

## USING THE BENEFITS OF GREEN INFRASTRUCTURE: THE GREEN BELT OF BUCHAREST

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**Abstract.** The article analyses the opportunity of planning a green belt around the Bucharest Municipality, a city that is facing a continuous enlargement and development without any plan of limiting this expansion. The method consists of historical research of the solutions that were applied to limit its extension and the role of Bucharest belts in stopping the urban sprawl. Besides the main transport infrastructure surrounding Bucharest, green spaces inside the city and in its suburbs can be used to plan a circular belt around the city, consisting in green, blue and yellow natural elements.

**Keywords:** urban sprawl, green space, planning, green belts, peri-urban.

**Rezumat. Utilizarea avantajelor infrastructurii verzi: centura verde a Bucureștiului.** Articolul analizează oportunitatea planificării unei centuri verzi în jurul municipiului București, oraș care este în continuă creștere și dezvoltare și pentru care nu există încă soluții de limitare a extinderii sale. Metoda constă într-o cercetare istorică a soluțiilor care au fost aplicate de-a lungul timpului pentru a-i limita expansiunea și rolul pe care le-au avut centurile Bucureștiului stabilite în acest scop. În afară de principala infrastructură de transport care înconjoară Bucureștiul, spațiile verzi din oraș și din zona sa peri-urbană pot fi folosite pentru planificarea unei centuri alcătuite din elemente verzi-galbene-albastre.

**Cuvinte cheie:** expansiune urbană, spațiu verde, planificare, centuri verzi, zona peri-urbană.

### INTRODUCTION

Urban expansion is a phenomenon that can be visually perceived in the landscape (JAEGER & SCHWICK, 2014). It is spreading globally and seems to be an inevitable consequence of development, which is why it has received attention in recent years, especially in the field of spatial planning. It is considered today that policies are needed to limit urban growth through the design of green belts, that lead to spatial concentration of development in the core city and increase its density (NELSON & SANCHEZ, 2005; WOO & GULDMANN, 2011). Such development control policies produce benefits for society by protecting valuable open spaces and ecosystem functions (BENGSTON & YOUN, 2006; TENEA et al., 2013). The way spatial planning is applied today can negatively affect the ecological functioning of the landscape, biodiversity and the provision of ecosystem services to society, especially in metropolitan areas that face increasingly frequent ecological risks (MARULL et al., 2023; SHEN et al., 2023). In order to avoid these risks, the areas of urban/metropolitan green infrastructure must be increased through priority planning and adapted to the development of metropolitan areas to cope with climate change (MARULL et al., 2023).

The importance of the theme proposed in this article lies in the fact that it analyses the opportunity of planning a green belt in the Bucharest metropolitan area, seen in a new approach, namely as an element of green infrastructure. The article is based on a study of the history of the expansion of Bucharest, of the relationship with its peri-urban area and the integration of nature in its urban and peri-urban tissue. The study is justified because, the establishment of green belts around Romania's big cities is argued from a legislative and strategic point of view, this does not happen in practice. The article links concepts such as urban sprawl, green belt and green infrastructure.

**Concepts.** Recent research is increasingly focusing on **green infrastructure** elements, especially in countries seeking to transition to climate-resilient cities (HERATH et al., 2023). Green infrastructure refers to a network of green space, on a city or landscape scale, whose function is in relation to urban inhabitants (TZOULAS et al., 2007). By extension, urban green-blue infrastructure involves a network of natural (or nature-based) elements located in urban built-up areas that rely on either vegetation (green) or water (blue), or a combination of them (green-blue) (BROWN & MIJIC, 2019). According to the UN Habitat Report: *Cities and Pandemics: Towards a More Just, Green and Healthy Future* (\*\*\*. UN HABITAT, 2021), by incorporating green-blue infrastructure in urban areas, urban health can be ensured and air quality standards can be achieved. The important role of green infrastructure in cities was visible in the context of the COVID-19 pandemic (POPESCU & PETRIȘOR, 2021 a).

