterised by the presence of ruptures that are forming a complicated tectonic structure, while the burgeoning of the agglomeration of Athens in the second half of the 20th century has an important impact on the metropolis seismic safety. The core city of Attiki is characterized by low seismic risk rate while a great part of OMR (Outer Metropolitan Ring) is characterised by intermediate seismic risk rate (data from the map of seismic risk of Greece).

We should also notice that West Attiki records rich flooding (Diakakis, Foumelis, Gouliotis and Lekkas, 2011) in comparison to East Attiki. Finally, natural risks are higher in North-Eastern Attiki where earthquakes (as in Parnitha in 1999), land fires and floods have damaged transport lines and properties (NTUA, School of Rural & Surveying Engineering 2006).

Green energy consumption

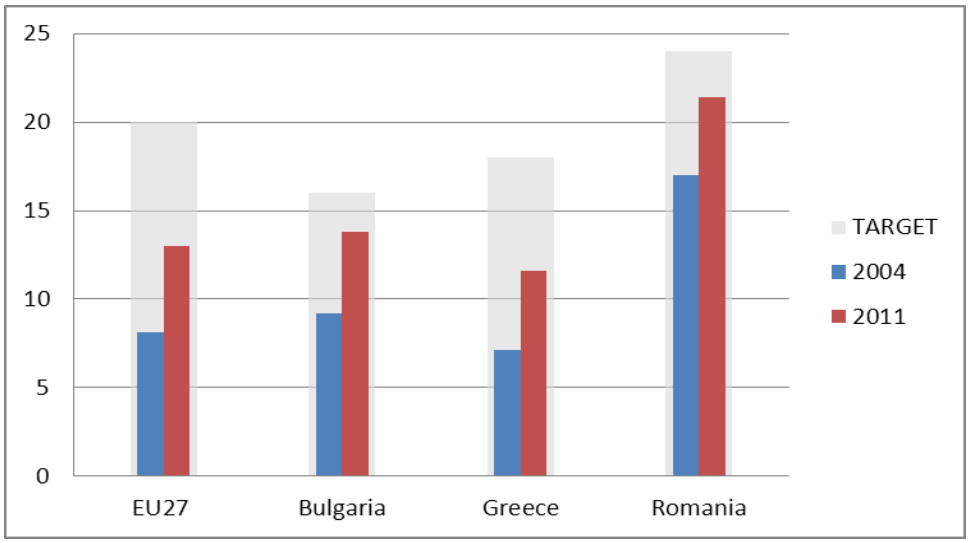
Regarding the climate change context, green energy becomes an important target of the environmental policy in the European Union. In 2009, in the European Union 9% of total energy consumption was from renewable sources (68% from biomass). In all member states, this indicator registered a growing trend. Between 1990 and 2009, in Greece and Bulgaria the dynamics are relatively smaller (1% to 6%) while Romania registers a much higher dynamics (from 2.5% to 14.9%).

In Greece, renewable energy sources are represented mainly by solar energy -in comparison with Romania, where windmills and biomass produce more renewable energy.

At the European level, 19.8% of the total electricity consumption is from green sources. The respective share for București MR amounts in 28.9% while in Sofia and Athens MRs, the value is half than the value for București MR (12.9% in Sofia and 13.1% in Athens). Considering that the EU target for 2020 is to reach 20% of renewable energy sources, it is clear that while București overextended this target Sofia and Athens must submit more efforts related to this issue.

Regarding the above indicator for the SEE countries in 2011, the share of Greece was more distant from the target than for the cases of Bulgaria and Romania (Figure 38).

Figure 38 Share of renewable energy in gross final energy consumption (%) in 2004 and 2011



(Source of data: Eurostat. Our own elaboration of the Figure)

Conclusions

Athens as well as Sofia and București are facing many environmental problems, from poor air quality to inefficient waste management, noise, diminution of green areas surfaces. Although some positive developments have been observed, the three capitals are still lagging behind the average levels in EU on major environmental indicators.

2.3.5 Territorial and urban structures and policies

General approach and literature review

In the frame of highlighting the territorial strengths and weaknesses of the three urban structures we have examined: (a) The urban development patterns in the three metropolitan areas and their surroundings: specific urban functions with national and interregional effect, built areas' expansion inside and outside the metropolitan areas in relation to the real estate market, urban sprawl in relation to the transport and other infrastructures, the land use patterns in relation to urban planning arrangements; (b) The links of the strategic national, sectoral and spatial plans with the metropolitan planning, the metropolitan planning strategies, objectives and

measures and the implementation of the latter. Attention will also be paid to the specific negative impacts of the recent crisis on the three city areas.

Specific literature on territorial and urban structures and policies includes various aspects: territorial structures of industrial metropolitan areas (Cepoiu, 2009), environmental consequences of restructured urban areas (Peptenatu, et al., 2010), development of urban structures (Ianos, 2004, Vossen, 2004, Vlastos, Barbopoulos and Milakis, 2005), urban planning arrangements (Angelidis, 2005, Thornley,1993).

European territorial policy documents have also been taken into account as, indicatively, Territorial Agenda 2020 (2011) and Leipzig Charter (2007). We have used Corine Land Cover (CLC) 2000 and 2006 and Urban Atlas data. Because there are not CLC data for Attiki for 2006 we have compared Urban Atlas data for 2007 with CLC data for 2000 for Attiki. As urban land cover data in Urban Atlas are divided in more classes than in CLC, we have developed a specific method of matching the urban land cover classes of Urban Atlas data to those of CLC in order to achieve an appropriate comparison.

Specific urban functions with national and interregional effect and the urban structures

We have stressed the importance of the three capitals at national level regarding industrial and service activities, universities, hospitals and commercial centres and analysed the accessibility of the city population to these amenities.

Here we will bring additional information on the potential of universities and culture facilities in relation to urban tourism in order to complete the analysis of the activities which have a structural role in the three urban areas. As it results from Urban Audit and national data regarding the number of students in higher education, the shares of the three capitals in the total of their respective countries are very high.

On the other hand, the index of the number of students in higher education (ISCED level 5-6) per 1000 inhabitants is higher in București Core City (99) and Sofia Core City (87), than in the Athens “kernel” (only 27) (Table 73). The three MRs have considerable cultural resources, which constitute important components of the respective city identities. Specifically, the three city areas include important historical and cultural neighbourhoods and monuments, which constitute an important asset for the urban tourism development.

Table 73 Numbers of students in higher education (ISCED level 5-6)			
For the year 2004	Nr of students in higher education (ISCED level 5-6)	Population	Nr of students / 1.000 inhab.
BG001C - Core city Sofia	99.196	1.138.950	87
EL001K - Kernel Athina	76.732	2.884.338	27
RO001C - Core city București	190.550	1.927.448	99

Source of data: Eurostat /Urban Audit - Core City Level (Kernel for Athens)

Elaboration of data: NTUA team

The comparative advantage of the three capitals in all these urban functions has not been exploited enough so far. This exploitation should be more deeply taken into account in the respective structural urban plans as well as the more detailed plans of urban interventions, including urban regeneration

Urban patterns in the fast expansion and recession phases

Regarding urban development patterns in the three capitals, we should at first mention the impressively intense expansion of the built area outside the City Cores of Attiki and București: Eastern Attiki in the case of Attiki, Ilfov for București and the close neighbourhood of the latter. In the case of Sofia intense expansion of the built area occurred mainly in the southern and eastern territories of the City Core (as defined in this project). This intense expansion has taken place during the last twenty years; it was faster during the last decade.

These built up areas have taken the form of linear developments along the main road axes of the respective areas as well as developments at the periphery of the smaller cities and settlements of the MRs. Industrial, commercial and “business” centres as well as storage facilities and, even more, residential housing and holiday homes have been developed throughout these new built up areas. Also, a more diffused development (through illegal built up to some extent for Attiki) outside the settlements is observed in the cases of București and Attiki. For Eastern Attiki, we should also mention the intense built up areas for holiday homes and tourist installations on the coastal zone. In Sofia, there is still pressure of building new dwellings in the denser part of the Core City while pressure has increased in the surrounding area.

In all three capitals, the demand for housing has considerably increased before the crisis due to the impressive rise of migration. On the other hand, because the banks provided loans for

purchasing homes more easily, the total number of homes bought by households has increased considerably. In this frame the housing and land prices have been significantly raised. The decrease of the available population income during the crisis limited the housing demand and the land prices in Attiki and București while the decrease in Sofia is so far comparatively lower, as it seems that the housing demand remains high. In all three cases, the housing problem becomes more important for the poorest population.

Green space area per capita was during the last decades and remains currently considerably higher in Sofia and București City Cores than in Attiki City Core. However, the extentof some major green spaces in Sofia (for example at the foot of Vitosa) as well as in București has been reduced because of the pressure to expand the residential areas.

Impressive urban sprawl, insufficient development of local urban centres in the recently built areas

We should examine if the impressive expansion of the built-up areas outside the three City Cores is a type of urban sprawl as defined by several relatively recent research and publications (Batty, Chin and Besussi, 2002, Bruegman, 2005, European Environmental Agency, 2006, Burton, Jenks and Williams, 2002). Urban sprawl and its opposite, “compact city”, are very important concepts for territorial planning, because they are closely related to the degree of conservation of natural resources (especially agricultural land) as well as the degree of energy consumption and pollution of air, soil and water corresponding to different configurations of the transport system.

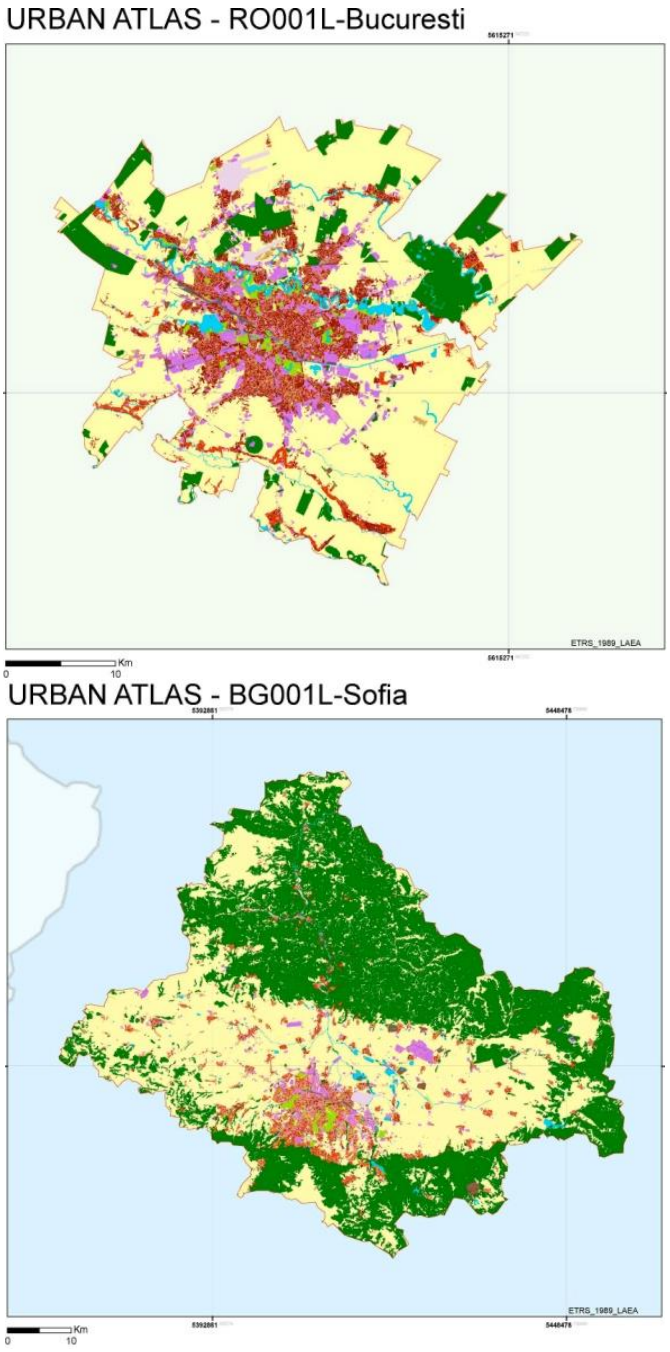
Urban sprawl has many aspects. It involves the diffusion out of the suburban zone of a city, in areas with low density and (usually) rural development. It is also connected with strict separation of land uses and corresponds to different forms of planning having in common the high rates of dependence on private cars. "Compact city" is associated with relatively high densities of residential and mixed land uses. It relies on an efficient public transport system and corresponds to a spatial distribution that encourages walking and cycling, thus leading to low energy consumption per person and less air pollution. Even more important: a relatively large population (with sufficient density) offers a larger potential of social interaction. Therefore, “compact city” is a more sustainable model of urban development because it involves less dependence on private cars and requires fewer and cheaper per capita infrastructure.

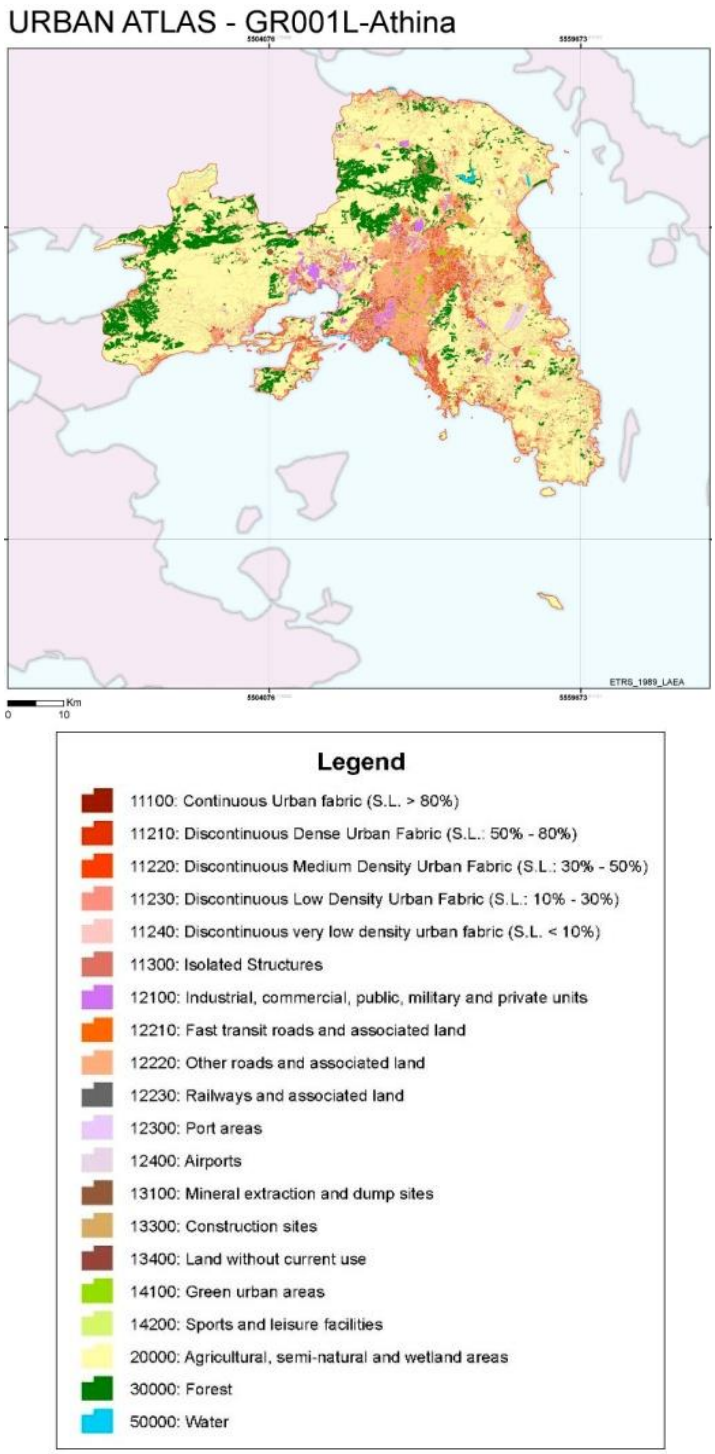
Concerning the basic components of urban sprawl, we can point out some common features among the three capitals. Regarding population density change, the country reports show that a

considerable development outside the City Cores (CC) is undergoing in the three capitals. Smaller cities and settlements in the outer FMA (that means except the CC) and OMR are developing (and are gradually integrated in the three FMA and their close neighbouring areas). See also the population density and land use zones in Map 75 and Map 76.

Map 75 Population density in București, Sofia and Athens

Map 76 Land use zones in București, Sofia and Athens





However, in all three capitals the dispersion is the main feature of the new built areas; the pre-existing local urban centres have been developed less than needed to cover the demand of the additional population regarding local public as well as private services. In this sense, the respective local urban centres remained weak and the entire urban development model differs

by far from the “compact city” model. The fact that urban sprawl is excessive in the three cases leaded to the previously mentioned negative social and environmental impacts.

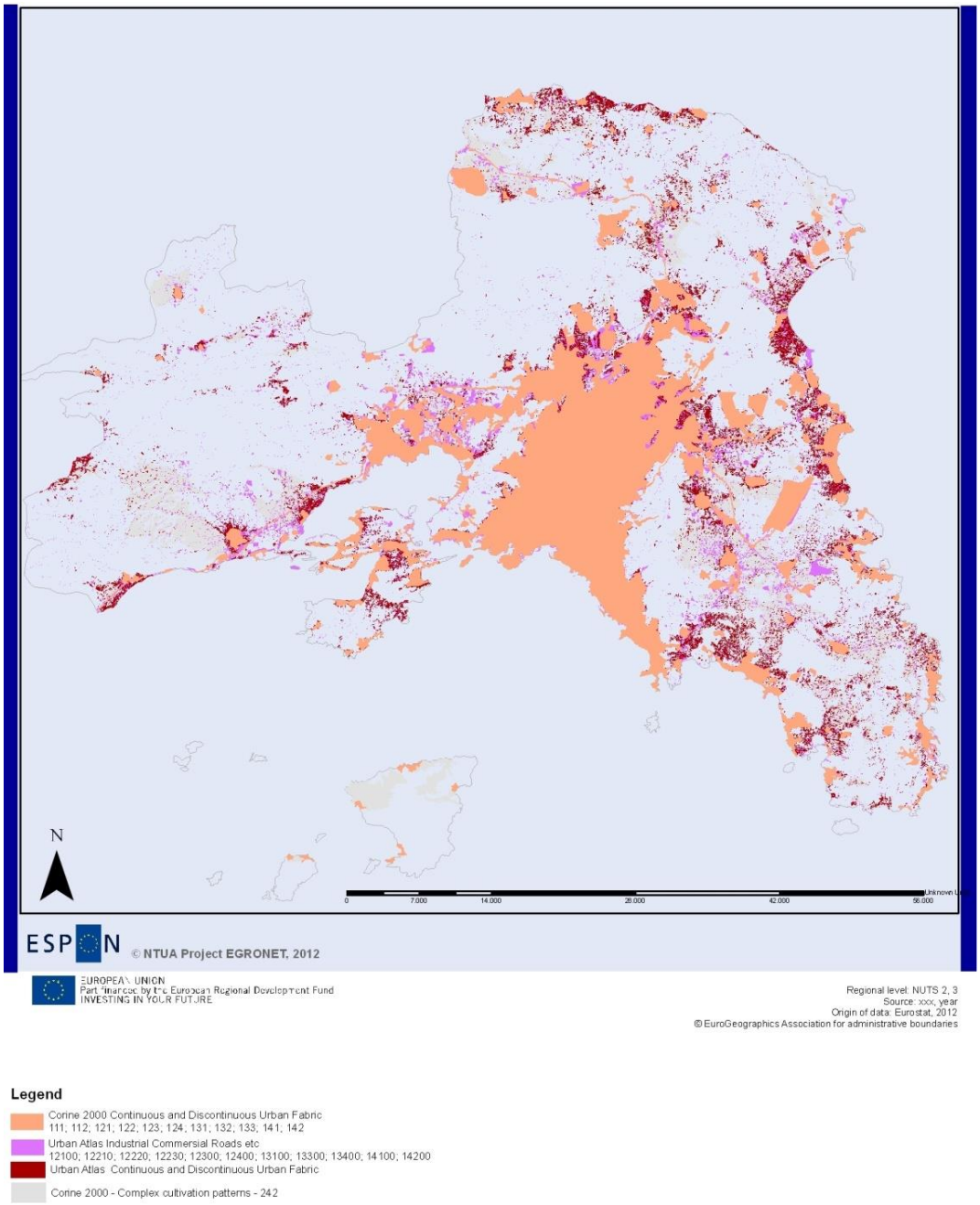
As we have already pointed out, urban pressures in all three cases resulted in important limitation of the agricultural land and decrease of the agricultural production (Map 77). Thus, agricultural land, a very important local asset in in all three cases, is not enough exploited. As we have also stressed before, while business and commercial centres, but also smaller commercial and services units as well as the construction sector have been developed rapidly up to 2008, this development has been considerably slowed down during the crisis period. The land and buildings prices have decreased and at least in the case of Attiki a number of stores and services have been closed. This change demonstrates that the development pattern in these areas was not resilient to the crisis. Therefore, this development pattern should be recorded in the disadvantages of the overall territorial pattern in the case of the three capitals.

Rather monocentric patterns at both FMA and MR level of the capitals

Regarding the polycentricity at the FMA level, approached as approximations of NUTS3 (“regional units” for the City Core of Athens), it seems that the three FMA are rather monocentric, as the City Cores have a very high weight in their entire FMA. As we have stressed previously, despite the fact that important commercial and business centres have been installed in the recently built-up areas outside the city cores, the peripheral centres of the FMA are comparatively weak and should be further enhanced.

Regarding the entire MR, the level of polycentricity is higher in the MR of București and Sofia than in the MR of Attiki; the shares of the urban centres’ population located in the Outer Metropolitan Rings (OMR) in the population of the two first MRs are considerably higher than in the case of the latter.

Map 77 Specific analysis for Attiki: Land use changes



2.3.6. The role of Athens in the urban networks of the three capitals, Greece, SEE and Europe

The "regional" aspect

We should start from the "regional" role of Attiki and other poles of the SEE meaning the position of the city regions in regional development and the inequalities among them in

economic and social issues, before going to the specific “territorial” role of cities meaning their role in the urban networking relationships.

From this scope, we should firstly remind that Greece’s GDP per capita in PPS is much higher than that of Bulgaria and Romania. If we go down to the regional level, we ascertain that in 2009 almost all the NUTS3 regions of Greece had higher GDP than all the respective regions of Bulgaria and Romania (Map 78).

The Attiki capital city region and in its neighbouring NUTS3 units had in 2009 the higher GDP PPS per capita values in Greece. Even more they are followed by the areas of the axis Athens - Thessaloniki which has its central node in Athens. Apart from these regions, high GDP per capita is observed in the Greek most touristic areas: those of the regions of Cyclades and Dodekanisa.

During 2000-2009, the higher % changes of GDP per capita are observed also Attiki as well as in some island regions (Map 78). During the crisis period, GDP of the region of Attiki decreased significantly and, what is more important, unemployment rate increased more in Attiki in comparison with the other regions of the country.

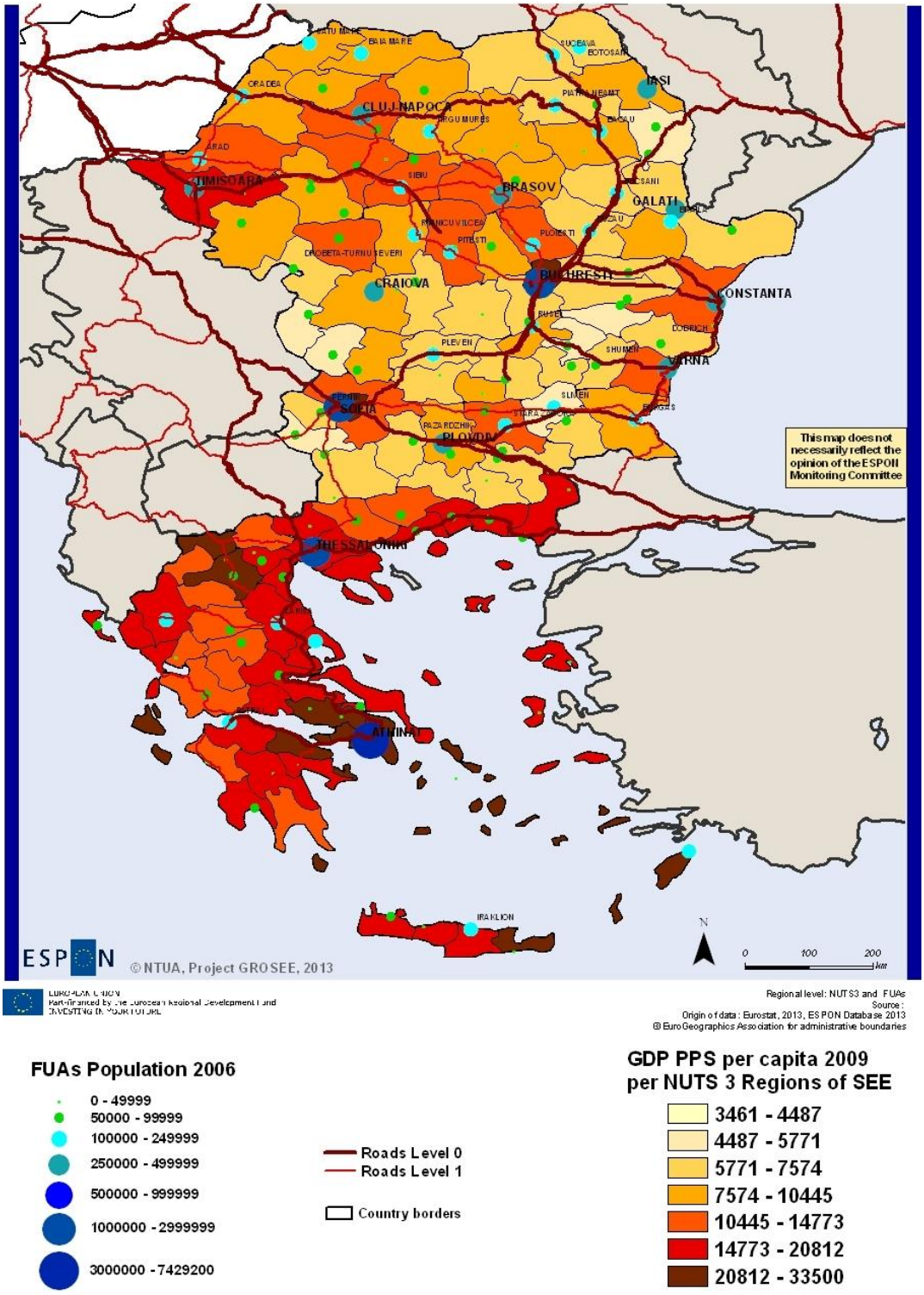
Apart from seeing the order of the regions in economic performance as it is the case for the GDP per capita, we have a good tool to measure regional development inequalities in a country: the dispersion of the regional GDP per inhabitant11 (data provided by Eurostat).

Regarding this index at NUTS2 level, in all SEE countries, regional inequalities rose impressively from 1995 to 2009.

