

# SHAPING URBAN SPACE IN ROMANIA. CASE STUDY: THE BISTRIȚA-BECLEAN URBAN AXIS

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*Key-words:* spatial shaping, urban axis, urban space, urban sustainability, Spatial Planning System, Bistrița-Beclean axis, Romania.

**Abstract.** This paper analyses the development of the urban axis by shaping urban space. Through this process, the aim is to transform the city to promote urban sustainability transitions. When comparing the socio-economic systems of the Bistrița-Beclean Urban Axis, information was obtained regarding the key contextual factors influencing the capacity for urban transformation; in particular, the previous local historical trajectories of each socio-economic system, the role of local social movements and local governments as articulators of the different components of the framework. In addition, the way different concepts of sustainability coexist, and the interaction between different socio-economic systems at the urban level emerge as critical issues. The Urban Axis Spatial Planning System research elements of green infrastructure and urban design. Urban design theory is primarily concerned with the shaping and management of public space (i.e., ‘public environment’, ‘public domain’ or ‘public realm’) and how public places are used and experienced. Public space includes all spaces used freely, on a daily basis, by the general public, such as streets, squares, parks, and public infrastructure. Some aspects of private spaces, such as building facades or domestic gardens, also contribute to public space and are therefore also taken into account by urban design theory. Urban design is about making connections between people and places, movement and urban form, nature, and the built fabric. Urban design brings together the many aspects of recreational areas, environmental stewardship, social equity, and economic viability in the creation of places with distinct beauty and identity. Urban shaping draws these and other aspects together, creating a vision for an area and then implementing the resources and skills needed to bring that vision to life. By shaping the urban space in the Local Axis, a system is being built that leads to a balance between density and compactness on the one hand, and quality of life in a healthy urban environment on the other hand.

## 1. INTRODUCTION

Urban design is the process of designing and shaping the physical features of cities, towns, and villages and planning for the provision of municipal services for residents and visitors.

Urban settlements face a range of environmental, economic, and social problems. Affecting their structure and functionality (Niță, 2011). International organisations frequently promote policies and strategies (Habitat I and II, Agenda 21, the European Charter of Cities, the Millennium Declaration, Metrex, etc.) to achieve the sustainable development of cities (Schäffler *et al.*, 2013).

Sustainable urban planning aims to address these issues in a way that is integrated but takes into account local specificities (Norton *et al.*, 2015), consolidates the vision of decision-makers (Vandermeulen *et al.*, 2011), and considers stakeholders’ arguments (Faehnle *et al.*, 2014) while aiming to select the best development solution (Govindarajulu, 2014). Integrating all these aspects requires strategic, interdisciplinary, and participatory urban planning that makes increasing use of green infrastructure in the decision-making process (DG Environment, 2012) as a useful tool in achieving sustainability targets for settlements (Church, 2015).

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The existence of public space is generated and conditioned by human existence. Space must have a “grouping” to express itself, propagate its symbols, generate states, condition reactions, etc. (Crișan, 2011).

The endless city is the result of uncontrolled progressive urbanisation, inaccessible to people, a city in which socialization does not exist and identity is reduced to its daily crossing. While initially the premises of development and usefulness within a spatially defined framework, in the post-modern era the limits have become suppressed, leading to the dissolution of inter-human reactions/relationships [...]. The vertical mix is a counter-reaction to the overdevelopment of the contemporary city concentration within a predefined framework, through procedures such as the combination and agglomeration of specific elements borrowed from the city and responding to functional needs, which constitute a prerequisite for the development of the city’s urban mix. The borrowing of functions belonging to the city results in a self-sustaining microsystem (Crișan, 2011).

The analysis of urban axes is defined in the context of the orientation and development of the city. From here it is outlined research the spatial planning model.

If the tendency of excessive urbanisation has been the predominant development of the horizontal, the rationalisation of the mix introduces the vertical component of urban development (Crișan, 2011).

Development principles are the premises for the comparative analysis of the interrelationship of the urban systems that trigger elements and the reactions between them.

The fluidity of circulation increased accessibility, and the interrelation of differentiated functional elements transform the mix into a microsystem that takes on the attributes of the urban environment (Crișan, 2011). As a reaction to excessive population growth, the vertical mix comes as a solution by increasing the local density of land area [...] (Crișan 2011).

Urban regeneration is a way of reorganising and modernising existing built environments rather than planning new urbanization. The regeneration process involves different forms of spatial interventions that could change the form and structure of land use in cities in a way that could facilitate the implementation of spatial policies addressing climate change (Balan, Antonio de Oliveira, 2013).

By integrating the city with all its elements, the mix has the attribute of cancelling out the functions which the inhabitants do not need. The connection with the city is achieved through the continuity and integration of its elements into the mix. The shaping of urban space is achieved through the vertical mix (Crișan, 2011).