**Green belts** are an element of green infrastructure with the role of protecting ecosystems and biodiversity (\*\*\*. European Commission 2012). The planning of green belts that integrate nature into the urban fabric has been proposed since the 19<sup>th</sup> century, when the English urban planner Ebenezer Howard introduced the theory of the “garden city”, whereby green space was considered a means of preventing the uncontrolled expansion of the city. According to this theory, green belts were planned so that they could separate urban from rural areas, constituting the natural boundaries of cities, beyond which they should not develop, preventing landowners from using them for urban development purposes. The green belt concept was gradually taken up and applied by other countries on all continents to control urban sprawl (AMATI, 2016), although towards the end of the 20<sup>th</sup> century it was no longer applied in the same form, being replaced by *green wedges*, containing a mixture of green areas with industrial and urban areas. The conversion from green belts in green wedges has been proposed by town planners and landscapers, for whom the

subject is of great interest (NAGENDRA, 2011). Research shows that new policies and a new green belt concept are needed in the future (NUNES SILVA, 2010).

Forasmuch the city is “an element of an economic, social and political complex that constitutes the region” (CORBUSIER & EARDLEY, 1973), the specialists pay particular attention to **regional green belts** which represent a special type of green open spaces in metropolitan areas, a tool used by regional planning authorities for the protection of neighboring open space against uncontrolled land consumption at a local scale (ZEPP, 2018; STAN, 2022). The term “regional green belt” still needs some clarification, due to the frequent use of related terms such as “green space” (TAYLOR & HOCHULI, 2017): if in the case of small-scale green spaces, the benefits for residents are numerous at the local level (KEITH, 2016; MELL et al., 2016), regional green belts have a wide array of benefits at all scales, both through their spatial structure and due to the ecosystem services they provide. Regional green belts, one of the most effective elements of spatial planning, maintain and promote the integrity and connectivity of the landscape, help the city adapt to climate change, and can prevent *urban sprawl*.

The physical expansion of cities, accompanied by a decrease in housing density, is known in the international literature as *urban sprawl* (RUBIERA-MOROLLÓN & GARRIDO-YSERTE, 2020). Studies on urban expansion were first carried out by urban planners, by approaching the phenomenon from a multidisciplinary perspective, involving many other disciplines (TORRENS, 2008). Because any urban expansion entails urban growth (BHATTA, 2010) and leads to habitat fragmentation (TACHE et al., 2020), its control is necessary. Otherwise, urban sprawl can cause certain negative costs and has consequences on open areas and ecosystems, infrastructure, air, water and human health, increases land fragmentation and decreases connectivity, affecting green space functions and biodiversity (POPESCU et al., 2020).

**Planning aspects.** In some large cities of the world, green belts act as policies to prevent urban sprawl and are applied for different purposes: to preserve nature, to maintain certain land uses, or to improve the landscapes they cover (AMATI & TAYLOR, 2010). Green belts are considered a strategic planning tool and are included in urban growth management policies (UGMP), which aim to prevent urban sprawl in the surrounding peri-urban and rural landscapes (KIRBY et al., 2023). From a planning point of view, green belts are considered **zoning regulations**. Green belts along with other urban containment boundaries (UCB) are today usually planned along suburban transport routes (mainly railways) so as to divide a metropolitan region into sub-areas with different regulations for urban development. Here, urban development is usually allowed only in the central area, while in the rest of the metropolitan area minor developments are allowed and green areas must be kept free from any development (FERTNER et al., 2016).

**The international situation. Examples of green belts.** From the beginning of the 20<sup>th</sup> century several big cities have developed green belts with different forms and functions. Some of them are still there, other were replaced and other were completely abandoned.

For example, in Denmark there is a green belt planned in 1947, known as the “Fingerplan”. The green belt envisages 5 metropolitan railway lines and the green space between them. The urban fabric is denser in the center and sparser in the 5 fingers where only urban development of regional importance is allowed. In between, *green wedges* contain land for agriculture and recreational purposes.

In Japan, green belts were incorporated into urban planning administration as “green space” to prevent disorderly urban expansion. The Tokyo green belt developed in 1939 and was intended to create large green areas and to stop urban sprawl. The green belt separated the city center with urban land uses, from the peri-urban area, with specifically rural land uses (YOKOHARI et al., 2020).

