Study on landscape redevelopment in the eastern post-industrial area of Cluj-Napoca
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Abstract. The industrial areas placed in urban spaces had suffered many changes over time due to the changing of technology and also because of the modification of the market demands which meant the transfer from production to services. In many cases, what were left behind were large spaces with their local identity profile lost, some of them abandoned today. The reorganization of the destroyed and polluted sites is part of a process of urban development which purpose is to create a superior living environment. The present study aims to identify an unaesthetic area from the eastern industrial zone of Cluj-Napoca and bring more value to it by understanding the characteristics of the urban configuration and by increasing the social and urban quality. The landscape design proposals were made based on the existing situation analysis and they intend to grow the attractiveness, the value and improve the urban climate. More green spaces create a pleasing ambient for the employees and visitors. The completed project could be considered a local model worth following.

Key Words: study, industrial heritage, landscape sciences, urban development.

Introduction and objectives. The revitalization of former industrial sites has a very important role in avoiding the chaotic real estate developments. A high quality urban landscape creates an attractive environment for living, working and investments and provides the necessary conditions for a sustainable urban development (Condoros 2010).

In Cluj-Napoca, the main categories of green spaces are:
- green spaces with limited access;
- public green spaces and green spaces with specific specialization;
- recreation facilities;
- sports bases;
- green areas with limited access inside the courtyards of different institutions;
- planted areas in private yards.

The existing situation is unsatisfactory from different points of view:
- lack of green spaces: from the ratio between public green spaces and the population of the city results an index of 7,18 m²/capita which is inferior to the normal index for cities with more than 100000 citizens (17-26 m²/capita);
- the uneven distribution of green spaces: there are neighborhoods with a severe lack of green spaces: Mănăștur, Mărăști, eastern industrial area.

It is necessary to preserve the existing green areas, but also to create more green spaces and leisure parks (www.primariacj.ro).

The inexistence of a bypass to reduce congestion in the built-up area of Cluj-Napoca and also the insufficient number of vehicles for the public transport combined with the increasing number of cars in town seem to be a major problem. Thus, in many days the traffic is heavy on the main roads. Because of the heavy traffic many environmental problems appear:
- excessive pollution with exhaust gases;
- on main roads and in the major intersections of the city the noise is over limits;
- car accidents (www.primariacj.ro).
The objectives of the present study are:
- restructure of the industrial heritage for urban regeneration and development;
- conservation and conversion of the historic specific features as cultural assets is a good strategy for stimulating investments and discovering a new lifestyle in the improved urban environment;
- landscape redevelopment for urban aesthetics, for ensuring public health standards and for protection against nuisance factors, natural and anthropogenic.

In the process of Cluj-Napoca’s development and urban planning, it must be avoided causing damage to the natural environment and it should be obtained maximum of economic and social benefits in terms of sustainable development. In general, the development of settlements and growth of population affect the natural environment by reducing the amount of forested land, by air, water and soil pollution and intensive exploitation of natural resources (Sandor & Posta 2010). A very important part is setting the framework of spatial development of the city in accordance with the potential and aspirations of the citizens. Some of the objectives that have to be accomplished are assuring the quality of built and planted areas, improving living conditions by eliminating malfunctions and efficient use of land in accordance with adequate urban functions (Law 350/2001).

**Research methodology.** The research methodology took place in several phases:
- phase 1: identify an unaesthetic industrial area and inefficiently used;
- phase 2: identify the urban environment that includes the studied area;
- phase 3: existing situation analysis (site visit; getting a site plan as recent as possible and relate it with the actual situation; creating a photo album with the existing situation; identify the elements that are part of the landscape; taking notes of everything that is important for the study);
- phase 4: elaboration of a concept of redevelopment (identify the opportunities and making them valuable; drawing sketches of the concept);
- phase 5: presenting the redevelopment proposals and detailing the solutions (selecting the working method for the elaboration of the proposal; drawing the redevelopment proposals using specific software and its details).
- phase 6: model making (Figure 1).

![Figure 1. Scale model plan of the studied area - made from different types of material.](image)
Results and Discussion (case study)

Existing situation analysis

Location - the location that was chosen for analysis is the eastern industrial area of Cluj-Napoca and is delimited by the following: Muncii Avenue, Fabricii de Zahăr Street, Someșul Mic River. Its address is 16 Muncii Avenue and Fabricii de Zahăr Street No. FN (Figure 2).

Figure 2. Location (Source: http://cluj-city.map2web.eu/).

Neighborhoods - the functions of the buildings from the surrounding area bring a lot of employees and students in the area and in the close future, even residents. They can not enjoy the benefits of the green space that is designed because it is a private space meant to serve the destinations of each company, but everyone can be glad for the ecologically and aesthetically improved environment.

Entrances - the access to the studied area is both pedestrian or by vehicle. Car accesses overlap in each case with the pedestrian ones and there is no clear delimitation between them. The accesses are only distinguished by the different materials used at each gate. Circulation in the area is restricted by the security agents that are present at almost every entrance.