Urban planning aims to encourage the complex development of localities by coming up with medium and long-term development strategies. Urban planning covers all the country’s localities organized in a network based on their hierarchical and balanced distribution throughout the territory. Urban planning aims to establish the spatial development directions of localities following their potential, as well as the aspirations of their inhabitants (Dragoș, Dumitrică, 2020).

Urban green infrastructure is a concept benefitting from a multitude of approaches (Newell *et al.*, 2013) but, in its broadest sense, it expresses connected networks of multifunctional spaces that support ecological and social processes (Ioja *et al.*, 2014).

Green infrastructures display fundamental characteristics of connectivity and multifunctionality and cover a wide range of specific elements (Cameron *et al.*, 2012).

The presence of green infrastructure in each area can catalyse economic development in that space (Netusil *et al.*, 2014) by increasing the price of land or housing. A prohibitive land price induces a certain state of conservation of that infrastructure. On the other hand, the development of urban functional areas generally revolves around a green infrastructure that is further refined to increase the attractiveness of that functional area.

The Urban Axis spatial planning system research elements of green infrastructure and urban design. In terms of spatial planning, it is impossible to separate land use (natural space, agricultural space, urban space) from the distribution of activities (housing, trade, production) (Dragoș, Dumitrică, 2020).

## 2. THE THEORETICAL BASIS FOR THE SPATIAL PLANNING SYSTEM OF THE BISTRIȚA-BECLEAN URBAN AXIS

In the analysis of the shaping of the urban landscape of Bistrița and Beclean, the main characteristic of a geographical axis should be taken into account, evaluation of the territory. An urban system is a system of urban localities between which economic, social, and cultural cooperation, spatial planning, environmental protection, as well as technical and public facilities are established, each of them maintaining its administrative autonomy.

In social terms, sustainable development means making economic efficiency compatible with profit, both being attributes of the competitive market, together with social justice and equity, through a fair distribution of benefits from environmental protection activities (Petrișor, 2006).

The Urban Axis spatial planning system should lead to integrated plans, not just land use planning or simple investment plans. In addition, it should present a strategic vision to help make decisions and allocate resources that lead to poverty reduction and economic growth. The selection of priorities should also be a matter of public choice, with general participation. Thus, both sectors can expect to achieve a better allocation of public and private resources. The main aim of the research is to use spatial planning as a means of achieving a sustainable city.

The spatial planning system of the Urban Axis used when shaping the territory is based on the following principles for a sustainable city:

- sustainability – implies both better living conditions for the urban poor, basic living conditions, and the health and well-being of all involved;
- competitiveness – enables the city to develop its economy in a national and international context, generate economic wealth, and ensure consistency between approaches to social equity and social security, as well as to systems that promote a productive and competitive private sector.

## 3. METHODOLOGY

In the analysis of the study, three basic principles are outlined with the help of the modelling of urban space in the local axis.

The first principle is the theory of the geographical axis which represents a line of diagnosis and prognosis of an area in time and space, a territorial complex (Pop, 2003) where we can analyse a model of shaping urban space in the local axis of Bistrița-Beclean.

By modelling the urban space in the local Axis, a system is built, leading to a balance between density and compactness on the one hand, and to a quality of life in a healthy urban environment on the other.

In order to be able to model the urban axis system sustainably and coherently, the second principle of star network topology is used (Fig. 1).

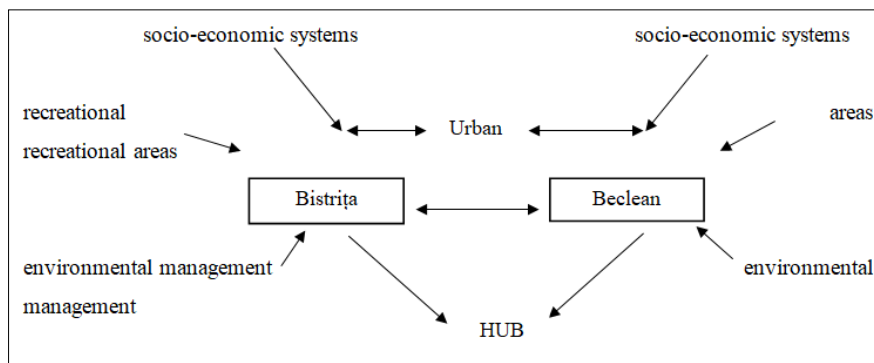


Fig. 1 – Making the local Bistrița-Beclean Urban Axis HUB according to the star network topology model. The shaping of the urban space will be done according to the system developed.

The star network topology is the type of network topology in which each of the network nodes is connected to a central node, called a hub or switch (Ciobanu, Pavel, 2016).