After the war, parts of green space were transformed in agricultural land but many of the large parks and riverside parks exist today. However, some green belts were in time replaced to promote urban agriculture for land conservation or were even disbanded if they no longer corresponded to the contexts and needs of the city. Today the green belt disappeared and urban sprawl continues around Tokyo. Instead of a greenbelt, cities in Japan changed their policy to draw a boundary line surrounding each local municipality.

The famous green belt existing today is the Vienna green belt: initially designed for the protection of green space, it became a protected landscape in the early 1900s (BREILING & RULAND, 2016). Originally, this protected green belt consisted of forests and meadows and over time smaller green areas were planned to be protected and joined into an increasingly large belt that today contains almost half of the city Vienna (Fig. 1). However, the connection with the urban space in the city center was not achieved, having different uses in time: in the post-war periods it was a source of food and wood supply for a large part of the population, and later it provided recreation and environmental services: clean air, biodiversity.

Several cities have abandoned green belts partly due to political factors, and it was needed to adopt other land uses (Table 1).

#### **The national context. Planning a green/yellow/blue belt of Bucharest**

In Romania, planning activity takes place at national and local levels and aims at achieving a balanced development of the entire territory, including by limiting sprawl (POPESCU et al., 2022). As in other countries, in Romania the uncontrolled expansion of built-up areas leads to land fragmentation and loss of biodiversity, which makes it imperative to find appropriate policy instruments to prevent these negative effects (POPESCU & PETRIȘOR, 2021). But although theoretically in Romania most planning documents consider the natural environment an important resource that can ensure sustainable territorial development, this has not been transposed in planning practice.

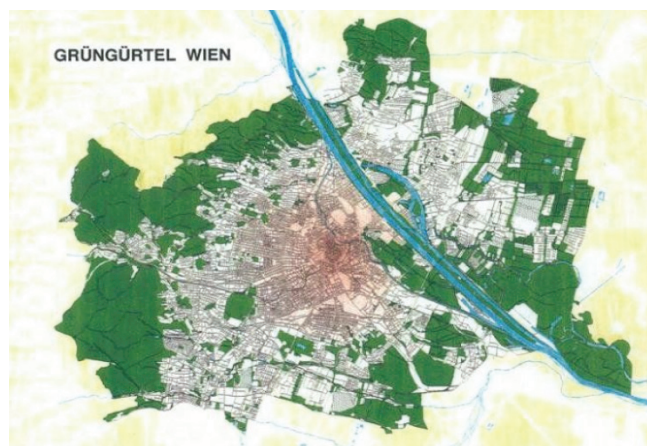


Figure 1. Vienna's green belt in 1995 (FOET, 2010).

Table 1. The use of green belts in several cities of the world.

Country/city	Evolution over time of implementing green belts
Japan: Tokyo	Landowners opposed the implementation of the idea of green belts. Measures have been taken to preserve green areas on the periphery, such as promoting urban agriculture.
South Korea: Seoul	Initially there was a formal green belt zoning. Landowner protests reshaped the old form of green belts.
Australia: Sydney	The city abandoned/gave up the idea of a green belt.
Australia: Adelaide	The city limited the development through a green belt represented by parks that separated the city from the countryside. Gradually the parks were integrated into the suburb.
Australia: Melbourne	The city policy foresees radial development separated by green wedges. The development of green belts was encouraged.
New Zealand: Christchurch	The city used the UK green belt idea only for a while, then dropped it as it didn't fit the context of the city.
New Zealand: Auckland	The city refused the idea of green belt from the beginning, not being adequate to the city's needs.

