

THE ECOLOGICAL PERSPECTIVE IN NOWADAYS' URBAN LANDSCAPE PLANNING IN TRANSYLVANIA

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Abstract: Nowadays' (Transylvanian) urban landscape as a complex, built and natural, social and economic environment is undergoing a sudden and accelerated transformation. Urbanization is a defining feature of current spatial/urban metamorphosis in Transylvania, too, yet the current model of urban development profoundly alters the natural environment, often reducing biodiversity and ultimately threatening human wellbeing. Present not only in academic theory, but in a broader sense in the daily public debate for the past decades, ecological perspective has become one of the leading design principles in nowadays' professional practice and theory in urban and spatial planning, a compulsory attribute of the contemporary mindset and (urban) landscape. Proposed research on ecological perspective in current urban (landscape) planning in Transylvania, Romania is focusing specifically on the role ecological perspective can play in understanding, the applying the more general and complex phenomenon of sustainability in the planning and management of landscapes. The idea of sustainability, the ecoregional approach are not only traditional attributes of the historical landscape, but also generators in present day development of cities around Transylvania, Romania. The ecological approach can enhance finding solutions in urgent social and environmental challenges regarding efficient management of resources, sustainable urban and spatial planning.

Keywords: ecological perspective, sustainable city, regulation documentation, General Urban Plan, Local Urban Regulation, biodiversity and ecosystem functions

Introduction

Present not only in academic theory, but in a broader sense in the daily public debate for the past decades, ecological perspective has become one of the leading design principles in nowadays' professional practice and theory in urban and spatial planning, a compulsory attribute of the contemporary mindset and (urban) landscape shaped by concerns about environmental challenges (Fekete et al., 2021),

the human's relationship to (natural) environment, climate warming etc. Proposed research on ecological perspective in current urban (landscape) planning in Transylvania, Romania is focusing specifically on the role ecological perspective can play in understanding, the applying the more general and complex phenomenon of sustainability in the planning and management of landscapes.

The idea of sustainability and the ecoregional approach are not only traditional attributes of the historical landscape, but also generators in present day development of cities around Transylvania, Romania (Ványolós, 2020). The (Transylvanian) landscape as a complex, built and natural, social and economic environment is undergoing a sudden and accelerated transformation. The ecological perspective can enhance finding solutions in urgent social and environmental challenges (Ványolós, 2020) regarding efficient management of resources, agricultural production, sustainable urban and spatial planning, public health safety etc. The ever shrinking natural environment, uneven demographic growth altogether with the excessive urbanization, prodigal resource-energy management, multiple pollution are all results of unsustainable development models (Ványolós, 2020). Sustainability, the ecological perspective in landscape architecture, urban and spatial planning are essential in the process of identifying a responsible and coordinated, mutually beneficial coexistence of human and natural habitats.

2. Materials and methods

Current section is structured in two distinct parts: a detailed vocabulary containing a brief, but necessary definition of keywords followed by the proposed methodology, altogether with tools and instruments for current research.

Vocabulary

Setting up a detailed vocabulary for conducting the research and materializing it in the present paper is one of the key elements in facilitating terminological clarity, and a certain objective perspective on the subject.

This vocabulary includes the following main keywords and their brief definitions:

ecological networks and greenways= linear open space established along either a

natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route, thus including ecological, recreational and cultural heritage aspects; *ecological compensation* and *ecological stability* of the landscape for human functions, *natural carrying capacity*, *self-purification capacity* are the basis for the ecological networks (Walmsley, 1995)

ecostabilisation principle = a concept designed to make landscape suitable for human functions without degrading ecological stability and thus risking environmental quality (Jongman et al., 2004)

green/eco/sustainable city = a city designed as a *complex landscape* (Meurk and Swaffield, 2007), with a thorough consideration for a multiple- social, economic, environmental- impact and resilient habitat, without compromising the ability of future generations to experience the same

strategic/regulation/building documentations = the three basic, different types of technical documentation concerning urban/spatial planning process: the *strategic* character lays in the generic theory, the principles that guide urban/spatial development, the set of specific building and landuse rules are comprised in *regulation* documentations, while the building type of documentations deliver the project for materializing particular construction proposals

General Urban Plan (GUP) = represents the legal ground for any development action proposed, including rules with respect to urban planning matters on short term (delimitation of the buildable area, landuse regulation, delimitation of the area affected by public encumbrances, establishment of the protected zones and historical built areas etc.) and on medium and long term (ex.regulation for the natural risk areas, defining areas of temporary of definitive building interdiction, the list of the

main proposed developments, the delimitation of the areas where urban regeneration projects are intended to be performed)

Local Urban Regulation/Building Code = set of various- landuse, functional and building-regulations, as part of the General Urban Plan

biodiversity and ecosystem functions = the benefits of ecosystem, categorized into four types according to their role: provisioning (ex. providing products such as food), regulating (ex. processes that shape the environment, like the air or water purification), socio-cultural (recreation, spiritual services etc.) and supporting (ex. soil formation and nutrient recycling)