Fences - in order to control the public access, all the area is surrounded by fences. They are made of concrete, galvanized wire placed on metal or iron pillars, wire mesh or sheet metal. Also in their case, the main problem is the lack of unity.

Alleys, pedestrian and vehicle paths - the land is flat and there are no differences in level. The largest area is covered by the auto and pedestrian circulation system. The type of pavement is asphalt and concrete slabs, but it does not have a uniform aspect because of the different textures it has. In some areas the pavement is deteriorated, in others is restored, but the lack of unity gives an unattractive image.

Parking lots - there are parking lots on the entire studied surface placed in the perimeter of each company. They reduce the green space substantially and the cars are present in any free zone. The association of the industrial building with the image of the parked cars, in most cases in a random way, gives the impression of chaos. This is because of the overcrowding, lack of space, unity, comfort and green spaces.

Outdoor furniture and decorative elements - there is a lack of decorative elements, but there can be taken into consideration an industrial element in a strong colour which catches the eye and also some outdoor furniture belonging to the Golden House.
restaurant: a gazebo and some benches in the leisure area. Unfortunately, there are few elements that can give value to such a large area which confirms the poor quality of the studied area.

**Urban utility networks** - all types of urban utility networks cross the entire surface: water, drainage, gas, telephone, electricity. They are places on the surface or underground, according to regulations.

**Hygiene** - there are various types of bins, bags and storage spaces for waste disposal. Some insalubrious zones need remediation, maintenance and cleaning.

**Lighting** - the lighting fixtures are not too many, some are old and some are new to keep up with the technology. Each company chose a different type of fixture, so there is an irregular distribution.

**Vegetation** - the existing vegetation is not distributed after a strict plan. It is composed of resinous trees and shrubs, deciduous trees and shrubs, climbing deciduous shrubs, except flower species (Table 1). Some of the species are mature, others are young specimens, while others appeared spontaneously by natural dissemination. The maintainance of the vegetation is mostly done by the companies that own the property and this is the main cause of the visible differences between the cared and poorly maintained species.

<table>
<thead>
<tr>
<th>Existing vegetation</th>
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<tbody>
<tr>
<td>Resinous trees and shrubs</td>
</tr>
<tr>
<td>Thuja occidentalis</td>
</tr>
<tr>
<td>Thuja orientalis</td>
</tr>
<tr>
<td>Pinus nigra</td>
</tr>
<tr>
<td>Picea abies</td>
</tr>
<tr>
<td>Thuja occidentalis</td>
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<tr>
<td>Fastigiata</td>
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</tbody>
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Table 1

Figure 3 represents the existing situation plan and it can be noticed the big difference between the green spaces and the built area. The situation is shown using photos in Figures 4 and 5.
Figure 4. Roof – seen from above (Source: https://maps.google.ro/)

Figure 5. Existing situation photos, 2013.
Proposed situation. This study is based on the observations made during site visits. While analysing the area, it can be seen that it has restricted access and is only frequented by employees and customers.

It has several entrances and every company has its own way for designing the parcel that belongs to it. The purpose of this study is to increase the green spaces, to meet the need of improving the urban climate and to design new rest, walking or decorative areas.

For the existing situation, the comparative analysis of surfaces gives the next results: total surface: $81745,17 \text{ m}^2$; surface occupied by buildings: $66396,98 \text{ m}^2$; surface occupied by pavements: $12554,64 \text{ m}^2$; surface occupied by vegetation: $2793,55 \text{ m}^2$ (Figure 6).

Currently, the studied area does not offer attractiveness. The lack of urban design is the major problem why the employees cannot come outside the building to enjoy the good weather or to contemplate nature. At this moment, the outer space is just a transit area, although there is enough space to create a quality landscape design.

The existing vegetation is poorly diversified, there is a poor variety of species and cultivars. In the proposal, not only the species with ornamental value will be kept, but also the mature species and those with a rich canopy (Juglans regia, Prunus cerasifera). The sick, old, deteriorated species or those that do not meet the necessary functions will be removed (Morus nigra).

Due to the location in an industrial area, the species that were proposed in the new design are resistant to pollution and also to dust and pollutants caused by the heavy traffic in the area (Table 2).

The proposal comes with new decorative zones, recreational areas, parking lots, alleys and one of the main purposes is to hide vehicles in the landscape.

To improve the urban microclimate, it can be taken as an advantage the large surface area of the roof and exterior walls to design a green roof and green walls in different artistic shapes.

A new lighting system will emphasize the alleys and the proposed highlights, ensuring an aesthetic night view. An architectural lighting will be realized using a series of LED nodes that will illuminate trees and shrubs that become visible at night. Several spotlights will also provide the architectural lighting of the warehouse.

The feeling that the new landscape development is trying to achieve is the sense of security. Visibility must be as extended as possible in order to have a very good control of what happens inside. That is the reason why the visual barriers will be avoided as much as the situation allows.
Therefore, the actual fences will be replaced with ones that allow a greater visibility, but at the same time they will have a uniform distribution, not a chaotic one like in the existing situation.