In the Romanian spatial and urban planning legislation, a green belt is defined as “the delimited area around the Capital of Romania and the municipalities of rank I and II, in order to protect the elements of the natural environment, to prevent the uncontrolled expansion of these municipalities and to ensure additional spaces for leisure and recreation” (Annex 1 of Law no. 350/2001 on territorial development and urban planning) (\*\*\*. Parlamentul României, 2001). Although the National Development Plan for the period 2007-2013 (\*\*\*. Guvernul României, 2005) has already provided for public investments to maintain green lanes in the building space of the localities as well as green belts around them for more than 15 years, this has only remained a provision. The planning of green belts around the big cities was also foreseen in the Territorial Development Strategy of Romania (SDTR) (\*\*\*. Ministerul Dezvoltării Regionale și Administrației Publice, 2015), as well as “Planting a green belt of the Municipality of Bucharest (the Argeșului Meadow, the Dâmbovița River)”. Today, the 2021-2024 Government Programme (\*\*\*. Guvernul României, 2021) provides for “the planting of trees in the immediate vicinity of large urban agglomerations in order to build or rehabilitate green belts that help filter the air in the urban environment” along with “encouraging the development of green spaces in urban areas”.

In 2017, the General Council of the Municipality of Bucharest issued a *Decision to start the procedures in order to achieve the “Green Belt of the Municipality of Bucharest” objective* (\*\*\*. CONSILIUL GENERAL AL MUNICIPIULUI BUCUREȘTI, 2017) which approves the start of the procedures for achieving this strategic objective. The technical documentation was approved for highlighting the preliminary data necessary for the implementation of this objective through the Environment Directorate.

In 2022, the Romanian Government approved the Bucharest-Ilfov Regional Program 2021-2027, carried out by the Bucharest-Ilfov Regional Development Agency, which was further approved by the European Commission (\*\*\*. AGENȚIA PENTRU DEZVOLTARE REGIONALĂ BUCUREȘTI ILFOV, 2019), **which, however, does not mention the green or yellow-green belt of Bucharest**, but sometimes refers to the development of green infrastructure in urban areas, one of the objectives (OR7) aimed at increasing and improving green spaces and infrastructures in the cities of the region to provide satisfactory ecosystem services.

## MATERIAL AND METHODS

The subject of this research is the city of Bucharest and its peri-urban area. It is a first step in a larger approach that will establish the possibility of planning and implementing a green belt around the city of Bucharest, which will slow uncontrolled urban development and will also provide with other benefits for people's health. The green belt must have all the attributes of green infrastructure: functioning in a network, providing connectivity, being strategically planned and providing ecosystem services.

For this, we analysed how the city of Bucharest expanded over time and how attempts were made to stop the uncontrolled development beyond its borders. This required a comprehensive perspective: on the one hand, a research approach from historical publications (GIURESCU, 1966; POTRA, 1990; MIHĂILESCU, 2003) that extensively analysed the evolution of the city of Bucharest, and on the other hand, the analysis of more recent plans regarding the planning of a green belt around the capital. For the present study we considered the following aspects: the limits and expansion of Bucharest, the circular roads seen as belts, the suburban/peri-urban area of Bucharest, the integration of nature in the urban fabric, planning the green belt of Bucharest.

## RESULTS

**The expansion of Bucharest.** Over time, the city of Bucharest has expanded in all directions due to its advantageous geographical location (a favourable natural environment as well as a point of intersection of important roads), population growth and its economic development. There has always been an interest in stopping its expansion, since the effects of its continuous enlargement have been mainly negative. The expansion consisted in new houses, scattered across the landscape and surrounded by green space – yards and gardens, sometimes with orchard and vineyard, which is mainly a characteristic for Romanian villages. The documents show that, despite the measures that were taken – the establishment of new boundaries beyond which houses could not be built – Bucharest continued to expand.

Historical maps show that for 500 years (between 1300 and 1831) the area of Bucharest grew at a different rate. **Fig. 1** shows the 4 boundaries (drawn in black) that have delimited the city over time. The 4 rings reveal that the rate of expansion of Bucharest was not the same, increasing rapidly after the 18<sup>th</sup> century, and the biggest leap occurred in the 20<sup>th</sup> century:

- The smallest ring represents the extent of Bucharest in the 15<sup>th</sup> century, which practically included only the Dâmbovița meadow. Compared to that time, the current area is approximately 150 times larger.
- The second ring depicts the increase of its limits in the 1600s.
- Over 100 years, in 1700, the city expanded further to the north and south-east.
- The greatest expansion was set by the Organic Regulation of 1831 (the biggest ring).