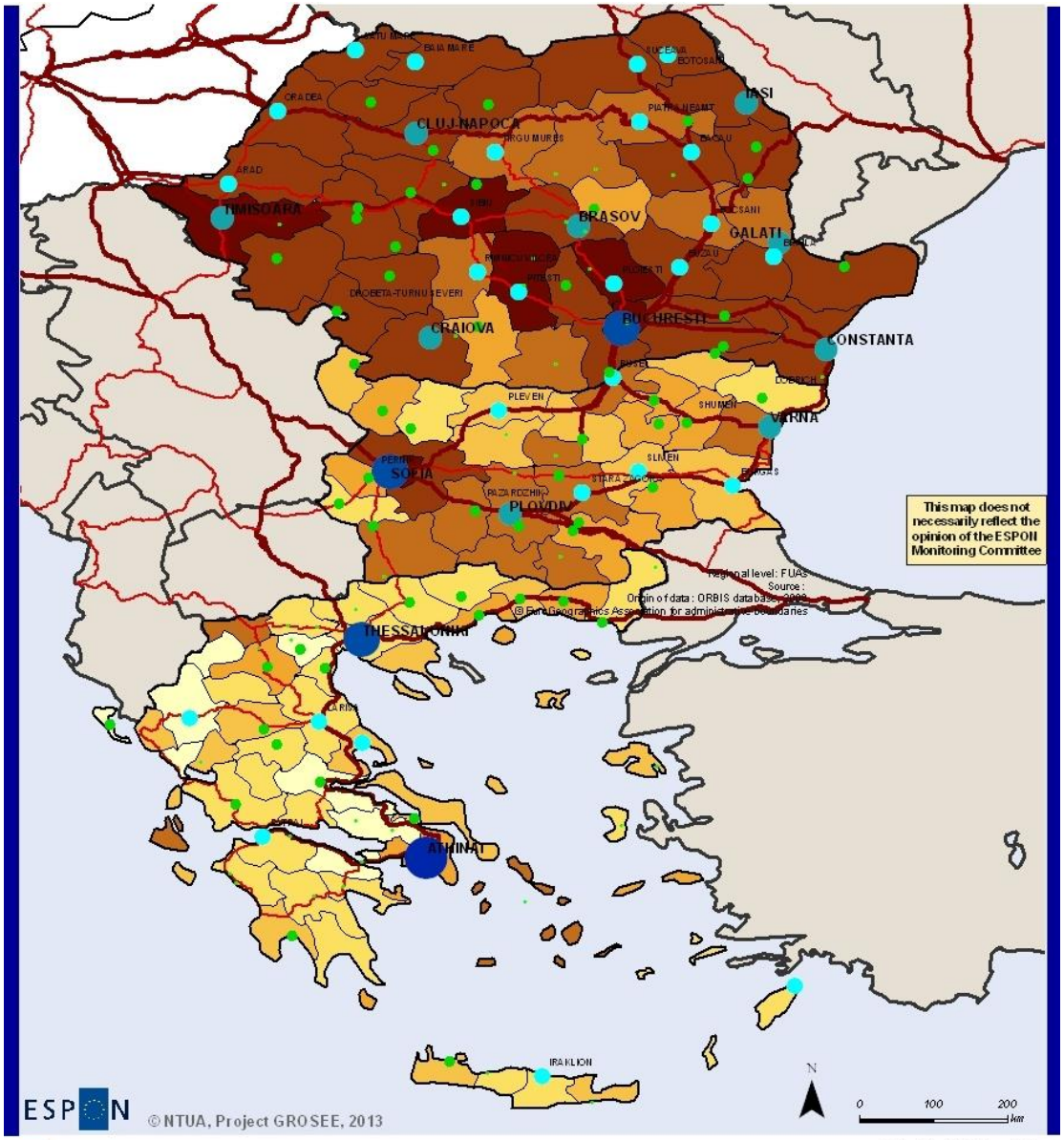
The "dispersion" analysis in 2009 at NUTS3 level reveals that regional inequalities in all three countries were even more considerable at this territorial level. A very important increase of the index occurred in Greece from 1999, year of entrance in the Euro-zone, until 2009.

[11]Since 2007, Eurostat has calculated a new, derived indicator which records the differences between regional per-inhabitant GDP PPS and the national average, and makes them comparable between countries. This dispersion indicator is calculated at NUTS 2 and at NUTS 3 levels. For a given country, the dispersion ‘D’ of the regional GDP of the level 2 (or 3) regions is defined as the sum of the absolute differences between regional and national GDP per inhabitant, weighted on the basis of the regional share of population and expressed in percentage of the national GDP per inhabitant

Map 78 GDP PPS per capita per NUTS3 regions of SEE



Map 79 GDP PPS per capita change % 2000 – 2009 per NUTS3 regions of SEE



The "territorial" aspect

Athens in the urban systems of Greece and SEE

The ESPON 2006 project 1.1.1 (2005) constructed a typology of Functional Urban Areas / FUAs, which is based on the average scores of seven features and functions of the FUAs: population, transport, tourism, industry, knowledge, decision-making and administration. Subsequent ESPON projects have enriched the definition of FUAs.

The ESPON concept of Metropolitan European Growth Areas / MEGAs is even more important for our analysis, as MEGAs of SEE may be seen as the core nodes of a potential "Global Integration Zone" in SEE functioning as a "counterweight" to the "Pentagon", the most "integrated" area of the EU space. See, among others, for the features and advantages of spatial integration, the ESPON 1.1.1 (2005) and ESPON FOCI (2010) projects. We will come back to these in next.

According to ESPON 1.1.1 project, there are 5 categories of MEGAs ordered by significance: Global nodes, Category 1 MEGAs, Category 2 MEGAs, Category 3 MEGAs and Category 4 MEGAs. SEE includes four MEGAs: Athens which is classified by ESPON 1.1.1 as the most important MEGA in SEE –MEGAs 2 category- and, Sofia, București and Thessaloniki included in the MEGAs 4 category

According to the ESPON 1.1.1 project, Greece has 45 FUAs, Bulgaria has 31 FUAs. while Romania has 59 FUAs. In Map 80 we present the FUAs of Greece, Bulgaria and Romania and their position according to the population volume and population density criteria. Regarding these criteria, the position of Athens in Greece is of primary importance. Athens also has a higher position according to these criteria in the entire urban system of SEE. We remind that the same applies for the economy criterion. In addition, as we have already seen, Attiki has an even more primary role in Greece as well as in SEE regarding the highly specialised services.

In more general, the three capitals play vital, though different roles, in their respective national urban systems. The majority of the other regional urban networks are rather monocentric, as the primary city has a very prominent role. There are few cases of morphologically and functionally polycentric urban systems, the latter include mostly small and medium sized cities.

Attiki has the most prominent national role in comparison with Sofia and București.

In Bulgaria and Romania, Sofia and București constitute strong centres of urban networks at supra-regional and regional levels though they have a less powerful role compared to Attiki in

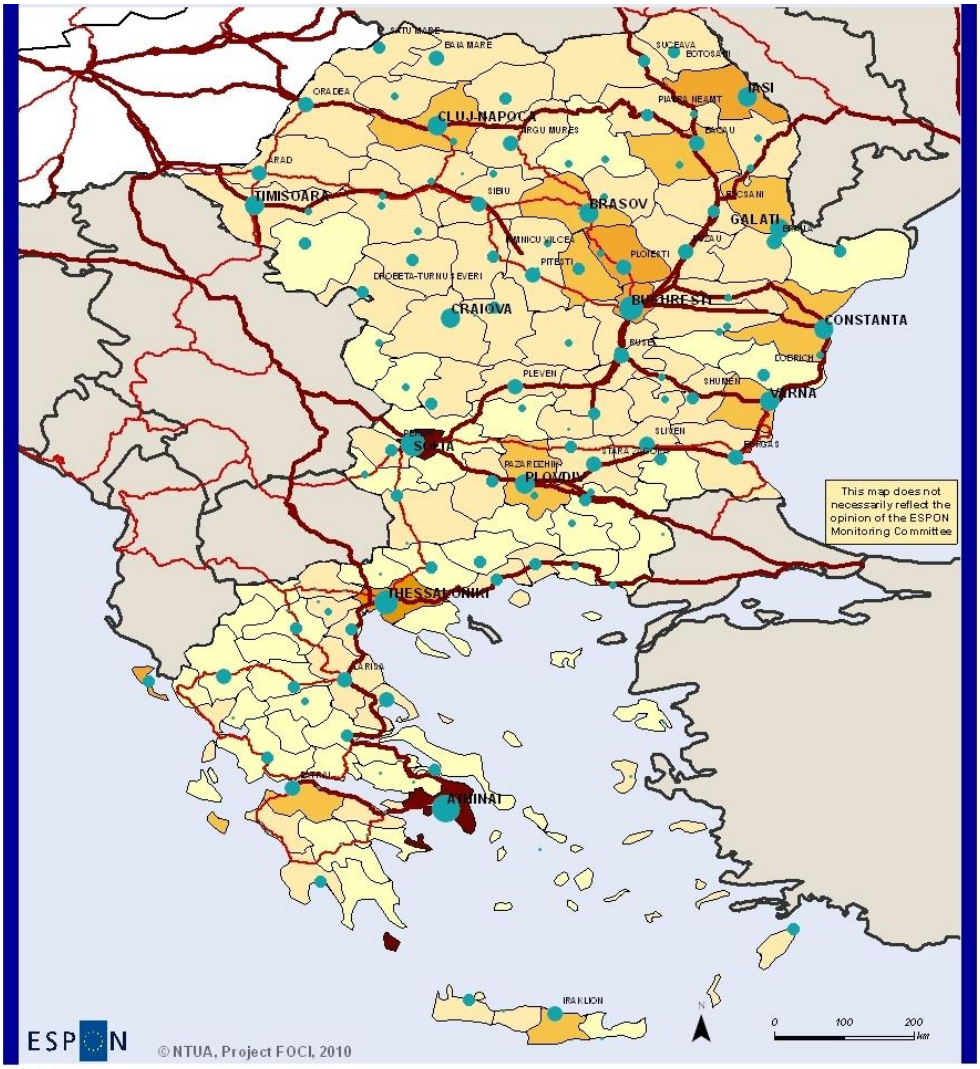
Greece. The majority of the other regional urban networks are rather polycentric, as the respective primary city has a medium prominent role.

In more general, from the point of view of territorial cohesion, capitals (as well as other big regional centres) should function as diffusion channels of competitiveness elements; in other words, they should redistribute development factors towards the rest of their national territory. Seen from this scope, Athens does not redistribute enough the competitiveness elements to the rest of the Greek space. In comparison, the same applies for Sofia and București; an important difference resides in the fact that had and continues to have nowadays a more primary national role than the other two capitals; we should notice that territorial policies for the three countries advocates for the reinforcement of the redistributive role of the capitals.

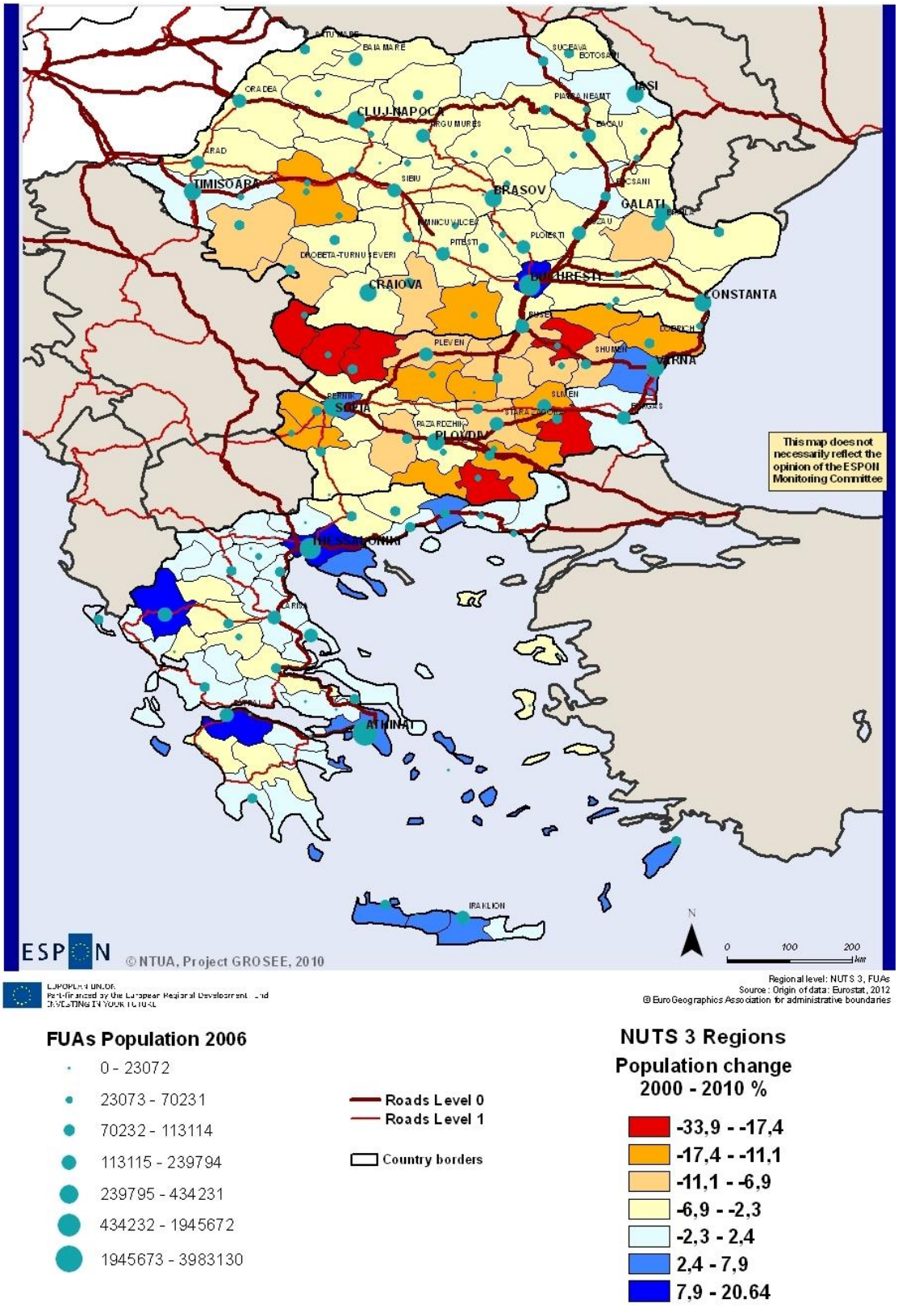
Taking into account that the three SEE countries examined constitute a part of the entire Balkan area, we should stress that the role of the three capitals in the Western Balkan countries is actually relatively low.

Specifically, Greece has a considerable role in FDI and a number of economic sectors of its neighbouring W. Balkans countries: Albania, Serbia and FYROM. This role is for the most undertaken by Attiki companies. However, this role could be increased much more

Map 80 Population density 2010 and FUAs population 2006 in NUTS3 regions of SEE countries



Map 81 Population change 2000 - 2010 in NUTS3 regions of SEE countries



Territorial integration In SEE

PUSH and PIAs of ESPON 1.1.1 in SEE

ESPON 1.1.1 project has identified Potential Integration Areas on the base of the proximity of cities to each other: “The preconditions for polycentricity are best where cities are located in proximity to each other… Morphological proximity is of course no guarantee of co-operation, but proximity does nevertheless provide cities with a better opportunity for functional integration…” (see in ESPON FOCI). In this sense, they suggested Potential Urban Strategic Horizons (PUSHs) and Potential Polycentric Integration Areas (PIAs). For each of the FUAs, they have calculated the area that can be reached within 45 minutes by car from the FUA centre. The resulting areas are labelled PUSH.

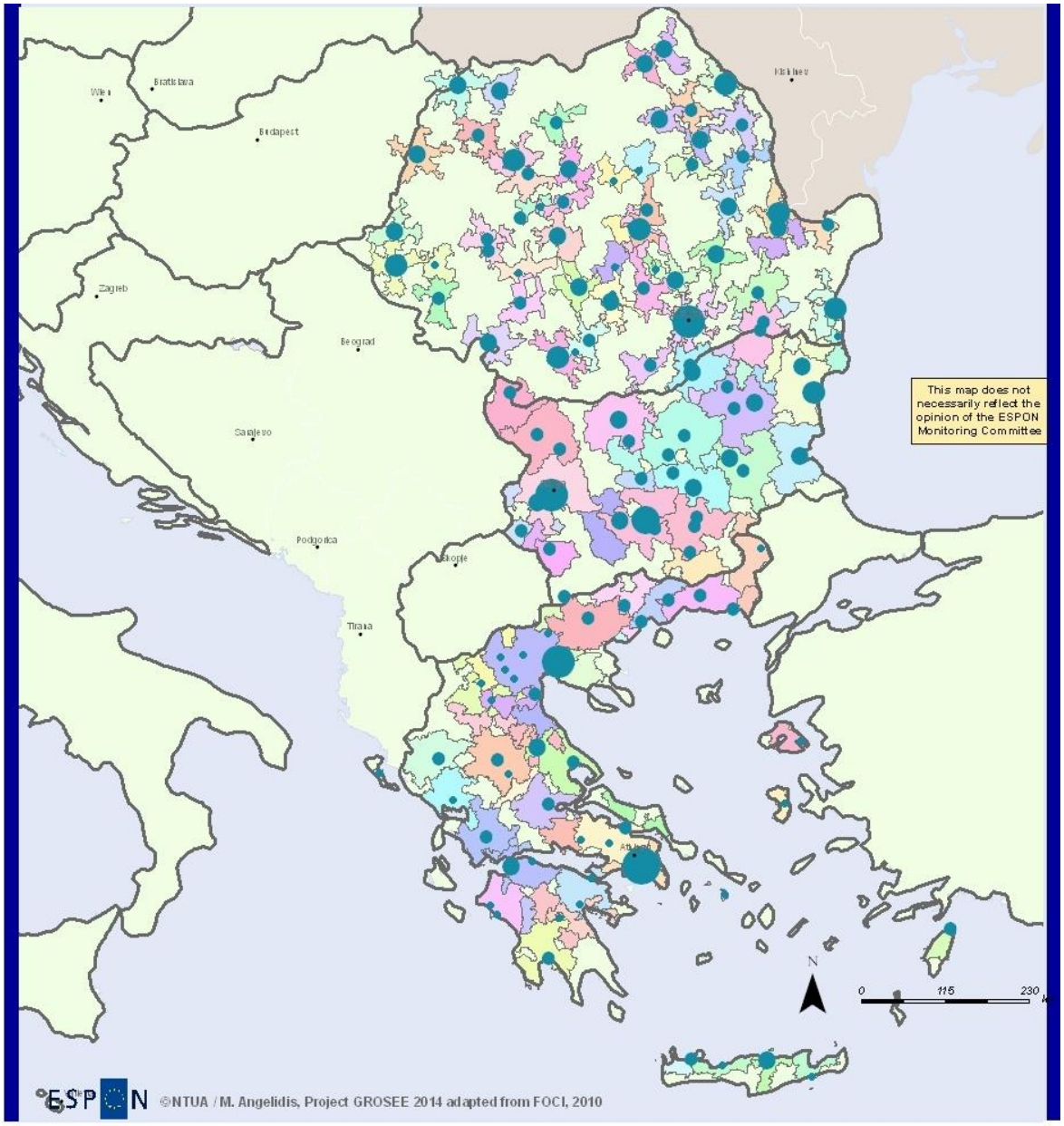
In a next step, they have identified PIAs, based on the hypothesis that neighbouring cities with overlapping travel-to-work- areas can be functionally integrated and can gain from cooperation. A total of 249 PIAs were found where at least two PUSH areas shared more than 1/3 of their area with each other. These areas concern 1,139 PUSHs, while the remaining 456 PUSHs are more isolated.

We present in Maps 78 and 79 the PUSH and PIA for SEE, respectively. Both Maps are adapted from the respective ESPON FOCI ones using ESPON 1.1.1 data (NTUA team for FOCI). We have specifically extracted the SEE area from initial Maps referred to the entire ESPON space. We conclude from the Map 82 that the area covered by PUSH in Greece is much larger than for Romania (because the transport network in the latter is weaker); therefore the implementation of a policy of spatial integration is possible in Greece in a higher share of regional urban networks.

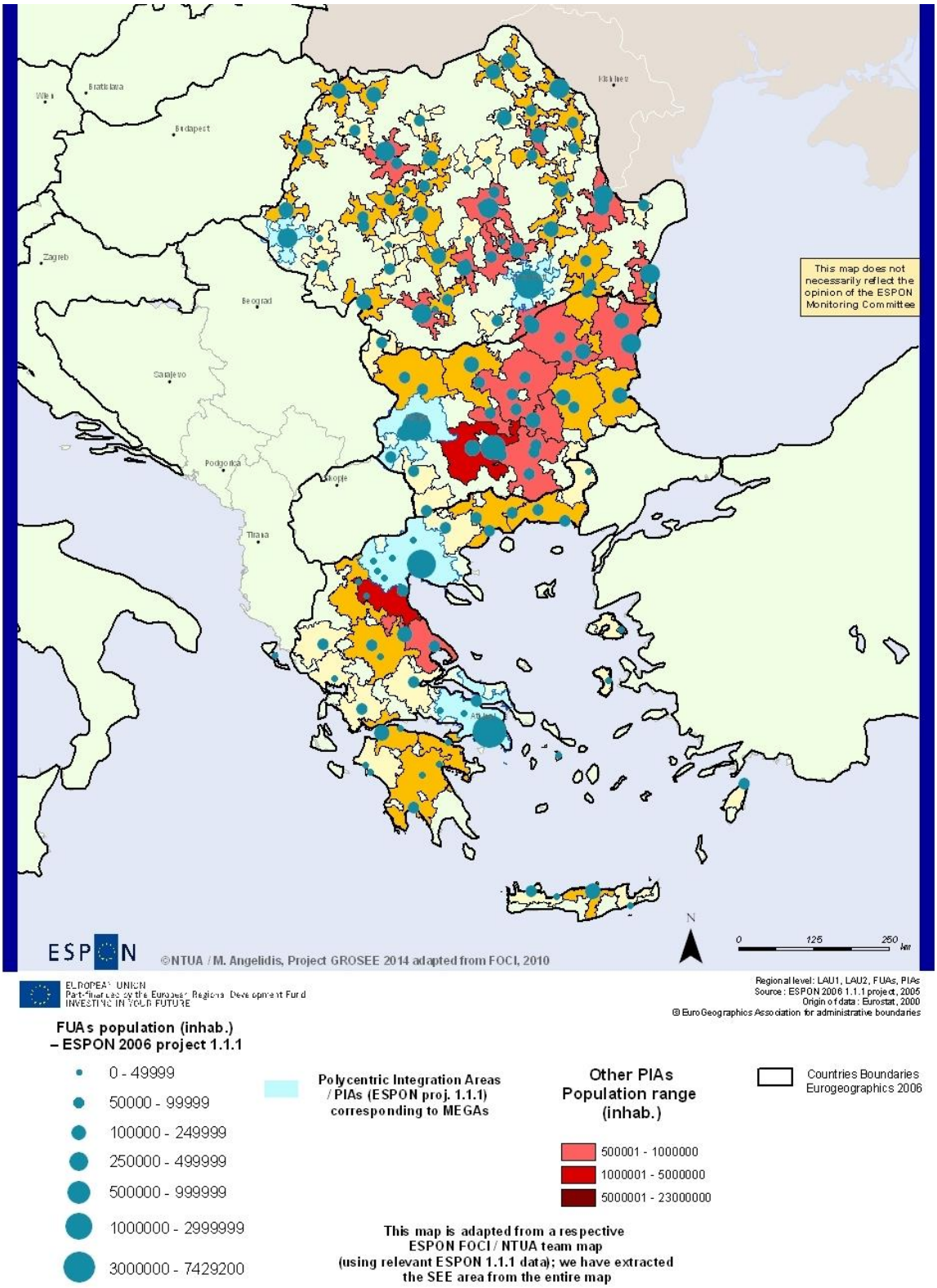
The Map 83 discerns the PIAs of MEGAs from the medium and small size of population potential PIA. It results that in Greece PIA of Athens and Thessaloniki are very important in area and population so territorial policy should make a great effort to promote integration in other – peripheral- PIAs.

PIAs of Sophia and București have a less primary role in these countries so the policy of creation of peripheral PIA should be mainly oriented in the improvement of common infrastructures in peripheral PIA.

Map 82 Potential Urban Strategic Horizons (PUSH) areas in SEE



Map 83 Potential Polycentric Integration Areas (PIA) in SEE



The role of Athens in the urban networks of SEE and Europe

We would not be able to understand the role of Athens in SEE and Europe if we do not start from the role of Greece and SEE in Europe.

Greece belong to the EU "south" and follows the changes of the EU "south" during the crisis period; Romania and Bulgaria belong to the EU "east", but the interdependencies between Greece, Bulgaria and Romania result to some common changes of the three SEE countries during the crisis.

Greece and SEE in economic exchanges inside Europe

The role and specialization of the countries and groups of countries in the world trade are key components of their integration in the world space (see in detail in ESPON TIGER 2012).

Greece belongs to the Mediterranean countries which occupy intermediate positions regarding exports (between the manufactured and technological goods, on the one hand and the labour intensive goods, on the other), it is still very specialized in no manufactured goods.

Bulgaria and Romania are specialised in the export of more labour intensive industries while northern and north-western Europe still focus on the export of manufacturing technological products.

Also, the degree of exports' specialisation in services highlights contrasting roles of the different EU countries in the international division of labour. Greece belongs to a range of countries in which the services trade represents more than half of their goods trade while the respective ratio is around 30% for the entire EU27. Bulgaria and Romania, similarly to the rest of eastern as well as central European countries, have a low share in export of services.

According to the typology developed by the ESPON TIGER project (2012) for the geography of trade at regional and country level:

(a) Greece belongs to Type 4 which is similar to the EU average, but with a trade more oriented toward eastern European regions, China and Japan.

(b) Bulgaria and Romania belong to Type 1 which includes countries with trade very oriented to Europe, both to central-eastern EU and the eastern neighbourhood of EU.