Ecosystem Services (ES) = the entirety of benefits the human population derives, directly or indirectly, from biodiversity and ecosystem functions

ecological perspective = a design/planning approach, a methodology based on the nature focused sustainability principles of the ecological integration theories which propose that natural systems, not designed landscapes should be integrated as support elements within existing urban contexts and processes (Jongman et al., 2004), so that a human environment more aware of nature, of natural resources would be facilitated; there are three main, distinct, but interconnected types of theories in contemporary urban design and planning (Heymans et al., 2019): beside the *ecological integration theories*, the *landscape structure theories* and the *design integration theories*- the first proposing that landscape systems, not the built environment, should be the organizing principle of urban design planning, while the second one proposing that designed landscapes should be integrated into the existing urban context and adapted to the existing urban structure; it is strongly connected to *environmental planning* criteria (Jongman et al., 2004)

network strategy= set of principles designed to conserve and restore *dispersal corridors* and *stepping stones* (habitat islands), which function as habitat structures between core nature areas and facilitate the *biological conductivity* in the landscape

Biologically Vital Areas (BVAs) = an indicator used to assess the environmental value of urban greenery, as well as a planning tool used to recommend its minimum level, referring to zones with ecological functions within cities, generally in green spaces, meant to help to counteract the negative impacts of built-up areas and impermeable structures on urban environments and city dwellers (Kimic et al., 2022)

Methodology

Research methodology consists of two main components: (I) a contextualizing of proposed subject within a review of selected relevant academic/ research literature and current legal framework regarding urban planning in Transylvania, Romania, (II) a general critical analysis of urban planning professional practice, concluded by preliminary findings and later exemplified in the case studies, in specific projects, planning documentations, their implementation and relationing to theoretical fundamentals, including legal framework. The first component results in a set of criteria elements that will guide the second component, structuring it and help delivering the desired goals.

A general context for current research of urban planning and corresponding specific documentations is set in component (I), starting from the premise that an ecological approach/perspective, a natural environment friendly design and planning, also as an organizing principle, is needed in dealing with current problems of the city according to concepts of contemporary new ethics and aesthetics (Mostafavi and Doherty, 2010). It considers the

city and urban landscape planning using multiple instruments and with a holistic worldview that is flexible both in scale and disciplinary focus, thus analyzing urban planning around the core terms “biodiversity and socio-ecosystem functions/ services” and the city from a systemic approach regarding it as dynamic, self-organizing entity (Heymans et al., 2019). The previously defined ecological perspective and related design and planning theories, altogether with the four identified ecosystem functions set up the following criteria elements for the analysis of selected, relevant urban planning projects:

- conservation and protection of existing natural infrastructure, of ecological network and greenway elements (Walmsley, 1995) in urban areas in proposed regulations
- the relationship between built and natural environment, the proposed (shrinking or expanding) urban built/buildable area
- sustainability of landuse through provided recreational, regulating, provisioning and supporting ecosystem services
- promoting specific urban biodiversity (Swaffield, 2003) functions, increasing the value of BVAs to enhance the role of those areas within urbanized zones (Kimić et al., 2022), as part of a required ecological compensation or ecostabilisation (Jongman et al., 2004),

In component (II), in completion to scientific documents, legal framework represents an important literature resource for current research, scrutinizing urban planning process, in particular how the resulted projects and planning documents are related to legal framework, its theoretical basis, terminology and operational aspects. There are two distinct categories of laws and other similar documents that make up relevant legal framework. The

most important elements of the first category are *Law nr.350/2001 of Urban and Spatial Planning* and *Law nr.351/2001 of National Territorial Development Plan*, while the second category contains laws from various different domains, like protection of the environment, of natural resources (*Law of protection of environment nr.137/1995*, *Law nr.107 /1996 of Water Resources*, *Law of green open public spaces nr.24/2007*, *Law nr.46/2008 of the Forestry Code* etc.).

A critical analysis of current urban planning practice in Transylvania, Romania, considering the detailed set of criteria, constitutes the main body of present research. Preliminary general findings then are exemplified in case studies, by focusing on specific project documentations, their implementation and relationing to theoretical fundaments, including legal framework.

Third generation (elaborated after 2010) of GUP documentations were analyzed, the four detailed case studies (Cluj-Napoca, Târgu Mureș, Odorheiu Secuiesc and Miercurea Ciuc) being a representative selection of GUP for cities from the three main categories (large, medium size and smaller city municipalities).