These limits were marked with barriers through which one entered or left the city (there were 10 barriers in 1831). Each time, slums (*mahalale*) were formed at the edge of each border, which were later incorporated into the new city limits.



Figure 2. The expansion of Bucharest between 1300 and 1831, with 4 borders (1459, 1600, 1700, 1831) (processing after GIURESCU, 1966).



Figure 3. The Szathmari Plan of Bucharest in 1864: *Charta României meridionale (Charter of Southern Romania)*. (Source: <https://romania594.blogspot.com/2018/05/harti-bucuresti-in-format-kmz.html>).

**The belts of Bucharest.** Bucharest was delimited by surrounding it with belts (circular roads) which until the end of the 19<sup>th</sup> century had barriers and guards at the entrance to the city for the main radial roads (barriers which were

later abolished). What is important is that these circular roads – the belts – also had the role of stopping the expansion of the hearth of the city.

Despite their role of limiting the expansion of the city, in time, old belts were replaced by new, larger ones. With the increase of the area of the hearth of the city, new barriers appeared (with fee-based access). Historical documents describe 5 such belts of Bucharest, which in principle correspond to the limits shown in Fig. 2 and show the jump in the growth of the city. The most eloquent is that of the mid-19<sup>th</sup> century, which can be seen on the Borroczyn Plan of 1852 and on the Szathmari topographical map of 1857/1864 (Fig. 3) (the latter was based on the limits set in 1834 in the Organic Regulation). This last belt is still visible today on the map of Bucharest, but it is modernized.

***The effectiveness of the belts in stopping the expansion of Bucharest.*** Until the 19<sup>th</sup> century, although new limits and belts were fixed to stop the expansion of Bucharest, they were not respected and every time new, wider ones had to be built. Regulations prohibited new constructions, and contained punishments and sanctions (such as house demolition). But since no decision could stop the expansion of Bucharest, in the 19<sup>th</sup> century new regulations decided all entrances and exits from the city beyond which no construction was allowed (the Organic Regulation of 1831 contained a separate chapter dedicated to these regulations). And yet, the city grew considerably, and beyond the city limits, fringe neighbourhoods were being built, with new construction on vacant lots. In order to prevent the expansion of the city, in the period between the 2 world wars, a plantation belt was designed – **a green ring**, with the idea that no homes could be built beyond. But it was not implemented either, and after the Second World War constructions were still erected beyond it.

***The integration of nature in the urban fabric.*** Ever since its birth, Bucharest was bordered by forests, that at first grew to the edge of the city. With a soil that allowed a diverse vegetation both inside and outside the city, Bucharest was full of gardens, trees and orchards a few hundred years ago. The documents reveal that starting from the 16<sup>th</sup> century, the rich people from Bucharest owned extensive estates and vineyards outside the city. Vines were also planted outside the city by the monasteries, on uncultivated areas (however, with the continuous expansion of Bucharest, constructions were erected on these areas later). In the city, in addition to vineyards, the households had fruit trees, and the townspeople had orchards beyond the city. Green space was plentiful in Bucharest, which was famous for its gardens, as highlighted in the plans and maps of the time. Green areas had a social role, because kiosks (summer houses with garden) were built in the city and on the outskirts of the city; they were a place for the townspeople to relax and walk. In the 19<sup>th</sup> century, Bucharest was rich in green space in the central area of Bucharest, and most houses and palaces of the nobles had gardens or parks. Another area with green space was the one occupied by the residential districts, with smaller houses that also had gardens and large yards; and the agricultural area was at the periphery – that is, beyond the barrier belt.