All data that is transmitted between nodes in the network is first sent to this central node and only then relayed to some or all the other nodes in the network. This centralised connection allows for a permanent connection, even if a network device goes down (Ciobanu, Pavel, 2016).

For the implementation of the local Bistrița-Beclean Urban Axis HUB, the GIS technique of spatial rendering and analysis will be used, while the Vertical Mix typology will be employed for the sustainability of the system.

#### 4. DATA USED

SketchUp graphics software was used to create the urban model. SketchUp is a premier 3D design software that truly makes 3D modelling for everyone, with a simple-to-learn yet robust toolset that empowers you to create (<https://app.sketchup.com/>).

There is also an application for viewing properties in the Integrated Cadastre and Land Registry System Geoportal ANCIPI (<https://geoportal.ancpi.ro/imobile.html>).

OpenStreetMap (OSM) is a collective, open-source project that aims to build a global geographic database, such as road atlases, using both manually entered data against a background of spatial imagery, as well as data collected from GPS devices.

#### 5. SHAPING URBAN SPACE

**A.** The location of the study objective and the integration of the development area into the integrated cadastre system.

Bistrița is the municipality of Bistrița-Năsăud county, part of Transylvania, Romania, made up of the localities of Bistrița, Ghinda, Sărata, Sigmir, Slătinița, Unirea and Vișoara. It is also the largest town in the county (Figs. 2, 3).

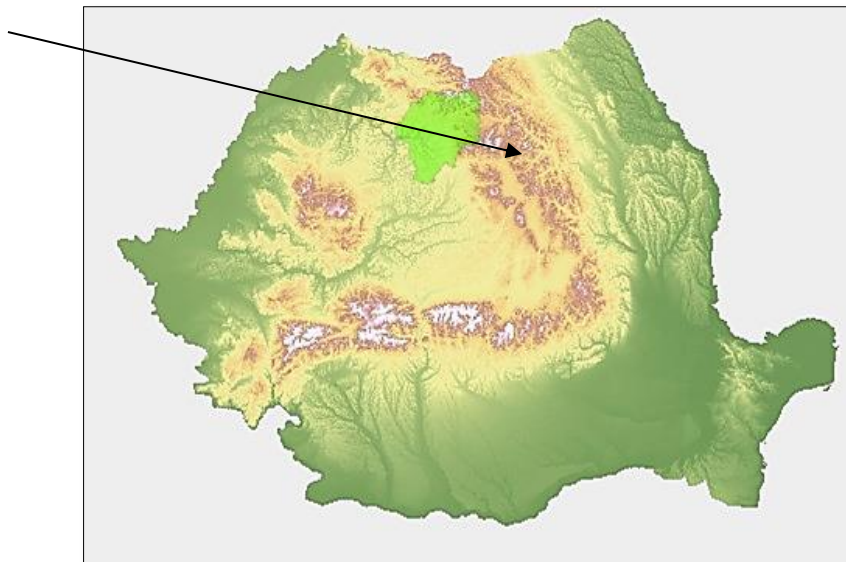


Fig. 2 – Location of the urban space at the national level.

Source: <https://geoportal.ancpi.ro/portal/apps/webappviewer/index.html?id=50289a41aafc4e01aefd131c2105e374>.

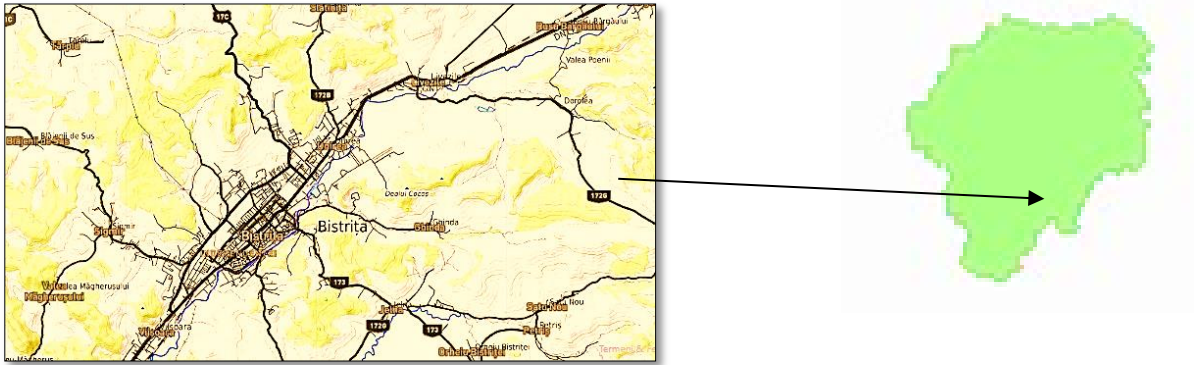


Fig. 3 – Location of the urban space at the county level.