Greece and SEE in the EU countries' spatial development typology

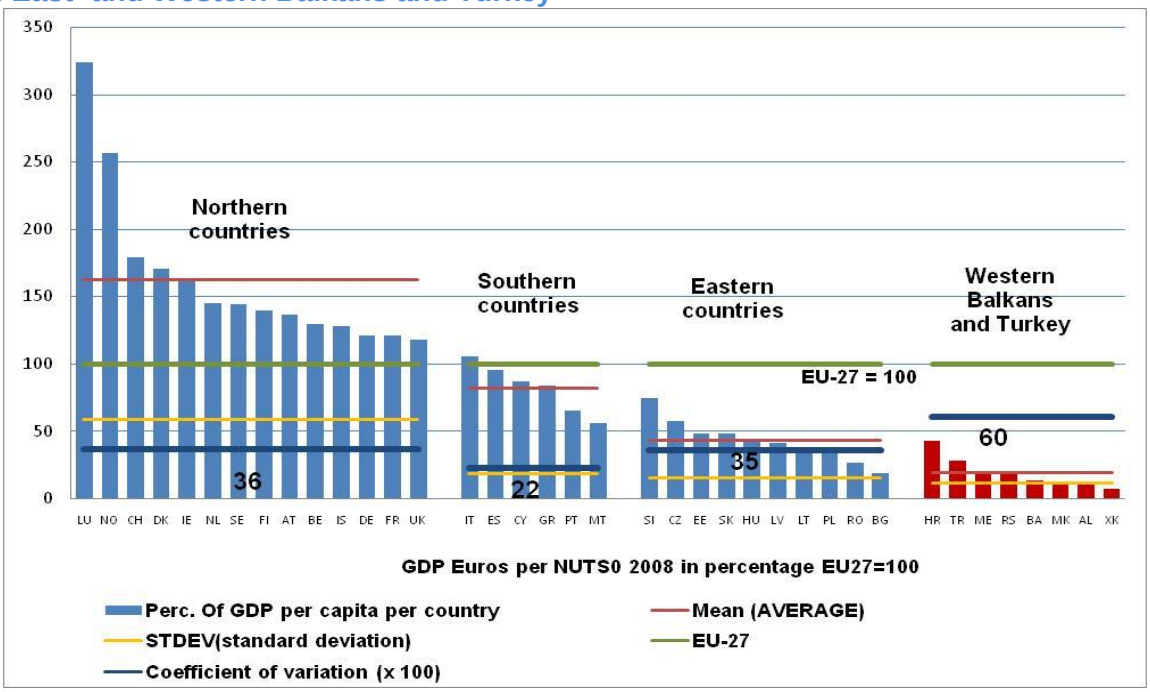
SEE includes Greece, which was integrated in the EU relatively early (1981), and Bulgaria and Romania, which entered the EU much later (2007). The three countries are included not only in the specific spatial pattern of SEE but also in more general spatial patterns that include the 27 EU member states. The following two general typologies are often used in the EU territorial analysis:

(1) The EU 27 countries can be divided in three major types according to their economic performance, measured by their Gross Domestic Product (GDP) per capita: highly developed, moderately developed and less developed countries. See for instance the use of this division in the 5th Cohesion Report (2010) and a detailed discussion of this typology in ESPON INTERCO (2012). We should note that Bulgaria and Romania are included in "less developed" countries, while Greece in "moderately developed" countries.

(2) More interesting is a "territorial" typology that distinguishes the 27 member states of the EU (plus Norway and Switzerland) in three groups according to their geographical location, as follows: (a) "Northern countries" - EU "North": LU, NO, CH, DK, IE, NL, SE, FI, AT, BE, DE, FR and UK (b) "Southern countries" - EU "South": IT, ES, CY, GR, PT and MT (c) "Eastern countries" - EU "East": SI, CZ, EE, SK, HU, LV, LT, PL, RO and BG.

These three "territorial" groups correspond largely to the previous three groups of countries: the "Northern" to the "highly developed" countries, the "Southern" to the "moderately developed" and the "Eastern" to the "less developed" countries (Figure 39) (Note: we have used in this figure data for 2008 because this is the year of turning to the crisis, during which successive changes in the relative index values have occurred for some of the EU countries).

Figure 39 Per capita GDP in PPS (Purchasing Power Standard) in % of the EU27 average (=100) in 2008, per country, in EU27, Norway and Switzerland –divided in North, South and East- and Western Balkans and Turkey



*the figures 36, 32, 35 and 60 represent the average to the EU-27

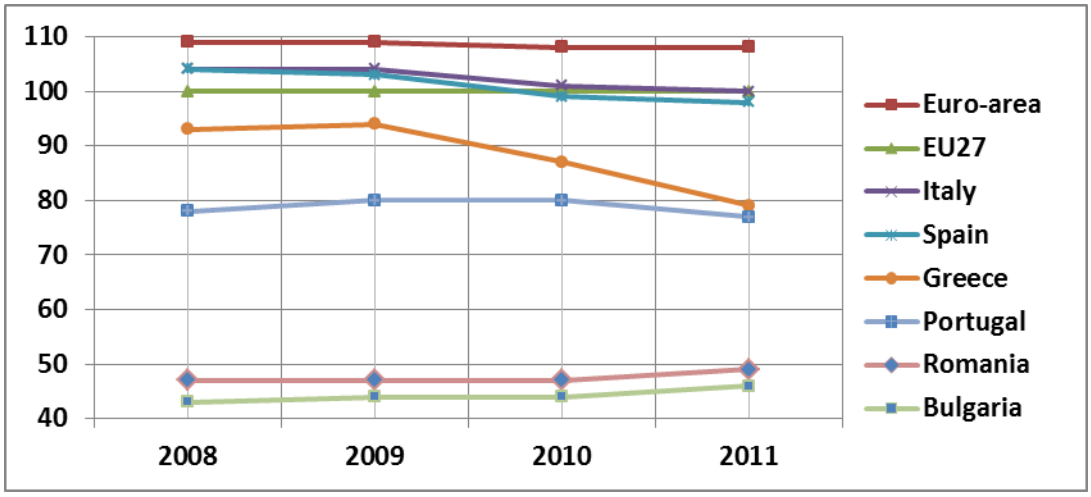
Based on Eurostat data. Table compiled from ESPON FOCI –elaborated by NTUA team

Obviously, this "territorial" division does not fully follow the ranking of the above ratio of GDP. For example Slovenia, which is part of the "East", has a higher index value than Portugal and Malta, which belong to the "South".

The same figure presents the Candidate and Potential Candidate Countries for EU membership (CC / PCC) - the Western Balkans, which represent the "rest part" of the historical and geographical unit of the Balkans, the “entire” South-East Europe (both in the EU and not). Turkey is also a Potential Candidate country. Because the Western Balkan countries constitute the "neighbourhood" of the SEE, it is worth noticing that a future economic integration of the "entire" SEE will be difficult, as the Western Balkans countries present a significantly lower per capita GDP than the "poorer" countries of EU, with the exception of Croatia, where the GDP per capita in 2008 was higher than that of Romania and Bulgaria.

It should be stressed that during the crisis, the distance between the EU North and the EU South widened considerably (Figure 48).

Figure 40: Per capita GDP in PPS in % of the EU27 average (=100) during the crisis period 2008-2011, in Euro-zone, SEE countries, Italy, Portugal and Spain



Own elaboration, based on Eurostat data

The SEE countries' development interdependencies as a frame to understand the role of Athens in SEE and EU urban networks

During the '90s, a reconversion process was undertaken in Bulgaria and Romania. As in most cases of the Eastern European countries, capital cities attracted population and activities at the expense of the smaller cities and the countryside.

On the other hand, Greece followed to a significant extent the South-European economic development pattern: shrinking of agriculture and industry, growth of the service sector and tourism, which is related to some extent to the over-development of the construction sector.

GDP in PPS per capita in most regions of Bulgaria and Romania was less than half of the EU-27 average in both 2008 and 2012, while per capita GDP in Greece was clearly higher.

Before the crisis, from 2000 to 2008, all SEE countries experienced high annual growth rates. The starting year of the crisis (2008) marked a particular strong reversal of the previous tendency in SEE. It is worth noticing that a reversal of similar intensity is also observed in the case of the Western Balkans, which are the SEE "neighbourhood" (EC / DG Economic and Financial Affairs (2012), Backé and Gardó, (2012), Bartlett and Prica, (2012)).

Greece was much more affected by the crisis, while Romania and Bulgaria followed with a comparatively lower per capita GDP decrease. The high level of debt and the following implementation of a not successful model of budgetary adjustment led to greater difficulties in

the case of Greece. The way out of the crisis, mainly for Greece depends on the EU response to the more general economic crisis of the entire EU27, primarily of the Eurozone. All three countries try to improve extroversion and competitiveness of their economies, as well as to substitute a part of their imports with domestic production in combination with structural reforms. The improvement of territorial cooperation and territorial policy coordination among the three SEE capitals and countries could contribute to the successful implementation of the national development strategies.

Concerning the evaluation of the spatial economic interdependences within the SEE but also from / to the rest of the EU, the amount and the spatial orientation of Foreign Direct Investments (FDI) is an important indicator, which is very closely related to competitiveness. The higher share of FDI in all three countries comes from the more developed EU countries.

FDI from Greece to both Romania and Bulgaria hold one of the first places in the respective ranking. They mainly concern financial services and communications (investments by big companies) as well as trade, services, industry, construction and real estate, where investments come from big as well as smaller companies (Iammarino and Pitelis, (2000), Bozhilova, (2010)). We should also note that FDI towards Romania come above all from Austria.

Generally, Greek DI in Bulgaria and Romania during the last twenty years had an important impact on the raising of competitiveness through territorial integration in SEE. The more important actors of this kind of integration come from Athens.

In addition, other forms of interdependence among the three countries have gradually been growing, almost continuously, during the last twenty years such as commercial exchanges, tourist flows (from Greece to Bulgaria and Romania at a first stage but also from Bulgaria and Romania to Greece later on) and immigration.

More specifically, immigration from Bulgaria and Romania to Greece -mainly towards Attiki and northern Greece and less to other Greek regions- was much more important than the opposite and concerned mainly the service sector, but also construction, industry and agriculture. It should be stressed that a shift of labour force towards Greece due to higher wages there, matched quickly with a shift of intense labour force industries, mainly small and medium sized, towards Bulgaria and Romania.

In general, Greek DI -derived mainly from Athens- were at first concentrated on București and Sofia and secondly on the other big cities of Bulgaria and Romania (see in ESPON FOCI 2010 and Angelidis et al., 2011).

In conclusion, the interdependencies among the SEE capitals and countries have been developed very significantly over the last twenty years in economy issues such as FDI, trade and tourism, but also shift of labour force especially from Bulgaria and Romania to Greece.

However, the dependency links of the three countries on the economies of stronger EU countries in key sectors of competitiveness, such as FDI, have also been significantly deepened. The unequal nature of trade exchanges between SEE and the EU "north" -SEE import from the "north" high technology goods and export to the latter low technology goods - was maintained, if not increased.

Seeing from the side of the role of Athens in the urban network of SEE, Athens has a primary role in this network and could potentially play a more important role in territorial integration in SEE guided by integration of the SEE urban network.

The role of Athens in economy as well as in transport (in comparison with those of Sofia and București) in the European urban network is examined largely in next. Emphasis is given there to the links of Athens with the European core.

Taking also into account these analyses we can take the following conclusions on the role of Athens in the urban networks of SEE and Europe:

The links among Attiki and the two other capitals are clearly stronger than those among București and Sofia. Direct links among Athens and the lower level cities of Bulgaria and Romani are relatively weak; they mainly pass through the respective capital. This conclusion results from the analyses of research cooperation and firms' subsidiaries links as well as well as financial, economic exchange links and migrations flows. All these network links among SEE cities put together define the role of Athens polycentric development pattern of SEE.

The role of Athens in the urban network of EU could be seen in a similar frame with the above. This time Athens plays the role of redistributor of investments, economic exchanges in which metros of the European core have a more powerful role, to the rest of Greek territory. However, Athens does not redistribute efficiently technology and innovation to the rest of the country. Therefore, Greek territorial policy should rather promote this dissemination / redistribution through the improvement of territorial integration in smaller Greek urban networks and potential integration areas.

3. Drivers of competitiveness

Impact of history and geography

The “closed” communist economy of Bulgaria and Romania made difficult the improvement of their competitiveness under the conditions of an open economy.

Historical factors impact considerably on different aspects of competitiveness. Looking at the historical past of Romania and Bulgaria, it is clear that the over 40 years of communist regime strongly influenced the economic development of the two countries. The focus is set in this period of planned economy on the industrial speed up, forcing large urban and rural areas to develop an extensive industrialisation, which has minimized the abilities of the two countries for competitiveness. A second issue in reaching a high competitiveness at local, regional or national level lies in the slow transition process to the market economy.

The early accession of Greece to the EU increased the competitiveness of the selected branches, but also the excessive growth of “introvert” branches. The economic development of Greece has been closely related since 1981 to the EU economic unification process. This has led both to the agriculture and industry restructuring and to the increase of their competitiveness at European and world level although it has also been associated with important losses in production and jobs. The entry of the country in 1999 to the Eurozone (which offered monetary stability) has contributed to the competitiveness increase of the financial sector as well as of a number of service branches, but has also accelerated the development of sectors related to consumption patterns, such as construction, health and education activities.

Even if there is a negative impact of the peripheral position of the capitals in the EU, it can be transformed into an opportunity to exploit their position as crossroads of the Danube and Mediterranean. In terms of geographical factors, it is clear that the peripheral position of the three countries and capitals within the EU has a considerable impact on their competitiveness at the EU level. An asset for the Romanian and Bulgarian regional competitiveness is given by the presence of the Danube, facilitating the transition of goods at European and global level. The advantageous position of Greece and Attiki at the crossroads of the Mediterranean, the Middle East and Northern Africa constitutes a considerable potential for raising their competitiveness. Bulgaria has a coastline along the Black Sea, and Sofia has a key location in the Balkan Peninsula.

Economic performance, economic structures

The SEE countries had an impressive increase in economic performance, with the capitals at top, followed by a fast decrease during the crisis which affected the capitals in the same way or even more than the countries themselves. During the pre-crisis years 2000-2008 GDP in PPS per capita in Attiki approached the EU27 average, but thereafter, it recorded a significant decrease. Bucharest and Sofia showed a remarkable increase in GDP per capita before crisis, while the decrease in the crisis period was lower than in Attiki.

In this context, not only a slowdown of economic activity during the crisis is behind, but also an important decrease of investment which is highly important for competitiveness. Economic activity and investment have slow down during the crisis in the three countries and capitals after a previous fast growth. Changes as for these aspects of competitiveness of the three capitals have several similarities and dissimilarities that were analysed below.

Regarding GVA (reflecting the volume of economic activity) as for the EU27 average, Attiki presented higher scores during the last decade in comparison with Bucharest and Sofia, which approached the EU average faster than other EU countries and regions.

As for the FDI that constitute a very important component of competitiveness as well as GFC formation per capita, which is also important, Sofia (and Bulgaria) at first and Attiki (and Greece) at second present a deficiency compared to other more developed countries and regions. While there is a shortage of investments in all of Romania, Bucharest sees a higher rate of investments per capita.

Consequently, the crisis resulted to a general decrease of the disposable household income, being much higher in Attiki. The disposable household income during 2000-2008 presented a significant increase in Bucharest and Sofia, while the respective change was less intense in Attiki. Hence, the growth rates of the previous economic indicators in the three capitals had an almost similar impact in household incomes. According to data which are not fully comparable and grey literature, the disposable household income during the recent years has impressively decreased in Athens, aggravating the crisis, while the decrease was clearly lower in Bucharest and Sofia.

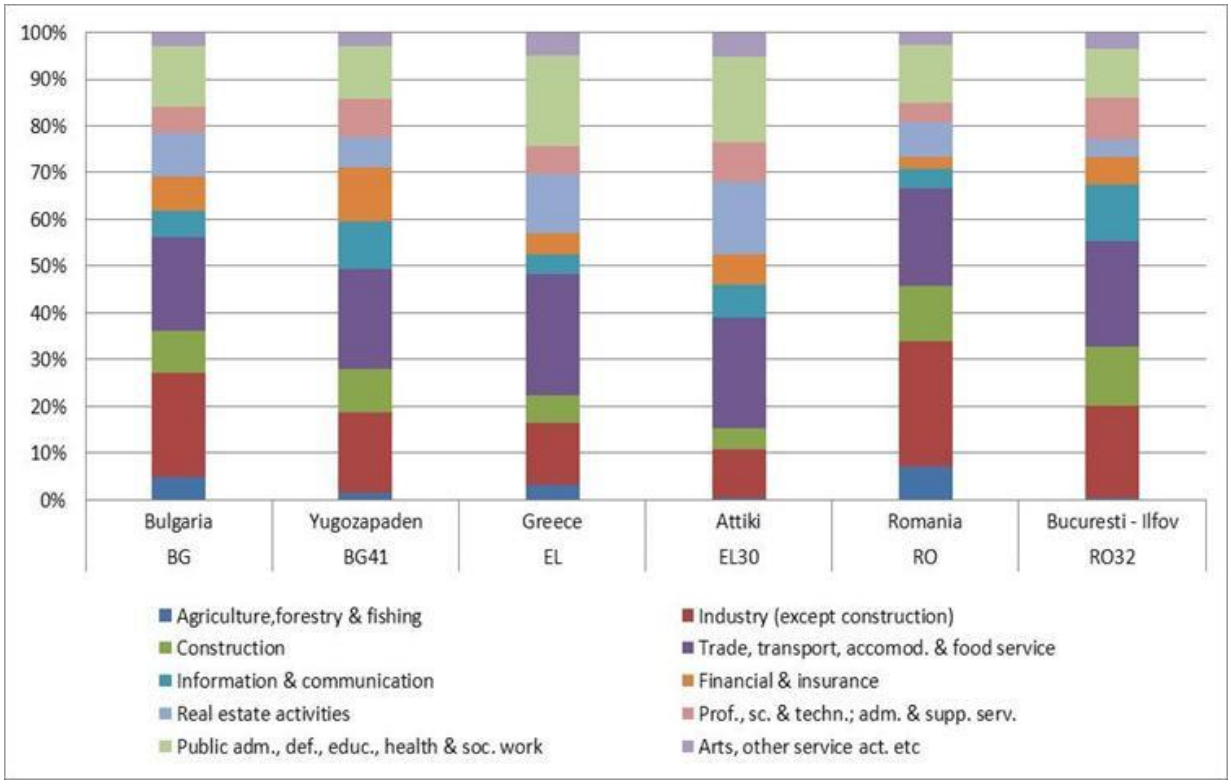
From another point of view, the models of sectoral breakdown in all capitals and countries of SEE do not strengthen their competitiveness and important differences among them can be perceived. In the capitals the service sector shows higher shares than in the rest of the respective country. Especially, the capitals have an even higher share than the countries

regarding financial services, which have strategic importance for competitiveness. The financial sector of Attiki is the most important of the three cities in total capital as well as the most competitive (despite the fact that its share in the overall breakdown of sectors does not differ much from that of the two other capitals). Attiki has also a much more powerful information/communication sector together with higher technological level than Bucharest and Sofia. The most important conclusion is that strategic industrial and financial branches are week in the three capitals. Because this issue is highly important we review it in the comparison of the SEE capitals with metros of the EU core (section 3.4.2 of this report).

Table 74 GVA per economic sector % in the three countries and capitals in 2009

Country/capital (NUTS 2)	Bulgaria	Sofia / BG41	Greece	Attiki / EL30	Romania	Bucharest / RO32
Agriculture, forestry & fishing	4.8	1.5	3.1	0.3	7.2	0.3
Industry (except construction)	22.1	17.2	13.4	10.4	26.8	19.7
Construction	9.2	9.2	5.8	4.6	11.7	12.9
Trade, transport, accommodation & food service	20	21.5	26	23.8	20.9	22.6
Information & communication	5.7	10.3	4.3	6.9	4.3	11.9
Financial & insurance	7.1	11.4	4.4	6.4	2.5	5.9
Real estate activities	9.4	6.6	12.5	15.5	7.3	3.8
Professional, scientific & technical, administrative & support services	5.5	8.1	6	8.7	4.4	9.1
Public administration, defence, education, health & social work activities	13.2	11.2	19.5	18.2	12.3	10.2
Arts, other services, activities of households & extra-territorial organizations	2.9	3	4.9	5.3	2.6	3.6
Own elaboration, based on Eurostat data						

Figure 41 GVA per economic sector in 2009 in the three countries and capitals



Own elaboration, based on Eurostat data

Human capital

Another aspect that can be stated is that the three capital regions suffice in both quantity and high skilled human potential, but experience low labour productivity rates. The three capitals have a sufficient volume of human capital because their employment rate is comparatively high. The population composition per age groups as well as other demographic and social characteristics of the three capitals does not cause any major problem regarding the sufficiency in quantity as well as the skills of the human potential. However, women and young people do not participate enough in production as it results from the high unemployment rates, which are even higher in Attiki. What is more important, the human potential of the three capitals is comparatively well educated. Finally, the labour productivity index regarding the entire economy or only industry and services is low in Romania and Bulgaria while it is relatively higher in Greece and Attiki as well as in Bucharest.

Technological and innovation readiness

Moreover, they have considerable utilisable human potential, but low investments in the R&D sector. Regarding the technological and innovation readiness as well as the specialization in

strategic importance services as the Advanced Producer Services, which constitute very important drivers of competitiveness, the three countries show a low performance, especially Bulgaria and Romania; the three capitals perform much better than the countries, but lower than the regions of the European “west” and “north”. The three countries and even more the three capitals have a considerable human potential in R&D, the share of which in the total employment is growing and does not differ so much from the EU27 average. The weakness of the three countries and capitals in this respect lies in the low level of expenditure as well as long-term investment in R&D. We should stress that Attiki performs better than the two other capitals.

Economic and urban networking and clustering

Attiki has also a high share of cooperation among research groups. These groups are located in the three capitals with prevalence of Attiki as coordinator. A weak networking and clustering and a low redistribution of effects on innovation inside the SEE can be observed. Research links among cities have been studied by several research projects. ESPON FOCI (2011) has analysed data for research projects funded by the EU included in the CORDIS database focusing on the linkages among the research groups located in FUAs of the SEE for two branches of high technology: “Information processing, information systems” and “Biotechnology”. GROSEE has updated this analysis (for 2012) for the projects the coordinator of which is located in SEE and at least one participant is located in SEE. We have studied the total of research cooperation branches inside SEE as well as among SEE and the rest of the EU27.

From the first analysis, we have concluded that most of the coordinators (more than 90% of the total) are located in Greece. Only 8,5% of the total number of projects concern cooperation among Greek / Romanian, Greek / Bulgarian or Romanian / Bulgarian cities. Mostly the three capitals and Thessaloniki participate in the collaborations inside SEE, while Attiki has a much higher share than the other. Regarding the national / regional level linkages, the shares of the three capitals are impressively high, much higher than their share in other type of economic activities. Most links originate from Athens and are directed, in their large majority, to Bucharest and Sofia. The number of links between Bulgarian and Romanian FUAs is very low.

On the other hand, a much higher presence of firms’ subsidiaries in EU “western” and “northern” cities means a much higher internationalization of their economy compared to the “southern” and “eastern” cities. Regarding the firms links among cities, ESPON FOCI has examined the links among subsidiaries (of ORBIS database firms) located in FUAs in SEE or between

subsidiaries located in SEE with others located in FUAs in the rest of the EU (see Angelidis et. al., 2011). In the following, we recall FOCI's main conclusions of this analysis which explain for the most the actual situation according to our own study of a wide range of relevant grey literature (mostly for the bigger firms).

The cities (FUAs) of EU "west" (including the extended Pentagon area) prevail by far regarding the number of the firms' subsidiaries weighted by the city population; northern Europe follows at a considerable distance while southern and eastern European cities follow with much smaller numbers. Secondly, the "flows" starting from cities of the more developed parts of west, central and north Europe (mainly the "Pentagon") and oriented towards cities of the SEE are much more intensive than the other way around. The links of SEE cities with the rest of southern and eastern Europe are clearly less intensive. Athens and a few other Greek cities (much less) have much more intensive links with the rest of Europe than the Bulgarian and Romanian cities, of which Sofia and Bucharest rank highest. In the case of Greece, the higher dependence links are from Paris and London while for Bulgaria and Romania they originate from Vienna, Paris and Amsterdam, with Athens being in the 4th and 6th position in the last rankings. The firms located in Bucharest and Sofia have the most numerous links with Austria and mainly with Vienna.

If we are looking inside SEE, the headquarters located in Athens control the most subsidiaries which are located in Athens (85% of the total subsidiaries located in Greece) and very few subsidiaries located in other Greek cities (**Map 84**). The respective shares for Bucharest and Sofia are slightly smaller. Thessaloniki, Varna and Cluj-Napoca follow. Links originated from Attiki are directed to Bulgaria and Romania, especially to Bucharest and Sofia.

As far as we can observe, there is an unequal interdependence of the SEE capitals from the EU western and northern metros compared to the influence of the SEE countries' cities from the respective capitals. The examined linkages among firms or research centres are very meaningful because both research centres and the subsidiaries included in the ORBIS database constitute (even at different degrees) comparatively more competitive, internationalised and modernized parts of the economy of the three capitals and countries (the enterprises not included in the ORBIS database are medium sized, small or very small). Although our research covers only a part of those linkages, we can conclude that in cases the three capitals and SEE are involved in dynamic clusters of research or economic branches, the leading role is assumed by cities outside the SEE. Such networking and clustering inside the SEE is undoubtedly weak. Also, the units of the most competitive branches in the national territories are also strongly dominated by the three capitals. Therefore, cities situated outside

the capitals do not profit enough from the potential positive effects of clustering at national and regional level. In other words, the three capitals do not reinforce enough innovation and, thus, competitiveness to the rest of their countries. This refers more to Athens and less to Bucharest and Sofia.

Map 84 Intensity of links between the firms' subsidiaries (of ORBIS database) in 2008 inside SEE

Accessibility and quality of life

Accessibility and connectivity inside the three capitals as well as at different territorial levels (countries, SEE, Europe) have different aspects. Regarding the attractiveness of the capitals (as well as SEE) for investments, the level of accessibility from inside the city to its transport gates (airports, ports, major external highways) as well as accessibility to basic services and to industrial and business zones of the city counts. The degree of accessibility for each specific type is moderate.

The degrees of social cohesion and the state of the environment are important indicators of the quality of life in the three MRs therefore for their attractiveness for investments. From this point of view, they have also a moderate performance in comparison with other EU regions.

Governance structures

According to our analysis, there is an improving, but still not enough support of competitiveness by the governance structures of the three metropolitan regions. The FMA of Attiki includes three basic levels of governance structures, one designated by the central government ("Decentralized administration") and two elected ("Region" and municipalities), while the MR of Bucharest includes two levels of governance structures (the county (judeţ) and the local level of towns and communes), both elected. Sofia capital is organized in city regions, subjected to the decisions of the city council of Sofia municipality. In all three capitals, the higher level authorities are involved in spatial development planning while the lower level authorities have competencies on the provision of public services, environment and quality of life and are involved in spatial development and local / urban planning close to their level.

In general terms, in all three cases, despite successive reforms of the administrative structures, spatial and urban development competencies are not divided clearly enough according to the respective administrative level, horizontal and vertical partnerships are not enough developed and implementation of territorial development strategies is weak. Therefore, the overall governance structure of each capital does not contribute significantly to the improvement of its competitiveness.

Conclusions

To conclude this sub-chapter, we should emphasize the impact of the recent crisis on the three capitals and SEE. This is undoubtedly a crisis of the entire EU that had a more intense impact on "South" countries such as Greece but also to some of the "East" countries such as Romania and Bulgaria and the capitals of the latter.

Apart from other considerations, the crisis demonstrated that the development solutions adopted by the three countries and capitals (independently from the declarations of intentions of the development plans) were not sufficiently resilient to the recent economic crisis.

Nowadays, the models of development of the SEE capitals and countries have been considerably modified due to the crisis. We should therefore consider in GROSEE very seriously the trends or the crisis period in order to examine the perspective of the three capitals and SEE. We should also take thoroughly into account (for policy options) the declared intentions of the interested governments to associate the crisis exit with reforms improving the countries' competitiveness.