***The peri-urban and the urban sprawl.*** The expansion of Bucharest led to the creation of peri-urban areas beyond the established belts, areas that had an important function. With the fixing of each limit, certain activities that initially took place in the city centre were moved to the suburban area beyond the established belt. At the same time, the peri-urban area contained agricultural land, forest areas and generally green areas. Along with the increasing influence of Bucharest on its peri-urban area, changes have taken place in the rural areas here. Due to the orchards and farmland they contained, they became supply areas for the city. At the same time, new conditions were created for recreation and leisure: some areas with tourist and recreation potential have appeared in the northern part of the city (Băneasa forest, Snagov Lake, the forests here) and in the west of the city (on Argeșului Valley). The suburban area grew continuously, spontaneously, through new rural settlements. At the same time, the city centre began to be built at the expense of green spaces, which until then had been abundant and relatively evenly distributed.

This peripheral area of Bucharest, which appears in Szathmari's topographical map of 1857 (Fig. 3), had a scattered structure that started from the belt and extended further south and east (1-2 km) along the main radial arteries. Functionally, visually and structurally, this suburban area was considered an annex of the city, with which it had strong ties, as many Bucharest residents worked or spent their free time here for relaxing. The suburban area had a mixed nature: agricultural, industrial and recreational. But the predominant function was agricultural: within a radius of 1.5 - 3 km there were lands covered with vineyards, orchards, pastures, fields. Neither the appearance, nor the structure, nor the function of the peripheral area were specific to the urban environment, but it was like an annex of Bucharest. Around the city was a kind of agricultural city, unevenly developed, more to the south and east.

After 1950, the city expanded excessively, and the agricultural lands and old houses outside Bucharest were replaced by an industrial area, resulting in an outer area in great contrast to the central one. At the end of the 20<sup>th</sup> century, the territory of the city of Bucharest was delimited by a belt formed by the railway line that surrounded it, and many neighbourhoods of today were in the past villages in its suburb. **The belt is still important today, because it separates the inner area of Bucharest from the outer, new one.** From an urban point of view, it structurally and functionally separates two areas of Bucharest - the one where the predominant function is that of services, and the predominantly industrial one (which in the past was predominantly rural, containing orchards, pastures and vineyards).

If until the 19<sup>th</sup> -20<sup>th</sup> centuries green spaces were abundant and evenly distributed in the city centre, unfortunately, the built surface began to increase in the 20<sup>th</sup> century at the expense of green spaces. A comparison between the military map of Romania dating from 1950 and recent satellite images (2023) shows that many green spaces have disappeared (Fig. 4).

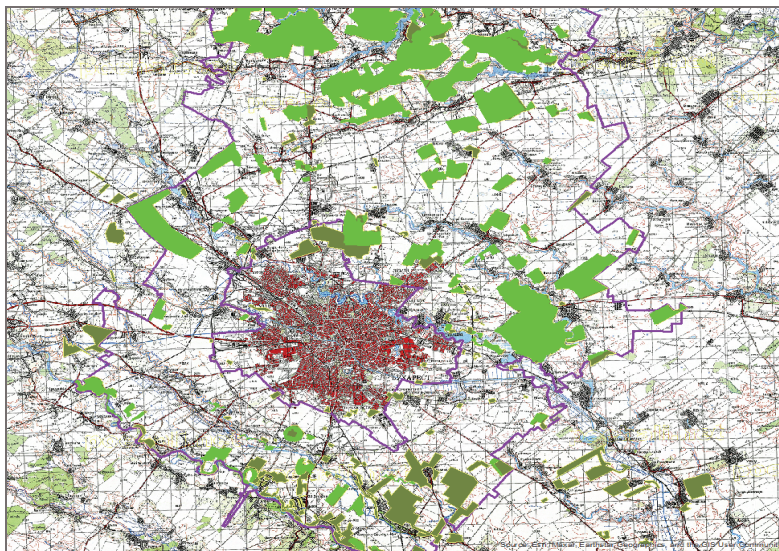


Figure 4. Green areas in the Bucharest metropolitan area.

Light green: existing green spaces (digitalized following satellite data, 2023)

Dark green: green spaces which no longer exist (but mentioned in a 1:100.000 military map from 1950s).