Source: <https://www.openstreetmap.org/>, <https://geoportal.ancpi.ro/portal>.

The integration of the development area into the integrated cadastre system Bistrița.

The systematic registration of buildings in the integrated cadastre and land register system is carried out by identifying, measuring, describing, and registering real estate in the technical documents of the cadastre, identifying the legal owners of the properties, publicly displaying the results obtained, correcting errors reported in the claims and, finally, the opening of new cadastral land (Manu, Ciuculescu, 2015).

The technical documents of the cadastre are the cadastral plan, the alphabetical list of the holders of property rights, the holders without deeds and other owners of real estate rights well as the cadastral register of real estate (Manu, Ciuculescu, 2015).

It should be noted that the Geographical Axes are analysed separately due to the particularities of the construction of the cadastre scheme (Fig. 4).

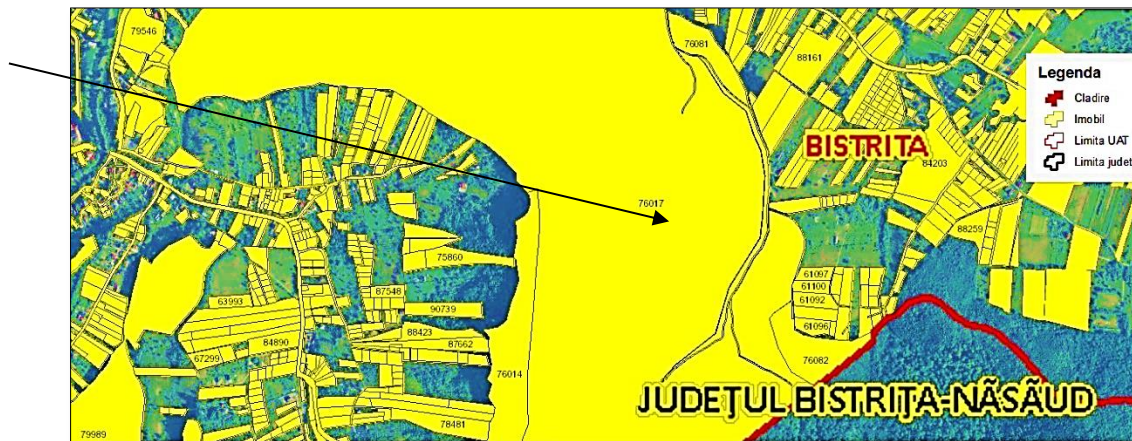


Fig. 4 – Development area subject to an integrated analysis in the cadastral system of Bistrița.

Source: <https://geoportal.ancpi.ro/imobile.html>.

Beclean, also known as Beclean on Someș, is a town in Bistrița-Năsăud county, Transylvania, Romania, consisting of Beclean town, and the villages of Coldău, Figa and Rusu de Jos (Fig. 5).

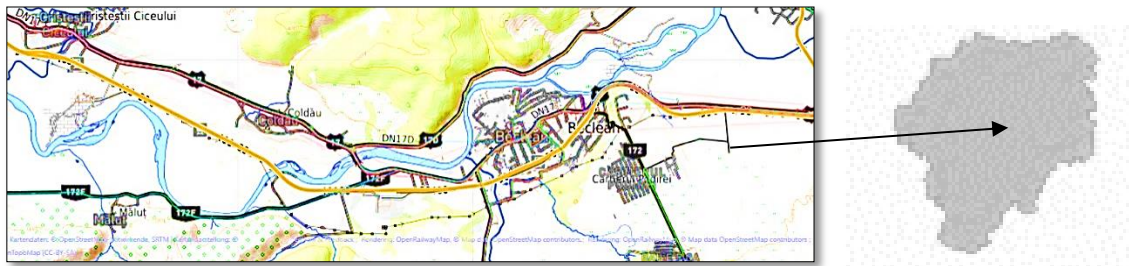


Fig. 5 – Location of urban space at the county level.

Source: <https://www.openstreetmap.org/>, <https://geoportal.ancpi.ro/portal>.

The integration of the development area into the integrated cadastre system of Beclean (Fig. 6).



Fig. 6 – Development area subject to an integrated analysis in the cadastral system of Beclean.

Source: <https://www.openstreetmap.org/>, <https://geoportal.ancpi.ro/portal>.

### B. Urban Shaping Plan

The General Urban Plan is provided by Bistrița City Hall. The PUG identifies the location proposed for shaping (Fig. 7).

It is worth mentioning that the model proposed for shaping integrates with the existing development of a pool (a sandy or sandless area located near water or provided with a water basin, specially designed to be used during summer for sunbathing, swimming or water sports) (<https://dexonline.ro/definitie/%C8%99strand>). The model brings value to urban development.