3. Results and discussion

A general analysis of GUP of 25 municipalities (out of the total 33) in counties of Transylvania, Romania, shows some preliminary findings, common to most municipalities from all four types of cities:

- few clear, recognizable contemporary design and planning theory elements that strategic and regulation proposals are based on;
- insufficient correlation of relevant regulation and strategic documents (of all involved administrative units: the city and the surrounding villages);

- unsustainable landuse that is able to provide only some of all necessary ecosystem services and often is not facilitating enough desired ecological reconstruction of polluted former industrial sites or renaturation process in highly urbanized areas;
- incoherence or/and not enough clarity in applying the general legal framework and planning methodology- ex.lack of differentiation of regulations for the three basic types of urban development interventions and corresponding urban territorial regulation units (maintaining/protection, urbanization and restructuring areas);

- missing or insufficiently correlation between strategic goals and regulations (often no plan concerning the integration of the built urban body into a wider territorial ecosystem through a network of natural areas and other, inner blue and green infrastructure elements).

Above mentioned preliminary results are exemplified in the following in the four selected, relevant case studies:

case study #1:

The GUP of Odorheiu-Secuiesc (**Fig. 1.**, Experiment Proiect, 2016) is a showcase for the postsocialist period in Romania.

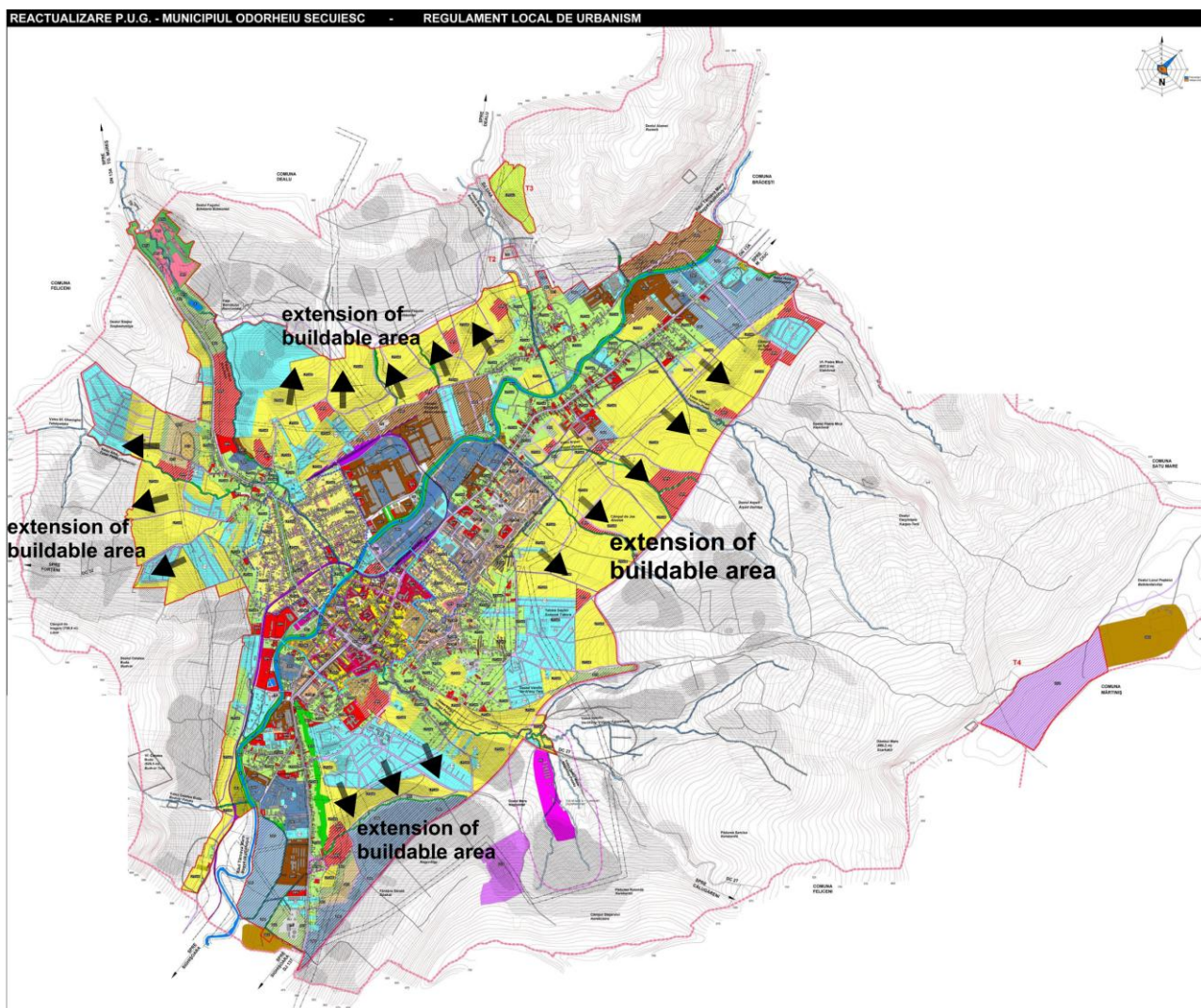


Fig. 1. GUP of Odorheiu-Secuiesc: unsustainable landuse and increase of the buildable area

It contains almost all the symptomatic characteristics of a loosely regulated urban planning simultaneously lacking necessary professional support, detailed legal framework and administrative capacity (Ványolós, 2020).