## DISCUSSIONS

Throughout the history of the city of Bucharest, planners have used different methods to limit its expansion. The fixed boundaries have been represented by the circular roads that surrounded Bucharest and which were considered belts. Each time new boundaries surrounded the new built-up areas, neighbourhoods and (later) villages. If initially the Bucharest belt limited the central area of the city from its rural area, it gradually included more and more suburbs in the city. This phenomenon determined the continuous modification of the city from a spatial and social point of view. Time has proven that no attempt to limit the expansion of Bucharest was successful.

The peri-urban zone of Bucharest, formed beyond its hearth, initially contained numerous elements of green space, but over time, both Bucharest and its peri-urban zone green spaces were less and less. Historically speaking, the city of Bucharest was never surrounded by a belt made up of natural elements, protected or not (as is the case of Vienna, for example), but was determined by the main transport routes (roads and then railways) that existed here. These can be the basis for planning a green belt that would separate the city of Bucharest from the rural area that surrounds it.

As Bucharest continues its expansion, the question arises on how a belt can be planned, connecting the green, yellow and blue elements of its peri-urban and central area (green space, agricultural land, water) and from which maximum benefits can be obtained: controlling urban sprawl and creating ecosystem services of all kinds.

There have been proposals to design a green belt around our capital, but these have not materialized, although there are laws and strategies that mention them. In 2006, when the drastic decrease of green spaces was observed, a green-yellow belt of Bucharest was planned, consisting of trees that will reduce pollution (\*\*\*, ROMÂNIA LIBERĂ, 2007). At that time, a project was drawn up to form a forest around Bucharest, which would prevent the expansion of built-up areas and which would also constitute a recreation space and through which the valuable landscapes could be preserved. The opportunity of this approach was analysed by the project “P.A.T.Z. – The Urban Agglomeration Zone and the Metropolitan Area of the Municipality of Bucharest”, completed in 2006 (beneficiary and financer: the General Council of the Municipality of Bucharest). The project proposed that the green belt around Bucharest would include 6 cities and 78 communes, administrative territories from the counties of Ilfov, Călărași, Dâmbovița, Giurgiu, Ialomița and Prahova (Fig. 5).

However, in terms of planning, this would have meant the imposition of restrictions and regulations of a permanent nature in the development plans of Bucharest and neighbouring municipalities. The restrictions would have been on the use of land included in the green-yellow belt, and this is a sensitive point as it touches some interests of landowners and developers. This may have been the reason why the project remained in the review phase.

The history of the city and its areas beyond the belts that bounded its hearth shows that an approach is necessary to stop the continuous expansion of the city. There are several options: for instance, based on the history of the evolution of the Bucharest area and the experience of other cities in the world, instead of a greenbelt, a simple boundary line can be drawn surrounding local municipalities. The belt/line would separate the urban area from the peri-urban area.

A natural green belt can be planned as an urban development boundary along the transport routes surrounding Bucharest, so that the Bucharest metropolitan area region is divided into sub-zones with different regulations regarding urban development. Such a belt can connect small green, agricultural or water areas (green/yellow/blue belt) in the peri-

urban area, whose number and surface will determine the size of the belt. This belt could be used not only to stop urban sprawl, but could provide supply, environmental or recreational services.

Another option is for this belt to connect with areas containing green space, agricultural land and water **inside** the city, in which case we are talking about *green wedges*. So, we can talk either about a classic, circular belt, or about alternative **green wedges**, or about a combination of them. Taking into account the rapid way in which the city and its peri-urban evolve, whatever option is chosen must always be adapted according to the context and emerging needs.