Fig. 7 – General Urban Plan. Source: Bistrița City Hall.

The study comprises the development of a recreational area and a multifunctional centre on the land located within the recreational area of Lacul, Lacului street, Ghinzii street, and Grănicerilor street, crossed by the Bistrița Ardeleană river.

The following objectives will be achieved: the creation of a multifunctional building, playgrounds for children divided by age group, an ice rink, a square with a pavilion and a fountain, an entrance area with an access gate, exterior landscaping, the rehabilitation of the bridge, the cleaning of the lake, a boat rental centre, hydro bikes (Fig. 8).



Fig. 8 – Location of the objective.  
Source: <https://www.openstreetmap.org/>.

A comparison between the pre-and post-development state of the area (Figs. 9, 10, 11, 12). The development of the space into a relaxing and leisure area can be seen in the models in Figures 10, and 12 rendered with the help of the SketchUp app.



Fig. 9 – Current state.



Fig. 10 – Model space.

The shaping objective included the landscaping and rehabilitation of the green areas within the complex. These landscaping and rehabilitation work consist of vegetation pruning (trees and shrubs), the removal of vegetation of a parasitic nature, the planting of tall vegetation seedlings (trees), the landscaping of unimproved, uncultivated land to allow public access to as wide an area as possible, the seeding with natural turf similar to the existing one only in the areas affected by the construction works of the investment objective.



Fig. 11 – Present status.



Fig. 12 – Model area.

The multi-purpose building is provided with an indoor space that can host events, especially for children, as well as with a small conference room that can host educational events for parents and children alike. Functionally, the building, covering a built area of 667.00 m<sup>2</sup> and a usable area of 577.00 m<sup>2</sup>, is made up of two sections: section 1 houses the conference room, with a capacity of 84 people, an adjoining office, an administrative area, a foyer, and service bathrooms. Section 2 consists of an indoor playground, two multi-purpose rooms, service bathrooms and a technical area serving the whole building.

The children's playground has been divided into 3 areas, bordered by pedestrian paths. Zone 1 has an oval shape and takes up an area of 325.50 m<sup>2</sup>. The equipment available in zone 1 is intended for the 1–3-year age group and includes various items such as spring riders, swings, see-saws activity towers, slides and sand boxes.

Zone 2 is circular and covers an area of 415.50 m<sup>2</sup>. The equipment in area 2 is intended for the 4–12-year age group and includes various items such as swings, see-saws, activity towers, slides and complex equipment with different routes and games. Zone 3 is also circular and covers an area of 154.00 m<sup>2</sup>. The equipment in zone 3 is designed for the +6-year age group and includes various items such as cubes, frames and climbing platforms. The main materials used are wood, painted and treated to withstand the weather and UV rays, and HPL panels, painted in bright colours. The playground also has flooring – cast tartan, complying with current safety standards.

The park will include a 380-m<sup>2</sup> circular ice rink. The ice rink will have its installations embedded in the base plate and the ice-making systems will be installed in the immediate vicinity in a removable technical cabin. Outside the period of primary use, the surface of the rink will be laid out in the form of an urban square for specific children's activities (Fig. 13).

Fig. 13 – Functional – ice rink model. Source: <https://app.sketchup.com/>.



The access gate and the landscaping in the main access area to the park have been redesigned and a complete restructuring of the said area has been decided. Near the access gate, a generously sized square will be created to free up the crowded space in the entrance area. The gate will also be transformed into some form of architectural installation that will add vitality to the park. It will take the shape of a metal sculpture inspired by natural elements.

#### The Leisure Domes Development of Glamping in Bistrița-Beclean Urban Axis

At the initial stage of the analysis, the area is in a state of degradation. The green space shows signs of human activity, where construction and household debris are present.

The research of the Urban Axes aims to develop the landscape through the valuation of space via urban planning. The development of the area is achieved through the creation of domes. The interior design of these constructions is modern and simple. The standard ones have large beds, bathrooms with toilets and showers, and wood-burning stoves, with the possibility of adding an extra bed on the mezzanine. Family domes can house two extra beds, making them suitable for three to four people (Figs. 14, 15, 16).

A geometric dome-shaped structure with a very comfortable interior, it houses a wood stove and a transparent wall that allows guests to enjoy a view of the surroundings. The domes are green, to blend in with the surroundings and become one with the landscape.

The research area is located in the Recreation Lake sector on the south-eastern side of the Unirea Sports Complex and the Ski Cocoș Trail.