The proposed increase of the buildable area (with more than 60%, from approx. 1085 ha to 1783 ha), in contrast with the demographic decrease and the lack of a significant building pressure, is the most evident proof of an unsustainable land management, that directly affects the wider urban and natural landscape by potentially polluting it not only visually, but in a more complex and lasting way becoming a threat to natural habitats, soil quality, underground water reserves. Insufficient regulation provisions promoting biodiversity (no specific regulations regarding permitted, recommended local species of vegetation or ecological corridors for protected habitats etc.). Furthermore, an expanded built area usually means a more costly and a less efficient infrastructure: road, sewage, water supply, electricity, waste management etc. networks. This excessive increase, combined with an undifferentiated, unphased implementation of the urbanization process lacking essential recreational and provisioning services (new blue and green infrastructure elements, public services etc.), is likely to result in time in a chaotic, unsustainable and ultimately polluting landscape management.

Though lacking overall ecologically rooted urban planning approach, with no clear contemporary design or planning theory fundamentals, there are some positive elements, like the proposed green/ecological corridor along the Târnava Mare riverside or regulations for protected natural areas (within the existing legal framework).

case study #2:

Cluj-Napoca has a unique, singular position in the regional context, being the

largest city in Transylvania and the one that had undergone probably the most significant and visible landscape changes in the past two decades in Romania, given its special, distinct topography and thus its sprawling expansion on the neighboring hills and along the Someș river valley (Ványolós, 2021). The complex and very much limiting context of its current GUP (**Fig. 2.**, Technical University of Cluj-Napoca, 2014) stems from the spatial planning proposals of the previous similar plan (1998), which set the conditions for the highly extensive and often insufficiently regulated urban development in the following decades, materialized in the previously mentioned urban sprawling.

The proposed increase of the buildable area (approx. 10%, from 9867 ha to 10465 ha) is sizeable, but mostly answering existing functional-spatial needs and a building pressure, partially justified by the city's social-economic role on regional and national level. It contains several sustainability planning components shaped by an ecological perspective: it does foresee ecological corridors within the main city body connecting and protecting important natural habitats (but without delivering a list of recommended local vegetation species) also as new elements of the green and blue infrastructure, thus providing some of the required recreational and provisioning services (ex. see *Rethinking Someș international design and planning competition*, 2017), different measures to counter climate change effects (identifying and limiting heat islands).

Despite having used certain elements of a contemporary ecological planning perspective and design integration theories, the General Urban Plan falls short on considering the larger metropolitan area as an operational landscape unit.