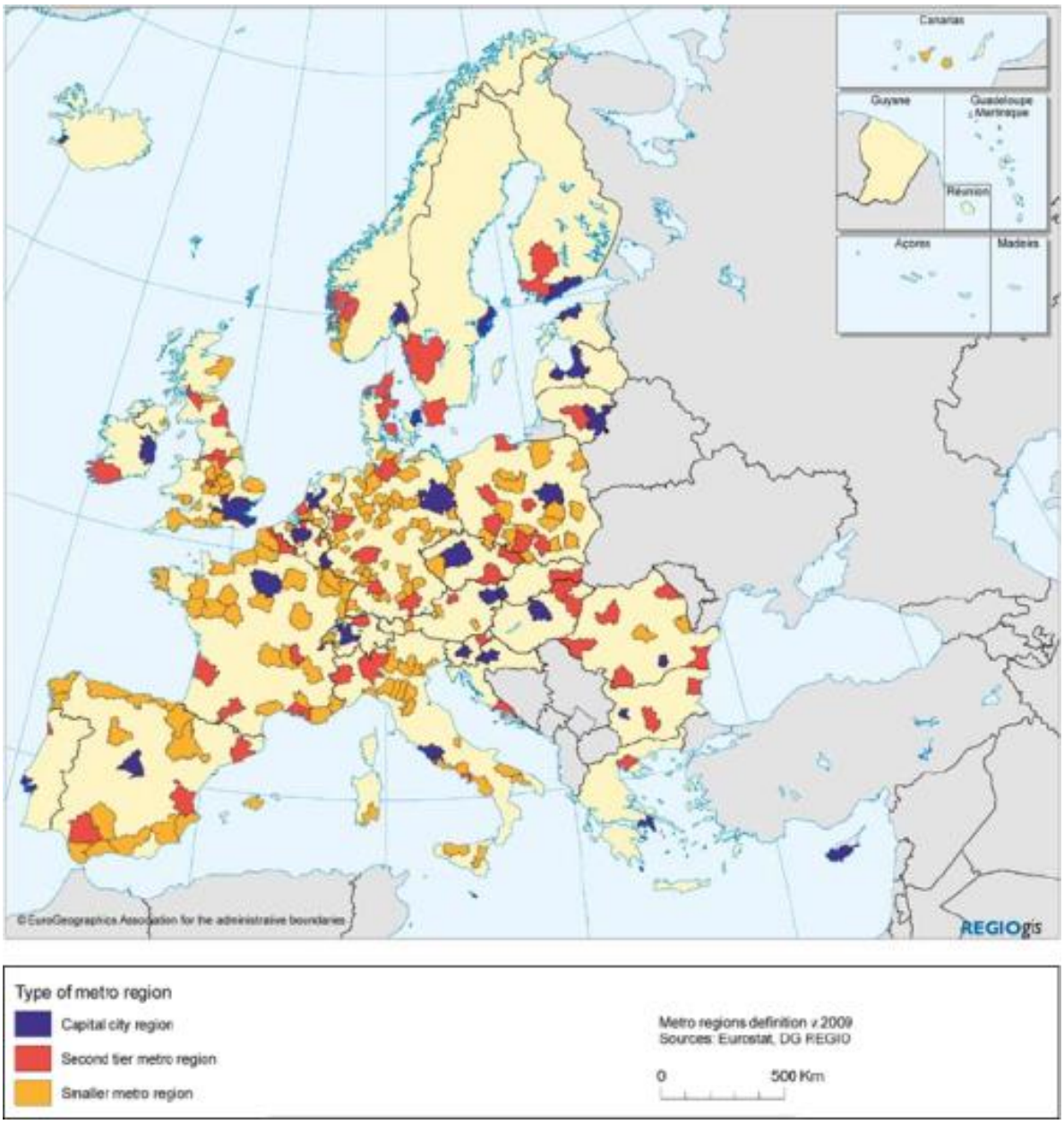
Comparison of the SEE capitals with other European metros

Comparison with EU capitals and second tier metros with emphasis on case studies

In order to better approach the strengths and weaknesses of the SEE capitals' development models it is useful to compare their competitiveness feature with the respective features of EU metropolitan regions (metros) which have similar population and European, national or regional role. Thus the results of the comparison would be more useful for the preparation of policy options.

In ESPON the majority of metropolitan regions are characterised as MEGAs. Because there are not recent data for the ESPON MEGAs, we have used the definition and respective data provided by Eurostat in cooperation with DG Regio under the heading "Metropolitan Regions" (Eurostat 2013). 253 cities of EU27, Croatia, Norway and Switzerland were characterised as Metropolitan Regions (MR, metros) according to the population criteria. Starting from the respective Urban Audit LUZs, Eurostat has approximated the area of the MR with NUTS3 units. Attiki corresponds to NUTS GR300 (FMA for GROSEE), Sofia to BG411 (CC for GROSEE) and Bucharest to RO321 (CC for GROSEE)

Map 85 Types of metropolitan regions by Eurostat: Capital city regions, Second tier metro regions, smaller metro regions



Source:

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Regional_typologies_overview

Eurostat (2013) has divided EU metros in (a) capital city regions, (b) “second tier metro regions” which are in fact “regional capitals of large areas” or “regional capitals with an important national role” and (c) “smaller metro regions”. It is obviously more appropriate to compare the SEE capitals with capital city regions and second tier metros. Unfortunately, data for the Eurostat

metros are available only for a few indicators. So, the comparison of the SEE capitals with all the European MRs can't include a number of important aspects of competitiveness. Therefore it is worthwhile to also compare the SEE capitals with a number of cases of capitals and second tier metros. We have used as an additional criterion for the selection the inclusion of the case studies in the EU "north", "south" and "east". We have selected:

- Stockholm and Amsterdam, capitals of EU "north" countries, Rome and Lisbon, capitals of EU "south" countries and Prague, capital of an EU "east" country; the population of Amsterdam and Rome is comparable to that of Attiki and the one of Stockholm, Lisbon and Prague to those of Bucharest and Sofia.

- Munich, Lyon and Manchester which are second tier metros of EU "north" with population comparable to those of Bucharest and Sofia.

Indicators and data used

Eurostat data for metros refer only to some of the competitiveness' indicators used in GROSEE. For the indicators not included in the Eurostat metros' database, there are Eurostat data for the NUTS3 units which constitute each metro. For some of these indicators we have aggregated the respective data for each metro. So, we could use more indicators than those included in the Eurostat metros' database. Using the same aggregation method we have calculated data for the case study metros more recent than those included in the Eurostat metros' database.

Also, for some of the GROSEE competitiveness' indicators, there is data only for NUTS2 level. Therefore, we have used obligatorily approximations of the Eurostat metros with NUTS2 units. In some cases, these approximations comply fully with the approximations at NUTS3 level used by Eurostat. In some other cases (as for example this one of Munich) NUTS2 approximation is quite wider from the Eurostat metro area (Table 75 show the indicators used for the case study metro per NUTS level of approximation.)

Table 75 Indicators used for the case study metros per NUTS level of approximation

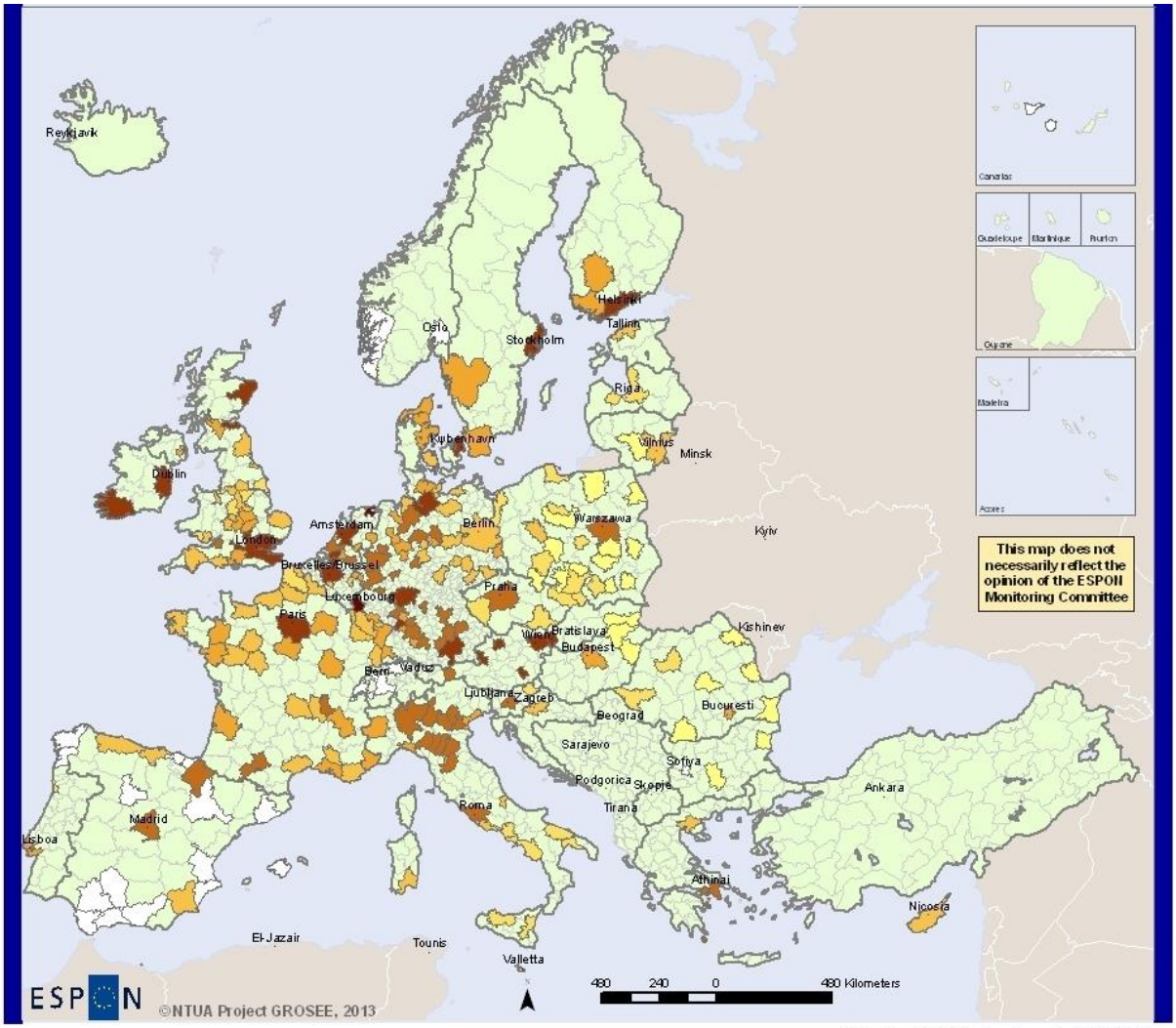
Indicators per aspect of competiveness	NUTS level of data and the MR approximation
Economic performance	
GDP PPS per capita as percentage of the EU27 average	NUTS3
Gross Value Added (GVA) at basic prices per activity sectors	NUTS2
Innovation / R&D	

Overall R&D expenditure as percentage of GDP	NUTS2
Number of patents per millions of inhabitants	NUTS3
Broadband penetration rate as percentage of total households	NUTS2
Labour force/human potential	
Labour productivity (in relation to the EU27 average) *	NUTS3
Employment rate as percentage of active population aged 20-64	NUTS2
Unemployment rate (percentage of active population aged 15-74)	NUTS2
Population aged 30-34 with tertiary education	NUTS2
*** Labour productivity was calculated as the ratio of the regional GDP in millions of PPS per 1000 employees** **** Tertiary education – provided by universities and other higher education institutions – is the level of education following secondary schooling** **See for the indicators in previous sections of GROSEE and among other in: ESPON Atlas 2013.**	

The results of the comparison

Before the crisis SEE capitals experienced a fast growth much greater than their countries and approached GDP per capita of the “north” metros.The three SEE capitals had in 2009 (year close to the start of the crisis) GDP PPS per capita higher than the EU27 average.

Map 86 EU metros: GDP PPS 2009 in percentage of the EU average (=100)

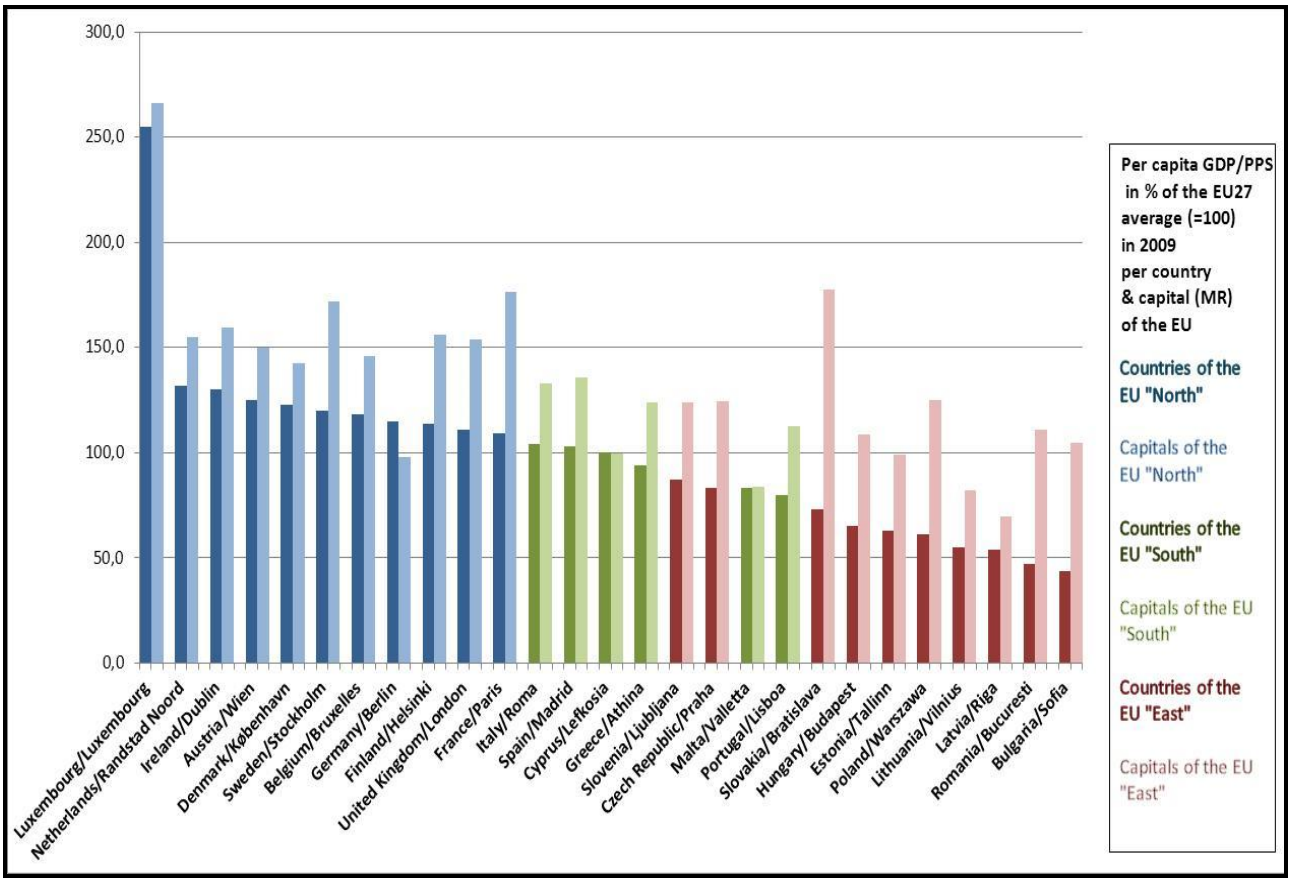


Metropolitan regions:
GDP PPS 2009 in percentage of the EU27 average (=100)

- 32,0 - 56,4
- 56,5 - 80,9
- 81,0 - 100,1
- 100,2 - 118,0
- 118,1 - 141,8
- 141,9 - 182,6
- 182,7 - 266,3
- No data

- NUTS 0 (countries)
- NUTS 3 regions

Figure 42 Per capita GDP PPS in % of the EU27 average (=100) in 2009 per capital city metro and country of the EU27



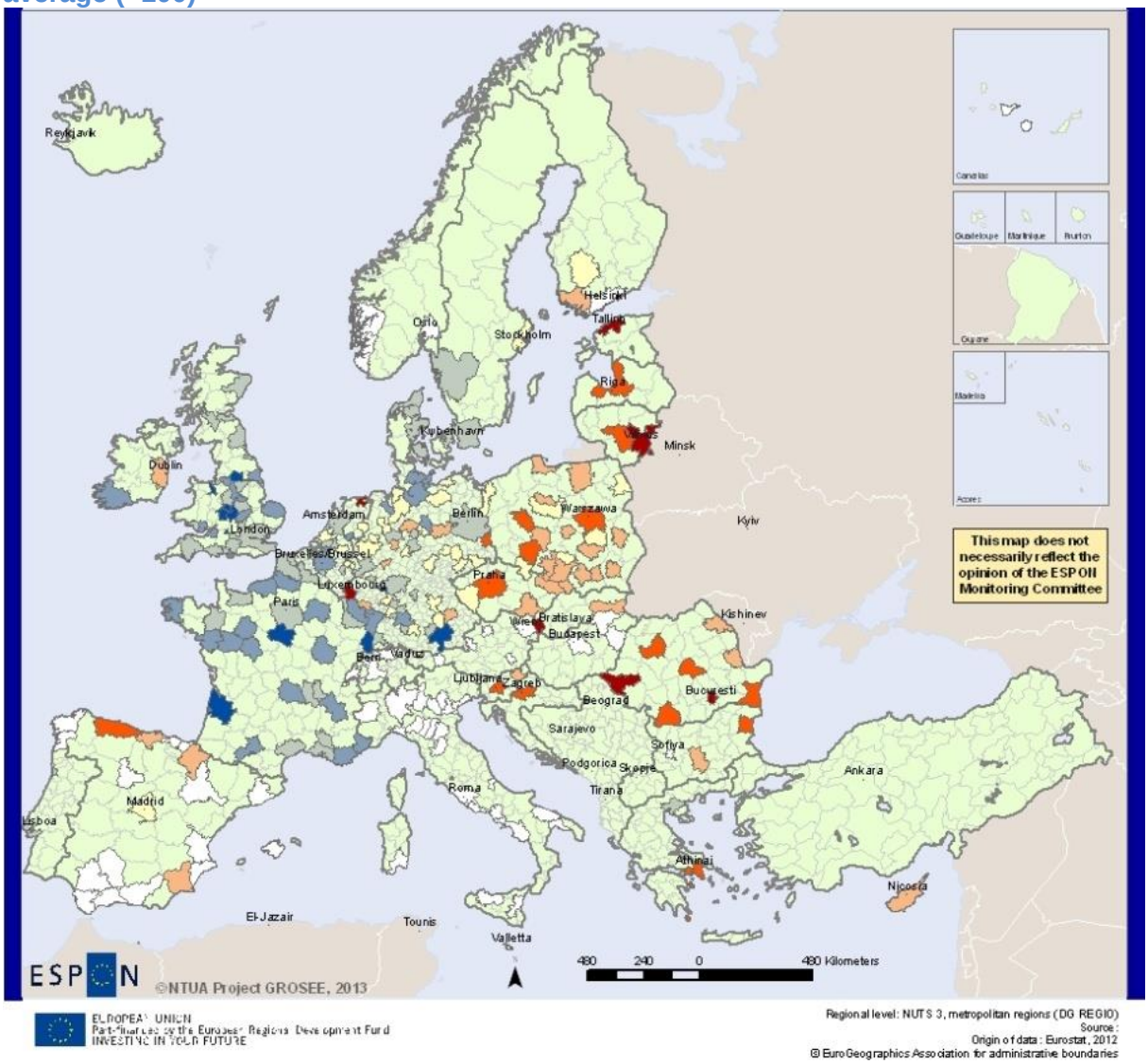
Own elaboration, based on Eurostat data

The highest values of EU capital city metros correspond to those of the “Pentagon”, the core of the EU “north”. Amsterdam (belonging to the “Pentagon”) but also Stockholm, case studies of the EU “north”, have clearly higher values than the SEE capitals, while Rome, “south” capital city metro, has a higher value than Attiki. However, the value for Lisbon (“south”) is closer to Bucharest and Sofia and lower than Attiki, while Prague (“east”) is on a par with Attiki and higher than the two other SEE capitals.

Before the crisis, the EU metros performed better than the respective countries but the difference of the three SEE capitals from their countries was even more considerable. Sofia and Bucharest performed impressively higher than their countries, like the other “east” capitals. This is the case for Sofia and Bucharest. During 2001-2008, the EU metros economy grew faster than their countries. the SEE capitals have progressed much better than the majority of the other EU metros. The EU “East” capitals grew even faster than their countries; their gains as for

the GDP in PPS measured in percentage of the EU27 average (=100) were very high. Bucharest gained the most among all metros. Sofia and Athens follow. Gains are also observed, although lower than the SEE capitals, in the case of Prague (“east”) and very limited in Stockholm (“north”).

Map 87 EU metros: Gains or losses 2001-2008 in percentage points of the GDP PPS EU27 average (=100)



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Regional level: NUTS 3, metropolitan regions (DG REGIO)
Source:
Origin of data: Eurostat, 2012
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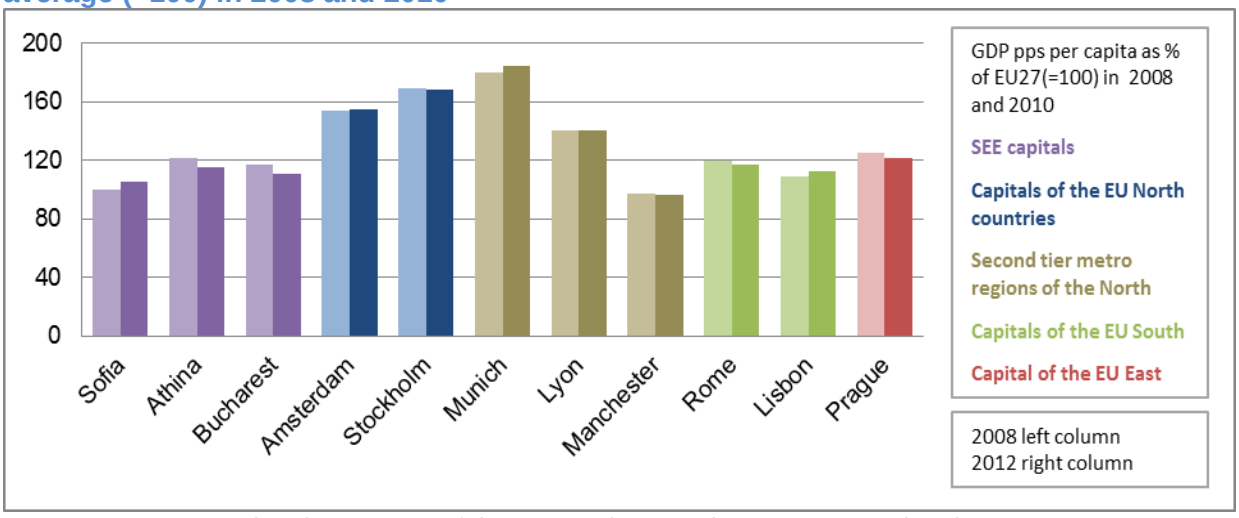
Metropolitan regions:
Gains or losses 2001-2008
in percentage points
of the EU27 average (=100) GDP PPS

- -22,90 - -14,10
- -14,09 - -7,40
- -7,39 - -1,20
- -1,19 - 5,20
- 5,21 - 13,00
- 13,01 - 26,30
- 26,31 - 60,10
- No data

- NUTS 0 (countries)
- NUTS 3 regions

Figure 43 SEE capitals and case studies metros: GDP PPS per capita as % of EU27 average (=100) in 2008 and 2010



Approximation NUTS3 of the metros (Eurostat), Rome: approximation NUTS2
Own elaboration, based on Eurostat data

During the crisis years 2008-2010 Attiki and Bucharest "lost" impressively, while "north" metros remained roughly "stable", except for Munich which "gained" a lot. Attiki and Bucharest recorded high loss in % of the EU27 average while Sofia "gained". From the "north" metros, Munich "gained", Amsterdam and Lyon remained "stable", and Stockholm and Manchester lost slightly. The "south" capitals, Rome and Lisbon, "lost" and "gained", respectively, while the "east" Prague lost 4 points.

The sector breakdown models make the development of the SEE capitals much less competitive and resilient to actual crisis in comparison to the metros of the EU core.We broaden here the respective analysis in section1 for the SEE capitals, as the comparison with the EU core metros makes much more evident the weaknesses of the first regarding competitiveness and resilience in the recent crisis.

Table 76 SEE capitals and case studies metros: GDP PPS per capita as % of EU27 average (=100) 2008, 2010, 2008-2010 change in percentage points

Types of metros	Metros	2008	2010	2008-2010 change in percent. points
SEE capitals	Sofia	100	105	5
	Attiki	121	115	-6
	Bucharest	117	110	-7
Capitals of the EU north	Amsterdam	154	154	0

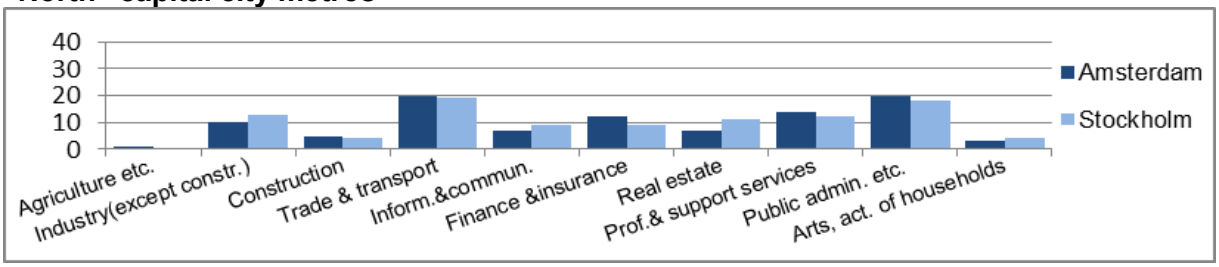
	Stockholm	169	168	-1
Second tier metros of the EU north	Munich	180	184	5
	Lyon	140	140	0
	Manchester	97	96	-1
Capitals of the EU south	Rome	120	117	-3
	Lisbon	109	112	3
Capitals of the EU East	Prague	125	121	-4
* Approximation NUTS3 of the metros (Eurostat), Rome: approximation NUTS2.Own elaboration, based on Eurostat data				

As we have already stressed in the analysis of the sector breakdown on the base of Gross Value Added (GVA) in 2009 , regarding financial activities (banks) and insurance, as well as information and communication branches, which are of strategic importance for competitiveness, Attiki presents a more important volume of GVA in comparison with the two other capitals.