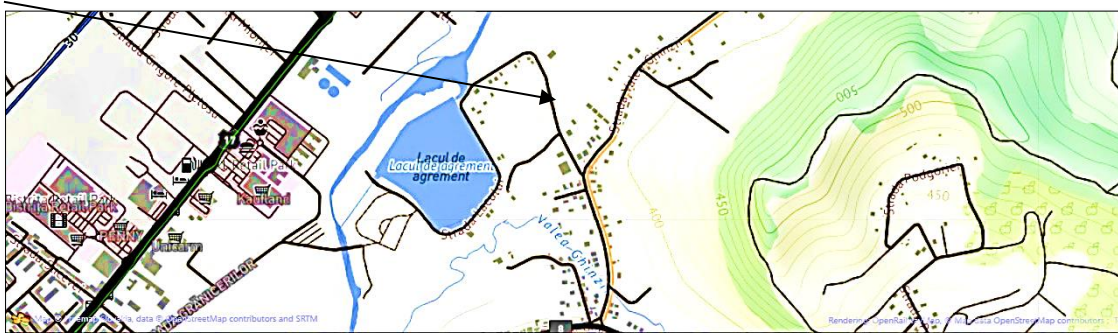


Fig. 14 – Location of the researched objective.

Source: <https://www.openstreetmap.org/>.

In the outline of the Bistrița-Beclean Urban Axis, a development model is being considered, which consists of the development of the Public Park taking up an area of 39,496 sqm. The idea is to capitalize on it by transforming it into a relaxation and leisure area since it is a related development element that completes the area of diversification of leisure activities at Figa Baths (Fig. 17).

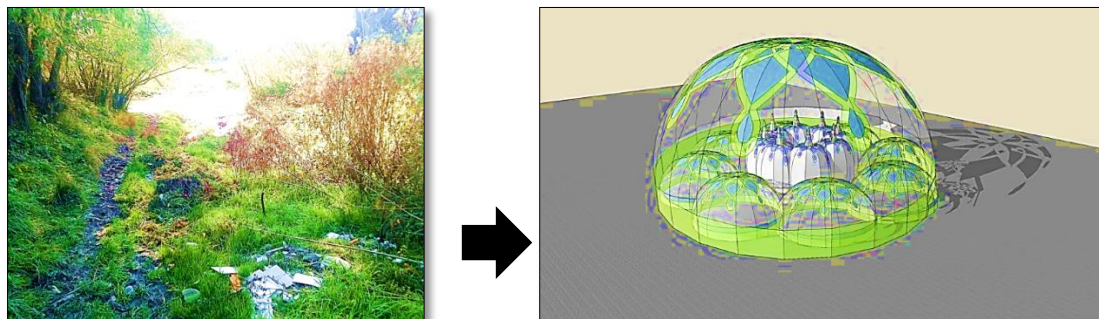


Fig. 15 – Current situation. Fig. 16 – Design model according to the analysis.

Source: <https://app.sketchup.com/>.



Fig. 17 – Location of the objective.  
Source: <https://www.openstreetmap.org/>.

The development of the Public Park will highlight the area's natural potential, allowing the creation of a well-organized theme park, with original architectural solutions that fit into the existing urban ensemble (Table 1).

*Table 1*

Planning a public space for leisure and social activities with a range of functions

The <b>social nature</b> function	Free spaces for relaxation and leisure, in a pleasant and relaxing context where socializing will be encouraged and facilitated among all citizens of the municipality, of all age groups, incomes, ethnicity, and occupation. They will function as a place for relaxation, leisure, and entertainment – both children and adults will be able to spend their leisure time here, making use of both street furniture – tables, benches – and play areas – playground, green labyrinth, gazebos.
The <b>aesthetic</b> nature function	The green spaces will be evenly distributed and equipped with wooden gazebos for visitors to able to take short refreshment breaks, the pedestrian walkways will be bordered by trees and benches, and the lighting installation will be positioned to enhance the architecture of the park.
The <b>educational</b> nature function	The greenery, made up of ornamental woody species, flowering species, and medicinal plants, as well as a collection of cacti, will be an excellent guide for schoolchildren, as well as others interested in learning about plants and acquiring notions of botany, ecology and adaptation to the environment.

The following main work components of the study were expected:

- Exhibition Centre for traditional Romanian objects and local products
- Outdoor growing area for annual, biennial, perennial, bulbous and medicinal flowering plants (garden area);
- Green labyrinth;
- Fireplaces, pergolas;
- Outdoor facilities (signposts and information boards, fencing, wrought-iron gates, light fittings, benches, tables);
- Pedestrian lanes (for walking and jogging);
- Children's playground;

- Fountain;
- The playground will be located in the central area, where all the equipment will be grouped, except for a set of three slides, which will be located in the southern part of the park;
- The table-tennis table will have a tartan surface, and the available area required for this type of game.
- The gates will also be completed with netting, and a running track will be laid out on the side of the court facing the park, which will complete the track system in Beclean;
- An irrigation system, a lighting system, and high-performance equipment are needed to increase safety and prevent crime (7 video surveillance cameras).