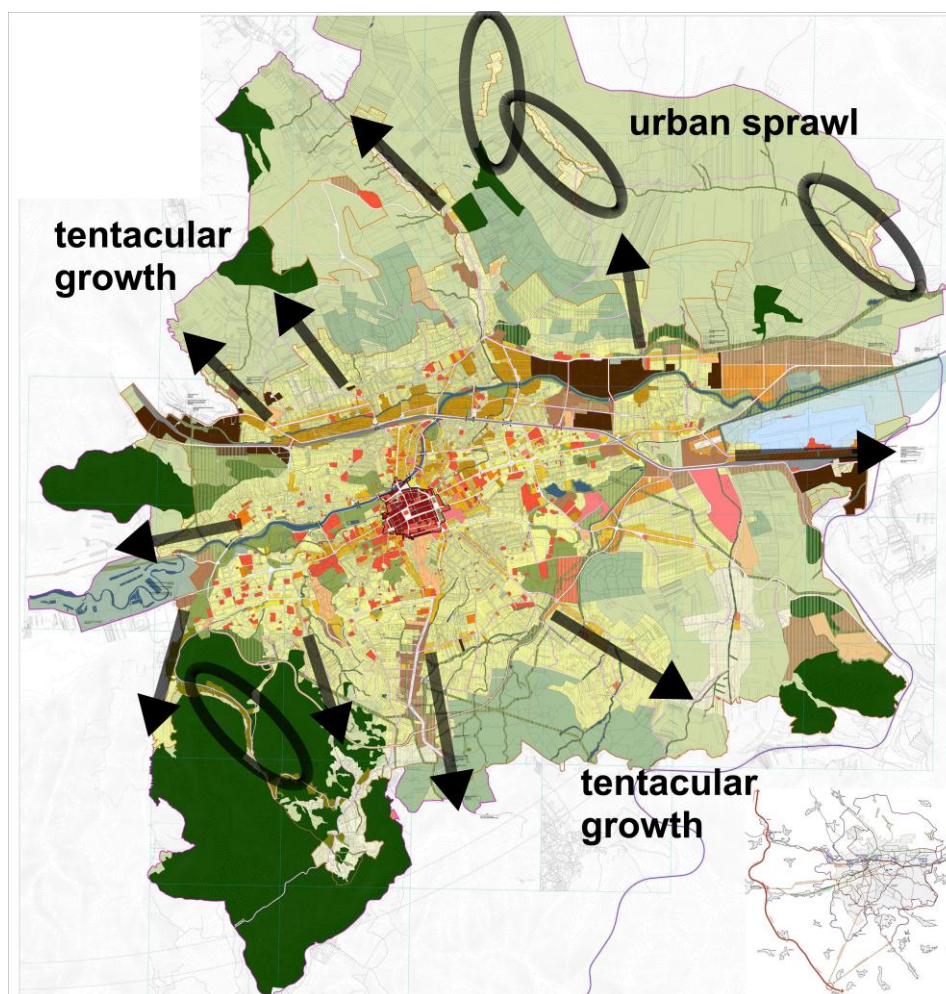


Fig. 2. GUP of Cluj-Napoca: sprawled and tentacular urban development

As a consequence there is no necessary correlation with the development of neighboring settlements (ex. Florești, Apahida etc.), not recognizing and not tackling the risks, the consequences of a generalized increased urbanization process and territorial-spatial polarization phenomenon (continuous overbuilt, urbanized zones vs. shrinking rural areas), and ultimately neglecting the historical landscape of a balanced network of rural and urban settlements.

case study #3:

The case of Târgu Mureș is relevant for medium sized cities in Transylvania, most of them not only administrative centres of their respective counties, but regional urban poles,

too. Though the recently approved GUP (**Fig. 3.**, Arhigraf, 2022) keeps the current buildable area almost unchanged (an increase of approx.1%, to 3719 ha), it does confirm the overall increase of approx.15% since 2014. Beyond the unsustainable land increase, almost generally valid for GUPs of most cities in Transylvania, there are some other problems of urban planning in medium sized cities (previously detailed in the preliminary findings) that can be identified in the GUP of Târgu Mureș. An insufficient correlation of relevant regulation and strategic documents - ex. with the GUP of neighboring administrative units of Corunca and of Sâncraiu de Mureș- could be one them.