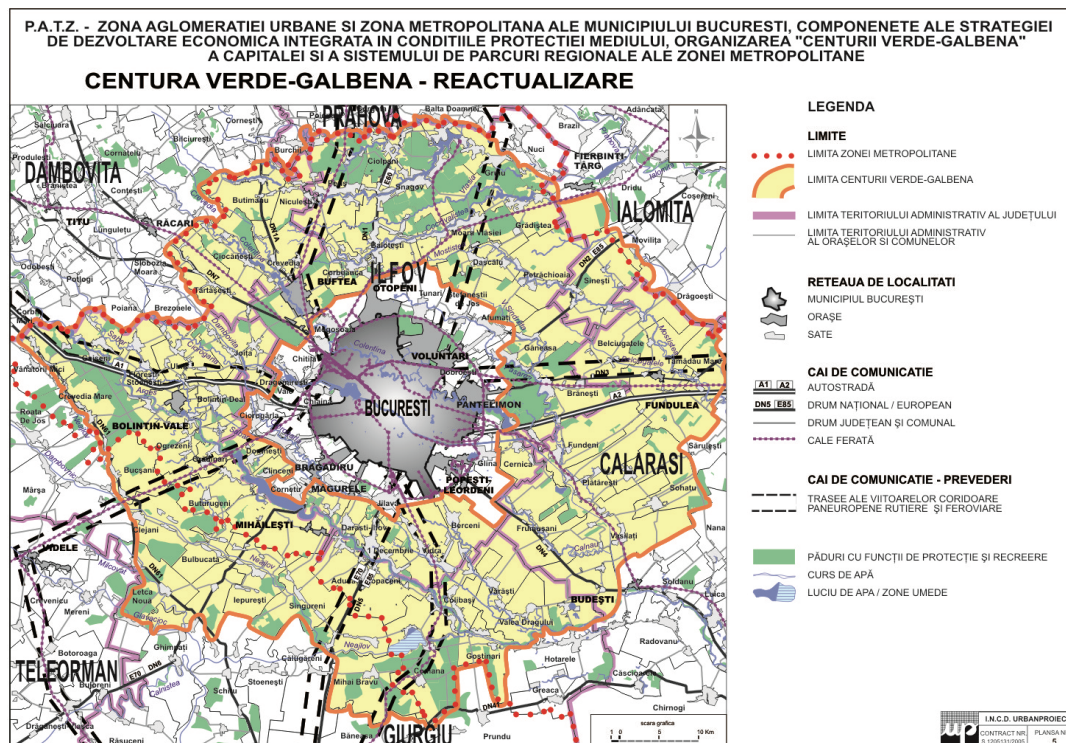


Figure 5. The green-yellow belt included areas from Ilfov, Călărași, Dâmbovița, Giurgiu, Ialomița and Prahova counties (Source: 2006 INCD URBANPROIECT București, PN 06010103 "Centura verde – politica urbană pentru protejarea zonelor naturale").

## CONCLUSIONS

The circular green belt has been successfully applied in the case of several cities and could be used as a planning tool in the case of Bucharest as well. Experience shows that its use often has positive results, preventing the city from expanding and separating it from the new satellite cities that have sprung up around it, while preserving the surrounding green areas for agricultural or recreational use. Such a green belt policy must also consider the possible disadvantages, as it may have a negative impact on development, leading to increased land prices.

Today, the question arises again about the feasibility of planning a green belt around the city of Bucharest or its metropolitan area. This should not take the form of a simple ring made up of green space elements; a new approach is needed, through which to achieve the connection between the green-yellow-blue infrastructure elements existing in its peri-urban area and at the level of the municipality of Bucharest and also the connection with the transport infrastructure. The green belt, as an element of green infrastructure, would offer several advantages – connectivity, the provision of ecosystem services – in addition to that of stopping the expansion of the city.

The green belt must be adapted according to the concrete situation of the region where the city is located. It can either consist of connected natural elements, close to the main radial arteries around the Bucharest metropolitan area (a circular green belt), or it can contain a mixture of green areas with industrial and urban areas along certain roads leading to the city centre (green wedges). In both cases, the goal is both urban growth control and green space conservation. Unfortunately, an antagonism can occur between the needs of conservation (green spaces must be protected) and of limiting the growth of cities (they cannot expand indefinitely), on the one hand, and those of development on the other.

Based on the history of the expansion of Bucharest, it must be analysed whether the green belt can be proposed around the existing transport belt, or if it is preferable to have a green belt that takes into account the construction plans of new transport infrastructures around Bucharest. It is important to know which elements of green space can be connected, especially since there is little open green space left in the heart of the city and that "green connections" should be made along the main traffic arteries in the capital.

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