Those who come to spend their free time or exercise in Aluniș Park will be able to leave their cars in the car park that will be set up in the area between Codului Street and the park. Furthermore, a building with toilets and changing rooms will be built at the entrance to the park.

In addition to these facilities, the Cîrc area also has a mini-golf course, two mini-football courts with an artificial grass surface, and a multi-purpose court (volleyball, handball, basketball), a wall climbing area, 6 clay tennis courts, a table tennis pavilion with an area of 450 m<sup>2</sup> (about 15 tennis tables) and a paintball area, playgrounds for children (Fig. 18).

Fountains and water fountains have always been places that have attracted audiences of all ages. The image of water, the play of jet streams, the sound of falling water, and the ozonated air are some of the reasons that make us stop by them, no matter how in a hurry we may be.

We propose two options for the creation of an artesian fountain which entail around the same costs. The beneficiary will decide the type of fountain to be created in the park.

#### Fountain type 1

The “water lily fountain” is made of reinforced concrete and has a general plan size of 3,00 × 3,30 m.

The walls of the shaft are 30 cm thick and the total height is 1.20 m, exceeding the pavement height by 40 cm.

The inside is made of elastic waterproofing. Both inside and outside the walls are clad with limestone tiles of the “Residue” grey colour type.

For the implementation of circulation and water supply installations in the immediate vicinity, a buried reinforced concrete basin of 1,80 × 1,80 m would be built. The pre-filling installation of the fountain will be connected to the existing sewage network in the area.

#### Street furniture:

The park will be equipped with street furniture. There will be 60 wooden benches with metal frames, and 20 metal and wooden bins for collecting household waste.

#### Benches:

The proposed street furniture is made of natural materials – softwood mounted on a metal frame. The benches will be mounted on the border between the alleys and the green space, or on special side platforms or side terraces.

There will be 60 benches with backrests, grouped in groups of 4 or isolated, along the alleys. The benches are made of softwood slats (fir) mounted on a support of steel pipes.

The wooden elements will be hidden, and the distance between planks will be 20 mm. The slats will be 80 × 40mm. The edges of the curved benches and slats will be rounded. The used wood will be fir wood (mixed with cherry wood) soaked and finished so as to prevent splintering. The wood is to be treated against pests, fire, moisture, and UV exposure.



Fig. 18 – Model sketch of spatial design.  
Source: <https://app.sketchup.com/>.

By planning the territory, the tourist potential of Beclean as an urban centre component of the geographical axis system increases through its diversification of the tourist offers, and the connectivity with the Băile Figa resort.

The development of the area under investigation is an opportunity for sustainable growth, which entails both improving the living conditions of the urban poor, as well as ensuring the minimal conditions necessary for a decent living, and the health and well-being of all.

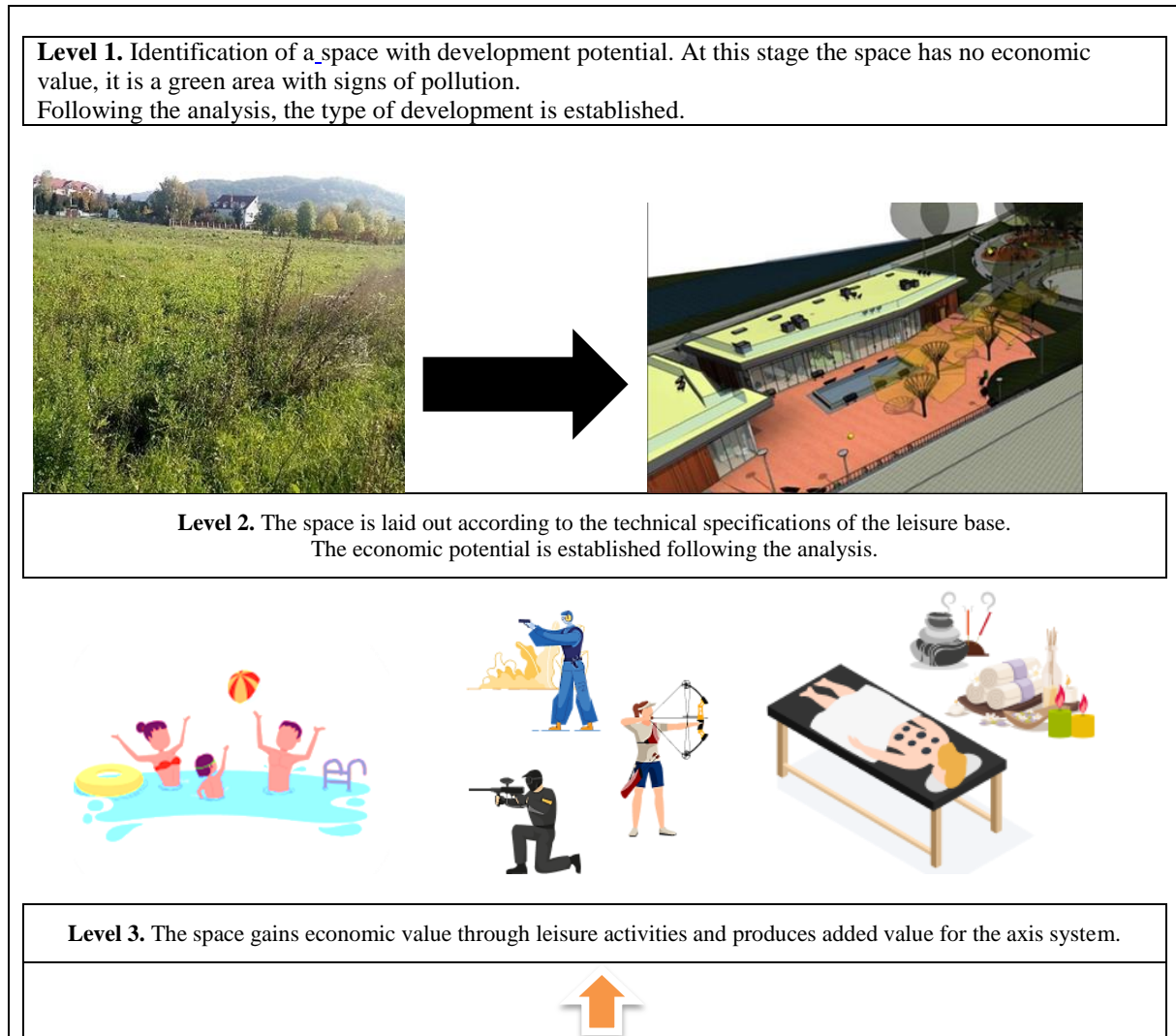
## 6. THE ANALYSIS OF THE IMPACT OF RESEARCH ON URBAN DEVELOPMENT