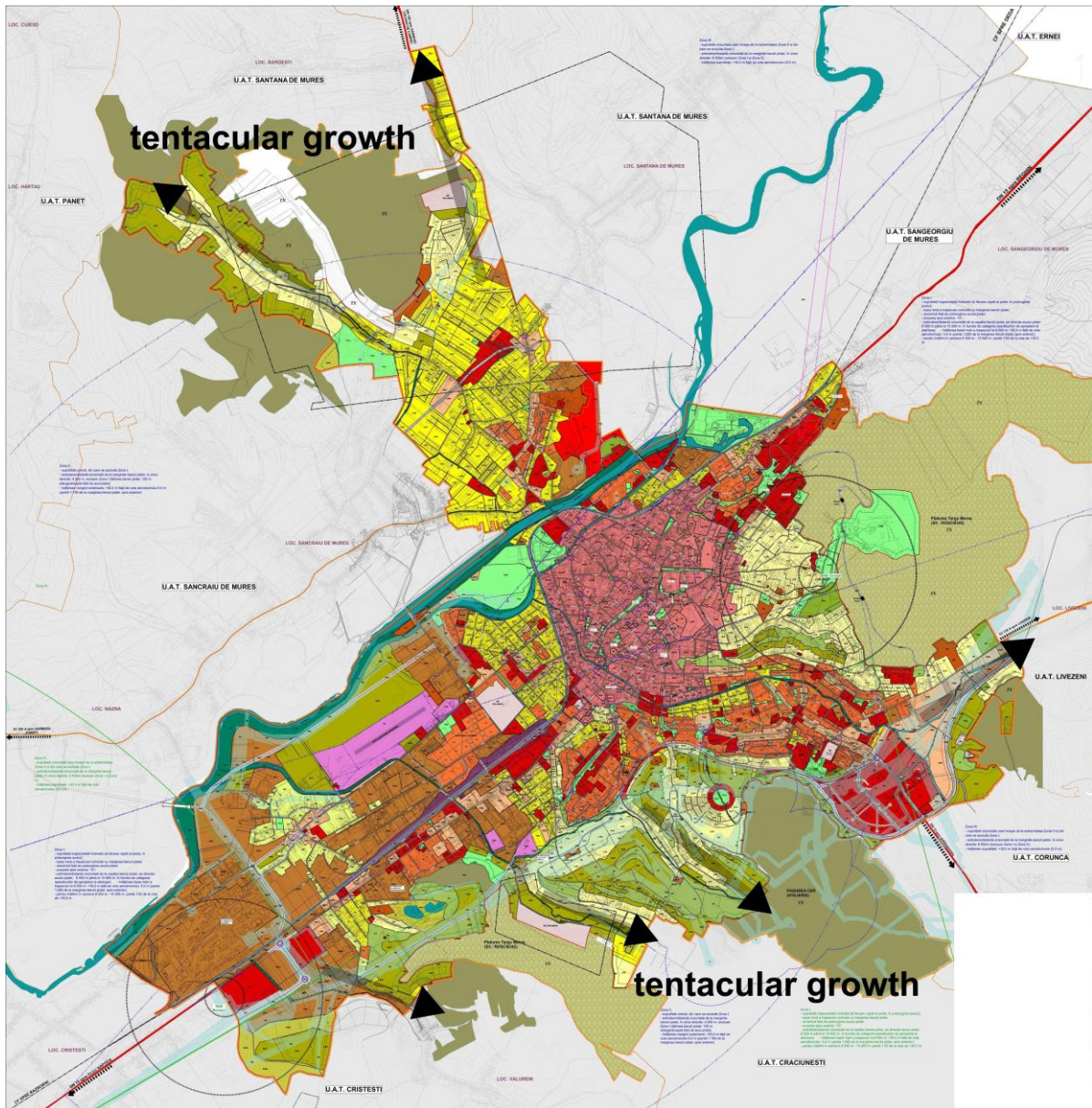


Fig. 3. GUP of Târgu Mureș: tentacular urban development

The often occurring/recurring problem - an incomplete differentiation of regulations for the three basic types of urban development interventions and corresponding urban territorial regulation units (maintaining / protection, urbanization and restructuring areas) - is also present. In many existing or proposed urbanized areas, only few of the compulsory public services and new blue and green infrastructure elements (ex. urban parks, public gardens, sport and leisure facilities etc.) are to be found. Similarly, there are no

regulations regarding recommended local species of vegetation.

A separate general conceptual plan (transpositioned in the urban regulation plan) would be welcome to illustrate the desired integration of the built urban body into a wider territorial ecosystem through a continuous and consistent network of natural areas and other blue and green infrastructure components (Ványolós and Lihät, 2021).

Several encouraging design and detailed regulation elements can be found in the GUP, despite the shortcomings,; as part of the

ecosystem services, specific provisions for enhancing open space in highrise residential areas erected in the socialist/ postsocialist period (greener car parking, protection, increase and development of vegetation surfaces, green roofing for better energy efficiency and also promoting urban gardening as a feature of the provisioning, regulating and supporting ecosystem services etc.), a generic regulation concerning urban rainwater management, distinct, special regulations for the ecological reconstruction of the landscape of some damaged, polluted former industrial sites (ex. former brick manufacturing platform) or that of designed to compensate the transfer of agricultural land to the buildable area while maintaining a land reserve for provisional ecosystem services (ex. agricultural production for local consumption needs).

case study #4:

The GUP of Miercurea Ciuc (Fig. 4., Planwerk, 2012) is one of the few urban planning documentations in Romania for the last 30 years that proposed a reduction of the buildable area (with 9%, to approx. 1790 ha). As the title is stating it, the GUP considered an ecological planning approach combined with elements of design integration and overall landscape structure theories, resulting in a strategic and regulation framework for a sustainable urban development based on the concept of the green city well anchored in a local, regional context. The "Green city in the heart of Seklerland" formula is a synthesis of a multitude of qualities and potentials of the city, meant to support and guide its development. Miercurea Ciuc is not only an administrative centre, but also of a specific geographical, cultural-spiritual landscape.