Table 2

<table>
<thead>
<tr>
<th>Proposed vegetation - plant material list</th>
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<tbody>
<tr>
<td><strong>Green space</strong></td>
</tr>
<tr>
<td>Corylus avellana contorta</td>
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<tr>
<td>Fraxinus ornus</td>
</tr>
<tr>
<td>Prunus serrulata</td>
</tr>
<tr>
<td>Morus alba pendula</td>
</tr>
<tr>
<td>Betula pendula</td>
</tr>
<tr>
<td>Gleditsia triacanthos</td>
</tr>
<tr>
<td>Chamaecyparis lawsoniana</td>
</tr>
<tr>
<td>Thuja occidentalis globosa</td>
</tr>
<tr>
<td>Hibiscus syriacus</td>
</tr>
<tr>
<td>Buddlea davidii</td>
</tr>
<tr>
<td>Cornus alba</td>
</tr>
<tr>
<td>Hosta marginata</td>
</tr>
<tr>
<td>Viburnum lantana</td>
</tr>
<tr>
<td>Ligustrum vulgare</td>
</tr>
<tr>
<td>Spiraea x vanhouttei</td>
</tr>
<tr>
<td>Taxus baccata</td>
</tr>
<tr>
<td>Chaenomeles japonica</td>
</tr>
<tr>
<td>Kerria japonica</td>
</tr>
<tr>
<td>Weigela florida</td>
</tr>
<tr>
<td>Deutzia scabra</td>
</tr>
<tr>
<td>Vinca minor</td>
</tr>
<tr>
<td>Lavandula angustifolia</td>
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<tr>
<td>Rosa sp.</td>
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</table>

The perception of the area at the human level was taken into consideration when making the design proposal and that is the reason why the accent was put on emphasizing the human scale.

The redevelopment brings improvements in terms of aesthetic, social, environmental quality and educational. The image of the site will be changed dramatically. In time, this space will become an area that has its own identity.

The new landscape redevelopment will require maintenance, but it will give physical and mental comfort and it will stimulate leisure in open space. This will increase the attractiveness of the area, will provide a cool oasis in the summer heat and will satisfy every visitor by its functions.

Figure 7 presents the proposals for the studied situation and the legend shows the viewpoints of the perspectives that Figure 8 contains.

The drawings of the existing situation plan, the proposed plan, the perspectives and also the comparative analysis of surfaces were made at real size of the area using Google SketchUp, a 3D modeling program and CorelDRAW X3, a vector graphics editor. The design software was used to import plans, scale them, draw the concept and details and export part of the work.
SWOT analysis of the studied area

**Strengths:**
- the possibility of making the large area available unique by having specific features in the design;
- the proximity to locations that may benefit indirectly from the new green space because of improving the microclimate;
- location.

**Weaknesses:**
- noise pollution;
- lack of outdoor furniture;
- overlapping auto and pedestrian accesses;
- unaesthetic and insalubrious areas;
- poor diversification of species;
- lack of unity of the landscape;
- large built area;
- pollution because of the heavy traffic;
- poorly maintained, old and damaged green spaces;
- lack of leisure areas.

**Opportunities:**
- increasing of green spaces area;
- creating an attractive and pleasant environment for employees and customers;
- the entire area is cleaned;
- hiding the vehicle from sight as much as possible;
- creating areas for rest and relaxation;
- enhanced security;
- newly planted vegetation;
- the location can increase the number of visitors;
- new lighting systems;
- reduced pollution;
- increasing the wellbeing of employees and visitors;
- creating a local model worth following.

**Threats:**
- maintenance costs;
- high cost of execution;
- damage of the new design caused by poor maintenance;
- destroying outdoor furniture due to bad use;
- abuse of access on green space by auto and illegal car parking.

*Figure 8. Proposed situation perspectives.*
**Conclusions.** Urban regeneration is an essential condition for increasing population quality of life. A remarkable environment can be created by finding a balance between discreet and efficient conversion of the site.

The industrial heritage must not be destroyed and the surrounding areas should be improved to attract visitors. The green spaces placed in the industrial areas has the same importance as other green spaces within the city. It can even become a place for leisure, relaxation and also social interaction. The aesthetic part of the new design gives true value to the area and assures a good environment to work or just pass-by. The significant thing is the influence it has on the local circulation of air because of keeping cool air in the hot summers.

While walking in the city, usually the image is composed of concrete, asphalt and glass and passing through a green area gives citizens a different feeling. Every green space must be valued and improved and creating new green areas is a sign of respect for a healthy life. Inside of a city, it should always be a balance between green and built areas and traffic routes. This also applies to the industrial areas and it was taken into consideration and applied in this study.

The present study aimed to find an area that can be improved and after the situation analysis elaborate a solution using landscaping design. The new design has a positive impact on the environment and life of citizens. By increasing the number of quality green spaces, the city can increase its own value.

**References**


*** http://cluj-city.map2web.eu/.

*** https://maps.google.ro/.

*** Law number 350 from 6th of july 2001 on spacial planning and urbanism.