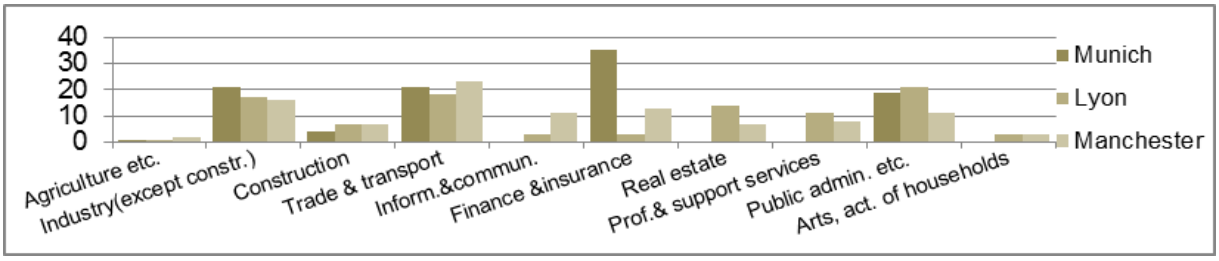
Figure 44 SEE capitals and case studies metros: Gross value added per economic sector in % of total GVA at basic prices in 2009

SEE capital city metros

"North" capital city metros

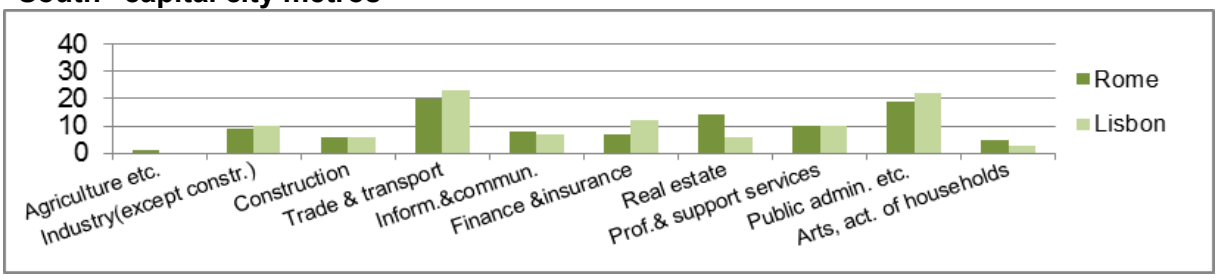


"North" second tier metros

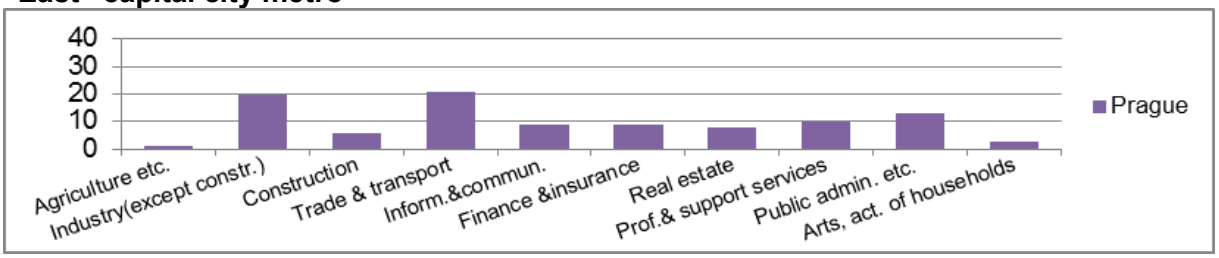


*Data for Munich available at larger categories (1.Agriculture etc., 2.Industry (except construction), 3.Construction, 4.Trade, transport, information & communication, 5.Finance, insurance, real estate, professional & support services, 6.Public administration, arts, activities of households etc.)

"South" capital city metros



"East" capital city metro



In addition, all three capitals present higher shares in trade, hotels and restaurants [transport] as well as in homes building and real estate, which all are introvert activities for the most. Bucharest and Sofia record also high shares in industry and construction, while Attiki has higher presence of public administration, defence, education and health.

In contrast, the sectors which are more crucial for competitiveness, such as financial activities, information and scientific and technological services have the highest total share in capital and second tier metros of the EU North; this share is lower in "south" capitals and Prague ("east" capitals) but also the specific analysis of APS and HT branches. In this respect, Attiki is closer to the "South" model while Bucharest and Sofia have clearly lower specialisation in these sectors.

Table 77 SEE capitals and case studies metros: Gross value added per economic sector in % of total GVA at basic prices in 2009										
Types of metros	**SEE capitals**			**Capitals of EU North**		**Second tier metros of EU north**		**Capitals of EU South**		**Cap. of EU East**
	Sofia	**Attiki**	**Bucharest**	**Amsterdam**	**Stockholm**	**Munich**	**Manchester**	**Rome**	**Lisbon**	**Prague**
Agriculture etc	1	0	0	1	0	1	2	1	0	1
Industry (exc. construction)	17	9	20	10	13	21	16	9	10	20
Construction	9	4	13	5	4	4	7	6	6	6
Trade, transport	21	22	23	20	19	21	23	20	23	21
Information and communication	10	8	12	7	9		11	8	7	9
Finance & insurance	11	6	6	12	9	35	13	7	12	9
Real estate activities	7	17	4	7	11		7	14	6	8
Prof., tech. & support serv.	8	8	9	14	12		8	10	10	10
Public administration, education, health	11	19	10	20	18	19	11	19	22	13
Arts, activities of households	3	5	4	3	4		3	5	3	3
* Approximation NUTS2 of the metros (Eurostat). Own elaboration, based on Eurostat data										

On the contrary, as we have already stressed, all SEE capitals have higher shares in construction (of buildings and infrastructures) and real estate as well as in trade and restaurants (sectors comparatively less important for competitiveness) in comparison with the “north” metros.

A kind of «bubble» in construction, real estate and other introvert branches have contributed to the emergence of the crisis in the SEE capitals. In this context, the more than expected slowdown in these branches during the crisis makes more difficult the exit from the crisis. Before the crisis, the construction / real estate sector was developing fast in the SEE capitals, as it was

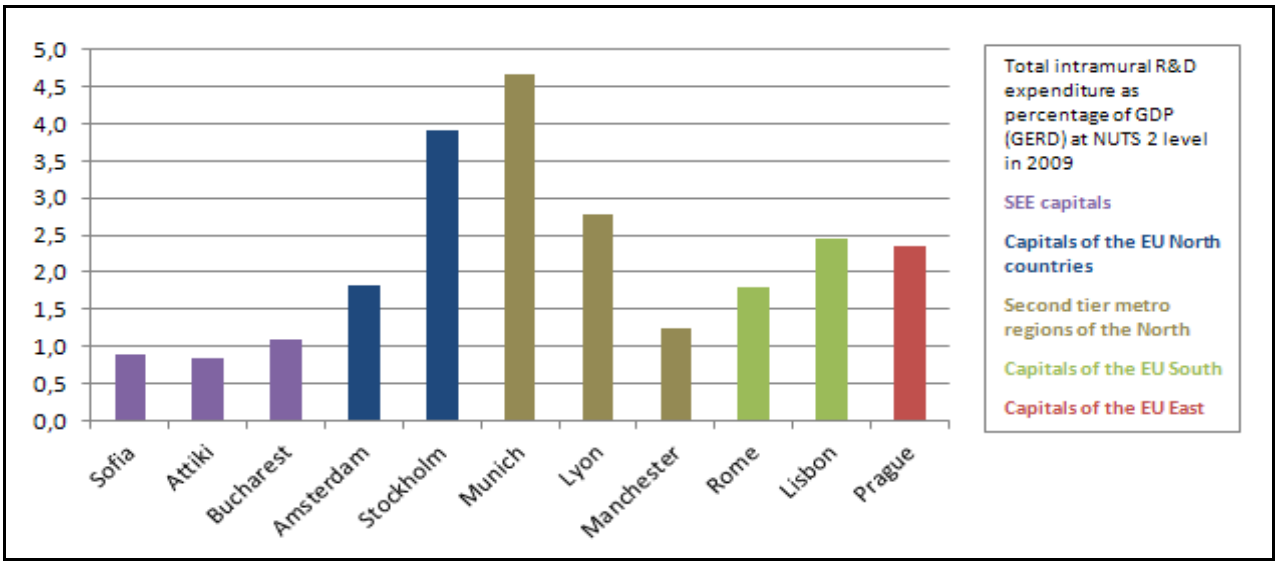
the case in the south capital city metros, resulting in a kind of «bubble» in construction with negative impact in the overall economy.

During the crisis, this sector has decreased to almost 50% since 2008 in Attiki and Bucharest (although it still has an important share regarding GVA). Significant decrease has also been observed in trade, restaurants and personal services as well as in public administration, education and health, introvert branches related to internal consumption for the three capitals.

The economic crisis is to a great extent responsible for the decrease of the GVA in the above sectors (especially in construction) and for the actual reorientation of the development models inside SEE. The former -before crisis- sector breakdown of the SEE capitals constitutes a major factor for the low resilience of their development models, especially in the case of Attiki.

The highest “competitiveness distance” of the SEE capitals from the EU core metros regards technological and innovation readiness. The percentage of the R&D expenditures as for the GDP in the SEE capitals remains exceptionally lower than the EU27 average. It is even lower compared to capital city metros (Stockholm) and to second tier metros (Munich) of the “north”. Their performance remains considerably lower even compared to capitals of “south” (Lisbon) and “east” (Prague).

Figure 45 Total intramural R&D expenditure as % of the GDP (GERD) at NUTS2 regions in 2009: SEE capitals and case study metros



Own elaboration, based on Eurostat data

As for patent applications to the EPO per million of inhabitants, in 2008, the differences of the SEE capitals (i.e. Sofia 8) from “north” capitals and second tier metros (i.e. Stockholm 478 and Munich 637) are extremely large, with Attiki scoring better than the other two. The South case study, Lisbon, also presents a very low value close to the respective of SEE. During 2008-2009, the values of the above patent index have been reduced similarly for all case studies, closing a bit the gap from the SEE capitals.

In the case of households with broadband access in 2011, all SEE capitals are far behind the “north” case studies. They are closer to the equivalent rates of capitals of “south” and “east”. During 2008-2011, the rates of the SEE capitals increased significantly in percentage points (Bucharest gained 50 points).

Table 78 SEE capitals and case studies metros: Broadband penetration as % of households 2008, 2011, 2008-2011 change in percentage points

Types of metros	Metros	2008	2011	2008-2011 change in
SEE capitals	Sofia	31	54	23
	Attiki	34	53	19
	Bucharest	21	54	33
Capitals of the EU North	Amsterdam	77	86	9
	Stockholm	84*	91	7
Second tier metros of the EU north	Manchester	52	68*	16
Capitals of the EU South	Rome	38	55	17
	Lisbon	50	67	17
Capitals of the EU East	Prague	45	67	22

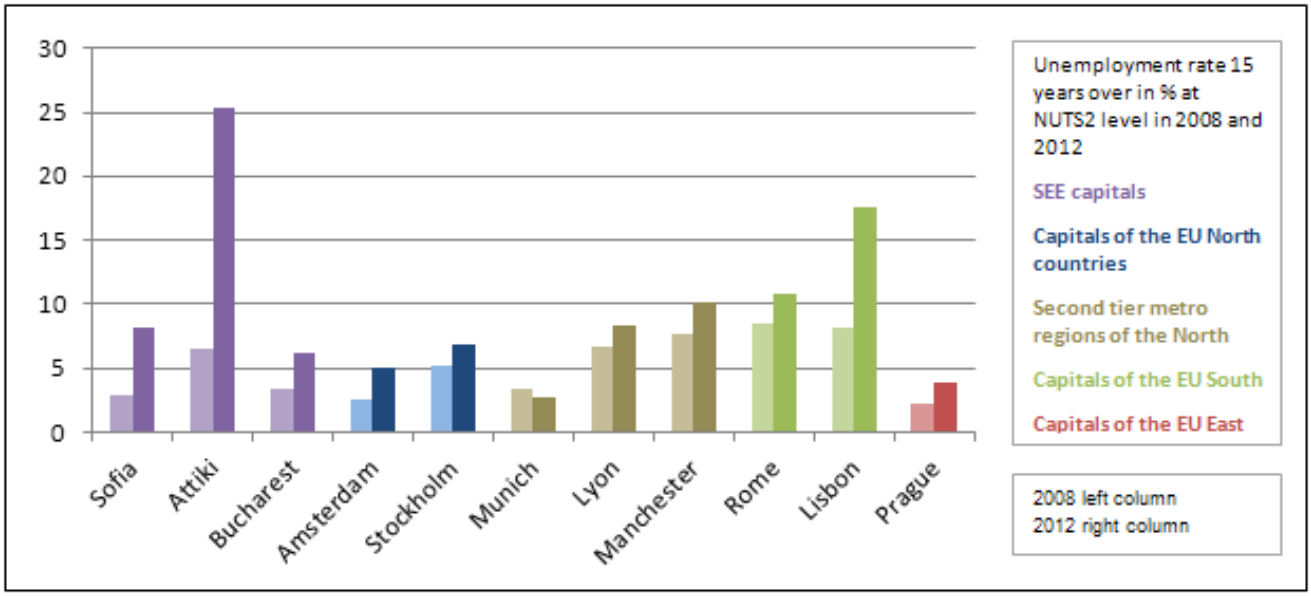
Approximation NUTS2 of the metros (Eurostat), *last available data from 2009,Own elaboration, based on Eurostat data

Labour force and human potential: lower competitiveness distance of the SEE capitals from the EU core metros in comparison with innovation

Specifically for labour productivity[12] in 2010, major differences were found inside the SEE, with Attiki exceeding the other two and being closer to "north" capital city and second tier metros. Sofia and Bucharest are closer as for this index to capitals of "south" and "east".

During the crisis, the employment rates for all SEE capitals decreased substantially except for Bucharest (Attiki: -12 percentage points). These rates are considerably behind those of the "north" case studies of capital city metros and second tier metros and are closer to the case studies of "south". Unemployment rates (aged 15 over) for the SEE capitals increased excessively in 2012 with Attiki (+19 percentage points) exceeding all case studies and being closer to Lisbon, case study of "south". The rates of Sofia and Bucharest are similar to those of the "north" capital metro of Stockholm and to the average rate of the "north" second tier metros

Figure 46 Unemployment rates (15 years over) in % at NUTS2 regions in 2008 and 2012: SEE capitals and case study metros



Own elaboration, based on Eurostat data

Moreover, the share of tertiary educated people (30–34 years) to the total population for 2012 in the SEE countries exceeded the EU27 average (36%). It is still lagging far behind the rates for

[12]Labour productivity was calculated as the ratio of the regional GDP in millions of PPS per 1000 employees

Stockholm (56%) case of “north” capital whereas it is significantly above the rates of “south” and “east” capitals. The rates of Bucharest and Attiki increased fast during 2008-2012, surpassing the rates most of the other case studies.

Conclusions

The weaknesses of the overall development models of the SEE capitals explain their differences in terms of competitiveness and resilience to the crisis compared to the EU "core"

The model of economic, social and territorial development for Bucharest and Sofia differ significantly from that for Attiki. However, similarities among the three allow using a common competitiveness pattern for some aspects of the comparison with other EU metros. This SEE capitals model is comparatively more based on introverted sectors (construction of infrastructures, real estate, health, education) than on extroverted ones (products of high technology, innovation) in comparison with the EU northern metros. This explains for the most the lag of the SEE capitals in overall competitiveness in comparison with the “north” metros, which lead to the fact that the first are less resilient to the crisis than the latter.

The more detailed analysis of the performance and the competitiveness factors of these two models as well as of the other models of EU metros, explained previously, further highlights the competitiveness weaknesses and opportunities of Bucharest, Sofia and Attiki.

If we compare Bucharest, Sofia and Attiki, there are differences in some strategic branches and in terms of unemployment, a common prevalence of introverted and less resilient model can be observed.

“North” capital city metros are the more performing, competitive and resilient to crisis because of the power of highly innovative extrovert sectors and a highly skilled workforce.

“North” second tier metros follow for the most the development model of the “north” capital city regions. They perform highly. Despite their high unemployment rates, they retain a high level labour force. Despite the fact that Manchester is considerably less developed than Lyon and Munich, all three have proven to be resilient enough to the current economic crisis.

On the other side, “south” capital city metros perform moderately; they are moderately competitive and less resilient to crisis because of the high share of introvert sectors. They are quite close to the SEE capitals regarding the economic performance and the sector breakdown model. They present moderate indices of innovation. Labour force seems one of the weakest

points of the “south” capital city metros, with considerably low rates of labour productivity, employment and tertiary education along with high unemployment rates. In general lines, their development model is less resilient to the current economic crisis. Prague, “east” capital city metro has an intermediate position between the “south” metros and the less developed “east” metros, but it has proven to be resilient to crisis.

Weaknesses and opportunities for competitiveness of the three capitals and SEE

As we pointed out, the development models of the capitals and countries of South East Europe have changed significantly due to the crisis. Therefore, in order to highlight the perspectives of the three capitals and SEE, we examined in depth the changing trends during the crisis period.

However, in order to determine the perspectives and appropriate policy recommendations, we should also take full account of the intentions of governments to link the exit from the crisis with reforms for improving the competitiveness of the respective countries.

Below, we attempt to summarize the main weaknesses and opportunities for the competitiveness of the three capitals and SEE.

- The actual breakdown of different sectors in the three capitals presents specific weaknesses due to the high share of sectors which are not relevant to export, such as constructions, several service branches as well as a high share of industrial enterprises that are not competitive at the world level.

- A second weakness, which is closely interrelated with the first, regards the comparatively low level of R&D due to low investment in R&D in the three capitals. On the contrary, the existence of a sufficient quantity of human capital with high level skills concerning both, the entire economy and the specific sector of R&D, constitutes undoubtedly an important strength.

- A third weakness concerns the low level of territorial cooperation through the networking and clustering of firms and research groups.

- Concerning internal connectivity to public services as well as business and industry zones, some weaknesses still remain because the recent improvements have not been completed and territorial planning is inefficiently implemented to some extent. Here again there is a challenge for the respective national, metropolitan and local authorities to transform these weaknesses to opportunities by completing the relevant interventions and improving the implementation of the territorial planning using EU as well as national and local funding.

- Therefore, the three capitals have considerable opportunities to develop more industry and dynamic services as well as tourism and culture activities. The main challenge for them is to develop R&D activities (with more expenditure and long term investments) in order to spread innovation throughout the entire economy as well as to develop specific branches of Advanced Producer Services (APS). Here again, further exploitation of the transport / communication infrastructures that have been at a first level improved using the EU CSF funding is a considerable opportunity for the three capitals and SEE.

The internal dynamics of the system of cities in SEE regarding competitiveness

The Core city (CC) areas have transmitted the dynamism, but also the disadvantages of their development model to the rest FMA. The CC has grown fast before the crisis, but had highly slowed down during the crisis. In all three cases the CCs, which had earlier higher competitiveness, have gradually integrated the other areas of the FMAs and transmitted to a large part of them the development dynamics and the competitiveness of the City Cores. In other words, the CC functioned as a strong territorial driver of competitiveness for the large part of their FMAs; this is particularly evident for the eastern area of Attiki and for Ilfov in the case of Bucharest.

Overall, the three capitals do not redistribute enough innovation and technological readiness and, more generally, they do not function as territorial drivers of competitiveness for the rest of the countries.

Direct Investment from Attiki represents a key factor for raising interdependency in SEE, and is, by priority, directed to Bucharest and Sofia. During the decade of the pre-crisis period, the three capitals functioned as major engines of the development of their countries and SEE while the economic cooperation and interdependency among them have increased considerably. The most important driver of such economic cooperation was the Direct Investment (DI) from Attiki to Bucharest and Sofia regarding specific branches such as the financial sector (mainly the banks), telecommunications, retail trade (hyper markets) and specific branches of services and, at a lower level, infrastructures construction, housing as well as real estate. Territorial cooperation in research was also more centred on the three capitals and much less to the rest of the three countries. In contrast, DI in industry has been directed less to Sofia and Bucharest and more to the regional capitals and to the smaller cities in the two countries.

Economic cooperation among the SEE capitals has gradually been extended to Western Balkans capitals and countries, but it has slowed down during the crisis. This kind of

cooperation has not been limited only to the three capitals and countries, but has also been extended to their neighbouring areas of Western Balkans and Turkey (as well as Moldavia). This cooperation, initiated mainly from Attiki and Greece, has been enlarged including gradually Belgrade, Skopje, Tirana and Istanbul. This interdependency that decelerated during the crisis period constitutes an important driver of competitiveness for the three capitals and SEE because it considerably increased investments in SEE and enabled the turnover increase in a large number of enterprises in relation to their improvement in R&D.

The reinforcement of FDI and transport links, originated from Western Europe, has contributed to a moderate raise of the competitiveness of the three capitals and SEE, but has aggravated the deficit of their external trade. Economic exchanges among the three capitals and SEE with Europe and the world concern mainly Western Europe and are focused on some specific branches of industry and services. FDI originated from Western Europe has contributed to a moderate raise of the competitiveness of the three capitals and SEE but at the expense of a growing deficit of the SEE economies regarding the balance of their external trade.

Finally, an important territorial driver of competitiveness regarding these multi-level interdependencies is the continuous increase of the accessibility in the three capitals and SEE to the rest of the EU space through the improvement of the transport axes at European level, mainly those included in the TEN-T.

Geographical and historical factors impacting the competitiveness of București city

Looking at the historical past of Romania, it is clear that the over 40 years of communist regime influenced strongly the economic development of the country. The focus is set in this period on the industrial speed up, forcing large urban and rural areas to an artificial industrialisation. The planned economy adopted for this period minimized the abilities of the country for competitiveness because there wasn't enough financing to adapt to the new technologies and to compete on the market economy. Also, after the industrialisation period from the centralised economy, measures should have been taken through a mentality shift in order to adapt to the new way of creating added value in an environment of fierce competition and rely on endogenous growth.

In terms of geographical factors it is clear that the peripheral position of the country within the EU has impact on the competitiveness. An asset for the regional competitiveness is given by the presence of the Danube, facilitating the transition of goods at European and Global level. The Black Sea-Danubue-Rhein-Northern Sea axis is not used to its strategic potential. Nevertheless

the Danube represents also a natural barrier in the cooperation with the southern countries as Bulgaria, as the Stara Planina Mountains represent a natural barrier in the communication between Bulgaria and Greece.

Another important fact in the cooperation and competitiveness of București with Sofia and Athens is given by the different languages as well as cultural and traditional specificities. Also, as pointed out by the interviews taken with the stakeholders from the three EU South East European capitals, structural and functional complementarities were hard to indentify.

4. Accessibility, connectivity and impact of the TEN-T Network

4.1 Accessibility, connectivity and the impact of TEN-T Network in București

From the perspective of accessibility and connectivity, București has been approached within the context of the national transport infrastructure network, as well as in the larger context of the SEE and European networks.

Although the position of București in the Romanian territory and urban system is not geographically a central one, the status of capital city contributed to the improvement of its accessibility through the policies and decisions regarding the transport infrastructure and insured its dominance, especially during the communist period, when the system was highly centralized.

Air transport

In terms of air transport, București has two airports, Băneasa and Otopeni. In March 2012 the low-cost flights from Băneasa Airport were changed to Otopeni and the airport was closed, with the plan to be converted in business airport, which would be another competitive advantage from the perspective of accessibility.

According to the analysis of the aircrafts movements and the number of passengers in 2009 (see also maps in Annex IV), the two airports of București were garnering most of the traffic in Romania (6.457.141 out of 8.337.797 passengers, meaning 77.44%)

Being the only one connected through regular flights to almost all the other airports in the country, the capital is not only the main receiver of passengers, but also a connector with the rest of the national territory through the domestic flights. According to the winter flight schedule 2012-2013, from București there were connections towards 9 of the 13 Romanian airports, with a frequency between 3 and 29 flights weekly.

Out of these, the contactability through one day business or study trip within the time frame 6.00-22.00 is actually possible daily only with 3 of the cities: Iași, Timișoara and Cluj Napoca. For the rest, either the return arrival time is later than 22.00, and/or the flights are not available

on every working day. Applying the same indicator to the connections with Athens, Sofia, Istanbul and Belgrade, analysis showed that day trips are possible between București and all the mentioned cities.

At the national level, the International Airport Henri Coandă București is the most important airport, also known to have the airport with the highest passenger traffic at national level.

Until the beginning of 2012, a second airport "Aurel Vlaicu" Băneasa operated low-cost fairs contributing to the national and international connectivity of the city.

Table 79 Number of air travel passenger at the International Airport Henri Coanda (Otopeni)

	2008	2009	2010	2011
Number of passengers	5064230	4483661	4917952	5049443
(Source: www.Bucurestiairports.ro – Annual Report 2010, 2011)				

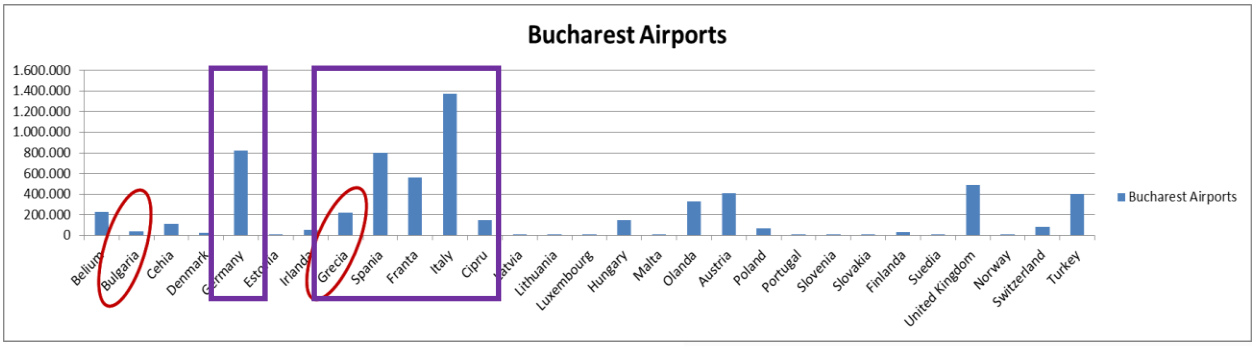
Table 80 Number of air travel passenger at the International Airport București Băneasa

	2008	2009	2010	2011
Number of passengers	1724633	1974337	2218150	2398911
(Source: www.Bucureștiairports.ro – Annual Report 2010, 2011)				

The most common destinations for both airports serving București, were to Western Europe, on the top of the list for Henri Coanda Airport being Vienna, Paris, Munich and Amsterdam, while the most attractive destinations from the Baneasa Airport were for 2011 Roma, London, Bergamo, Barcelona and Brussels. Only two other non-EU destinations made the top 10 at the Henri Coanda Airport, namely Istanbul and Tel Aviv. (www.Bucureștiairports.ro, Annual Report, 2011)

București Airports (Henri Coandă-Otopeni and București Băneasa) show a high number of passengers travelling to Italy, Germany, Spain or France. The increased interest for this countries can be explained by two reasons, first the migrating labour force traveling to countries as Italy, Spain, France, but also Greece and Cyprus. In the second case, additionally to the migrating labour force, an important number of passengers flying to and from Germany or Austria have ethnical relations maintained by the German minority. As we can see from the 2011 data the number of passengers flying to Bulgaria is rather low. The high number of people travelling to Greece is represented as we mentioned by a considerable number of labour force and to a less extent, by the touristic flows. (Figure 47)

Figure 47 Air passenger transport between International Airport Henri Coandă (Otopeni) and București Băneasa Airport and partner reporting countries, 2011



(Source: Processed data from EUROSTAT)

Railway transport

Although the railway network in Romania is dense and covers most of the territory the quality of the tracks and the high sinuosity of the segments are not offering good premises for accessibility due to the high amounts of time spent on traveling.

București has daily regular train connections to all the bigger cities (over 100.000 inhabitants) in the country, but the distance between them is not supporting rail travel as an efficient way of commuting or business travelling.