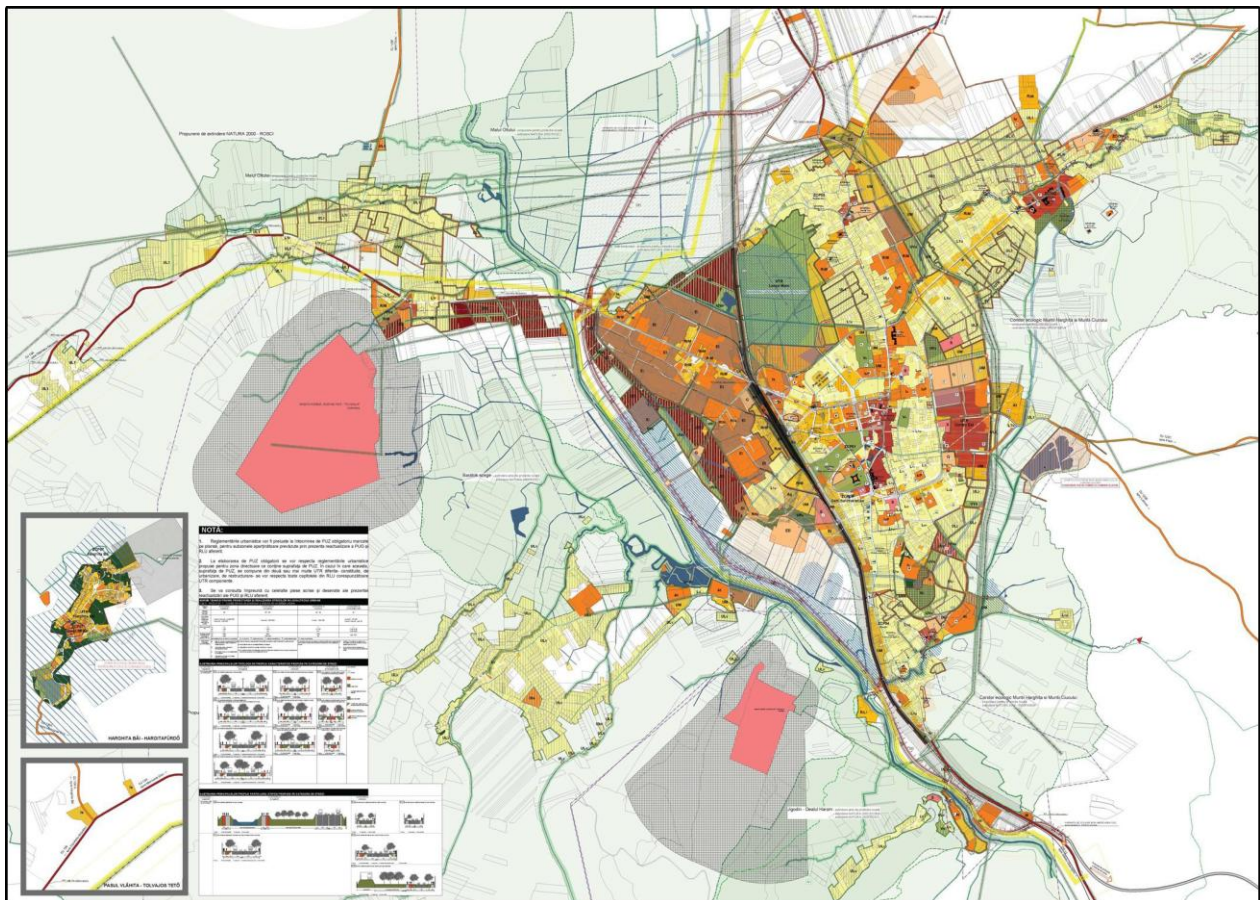


Fig. 4. GUP of Miercurea Ciuc: a framework for a sustainable urban development

Extending the urban green infrastructure with of new elements is among the main objectives of the GUP.

The spatial-functional reconfiguration promoted a more efficient landuse, limiting possible overlapping of contradicting activities and thus having an enhanced functioning and diversification of connections between different zones, with emphasis on new pedestrian and cycle routes.

The green character remains indispensable for both major functional components of the city profile, living an tourism. An urban development, building from the center to the peripheries represents the main principle for an efficient and rational, a sustainable spatial management, keeping the land resource available for future generations, too. Three main components make up the core idea of a sustainable land management: (I) brownfield type development in inner urban zones that need functional restructuring and/or ecological

reconstruction comes first, before the greenfield type development at the outskirts, (II) any increase of the buildable area will be considered on the basis of data containing an evaluation of land needed for proposed development, (III) any extension of the buildable area will be phased, when densification criteria of inner urban zones is met. The optimization of the spatial scheme is the result of the synthesis of complex data and conclusions from various preliminary studies (demographic, social, economic, environment etc.).

Miercurea Ciuc is a green city given the omnipresence of neighboring natural landscape within the city, the two main mountains (Ciucului and Harghitei) are dominant elements of urban perspectives, working as backgrounds for all defining views. Natural landscape has a pivotal role in the identification of the local urban brand.



Fig. 5. GUP of Miercurea Ciuc: concept of optimized landuse and reduction of the buildable area

As illustrated in a schematic concept plan (**Fig. 5.**), the GUP counters the risk of urban sprawl, of dissolution of the built city body in the surrounding natural landscape, instead integrating it organically through a complex network of blue and green infrastructure elements (park, gardens, sport-leisure surfaces, ecological corridors, protected areas and protection zones etc.), that delivers three of the ecosystem services (provisioning, regulating and supporting) to provide conditions of wellbeing in the city.

This concept plan has three main components: (1) the newly proposed Lunca Mare natural park and the ecological corridor, a green walkway along the Şumuleu stream between the Şumuleu hillside natural area and the Olt riverbank, (2) the middle green belt linking the Olt riverbank to the Şuta lakeside, and (3) the green corridor between the Şuta lakeside and the protected natural area of Jigodin-Csihányos, through the central urban zones and the Olt riverbank.