Shaping urban space in the Bistrița-Beclean Urban Axis stimulates competitiveness, which enables the city (part of the Geographical Axis system) to develop its economy in a national and international context, generate economic wealth and ensure coherence between social equity and social security approaches and systems that promote a productive and competitive private sector.

Research on the Bistrița-Beclean Axis land use planning system leads to the creation of an economic development model. For each level of growth, the economic value of the area presents a defining aspect of urban development (Table 2).

Table 2

## Economic development model



Source: Analysis model inspired from *The Experience Economy: Work is Theatre & Every Business a Stage* by Joe Pine and James Gilmore.

## 7. CONCLUSIONS

Urban design has the necessary tools at its disposal to integrate green infrastructure. There is a large number of documents on green infrastructure, starting from the European level, down to the urban settlement level which can be tools for planning instruments. However, the institutional actors are still not fully aware of their role in this process, Romania's urban planning has not yet reached the level of comprehensive maturity and is incapable of responding to external interference.

The characteristics of urban environments in Romania, stemming from the evolution of the urban settlement system over historical time, lead, in turn, to differences in the structure of green infrastructure existing, as well as in the development potential of new elements. Differences based on administrative criteria represented by the rank of localities and their position in the national settlement

system, on geographical criteria or based on the functional profile of these localities imply differentiations in the typologies of green infrastructure that find or seek their place in the respective cities.

Built space is a dynamic element within the landscape. Although there are no high values of urban sprawl, it is a dynamic area in terms of urban expansion. Along with buildings, other use classes have also shown a positive evolution, such as forest and agricultural land classes. Semi-natural areas are declining in landscape terms but remain strategic areas in urban development because of the benefits they bring. However, at the same time, more attention needs to be paid to their management.

In this context, green spaces are seen as strategic areas because they provide multiple benefits to the urban community and improve the quality of life.

The study on the planning of the suburban territory of the Bistrița-Beclean axis aims to solve the territorial issues in the suburban area of the city (the definition of interdependence relations in the fields of economy, infrastructure, urban development, ensuring the need for green and recreational spaces, foodstuffs, etc.), the relationships between the municipality and its suburban territory, taking into account that this territory constitutes the development reserve for the urban axis. By shaping the urban space, we can outline the Bistrița-Beclean local axis as a system that interacts through the development of the urban space, following the analysis of a program based on the transfer of materials between the two urban poles.

As a result of the analysis, we can say that the endless city is the result of uncontrolled progressive urbanization, a city inaccessible to people, where socialization does not exist and identity is reduced to its daily crossing. If initially the premises of development and usefulness were based on a spatially defined framework, in the postmodern period the limits are suppressed, thus supporting the development of the geographical axis system. Without a limited spatial framework, the Geographical axis enables the development of urban space by shaping the territory itself.

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