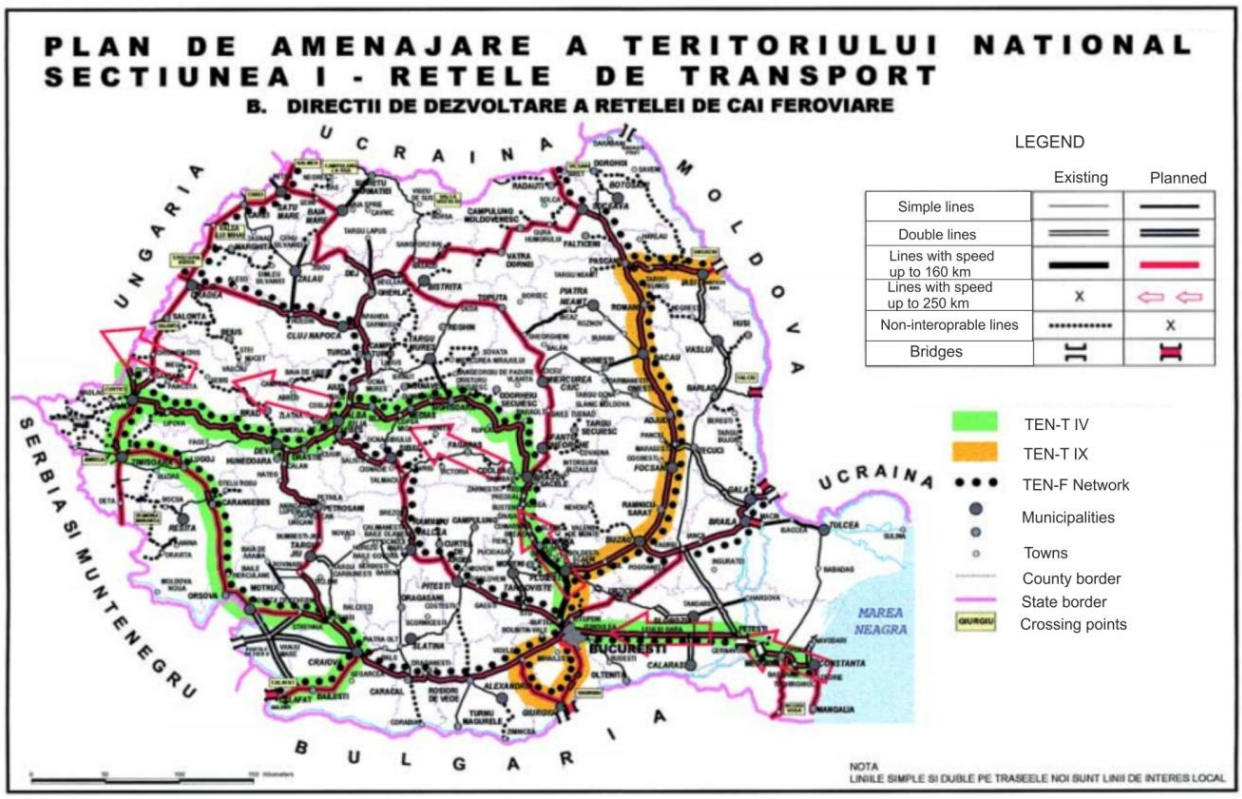
The travel flow by railway at national level shows higher scores in the case of inbound and outbound to the first level of neighbouring countries and a drop with the second level of neighbouring countries. The most significant traffic flow is to be noticed between Romania and Hungary as a result of the economical and ethnical connections, but also as a result of favourable natural conditions, implying multiple border crossings. High values are registered as well in the railway passenger flow between Romania and Moldova, the shared language being a main factor in the high levels of passenger transport. Between Romania and Bulgaria there are only two railways crossing points, at Giurgiu and Negru Voda, and only two with Serbia, at Jimbolia and Stamora Moravita, hindering an increased traffic.

Table 81 Railway passenger flow to neighbouring countries															
Outbound Country	**Bulgaria**			**Hungary**			**Serbia**			**Moldova**			**Ukraine**		
Year	2004	2008	2011	2004	2008	2011	2004	2008	2011	2004	2008	2011	2004	2008	2011
1000 passengers	14	10	26	132	111	78	n/a	7	6	35	20	20	4	2	1
Source: EUOSTAT Database															

Table 82 Railway passenger flow from neighbouring countries															
Country of Origin/ of Provenance	**Bulgaria**			**Hungary**			**Serbia**			**Moldova**			**Ukraine**		
Year	2004	2008	2011	2004	2008	2011	2004	2008	2011	2004	2008	2011	2004	2008	2011
1000 passengers	19	15	7	67	59	7	0	8	5	57	38	3	2	2	0
Source: EUROSTAT Database															

The railway network is composed of 8 backbones at national level, all of them joining in the North Railway Station in București. Even though București is well equipped with railway stations dedicated to the passenger transport, the connection to the Inner Metropolitan Region is rather poor.

Map 88 National Territorial Plan – Railway network



(Source: National Territorial Plan, 2006)

We analyzed the possibility of conducting one day trips within the time frame 5:00 – 23.00 between București and the 11 first rank cities in Romania. Only in the case of Ploiesti, Constanța and Brașov the train connections allow the possibility to travel to and from București in the time conditions set for the analysis. For the others it is either a matter of too much time spent on the travel (in some cases more than 7 hours for one way: e.g. Iași, Cluj Napoca, Timișoara) or one of timetable, meaning that the hours of the existing connections are not fitting the time frame, even if they are many.

One day trips are not possible to/from any of the other capitals in the area. Sofia is the closest capital city and even if the distance is only around 400 km, the travelling

time by train is around 10 hours, which is an indication of the inefficiency of the rail infrastructure and the low level of connectivity that it ensures.

Among the objectives of the transport strategy of the Romanian authorities, there are 3 segments of rail network directly connected to București considered for works of rehabilitation and modernization: București-Brașov (167 km), București-Constanța (227 km) and București - Videle - Giurgiu (114 km). The first two will be rehabilitated for higher speed usage, which will improve the connection between București and the touristic areas of Prahova Valley and Transylvania, in the first case, and the Black Sea coast, in the second one. The last segment is meant to improve the circulation towards Bulgaria and the South –East of Europe.

Road transport

Out of all the transport networks in Romania, the roads are the ones that illustrate the best the role of historical and political factor in the configuration of the routes. Although București is the main road hub, it did not create a major exchange axis as the politics during Ceaușescu's era was to create a harmonious crystallerian urban system of 7 cities of exact same size (around 300.000 inhabitants) that obey the capital city.

The same tendency to concentrate the infrastructure investments in and around the capital continued in the past two decades, which brings a competitive advantage to București and emphasizes its dominant role within the urban system, but it doesn't support the overall connectivity of the national road network, which, as can be seen in the figure Road Connexity and Connectivity Indices by NUTS 2 in SE Europe**,** is low. As a consequence, not only that traveling by car to and from the rest of country can take more time than the distance would require (due to the quality and configuration of roads), but also driving to the neighboring countries is hampered by the lack of proper road connections, which affects the accessibility of București at larger territorial scale.

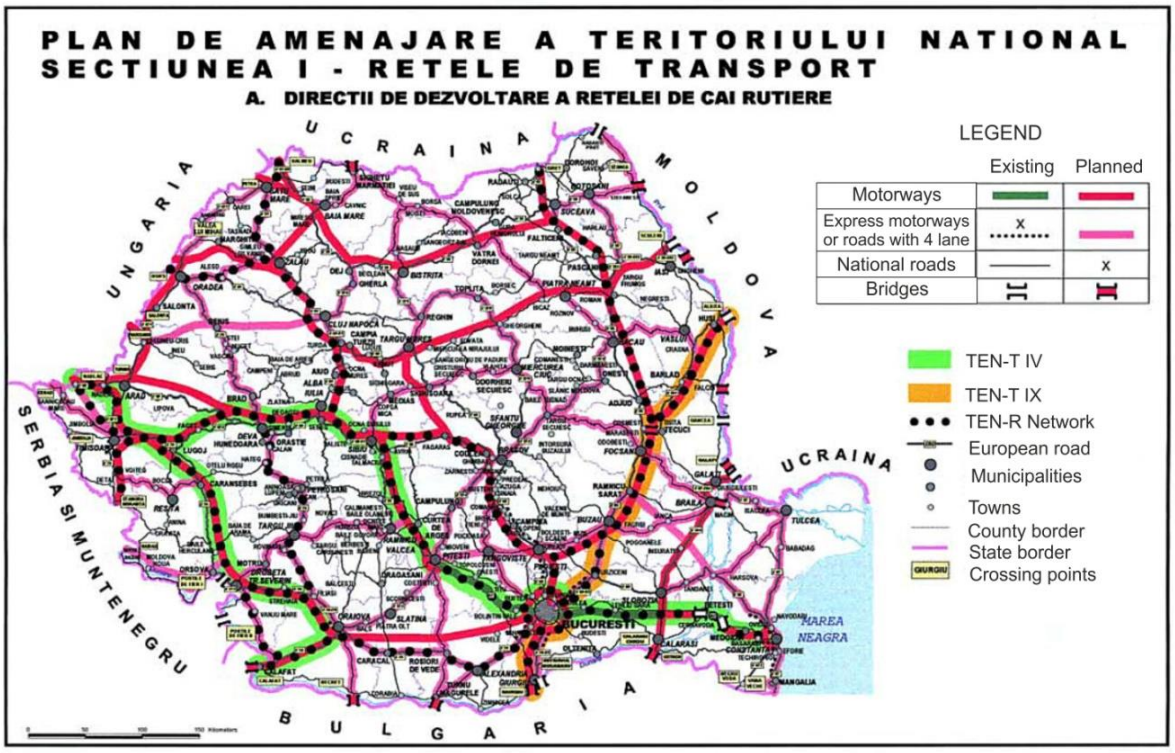
That is why a proper integration in the European transport corridors is crucial for București, as a growth pole in the area, and for Romania.

Lately, Romanian government insisted on the consolidation of two road axis – București – Brașov – Cluj – Oradea (Transylvania Highway) and București – Pitesti – Sibiu – Timișoara – Arad, both oriented northwest-southeast that respond less to an internal urban cohesion, but more to the European integration needs.

The current strategy is focused on rehabilitating and building segments of infrastructure that should reinforce the role of București in the TEN-T Network (the north ring of București should make the junction between the two highways, București – Brașov and București – Constanța, both part of Pan-European Corridors, still under construction).However, although the above mentioned highways can ease the traffic from the capital towards the main touristic areas of Romania, an improved connection with the rest of SEE and with the West of Europe, through Hungary, can only be achieved by finalising all the sectors of the corridors, not just those directly linked to București.

As by 2010 (EUROSTAT) the total length of motorways in Romania was of 332 km and many more are under construction or in project. Only in the București-Ilfov and Sud-Muntenia Development Region are about 270 km of motorway.

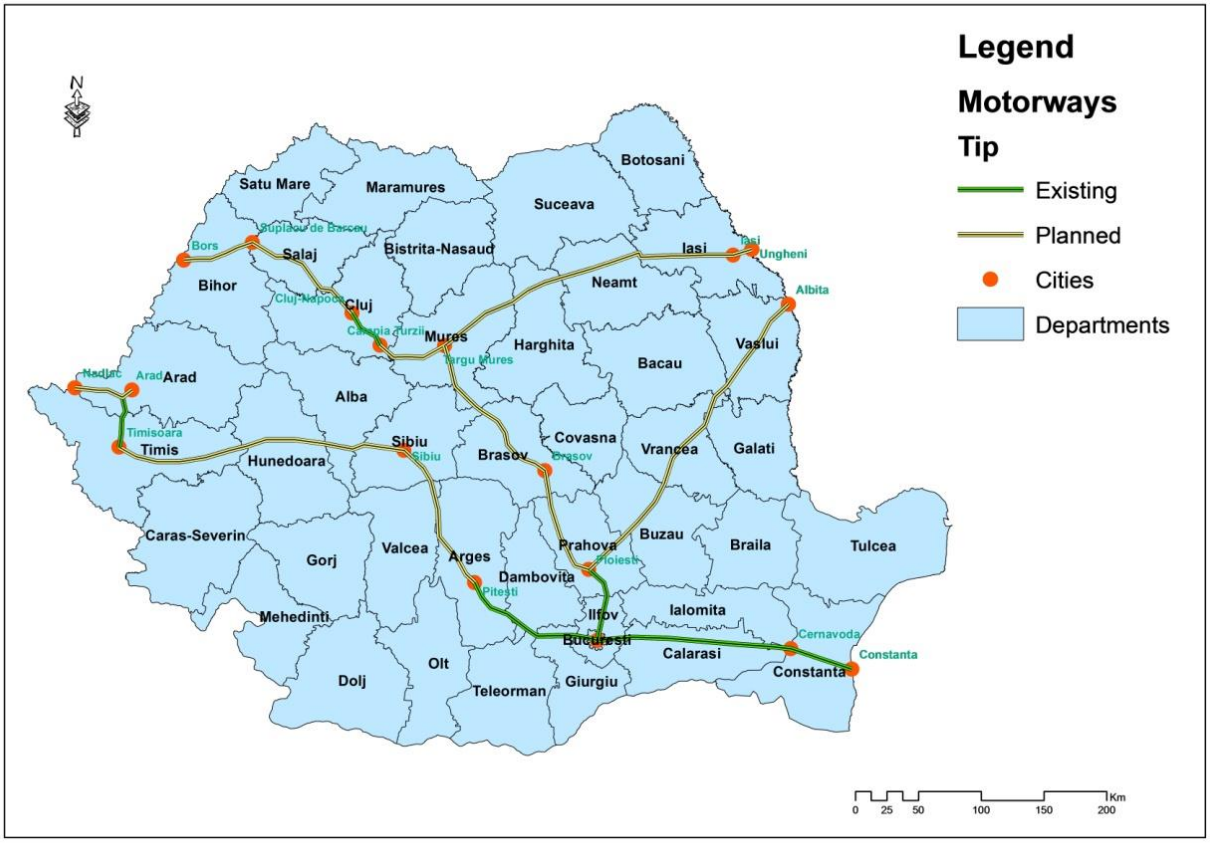
Map 89 National Territorial Plan – Transport Network



MONITORUL OFICIAL AL ROMÂNIEI, PARTEA I, Nr. 806/26.IX.2006

(Source: National Territorial Plan, 2006)

Map 90 Existing and Planned Motorways in 2013



(Source: CICADIT)

4.2 Accessibility, connectivity and the impact of TEN-T Network in Sofia

The accessibility and connectivity of Bulgaria is considered problematic, as pointed out in the draft partnership agreement with the EC for 2014-2020. The republican road network and the rail network are considered relatively well developed. Yet the quality of infrastructure is in critical condition, although serious improvements have been made since the EU accession of Bulgaria in 2007. Completing the network of highways and the roads within the scope of the TEN-T network is a major priority for the next programming period. The same goes for the completion of major rail infrastructure projects, part of the TEN-T network. The rail transport of passengers has lost positions in recent years and the need of investments for the sector is huge.

The development of inter modal transport is another key priority for the next programming period.

Sofia has a key position on the Balkan Peninsula as a pass through of three Pan-European transport corridors:

- Pan-European corridor №4 (Dresden – Prague – Bratislava – Budapest – Craiova – Sofia – Plovdiv – Istanbul and Blagoevgrad – Thessaloniki);
- Pan-European corridor №8 (Durres – Tirana – Skopje – Kyustendil – Sofia – Plovdiv – Burgas – Varna);
- Pan-European corridor №10 and the Trans European highway (Belgrade – Sofia – Istanbul).
- There are four main rail directions:
- the first main rail line Serbia-Dragoman-Plovidv-Turkish border;
- the rail line through the Iskar Gorge to northern Bulgaria and the bridges along Danube;
- the third main rail line to the Black sea ports;
- the rail line to Greece and FYROM.

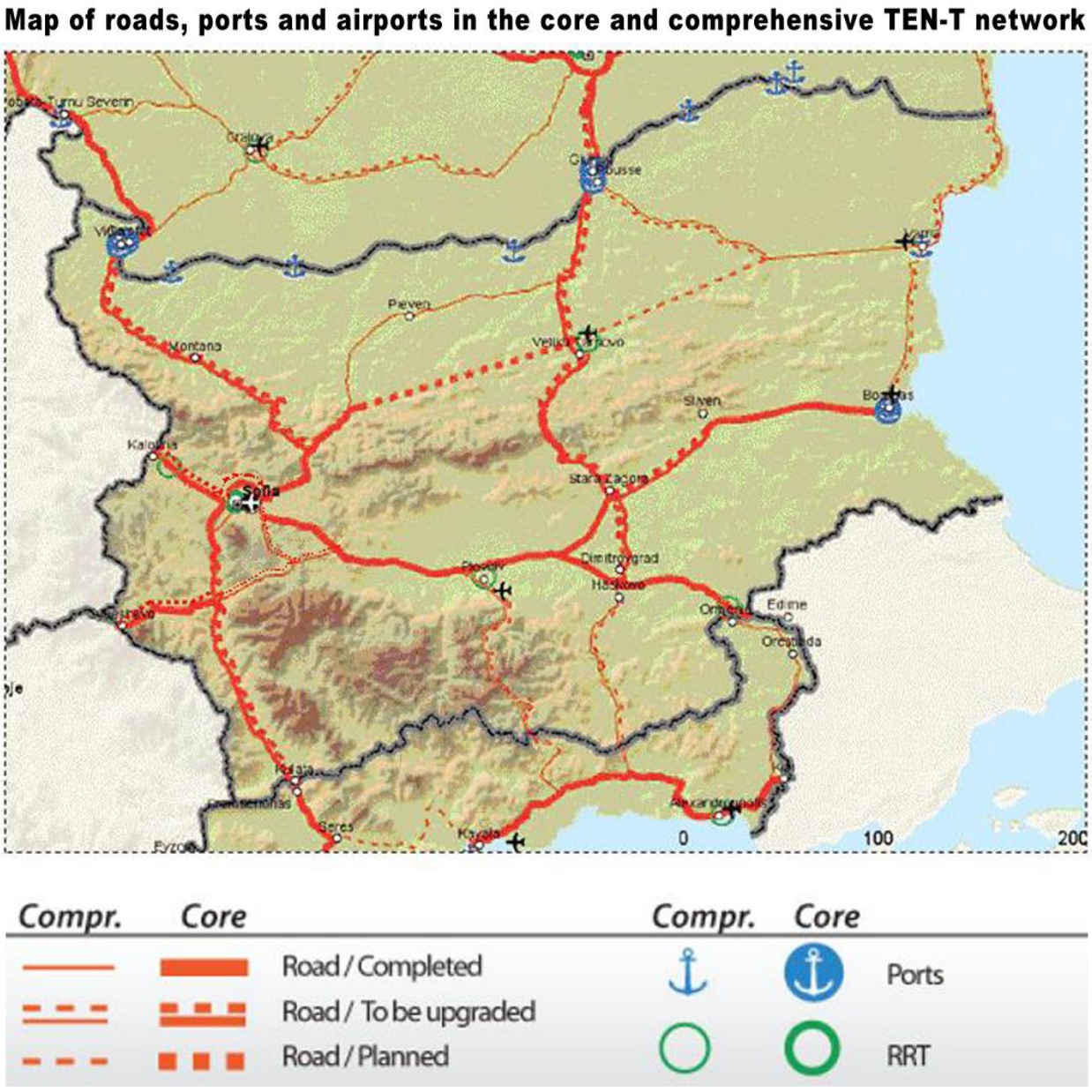
This strategic positioning is one of the main competitive advantages of the capital. With the shortest average distance to some of the main cities and all capitals on the Balkans (455 km.), the quality of the transport infrastructure is crucial for the utilization of this potential. This requires additional focus on the transit infrastructure. In line with this the development of the infrastructure is marked as a priority in the National Strategic Reference Framework /NSRF/ and the new OP "Transport" 2014-2020.

Road infrastructure

The highways, connecting Sofia to other major cities in Bulgaria are the Hemus motorway (north-east direction), the Trakia motorway (south-east direction) and to the south-west direction Lulin and Struma motorways (under construction). Trakia motorway runs south from the Balkan Mountains and is a major transport axis for South Bulgaria, connecting the capital with the maritime city of Burgas. It is also a part of the Pan-European transport corridors VIII and X. The Hemus motorway runs north from the Balkan Mountains and is a major transport axis for North Bulgaria, connecting Sofia with the maritime city Varna. The Lulin motorway connects Sofia with Pernik and through it with Struma motorway to Greece as a part of Pan-European transport corridor IV. The other main roads connecting Sofia to other major

cities are European route E80 - to the west to Serbia**,** E770 - to the south and the national road II-16 to the north to Romania. All of these highways and main roads are connected to the Sofia Ring Road and are natural continuation of the main street network of the city. In addition to the above axes, the road network of Yugozapaden Region to a grid of secondary roads**,** connecting small villages and towns in the region.

Map 91 Roads, ports and airports in the core and comprehensive TEN-T network



(Source: Ministry of transport, information technology and communications)

The inner road network of Sofia capital is in relatively good condition for the country, but it is still not up to the level of most of the major European cities. There are numerous planned improvements that are essential for the proper and competitive functioning of the city in terms of accessibility and connectivity. Among the most significant ones is the Northern Speed Tangent, which construction phase is planned for the end of 2013, the currently ongoing extension of the metro to the Sofia airport and to Business Park Sofia, a number of junction and boulevard improvements.

On NUTS2 level (Yugozapaden region) projects of high priority are the construction of the already planned and tendered Kalotina Motorway that will connect Sofia - Nish and Belgrade along the Pan-European corridor No 10 branch C, and the currently built in progress highway “Struma” (Sofia-Kulata-Thessaloniki) along the Pan-European corridor № 4. The completion of Struma highway is a major priority in the new operational programme “Transport and transport infrastructure” 2014-2020.

The road connection Sofia-Ruse-București is another priority for the next programming period as part of the TEN-T network. A part of this road connection (Sofia-Veliko Turnovo) coincides with Hemus highway. In the current programming period the Hemus highway will be connected with the Sofia ring road, providing the shortest link to North Bulgaria.

Rail infrastructure

The development of high-speed railways is considered by the NSRF and the municipal plan for development of Sofia a major priority. The increase of the average speed of the trains would result in rail transport becoming a viable, competitive and more ecological alternative to the road transport thus further increasing the competitiveness of the region. There are one completed and several ongoing constructions of high speed railways.

The ongoing reconstruction of the rail connection Sofia-Plovdiv-Svilengrad-Turkish border and Sofia-Plovdiv-Burgas will continue as well as major rail projects in the next programming period.

Improvements of the rail connection Sofia-Kulata as a strategic international freight route are also planned. The modernization of Sofia-Dragoman rail line and Vidin-Medkovetz as part of the line Vidin-Sofia will be sought under the Connecting Europe Facility.

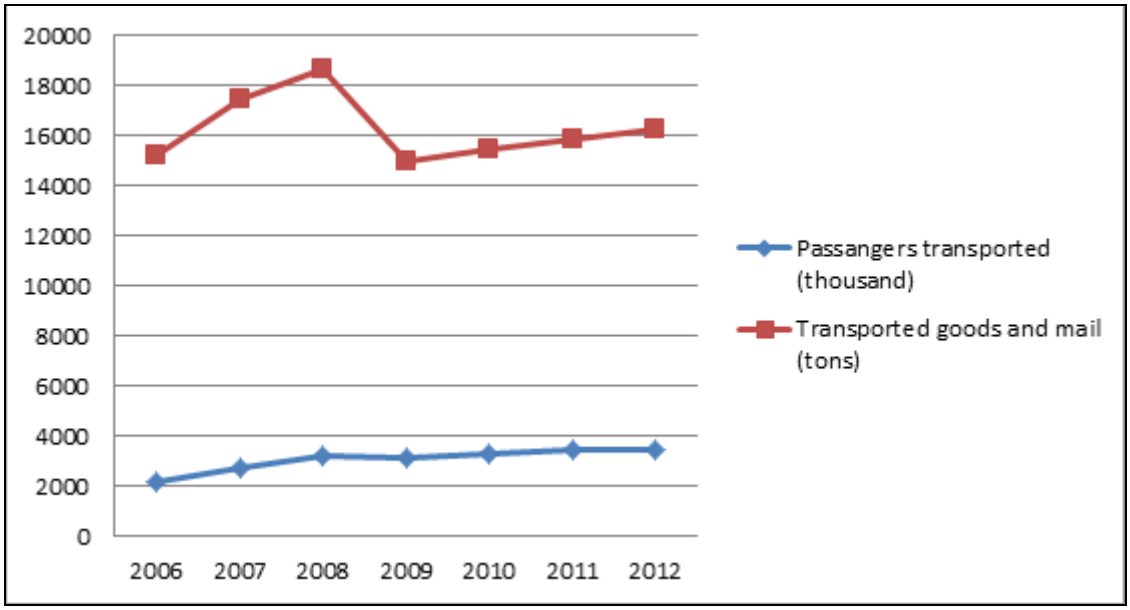
Table 83 Railway network (31.12.2010)				
Region	**Length of railway network (km.)**	**Double railway tracks (km.)**	**Single railway tracks (km.)**	**Density of railway network (km./1000 sq. km.)**
Yugozapaden region BG41	885	169	676	44.3
Sofia capital BG411	186	51	165	150,6
Source: Plan for Development of Yugozapaden Region 2007 – 2013				

The indicator of theoretical contactability, as described in the ESPON project FOCI, is a good tool for assessing the quality of the links between different cities (pole A and pole B. The indicator measures the ability to go from one city to the other and have enough time for activities such as business, education, sport, or other, and come back in a single day. The structure of the possible trip for a train travel is the following: 5h00->45 minutes travel to the train station, travel with train, 45 minutes travel to the destination city, at least 6 hours stay, 45 minutes travel to the train station, return travel with train, 45 min travel in the origin city (the final arrival should be before 23h00). According to this methodology the travel with train is possible from Sofia to only 2 out of 6 major cities (over 100 thousand inhabitants.) in Bulgaria - Plovdiv and Pleven. The connection within one day with any major city outside the country is not possible. Even with relatively close cities such as Nish which is 160 kilometers from Sofia, Thessaloniki - 314 km. and București - 380 km.

Air Transport

Sofia Municipality harbors the biggest airport in Bulgaria - Sofia airport with its two terminals. Sofia is the main entrance point of foreigners into the country. In 2012 the airport served almost 3 467 500 passengers. Passengers who land at Sofia Airport can make only domestic transfers to Varna and Burgas. One of the main disadvantages of Sofia Airport is the fact that there are no international connections and the transfer traffic is missing. Furthermore Sofia Airport is planning to increase the airport taxes with around 30% which can lead to a decrease of airlines' interest of landing at Sofia Airport. The development of the infrastructure, serving the airport, is one of the priorities in the municipal plans for the development of Sofia.

Figure 48 Transported passengers, goods and mails. Trends for Sofia airport



Based on the indicator of theoretical contactability, stated in ESPON project FOCI, the structure of the possible trip for air travel is the following: 6h00->1h30 travel to the airport, flight, 1 hour travel to the destination city, at least 6 hours stay, 1h30 return to the airport, return flight, and 1 hour travel to the origin city (the final arrival should be before 22h00). If we apply this methodology to the current flights time table between Sofia - București / Athens / Varna and Burgas, it can be concluded that one day trip from Sofia is only possible to Athens during the winter timetable in Tuesday and Thursday. With other major European capitals one day trips are achievable only to Vienna. It should be noticed that the time restrictions of the indicator (after 6h00 / before 22h00) cut off many opportunities for one day trip from Sofia. If we ignore them, one day trip can be accomplished every working day to Varna and v.v. (also Munich, Frankfurt and Brussels).