Although in the implementation phase local administration could not stick to the strict idea of buildable area reduction and the corresponding more efficient land use, most strategic and regulation proposals of the GUP regarding ecological perspective are still valid: new elements of the blue and green infrastructure providing socio-cultural, regulating and supporting ecosystem services, the detailed regulations for protected natural areas within the existing legal framework, a list of recommended local vegetation species.

Conclusions

As main findings of the current research regarding the ecological perspective in nowadays' urban (landscape) planning in Transylvania, the following can be concluded:

- few clear, recognizable contemporary design and planning theory elements that

strategic and regulation proposals are based on

- insufficient correlation between relevant strategic and regulation planning documents involved on the horizontal (neighboring settlements) and on the vertical (county, regional and national) administrative level
- difficulties, inconsistencies in the implementation phase due to sometimes unclear, not precise enough monitoring provisions in the legal framework
- in most GUPs detailed regulations for protected natural areas, habitats, in line with the existing legal framework
- unsustainable land management: in most cases a significant increase of the buildable, in contrast with the demographic decrease and the lack of a significant building pressure (the GUP of Miercurea Ciuc remains an exception)
- in some cases, new socio-cultural (recreational) and regulating services provided through proposed regulation in the newly urbanized areas, while in very few cases other ecosystem services (provisioning and supporting)
- in few cases separate, detailed and localized urban biodiversity provisions

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1. Fekete A, Hodor K, Dai D (2021) Urban Sustainability through Innovative Open Space Design. A Novel Approach to the Regeneration of Historic Open Spaces in Some Eastern European Countries and China Earth, 2(3):405–423.

2. Heymans A, Breadsell J, Morrison, GM, Byrne JJ, Eon C (2019) Ecological Urban Planning and Design: A Systematic Literature Review in Smart Urban Planning and Land Management (<https://www.mdpi.com/2071-1050/11/13/3723>, accessed in 01.12.2022)
3. Jongman RHG, Külvik M; Kristiansen I (2004) European ecological networks and greenways. *Landsc. Urban Plan.* 68:305–319.
4. Kimic K, Fekete A (2022) The Ratio of Biologically Vital Areas as a Measure of the Sustainability of Urban Parks Using the Example of Budapest, Hungary, *Resources* 11(5):47. <https://doi.org/10.3390/resources11050047>
5. Meurk C, Swaffield S (2007) Cities as complex landscapes: Biodiversity opportunities, landscape configurations and design directions. *N. Z. Gard. J.* 10:10–20.
6. Mostafavi M, Doherty G (2010), *Ecological Urbanism*, Harvard University Graduate School of Design and Lars Müller Publishers
7. Swaffield S (2003) Shaping an urban landscape strategy to promote biodiversity. In *Greening the City: Bringing Biodiversity Back into Urban Environment*, Proceeding of the Conference of the Royal New Zealand Institute of Horticulture, Christchurch, New Zealand, 21–24 October 2003; Dawson, M., Ed.; Lincoln University: Christchurch, New Zealand, 2005; pp. 246–260.
8. Ványolós E (2020) Peisaj transilvan (istoric) în schimbare. Oraş. In: Varga A, Andea S, Balog IM, Chişu A, Cosma E, Crivii A (eds.): *Istoria şi scrisul istoric azi. Opţiuni metodologice. Paradigme. Agendă*, Cluj-Napoca, Editura Şcoala Ardeleană, pp. 991–1007.
9. Ványolós E (2021) *Léptékváltás Kolozsváron, óriásközség a város szélén*. In: Salamin G, Tóth B (eds.): *Városok-tervezés-ingatlanpiac. Az urbanisztika aktuális kérdései*, Budapest, MUT, pp. 164–183.
10. Ványolós E, Lihăţ I (2021) Sustaining biodiversity, sustaining natural heritage; Developing ideas regarding on the introduction of local flora in urban areas within the renaturalization process of railway residual areas, *Târgu Mureş (Romania), Marisia*, 3(1):13–27.
11. Walmsley A (1995) Greenways and the making of urban form. *Landsc. Urban Plan.* 33(1-3): 81–127.
12. Arhigraf, Proiect, Proinvest, *Planul Urbanistic General şi Regulamentul Local de Urbanism al Municipiului Târgu Mureş*, 2010
13. Bogart Construction, Planwerk, *Universitatea Tehnică din Cluj-Napoca, Planul Urbanistic General şi Regulamentul Local de Urbanism al Municipiului Cluj-Napoca*, 2014
14. Experiment Proiect, *Planul Urbanistic General şi Regulamentul Local de Urbanism al Municipiului Odorheiu Secuiesc*, 2016
15. Planwerk, *Planul Urbanistic General şi Regulamentul Local de Urbanism al Municipiului Miercurea Ciuc*, 2012