Informational infrastructure

On NUTS 2 level (Yugozapaden region) the informational certainty is the highest in Bulgaria, but still there is gap between some districts and municipalities within the region. The access to Internet is provided in the cities, but small town and villages suffer from low access and quality. Compared to other EU countries, Bulgaria has

lower rates regarding the connectivity and applicability of technology from business and individual entities. Nevertheless, the national indicators for access and usage of Internet register in recent years higher levels. According to Eurostat data for 2011 57% of the households in Sofia capital have access to Internet, the average rate for the country is 45% and for EU-27 - 73%.

In the periphery of the region less people have access to the Internet and hardly can use distance education, information and e-services. Allocating resources for the development of the e-communication and informative society is a key driver of competitiveness for the regional economy. Special attention should be paid to the expansion of the access and the usage of informational and communicational technologies in smaller towns and villages in order to provide equal access to information. Further efforts should be made in the implementation of new informational systems like e-government, municipal e-services, etc.

4.3 Accessibility, connectivity and the impact of TEN-T Network in Athens (PP2)

4.4 Comparison of the three capital cities and SEE

Air Transport

The morphology of the urban system of Romania, Bulgaria and Greece plays a crucial role on the importance of their capitals within the national air transport networks. Romania and Bulgaria have similarities regarding the relationship between a non-centred capital city and two other opposite large cities (Cluj Napoca and Timișoara in Romania and Varna and Burgas in Bulgaria situated at 400-500 km from the capital). Also situated at the top of the urban hierarchy, Iași (RO) and Plovdiv (BG), struggle to increase their traffic and improve their accessibility, but they are either in a very competitive airport system (Iași is at less than 150km from 3 other airports) or too close to the strongest airport (Plovdiv is at less than 150km from Sofia). The bigger gap in the Romanian urban hierarchy (comparing to the other two) is also reflected in the big difference between the air traffic of the capital București (the BBU – Băneasa has lately been closed and all the flights have been transposed to the OTP – Otopeni International Airport) and the following large cities (less obvious in the case of the other two countries) which often determines the draw of international transport strategies that bypass the capital city. Whilst the case of the

small hubs of Timișoara and Thessaloniki is similar, the position of Athens in the national air transport system is clearly central (as we notice from the maps of air traffic numbers and flows). This emphasizes the crucial interface role of Athens, linking by air continental and insular Greece and well correlating it to a good road network. Insular tourist destinations bypass Athens by air (usually low-cost companies) only during high-season, responding to the punctual needs of tourism industry.

The aircraft movements in 2009 in South-East Europe as well as the number of passengers in the same year (strongly correlated between them) highlight the dominance of the capitals in all countries (except for Turkey), but also of the tourist destinations that manage to add balance to the territory. This is especially the case of Greece, through its Aegean islands, but also of the Adriatic and the Bulgarian Black Sea coastlines.

As for freight and passenger air transport, the statistical data on Eurostat is available for NUTS 2 level. Unfortunately, they do not cover all the existent regions, or the same years. However, the available data for 2009 allow us to observe that for every country the highest quantity of freight is exchanged in the NUTS 2 region where the capital city is situated, confirming once again the capitals' dominance and the territory's imbalance. The situation for passenger air transport is slightly different mainly due to the tourist regions that are attracting a large number of travellers.

The analysis of the air traffic flows reiterates the dominance of the capitals as main actors in the territory, not just for international and national flights. They are the main receiver for the international flights and then the connector to the rest of their territory. In the case of Greece and Romania, the cities of Thessaloniki and Timișoara try to emerge into a position of second-degree-hub whilst Bulgaria does not have such a territorial player. The flows show a very intense traffic between Athens and Istanbul, followed by Athens-Sofia, București-Istanbul and București-Athens. The air traffic between București and Sofia is much lower, due to the shorter distance (ca. 400 km instead of 800 km from Athens to Sofia) which makes the first more suitable for land transport.

The number of weekly regular flights between capitals shows the very strong influence of Istanbul in the area, as the only city connected to all the capitals, although with differences in terms of flights frequency. A strong connection can be observed between București – Istanbul, București – Athens, Athens-Istanbul. Sofia is better connected to Athens than București and Istanbul. At the same time, it is

noticeable the fact that Ljubljana, Belgrade, Sarajevo and Zagreb are much better connected with each other than to the other three capitals (see also maps in annex IV)

In order to identify the cooperation potential based on distance and time of travelling, which is indispensable to polycentric development, we used the one day trip indicator to establish the degree of contactability among the three capitals and Istanbul and Belgrade, two of the main poles in South East Europe. As used in previous projects, the indicator should take into account the train and air connections, but in this case, since there are no train connections between all capitals and the existent ones do not fit in the time frame set (6.00-22.00, with 6 hours spent at the destination), we could only consider the air connections. As per the 2012-2013 winter schedules of airports, the only pair of capitals that does not allow a day trip is Sofia-Belgrade because there are no direct flights between them and the stopovers would not fit into the set time frame. The rest of the city pairs confirm the existence of favourable connections for one day business or study trips, in some cases with more frequent daily flights (e.g. Athens-Istanbul, Athens-Sofia) providing even more than one possibility to return within the established time frame.

Rail transport

By analysing the railway networks of the three countries and of the whole SE Europe, northern Balkans seems to have a better coverage due to the vicinity within the inner continent, to morphological aspects that permitted lower cost investments and to their initial start as part of the industrial machine of the Austrian-Hungarian Empire at the second part of the 19th century.

Large territories in south-western Balkans (from Bosnia to West Greece) are poorly connected and large areas of the Adriatic coasts are effectively out of the rail network coverage or disconnected from the neighbouring countries.

Romania has the best coverage and density of the railway network but in the same time it has very poor connectivity index as the Carpathian ring represents a real breach. There is also a high sinuosity (railways have always followed the minimum-investment policy – very few tunnels or viaducts that bring travel time cuts). In Bulgaria, Balkan and Pirin Mountains also constitute important fractures. The

situation is a lot worse in Western Greece which is deprived of this transportation mean.

Considering the rail connections between the three EU countries (Romania Bulgaria and Greece) as well as their connections with the neighbouring countries, we have noticed a low transnational connectivity and high level of vulnerability and variability. Thus, the border between these countries is characterized by natural barriers – the Rhodopes mountains between Greece and Bulgaria (1500-2000m) and the Danube River between Romania and Bulgaria, as well as by few connections: only 2 important connections, out of which only one for each country is used for passenger transportation: Giurgiu - Ruse (RO-BG) and Kulata - Promachon (BG-GR). The railway București – Giurgiu, leading south, is disconnected since the flooding of 2005 on the river Argeș that has damaged the rail bridge. The variability of the rail network means a lack of regular availability of the trains over the past 23 years. In most cases it is derived from the high vulnerability above mentioned, but also from the economic or political decisions taken. For example, the train Sofia – București (– Kiev – Moscow) has had some gaps over the years and starting from February 2011, the Greek National Railways have suspended their international direct trains from Thessaloniki to Sofia and to București. All this create great breaches into the international rail transport as this affects the connection between the city pairs București – Sofia and Sofia – Thessaloniki. The distance between them (300-400km) is not big enough to be supported by cost-efficient intensive regular flights and neither short enough to be connected by personal transportation. Improving the axis București – Sofia – Thessaloniki – Athens with new medium to high-speed railway system, seems to be the minimum strategy in order to ensure good passenger transportation and to increase exchanges. Actual trains linking Sofia to București perform around 400 km in 10 hours which makes this line uncompetitive comparing to the other transportation means. Alternative network will also lead to diminishing of the network vulnerability to natural risks which would be usable by both regular and high-speed trains. The new Calafat–Vidin Bridge (rail and road - fully operational from June 14th 2013) is a great opportunity to better connect Bulgaria and Greece to Central Europe although the rail sinuosity of this link (HU-RO – Nădlac– Arad – Timișoara – Drobeta – Craiova – Calafat RO-BG Vidin – Sofia – Kulata BG-GR) has very high values which will determine high operating costs. A reconfiguration of this corridor is needed, terms of increasing speed or constructing shortcuts. Meanwhile, as for September 2013, no rail carrier is interested in passing this bridge as the conditions are not symmetric (the Romanian link Calafat - Craiova is not electrified in

contrast with Sofia – Vidin and has speed restrictions down to 30 km/h at certain segments). Romanian authorities need to understand the importance of this corridor for the entire European railway system and to decrease the hegemony of București.

Road networks

Road networks (as well as rail networks) in the three countries follow mostly an internal logic, which represent the heritage of an era where each one of them was included in a different political block and where natural borders functioned as delimitations, not as interfaces. The logic of Greek road system is different from the other two countries. The Aegean north-south motorway system Athens – Thessaloniki connects almost half of the urban population of Greece, almost 6 million people being concentrated on this apparently marginal but actually central axis (if we consider the ferry connections towards the Aegean islands. Bulgaria has similar west-east double axis Sofia – VelikoTârnovo – Shumen – Varna and Sofia – Plovdiv – Stara Zagora – Sliven – Burgas which also concentrate, together, almost two thirds of the Bulgarian urban population. Romania instead has a larger territory and the road system follows multiple logics, related to the hydrological architecture internal political needs of the medieval states that compose it: north-south axis in Moldavia, west-east in Wallachia and northwest-southeast in Transylvania. București is the main road hub but did not create a major exchange axis as the politics during Ceausescu's era was to create a harmonious crystallerian urban system of 7 cities of exact same size (around 300.000 inhab.) that obey the capital city. Lately, Romanian government insist on the consolidation of two road axis – București – Brașov – Cluj – Oradea (Transylvania Highway) and București – Pitesti – Sibiu – Timișoara – Arad (actually the TEN-T 7 corridor), both oriented northwest-southeast that respond less to an internal urban cohesion (less than 1 third of the urban population is situated along these axis) but more to European integration needs.

The analysis of the road networks encounters difficulties in the sense of providing comparable data between countries as each country has its own system of standardizing national roads. In order to understand the road networks morphology at intra-national level, data on road links and nodes has been appended to NUTS2 regional level. Our analysis on connexity and connectivity through the three indices shows high discrepancies between regions. South Romania and West Bulgaria show high values because of excessive investments in the capital city regions and Northern Greece because of an interface role of Thessaloniki area with the rest of

Europe. Although Bulgarian national road network (hierarchy of 3 levels) does not always reflect high-quality roads, it has a very good overall connectivity comparing to Romania. Some lower values in the Greece regions are due to a very fragmented territory and to the fact that ferry connections to the island have not been taken into account. However, we may notice very low levels of connection in the Adriatic regions and in Northern half of Romania. The higher values in Bulgaria, Greece, Hungary, Slovenia or Austria are also due to a development of the city-outer-rings that diminishes the bottleneck effect and leads to a better connectivity. Romania and the western Balkans need to do improvements in this matter.

Main answers on the accessibility

The analysis on accessibility has provided a series of key findings that may be structured on national, internal SEE and European level.

The air accessibility in the three countries is dominated by Athens, where bigger population, stronger economy also supported by great travel demand and central position in the territorial system play crucial role for high values airport traffic. In a strongly centralised urban system (and a bigger country), București play its card of dominant air hub (no other important airport in a ray of 250 km) but faces stronger competition from the cities of the next hierarchical level. Sofia has lower traffic possibilities (it is much similar to Thessaloniki in this matter) but the other two coastal airports ensure a territorial complementarity. This hierarchy is also reflected in the traffic flows from intercontinental air hub Istanbul to the three capitals (as the latter is situated at the same distance from the three capitals). Instead, the air traffic flow with central Europe (Vienna and Budapest) does not reveal such differences. Following the Greek model, Romania should invest in the development of three sub-hubs (considering its population) in Cluj-Napoca and Iași along with the existing hub of Timișoara). Bulgaria should support the development of its central territory by investing either in the hub of Gorna Oryahovitsa (in the vicinity of VelikoTarnovo, the national emblem) or in Plovdiv (which has already low-cost weekly flights and a significant number of charter flights for tourism demand.)

Although strongly fragmented, rail networks have stronger tradition in Romania and Bulgaria, closer to the inner Europe. Natural barriers play an exaggerated role in disconnecting large inner territories in all three countries and thus determining a very low connectivity. Future projects in medium to high-speed trains must make use of tunnels and viaducts in order to cut travel time between both sides of the Carpathians, Balkans, Pirin or Pindus Mountains. Natural barriers between the three

countries must not be seen anymore as separation between political blocks as it was 24 years ago but as new communication interfaces. Thus, supporting the viability of the new rail-road bridge Calafat RO to Vidin BG is crucial for the creation of a real alternative corridor between Central and Southeast Europe. Linking Bulgaria to FYROM (Gjueshevo BG to Beljakovce MK) or to northern Greece through Rhodopes (Kardzali BG to Komotini GR) would increase the connectivity and further exchanges. But, until then, Greece needs to revise its policy of suspending trains to Bulgaria since 2011 through the customs of Promachon – Kulata and Orestiada–Svilengrad. Greece also needs to draw a medium-term strategy of linking by train Athens and north Ionian, by building a railway between Kalambaka and Igoumenitsa. This, along with the existing highway works to Igoumenitsa, would set the foundations for a real multimodal Ionian harbour and create the future premises for a continuous Ionian - Adriatic railway and highway through Albania.

The main national axes in the three countries connect the high urban nodes in different geographic pattern. These axes do not totally respond yet to global European exchanges and future needs. All three countries need to adjust national road construction policy with European policies but in the same time, European strategies must take into account that the three countries need to become larger players and market interfaces in Southeast Europe and Ex-soviet space and not permanent EU borders. Thus, Romanian government should understand the enormous necessity of the western part of the TEN-T7 corridor (Arad – Timișoara – Drobeta – Calafat) and Bulgaria needs to make stronger investments in the central (north-south) axis Ruse – Stara Zagora. The first will create an alternative route European core to Athens and the second will facilitate the connection from Central Europe, Baltic, Ukraine to Istanbul via București (the Black Sea ring strategy). Comparing to the other two countries, Greece's actual advanced works and planned works on Ionian highways as well as future connections with Albania, Macedonia or the Cretan highway are designed to better respond to national and transnational needs.

Analysis of the efficiency of European transport corridors

Overview of existing corridors and TEN-T Networks

In southeast Europe, TEN-T Networks have been drawn to insure the north-south or northwest-southeast connectivity (from Central Europe - Vienna and Budapest towards Athens and Istanbul) so they respond to the major European needs. They

reinforce, once more, the important position of the EU capital cities of this region (București, Sofia, Budapest, Vienna, Bratislava, Ljubljana) partially cover the most important internal needs –București connection to the Black Sea and to Transylvania or Athens-Thessaloniki-Promachon highway. Instead Via Egnatia segment (east-west) in Greece represents a good example on how important it is to reduce territorial disparities, by linking poorly connected regions. The Bulgarian segment of TEN-T 7 (Vidin – Sofia – Kulata) does not match with national highway strategy (the two axes from Sofia to Black Sea) but was immediately perceived as a mean to collect European flows through Sofia.

The Western Balkans also lack coherence in building a strong inter-national road network because of a strong fragmentation and instability during the past 15 years. EU should plan a future integration in-block of this territory which could ease synergies and solutions for a coherent road network.

The Danube became a priority project as water transport is seen by the EU as an efficient alternative to land transport. The Danube's Strategy initiated by Romania and Austria in June 2011 shows great interest in this sector and will give both parties a key role in managing the projects. The Priority axis no 18 - Rhine/Meuse–Main–Danube inland waterways - is supposed to increase navigability and the transfer of freight traffic through multimodal nodes. It will favour the transport of goods mainly West-East, but also East-West if we consider the growing importance of the harbour of Constanța (RO) regarding the import of goods from China. The axis 18 is a cleaner and a more sustainable alternative to corridor IV as well as to Priority Axis TENT7. The 3 billion Euros estimated overall costs represent great investments that will also favour passenger transport and leisure traffic on the Danube. On the long-term it must be accompanied by national policies that support cargo traffic on waterways (subsidies, increasing tax for lorry cargo traffic, simplified water-border procedures, a bigger involvement of the Republic of Serbia in the process etc.) Otherwise, the great risk EU is taking is to invest in infrastructures that will serve punctual or much variable traffic needs.

One of the major EU preoccupations in road transportation is to create a fluent traffic from NW to SE between Central Europe (with Wien and Budapest as major nodes) on one side and Greece as one of the older EU member States and Turkey as an important commercial partner of EU (and future candidate), along the European corridor no. IV. Other preoccupations envisage a better connection between West and East Balkans. TEN-T Priority Project no. 7 covers these major objectives by trying to link the ports of Patras, Igoumenitsa, Athens, Thessaloniki and Constanța to

the heart of the enlarged EU by a continuous motorway. The Greek and Hungarian sectors of this Project are more than 90% completed whilst it is the case of less than 20% of the rest of the project (covering Romania and Bulgaria).

Impact of completion of TEN-T7 project on accessibility

In order to understand the reduction of the travel time of the TEN-T 7 corridor, we have used the JRC Transtools vector network for simulation inquiries. Travel restrictions have been set in terms of cross-border sections or of ferry-boat passages. There are also restrictions in terms of sinuosity or altitude gain, but the extent of the network and the big amount of data forced us to build or model only in terms of travel speed.

The next comparative table shows travel cost gains between the main city pairs that the TEN-T no 7 Project is likely to influence, in terms of time. The methodology includes setting up travel speeds to each road segment according to TransTools data (revised according to up-to-date modifications) as well as estimative cross-border waiting times (set to 90' non-Schengen to Schengen/EU countries, 60' on non-EU to non-EU countries, 20' for EU to EU countries, 0' for Schengen to Schengen) or ferryboat across Danube (40') or across the Aegean Sea (35km/h).

According to our simulations, the completion of the TEN-T no 7 as motorway (130 km/h) will bring significant improvements along the European corridor no 4. At this time, although considering difficult passing of the Serbian customs, Pan-European corridor no 10 (via Belgrade) is the shortest passage from the north to the south of the Balkans in terms of distance as well as in terms of travel time although it is subject to high impediments due to non-EU cross-border sections. The completion of the TEN-T no 7 Project at a Motorway level will create a time advantage of over 150 minutes (2,5 h) at a regular crossing from Vienna-Budapest towards Istanbul and the rest of Turkey. In the event of Romania and Bulgaria entering the Schengen area, travel time may be reduced by another approx. 60 minutes. The crossing through the other branch of TENT-7 (Arad-București) and then through a section of the Pan-European corridor no 9 (via Ruse – Stara Zagora) will constitute a good alternative after the improvements of the Romanian branch Timișoara-Constanța.

When considering the passage from Central Europe to the Aegean harbours of Greece, the corridor no 10 is still the shortest option (either via Zagreb or Budapest). The TEN-T no 7 Project (corridor no 4) will become the first option after the completion of all sectors. Finally, the completion of the corridor no 4 linking Budapest

and the Black Sea at Constanța will bring significant improvements of one hour via Timișoara - Craiova and over two hours via a completed highway through Arad - Sibiu.

Table 84 Travel time gains after the completion of TEN-T no 7 Project

Itinerary	Via	Distance (km)	Travel time (min) 2013	Time (min) 2020 (completion of TEN-T no7)	Time gain(compared to the shortest)
Vienna – Istanbul	(RS) Subotica - Belgrade – Kalotina (BG) - Plovdiv corridor no 10.	1556	**1010'**		
	Arad – București (RO) partial TEN-T 7– Stara Zagora (BG) (corridor no 9)	1677	1074'	990'	20 min
	(RO) Timișoara – Calafat – Botevgrad – Kulata (BG) TEN-T7 (corridor no 4)	1620	1080'	**867'**	143 min
Vienna – Athens	Budapest (HU) -Subotica - Belgrade (RS) – Bogorodica (MK) corridor no 10	1705	**1045'**		
	Zagreb (HR) – Belgrade (RS) – Bogorodica (MK) corridor no 10	1846	1054'		
	(RO) Timișoara – Calafat – Botevgrad – Kulata (BG) TEN-T7 corridor no 4	1874	1117'	**905'**	140 min.
Budapest - Constanța	Debrecen (HU) – Brașov – Ploiesti – Harsova E60 corridor (RO)	1074	674'		
	Szeged (HU) – Craiova (RO) partial TEN-T7 corridor no 4	1057	**624'**	561'	63 min.
	Szeged (HU) – Sibiu – București (RO) TEN-T7 corridor no 4.	1008	590'	**507'**	117 min.

The completion of the motorway will actually bring more time travel gains as sinuosity and slopes constitute fewer impediments on motorway sectors but will increase the toll costs which will favour road freight transport over personal transport. There is also a great improvement that via Ignatia brings in term of linking West Balkans (Epirus, Albania and Macedonia) to Istanbul and East Balkans in general, but this sector is already completed.

Conclusions on efficiency of transport corridors

The horizon 2020 for the completion of the TEN-T-7 Project may be not reachable if Romania and Bulgaria do not adjust their national strategies with EU-interest. The

recent inclusion (April 2012) of the Romanian planned highway Târgu-Mureș – Iași in TEN-T corridors shows that European interests is able adjust to national strategies in order to tackle major internal disparities (which should represent the national primary interest). In the same time, there has to be greater collaboration between Romanian and Bulgarian governments to meet European interests in the region. As we have shown, TEN-T 7 Axis will provide major travel time improvements and will (at least for the sector Timișoara – Calafat – Vidin – Sofia) constitute a great opportunity to create a more connected road network, in order to tackle traffic jams, network vulnerability to major force, or even to political or social shifts.

Along with the transport networks, another priority of the European policy is to optimise the energy networks (TEN-E), aiming to achieve the targets of the Europe 2020 Agenda (20% reduction of greenhouse gas emissions, 20% increase in energy efficiency and 20% of renewable energy in final energy consumption), ensuring at the same time the security of supply and increasing solidarity among states. In order to reach the mentioned targets, in the frame of the Energy Infrastructure Package 12 priority corridors and areas regarding the electricity, gas and oil supplies have been identified and need to be implemented. Among them, the North-South electricity interconnections in Central Eastern and South Eastern Europe, the North-South gas interconnections in Central Eastern and South Eastern Europe, and the Southern Gas Corridor, as well as the Smart Grids for Electricity involve all the 3 countries, enforcing their role in the area, as well as the connection with the western countries.

4.6 Conclusions

Our analysis shows that although in terms of numbers and spatial distribution, the airports are relatively evenly distributed in the SEE territory. It is also obvious that the influence they exert is different. The three capitals and Istanbul are clearly the dominant poles in the area in respect to air transport and they are well connected with each other, but the connectivity inside the SEE area needs to be improved in order to facilitate a better cooperation among all the cities and a more balanced access to the services they provide. The rail infrastructure and connections do not currently support a proper level of accessibility or connectivity neither inside the SEE area, nor with the rest of the European territory. The road network also shows discrepancies and dysfunctions in terms of connectivity. The main impact of the TEN-T corridors crossing the area will be therefore to provide major travel time improvements and better connections within the area under analysis, as well as with

the Central Europe and Turkey, supporting and emphasizing the role of the three capitals as growth poles. The general low absorption of EU 2006-2013 funds - 26% in Romania and 40% in Bulgaria - is critical for the Transport sector (less than 10% payments of EC to transport projects in Romania) which will delay the realization of a continuous transport corridor through the three SEE countries.

5. Policy options/recommendations

5.1 București and its metropolitan area

The metropolitan region, or metropolitan zone, or metropolitan area of București is a highly debated subject by policy-makers and scientists alike. It bares different names and of course it comprises different structures, according to the criteria of those who drafted the metropolitan construction.

In this sub-chapter we present the main ideas resulted from the interviews with some of the most important stakeholders from București metropolitan region. Some of the discussions were undertaken in the frame of the workshops held in București, Sofia and Athens.

The people interviewed cover different sectors of the economic and social life in the studied areas, such as: central and local administrations, NGO's, other public bodies and academic institutions.

Initial policy recommendations

At the beginning of the project, GROSSE researchers, based on the territorial analyses and experience from previous projects that they were part of, came up with a draft proposal for policy recommendations aiming to the development of the three EU-SEE capitals. During the development of the project, feedbacks were received mostly from the CU, beneficiary institutions, and participants at GROSSE workshops and other stakeholders. During this second stage of the project, the project team come into direct contact with the local stakeholders, getting to know their perceptions, desires and needs. All their experience is reflected in the interviews made within GROSSE project.

Ex-ante policy recommendations GROSSE researchers came up with:

Strengthening the București-Sofia-Athens development axis as well as the development of the three capitals metropolitan regions:

- Diversifying local regional economies with emphasis on manufacturing industries and agriculture
- Developing policies to support the R&D sector and especially the creative and innovative sectors.
- Increasing the attractiveness for specialised services in București and Sofia.
- Valorising the high cultural and touristic potential by improving infrastructure, services and promotion of the area within common programmes
- Improving social services, especially for disadvantaged groups
- Expanding general infrastructure to improve communication and access to

information • Improving labour and human resources development policies in parallel with social ones in order to avoid social exclusion and improving access to labour market by encouraging development of new technologies
Improving environment and quality of life inside the three capitals: • Implementing measures and active policies in the field of environmental protection and resilience to climate change and natural hazards • Improving systems of survey and disaster management • Reducing traffic problems and improving communication in the metropolitan areas to better control and reduce the sprawl tendencies, supporting the idea of a „compact city" • Promoting urban agriculture towards the improvement of urban environment • Improving microclimatic conditions and reducing urban heat islands
Improving internal connectivity of the three metropolitan areas: • Improving public transport in Attiki and developing transport infrastructure in both București and Sofia • Developing mobility plans
Improving integration inside the three capitals through better governance at metro level based on common strategies for the CC, FMA and OMR, implementing priority measures promoting integration at FMA level: • Establishing a special legal and institutional framework for metropolitan regions • Developing common spatial and socio-economic strategies with the adjacent towns and communes • Implementing strategic and action planning especially for enhancing the role of the metropolitan areas and surrounding regions as a leverage factor at territorial level
Improving cooperation among the three capitals and inside the South-East Europe: • Enhancing the cooperation in all sectors by setting up cooperation networks in R&D, among entrepreneurial associations and professional organizations. • Developing active cooperation networks among universities and faculties in both educational and research programs • Setting up a regional research centre similar to the NORDREGIO in the Baltic Area • Improving territorial cooperation by the networking companies and of research centres
Improving transport infrastructure with focus on TENs of Transport to promote the development of București-Sofia-Attiki axis and territorial integration of SEE: • Expanding the pan-European corridors to Athens and improving the direct road and rail connections of the three capitals envisaging a Balkan Corridor to better connect the Danube corridor to the Aegean and Mediterranean seas • Upgrading port facilities to enhance intermodal transport through cooperation of rail and maritime transport (both passengers and freight).

In the next sub-chapter we will see the main results and key findings of the interviews made so far, and how close these policy recommendations came to the perceptions

and needs of the interviewed stakeholders and the participants to the workshops held in the frame of the project.

Key messages from the interviews with the Stakeholders

București and its metropolitan region

Interviews were carried on with representatives of the two regional development agencies in the study area (Sud-Muntenia Regional Development Agency and București-Ilfov Regional Development Agency), of local authorities: București City Council (experts from Transport Department, the chief-architect of București), the vice-president of Giurgiu County Council and the chief-architect of Otopeni Town Council, leading scientists of academic institutions: Geography Institute and National Economics Institute of the Romanian Academy, experts from other public bodies (București and Ilfov Environment Agency) and representatives of the economy: Romanian-Bulgarian Chamber of Commerce and Industry.

Economics

The stakeholders consider that the services and IT sector are the most important economic activities for București; while for the metropolitan region, the most important economical activities are industrial manufacturing and agriculture.

Other strategic economic activities (both existing and desired) for București are: automobile construction, general constructions, food industry, construction materials, machinery and industrial equipment. In this respect, policy-makers should draft targeted policies in order to boost investments in developing these economical sectors and making them innovative and competitive on a global market. Policies should rely on the development of endogenous resources as well as know-how and good practices exchange within the European Union, but not exclusively and creating the conditions to develop the automotive industry and/or bringing in car manufacturing.

As mentioned before, the stakeholders consider that for the metropolitan region the strategic economical activities are industrial activities and agriculture together with food industry. This doesn't mean that the interviewed experts neglect the role of services, but the development of industry and agriculture (this includes the food industry) together with increasing accessibility in order to receive necessary resources and to deliver their products rapidly and cost-efficiently. As the interviewed stakeholders mention, policies in this domain should focus on increasing the

industrial attractiveness of the metropolitan region by offering the necessary infrastructure for industries requirements (roads and utilities) and skilled labour force. Policies in agriculture should focus on encouraging agricultural land-owners to join in cooperatives and support for big investments (like irrigations).

Almost every stakeholder expressed a different vision about the structure and functioning of București and its metropolitan region in relation to Sofia and Athens and their metropolitan regions. Even though they admitted the fact that București's critical mass offers many job opportunities and a market for their products and services, so far, authorities and institutions outside București (Giurgiu County Council, South-Muntenia Regional Development Agency and Otopeni City Hall) consider that **the capital city drains out the surrounding region** of its resources (financial and human) instead of fostering development. This means that policy-makers should pay a close attention when elaborating the legal framework of București metropolitan region. Tensions are very high between stakeholders, and many experts from the metropolitan region consider that București comes in like a predator to take their resources. Many of them are also sceptic that București was the capacity to induce and coordinate the development of the metropolitan region.

Still, almost all the stakeholders identified the need of **an integrated development master plan** for București and its metropolitan region. Policy makers already know this fact; they have to wait though for political and local authority's consensus.

Environment

The stakeholders from the environment field consider that București has no major environmental problems. Cooperation with Bulgarian partners is significant, but there was no mention about the collaboration with Greek partners, or about projects run by all three of them. However, stakeholders from other fields consider that **București has a fragile and vulnerable environment** (due to poor used water treatment facilities, waste management, and unauthorized landfill).

The stakeholders consider that the **main policy concerns should be focused on creating an integrated management system of the environment**, with a central body that has the overall view and coordinates all the efforts in this respect. European regulations on waste management, landfill functioning, waste collection and recycling, used water treatment, protected areas should be recalibrated to fit the metropolitan development framework, all this in order to make the environmental

issue an asset for the development of the metropolitan region and not a hindering issue.

Transport

Every questioned stakeholder considers **transport as THE priority**, as well as for the inside of the metropolitan region of București but also between the three EU SEE capitals.

The first priority for București metropolitan region is considered to be the **completion and modernising of the surrounding ring road** (CB road indicative-extending from one lane road to a two way road).

Secondly, **making efficient the railroad system**, both for long and short distances is seen as important. One stakeholder considers that public metropolitan system can be developed only in relation to the jobs supplied by industry in the metropolitan region. Policy-makers should realise that a metropolitan region cannot properly function and develop without a good metropolitan transport system, and railroad is the most efficient on a long term run. Policy-makers shouldn't be afraid to develop policies that encourage a long term view that will address needs from 30 or 40 years from now. The metropolitan railroad construction falls into this category. It's expensive to build and economically inefficient on a short term, but policies should encourage this kind of problem solving.

Stakeholders sustained that especially Călăraşi and Giurgiu need **to develop their river** ports and thus enhance their role as intermodal nodes on the Danube.

In general it is considered that there are policies for every kind of transport (the Master Plan for Transport). Transport policies are already elaborated. There are many plans, master plans, strategies and feasibility studies that justify the costs, but the biggest problem is the lack of financing!

South East Europe cooperation

At metropolitan level there were opinions that the administrative relations between București and the administrative units from the metropolitan region are lacking efficiency. There is also a strong concern that institutions from București will take all the funding for different cooperation. More than this, some stakeholders questioned the logic that stood behind the financing of projects in the regional growth pole (such

as Ploieşti) of which the rest of the region had no benefit (city tram lines, creating parks). They argued that **projects implemented by the regional growth pole should create benefits for the whole region**, not only for the growth pole. There are so many policies in the cooperation field (urban, regional, cross-border, economical, social) so that other special policies are hard to be drafted so that it won't overlap with existing policies and programmes. It is clear though, that a legal framework should encourage cooperation on all levels. Isolation in all its form in nowadays dynamic can only bring backwardness.

At macro-level, it could be noticed a general agreement on the lack of any kind of collaboration or cooperation of institutions or companies, between București, Sofia and Athens. More than that, no stakeholder could foresee what kind of collaborations could be further developed, especially in economical field. The stakeholders couldn't point out existing complementarities or synergies. All these situations, make very hard to conceptualize policies to enhance collaboration only between the tree capitals of the south-east of European Union.

One stakeholder sees the current situation as follows: there are three major capital cities that don't cooperate economically. The question is if there are economic markets in Sofia, Athens and București for such cooperation? If there has been a market an economic cooperation between the three capitals had been developed by now. This is a glance on what should be done for this issue. The first step is the increase the markets of the three SEE UE capitals, and policies regarding collaboration will follow. Of course, policies shouldn't address only existing issues but should also foresee future ones.

Although the stakeholders couldn't point out relevant collaborations with partners from Athens and Sofia, many of them mentioned projects in various domains financed by the Romanian-Bulgarian Cross-Border Operational Programme. Roughly, the stakeholders highlighted some important dysfunctions of the legal and administrative framework (significant differences between the Bulgarian and Romanian ones with a quite centralised and bureaucratic Bulgarian system). Common Romania-Bulgarian policies should address issues of common procedures for trans-national projects and cooperation (to avoid incompatibilities given by national laws, and bureaucratic lock-ins).

Stakeholders sustain that collaboration between Athens, Sofia and București is so difficult to be established because there are **no functional relations between them.** As already mentioned, none of the interviewed stakeholders could identify common

economical grounds on which to collaborate. Public policies in this domain should focus on **maintaining the balance between the politic, administrative, public and economic interests**.

Conclusions

Most of the initial recommendations were confirmed by the stakeholders interviewed in the three MAs.

The table below shows that more than 2/3 of the 23 recommendations got a confirmation during the interviews carried on. Some common elements should be pointed out, such as:

- in all three areas there was a concern about the relationship between the core city and the surrounding regions and the important role of latter ones, the need for an integrated planning and balanced development at metropolitan level were emphasized
- economic competitiveness was also an issue that has been underlined by most of the stakeholders; however solutions were seen in different ways but a common ground seems to be the need for an improved major infrastructure insuring a better accessibility in the three areas
- environment was another matter of common interest, although due to different conditions and circumstances; the need for a better, integrated environmental management, improving the microclimate and protection of green areas were some of the solutions repeatedly mentioned
- transport infrastructure and the achieving of the pan-European corridors and the TEN-T projects was seen as essential elements for the development of the region and improvement of inner-regional connectivity as well as increasing its connectivity and accessibility to and from other regions

Besides the above mentioned aspects, the interviewed stakeholders expressed their concerns on social issues, on governance, education and research, urban mobility and ICT.

Important inputs were given in relation to planning and programming. In both metropolitan areas of București and Sofia it has been pointed out the unsustainable relationships of the core city with its surrounding territories and the increasing regional disparities. Recommendations for a more sound and integrated metropolitan

planning and for a better use of EU funds for the next programming period, were done. It was pointed out that the growth poles policy should be better implemented in order to generate a more clear leverage effect at regional levels.

Athens insisted on the need of a more polycentric development of its metropolitan area to counteract the current tendencies of urban sprawl. This of course should apply to the other two MAs too.

It should be noticed that it has been emphasized in several cases the importance that should be paid to sectors and areas that have been less considered as priorities by now, such as agriculture or railways. There could be also mentioned as important remarks: improvement of urban mobility, culture and tourism as fields that should be developed in order to make a better use of local potential and values, support given to higher education, R&D and ICT sectors.

As a final conclusion, the remarks of the interviewed stakeholders in the three areas are confirming the initial findings and are stressing some important points which could help to set up priorities and to better ordering the policy recommendations. Special interest given to environment, agriculture, transports (including the Danubian corridor and its harbours), competitiveness, research, culture, tourism, planning and governance is a good support for drawing a more sustainable strategy for the SEE region.

Table 85 Policy recommendations confirmed by the interviews taken in the 3 MAs

Policy recommendations proposed	confirmed by the interviews
Strengthening the București-Sofia-Athens development axis as well as the development of the three capitals metropolitan regions:	
• Diversifying local regional economies with emphasis on manufacturing industries and agriculture	✓
• Developing policies to support the R&D sector and especially the creative and innovative sectors.	✓
• Increasing the attractiveness for specialised services in București and Sofia.	
• Valorising the high cultural and touristic potential by improving infrastructure, services and promotion of the area within common programmes	✓
• Improving social services, especially for disadvantaged groups	✓
• Expanding general infrastructure to improve communication and access to information	✓
• Improving labour and human resources development policies in parallel with social ones in order to avoid social exclusion	✓

and improving access to labour market by encouraging development of new technologies	
Improving environment and quality of life inside the three capitals:	
• Implementing measures and active policies in the field of environmental protection and resilience to climate change and natural hazards	✓
• Improving systems of survey and disaster management	
• Reducing traffic problems and improving communication in the metropolitan areas to better control and reduce the sprawl tendencies, supporting the idea of a „compact city”	✓
• Promoting urban agriculture towards the improvement of urban environment	
• Improving microclimatic conditions and reducing urban heat islands	✓
Improving internal connectivity of the three metropolitan areas:	
• Improving public transport in Attiki and developing transport infrastructure in both București and Sofia	✓
• Developing mobility plans	✓
Improving integration inside the three capitals through better governance at metro level based on common strategies for the CC, FMA and OMR, implementing priority measures promoting integration at FMA level:	
• Establishing a special legal and institutional framework for metropolitan regions	
• Developing common spatial and socio-economic strategies with the adjacent towns and communes	✓
• Implementing strategic and action planning especially for enhancing the role of the metropolitan areas and surrounding regions as a leverage factor at territorial level	✓
Improving cooperation among the three capitals and inside the South-East Europe:	
• Enhancing the cooperation in all sectors by setting up cooperation networks in R&D, among entrepreneurial associations and professional organizations.	
• Developing active cooperation networks among universities and faculties in both educational and research programs	
• Setting up a regional research centre similar to the NORDREGIO in the Baltic Area	✓
• Improving territorial cooperation by the networking companies and of research centres	
Improving transport infrastructure with focus on TENs of Transport to promote the development of București-Sofia-Attiki axis and territorial integration of SEE:	
• Expanding the pan-European corridors to Athens and improving the direct road and rail connections of the three capitals envisaging a Balkan Corridor to better connect the Danube corridor to the Aegean and Mediterranean seas	✓
• Upgrading port facilities to enhance intermodal transport through cooperation of rail and maritime transport (both passengers and freight).	✓

INTERREG Projects

The GROSSE project doesn't aim at analysing the impact of the INTERREG programme; this has already been done in "The Intermediate evaluation of the Interregional Cooperation Programme INTERREG IVC". Repeating the conclusions highlighted in the respective study does not bring added value and therefore the conclusions that resulted from the ex-ante and ex-post evaluations of INTERREG Programme were completed with the evaluation of INTERREG IVC projects and South-East Europe Programme that were unfolded in Romania, Bulgaria and Greece.

Needs

The two main priorities of the INTERREG IVC operational programme are well constructed, covering all the key aspects regarding "growth, jobs and sustainable development" (Interregional Cooperation Programme INTERREG IVC, 2007), but the future programming period should take into close consideration the Europe 2020 Strategy. High-ranking project objectives („To improve, by means of interregional cooperation, the effectiveness of regional development policies in the areas of innovation, the knowledge economy, the environment and risk prevention as well as to contribute to economic modernisation and increased competitiveness of Europe") and specific objectives need to be strongly correlated to the EU2020 Strategy.

The 10 sub-themes of the INTERREG IVC programme are all included under the three pillars of the strategy and the seven flagship initiatives: "the thematic focus of the current INTERREG IVC programme is already sufficiently broad for ensuring that inter-regional co-operation is able to contribute to the "EU headline targets" and the seven "flagship initiatives" as promoted by the Europe 2020 Strategy" (The Intermediate evaluation of the Interregional Cooperation Programme INTERREG IVC, p. 125), but nevertheless the future sub-themes have to be correlated and referenced to the Europe 2020 Strategy targets. The Europe 2020 Strategy is not without its shortcomings and the careful suggestions made by the ESPON SIESTA project also should be taken into consideration (some regions cannot reach the Europe 2020 targets which are guidelines and not compulsory).

Future INTERREG projects, and especially Strand C projects, should pay more attention to bottom-up project proposals. In this sense, the managing authority should consult with the potential beneficiaries of the programme in order to take into account their views and needs.

Past INTERREG ex-post evaluations (INTERREG III Community Initiative (2000-2006) Ex-Post Evaluation, 2010) highlighted the fact that national level auditing need to be “more efficient and harmonized”, but also a simplification of application forms, provisions, procedures, regulations, reporting and a greater budget flexibility needs to be implemented. This reduction of bureaucracy is still of actuality for the next programming period.

Opportunities

INTERRREG programme offers the opportunity and fosters a considerable potential to establish complementarities and synergies through co-operation and co-ordination with other EU and national programmes that should have territorial impact in the same territory.

Other opportunities are given by the fact that:

- Cooperation that already existed in some countries between citizens and institutions;
- The maturity of cross-border cooperation in some cases;
- The existing strategies for cross-boarding cooperation outside the INTERREG Programme;
- Other associated programmes such as ESPON etc.
- Policies provided by the EC

Threats

We consider as threats the fallowing issues:

- The low level of previous direct cross border cooperation for other countries;
- Natural phenomena that can be predicted;
- Changes in the EC policies;
- Changes in the national law framework and policies;

- Other main challenges could be given by implementing broad and vague strategies, adopt fuzzy project results, or themes that are not relevant for the territorial integration of the programme.

Challenges

The challenges that the capital cities and their metropolitan regions have to face are severe. The basic infrastructure lacks in most of the rural area from the metropolitan regions of București and Sofia. The capital cities struggle with infrastructure designed for needs from more than 20 years ago. Rural areas suffer of strong depopulation, lack of working places and lack of basic utilities. Meanwhile in Sofia and București, the economic development from the last years lead to overcrowding of the road transport system, decrease of environmental conditions and the social housing couldn't keep up with the increasing number of young people coming to work in the capital city. These are only a few of the most severe challenges that have to be dealt with. Although INTERRREG IV C offers "soft" solutions, local and regional authorities need solutions more to their hard problems. At least Sofia and București are in a phase were they can learn from the mistakes made by the more developed countries, but still soft solutions are sometimes useless in cases of hard issues. For example the B3Regions project aims to develop broadband services in remote rural areas, but remote rural areas in Romania barely have electricity, not to say a personal computer. There are other financial instruments for the "hard" issues, but these severe challenges have to be taken into account in order to have a proper background for the first ones.

The authors of "INTERREG III Community Initiative (2000-2006) Ex-Post Evaluation" found out that the main challenges in efficiently implementing the projects were given by the low level of resources given to technical assistance. This is still a challenge for future INTERREG projects.

Strengths

Cooperation, as cross-border, trans-national and inter-regional, brings considerable community added value, in accordance to ex-post INTERREG evaluations. All this will lead to a joint elaboration of programme and/or project strategies, joint decision-making and joint management between the managing authorities and project partners.

A strictly quantifiable, and not taking into account the non-quantifiable effects, INTERREG III programme states the following impact: „ […] projects directly or indirectly creating or safeguarding 115,000 jobs/employment opportunities and nearly 5,800 start-ups and businesses. In addition, the projects supported more than 3,900 businesses to use new strategies or technology" (INTERREG III Community Initiative (2000-2006) Ex-Post Evaluation, pg. 6). These numbers show the consistent impact but also the potential for improvement. It is not hard to see the importance of this programme in achieving the EU goals.

Lessons learned

Cooperation between local and regional authorities and economical and social actors (the universities perceived as trainers for the human capital and enterprises in general) in exchanging their experiences and good practices is primordial and this should continue. The EU acknowledges this fact, but more should be done in order to capitalize the results of INTERREG projects. In this respect, future policies elaborated at EU, national, regional or local level should be substantiated upon INTERREG results as well as other operational programmes' results. Even though the main focus of the INTERREG programme is to support cooperation between local and regional authorities, we cannot overlook the scarce participation of the universities. In this respect universities should be encouraged to involve more actively in project partnerships.

Greek partners from Athens are more present in INTERREG IV C projects in comparison to partners from București or Sofia and their metropolitan regions. Also, there is a low level of contracting projects as lead partners (in the case of Romania and Bulgaria, especially București-Ilfov and Yugozapaden Regions) in the case of the SEE Transnational Cooperation Programme, especially on the priority "Development of transnational synergies for sustainable growth area". The last two capital cities have to surpass their short term as EU members and focus harder on caching up with Athens. Nevertheless, it should be stated that all the three countries and regions are involved in many projects having as priority the "Protection and the Improvement of the Environment".

In conclusion, besides the excellent suggestions made in "The Intermediate evaluation of the Interregional Cooperation Programme INTERREG IVC" especially for the SEE, we would emphasize the need:

- For European, national, regional and local policies to be substantiated upon results from INTERREG projects as well as other operational programmes (SEE Transnational Cooperation Programme);
- To involve more strongly the universities and the research centres;
- To better link the future programming period with the Europe 2020 Strategy;
- To prioritize and implement the most tangible measures and effects that networking, know-how transfer and good practices exchange have to offer in these strongly challenged territories.

5.2 Sofia and its metropolitan area

After the EU accession of Bulgaria there has been a major improvement in long term policy planning on both national and local level. Since national policies had to be aligned to the EU agenda most of the strategic documents have been developed for the time frame 2007-2013. The new programming period and the new EU regulations require the elaboration of new strategies for the time period 2014-2020. This gives an opportunity for further improvements in the process of setting public policies. As highlighted in the analysis for the time period 2007-2013 the municipal policy of Sofia capital has been directed by numerous strategic documents. The implementation of most of them has not been evaluated and no direct linkage has been established between the process of long term goals setting and the annual budgeting of the municipality. For the new programming period it is advisable for the municipality of Sofia to consider reducing the number of strategic documents, integrating and subordinating goals and measures. This will improve the consistency of strategic documents and allow for an easier implementation and evaluation. Decisive for the success of long term planning will be the setting of mid and long term targets, with clear delimitations between measures within the responsibility of the state and measures to be introduced on local level. The adoption of programmes for the implementation of strategies on a year to year basis and the introduction of an obligatory evaluation procedure for the fulfillment of targets is of high importance.

In regard to this a careful analysis of the complementarity between local and EU funding of policies should be carried out. The EU funding does not cover all needs and in the field of urban development resources will be funneled to the integrated

development of three specific impact zones within the build up borders of Sofia city, as provided in the Intergated plan for urban regeneration and development of Sofia. This hides a risk of uneven distribution of financial resources and further widening of existing disparities between the core city and the surrounding areas within the territory of Sofia capital. Since municipal financial resources are limited, building a functional model for public-private partnerships will be of great importance for meeting demands. Such possibilities have been frequently debated on municipal level and a new law for regulating this process on national and municipal level has been adopted but no progress has been registered so far. This is especially vital for the territories of the capital, designated as areas for long term perspective development since the construction of their infrastructure is entrusted to private initiatives.

The development of new analytical tools for better targeting of policies is also necessary. As highlighted in the analysis this is especially needed in the field of transport policy, climate change prevention policies and the other indicators for sustainable development. In regard to this special care should be paid to improving the data base for children in school age and the risk of early school dropout, as highlighted in the municipal strategy for the prevention of social exclusion. Although this is interdependent with the development of the national statistical system, Sofia capital can play a lead role for introducing new statistical models on NUTS 3 level for indicators that are currently available only on NUTS 0 level.

As shown in the analysis, more targeted research the functional urban area of Sofia and the existing imbalances between the core city of Sofia and the surrounding territories is needed. Although highlighted in strategic documents, the territorial imbalances and the exchanges between the different settlements in the municipality and the agglomeration area have to be further studied. Special attention should be paid to the imbalances in the provision of social services and the construction of basic technical infrastructure. As advised in the National concept for spatial development an attempt should be made for subordinating the Master plans of all municipalities in the agglomeration area. Furthermore the role of the council for regional development of Yugozapaden regions has to be strengthened.

The analysis has further illustrated deficits in certain sectoral municipal policies that should be addressed in future strategic documents. In the field of social care special attention should be paid to the development of new social services on local level, since their share is considered critical. Alternative models for early child care should be developed to address the shortage of kindergartens. Furthermore the inclusion of

the Roma minority should be a major priority despite the social sensitivity to the issue. The regeneration of Roma neighborhoods will require serious investments and time and the possibilities for using alternative financial resources should be explored. In the field of environment a major priority should be raising the air quality. Improvements in the transport policy are decisive for achieving this goal.

In terms of competitive advantages Sofia capital has to address a number of challenges. The share of industry in the economy of the capital has fallen due to deindustrialization but there is a room for developing new high-added value production facilities. In line with this the regeneration of old industrial plots is a possibility that has to be further cherished. A prerequisite for the success of this policy is the in-depth analysis of the land ownership structure of these plots and the improved coordination between the respective authorities.

The potential of the capital for developing a knowledge based, high-tech sector is substantial. A precondition for this is the registered concentration of highly educated labor force in this sector of the capital's economy. The completion of the Sofia tech park is of major importance for achieving this priority. Efforts should be made for further strengthening of the relationships between universities, science academies and business, including the implementation of partnerships agreements for common actions. Functional formats at municipal level for bringing all relevant parties together should be explored.

The development of the TEN-T network is of key importance for the competitiveness of the region. The completion of planned priority projects as the Struma highway, The Northern speed tangent, the road connection Sofia-Ruse-București, the highway Hemus (as part of the extended TEN-T network), the railroad Sofia-Burgas and Sofia-Plovdiv-Svilengrad-Istanbul, the new inter-modal terminal in Sofia will have a huge impact of the development of both the capital and the country.

The improved accessibility and connectivity is a precondition for future trans-regional and transnational cooperation. Efforts for building new partnerships should be intensified, including all relevant parties, since the activity in trans-border and transnational cooperation in the current period has been modest. Further efforts for raising the administrative capacity of Sofia municipality in the field of cooperation should be made.

5.3 Athens and its metropolitan area (PP2)

Key messages from the interviews with the Stakeholders

In the context of diversifying local and regional economy, the Greek stakeholders have agreed to the policy recommendations of GROSEE and highlighted the importance of some strategic economic branches such as transport and mainly logistics and innovative enterprises. All stakeholders have indicated **tourism and culture as key elements** for development.

The economic and social relationships between the City Core, the rest FMA and the Outer Metropolitan Ring are directly linked, especially between the CC and the FMA in the fields of transport and trade. However, the continuous linear development of land uses has not contributed to the development of the CC and led to significant lack of coherence. Therefore it is suggested **to change the current pattern of territorial development and give emphasis to the development of local centres**.

According to the Greek stakeholders, the criteria for the delineation of FMA should probably be operational / functional, geographical and financial rather than administrative.

Attiki stakeholders stated also the negative impact of the concentration of poor population groups - such as immigrants- in the Core City and the emigration of highly skilled labour force. In this context it is essential to focus on **strengthening the social structures and formulating appropriate social and economic measures**.

Greek stakeholders have agreed to the policy priorities of GROSEE and highlighted **the importance of cultural resources, tourism promotion and urban mobility**. In the case of urban regeneration it is suggested to further analyse socio-economic components in order to effectively address the major problem of social and spatial segregation.

The relocation of activities to the metropolitan area led to the decongestion of the CC and the regeneration of the local areas where the economic activities settled but also to the abandonment of many local centres. Moreover, the current social and economic disparities between the CC and the rest MR are likely to result in major labour movement / social unrest degradation of Core City centres, affecting negatively important economic activities such as tourism.

Environment

In the case of Attiki the state of urban ecosystems is seriously degraded, especially in the coastal zone. Greek stakeholders have all **suggested improving**

microclimatic and green areas conditions through actions of prevention and maintenance and by making the best use and getting benefits from open spaces (such as the former Hellinikon airport) and coastal zone. It has also been suggested to hand over / transfer the management of urban parks to NGOs.

Transport

In the context of promoting urban mobility and a "Compact city" model, Greek stakeholders agreed to the proposed policies and emphasized the importance of **improving public transport, expanding cycling and metro networks, creating regional parking stations (park and ride), modernizing the rail network and expanding it** to eastern and western Attiki as well as expanding the suburban to ports of Rafina and Lavrio and developing telematics networks. In the important case of intermodal nodes several suggestions were made both for CC and the MR, such as Eleonas, Larisi's station, Attiki's centre, major ports and national highways.

South East European cooperation

All Greek stakeholders underlined the importance of higher education and cooperation networks for the development of synergies between the three capitals, especially in the fields of culture, intermediate technologies and medicine. As for enhancing synergies and complementarities inside the SEE production system, the field of logistics, **the R&D sector and ICTs** (information and communication technologies) have been stated as the most important ones.

The **setup of a regional research centre** may lead to strengthening governance, developing channels of communication and know-how transferring between the three capitals and the European core, as stated by Greek stakeholders. Policies targeted to **enhance local identity and polycentricity** should be further implemented.

They highlighted the importance of the policy recommendations formed by GROSEE in the field of Trans-European Networks and further noted the significance of improving road and rail networks, expanding "motorways of the sea" and interfacing with Danubian cities, with respect to the environment and local identity.

The conclusions drawn from interviews with the Attiki stakeholders in analysing the structures and main problems of the CC, the FMA and the MR, and commenting policy recommendations regarding the development of the capitals, the cooperation inside the SEE and between SEE and the European core as well as improving the Trans-European networks, showed **a general acceptance of the preliminary policy recommendations** formed by GROSEE.

Concerning the enhancement of territorial cooperation inside the SEE and with the European core, Attiki stakeholders stated the importance of **higher education, R&D, ICTs, accessibility (emphasizing on logistics), environmental management, cultural resources and governance,** as suggested more or less by the initial proposals of the project. Especially in the field of improving accessibility, the policies formed by GROSEE involving the expansion of pan-European corridors (emphasizing on maritime transports), the idea (in general terms) of a “Balkan corridor” and enhancing intermodal transport, were almost fully accepted.

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