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TRIVALE FOREST-PARK: THE GREEN LUNG OF THE CITY OF PITEŞTI

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Abstract
The paper presents the results of a study regarding the landscape regeneration and reintegration of the Trivale Forest-Park. The peri-urban forest area stretches from the Zoological Garden to the city center, 2 km away from the Argeş River. The Trivale Park lies in the southern part of the studied site. The site contains vegetal and built elements with a historical value, which date back to the beginning of the 20th century.
The methodological approach includes 4 main stages: information gathering, on-site documentation, the synthetisation of the information resulting from the analyses conducted in the studied area and the elaboration of the strategy of reintegration and regeneration of the landscape at a functional and aesthetic level.
The synthesis revealed that the forest is a green enclave threatened by real estate development and the local's negligence, being unintegrated at a functional level in the urban context. The proposed solution for the exploitation of the forest-park consists in its activation as green lung of the city. The main objectives of the strategy are the insertion of new functions in the forest through minimal and sustainable interventions, and the aesthetic exploitation of the historical park in the context of the integration of the forest-park.

Keywords: landscape analysis and planning, Trivale Park, urban forest.

1. INTRODUCTION

The urban forest can be described as an ecosystem comprising of trees, shrubs and herbaceous vegetation which can be found inside and around settlements and it can include the trees in the street as well as those in the gardens, the vegetation in the parks and the natural water network. Unlike the natural forest, the urban forest is maintained through constant human intervention.
The benefits of the urban forest are directed towards the communities (economic, social and environmental benefits), as well as towards animal's habitats. The ecological services that the forest brings are seen as benefits brought to the ecosystem, such as: capturing the CO_2, protecting a river basin, conserving the biodiversity and embellishing the landscape, the regulation of climate and water circuit in nature, the soil formation, recycling (Campbell et al., 2005). The forests are among the biggest biodiversity conservation units in the world, and according to the latest estimations, they contain 60 to 90% of the totality of the planet's terrestrial species (Konijnendijk et al., 1996).
The studied site presents a meaningful development capability for minimal landscape interventions that can underline the atmosphere which is so characteristic for historical forest parks. The approach focuses on the possibilities of regeneration and reintegration from the point of view of landscape

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architecture of the forest-park by creating a balance between the new interventions and the measures that are required for the protection of the existing habitats.

2. MATERIALS AND METHODS

The objectives of the research are divided into two categories: theoretical objectives and applicative objectives. The theoretical objectives imply the assessment of the development potential from the point of view of landscape architecture, and the applicative objectives deal with the diagnosis as far as the ecological and social aspects are concerned, the establishment of a strategy through which the dysfunctions are being taken care of, and last but not least, the substantiation of a program through which the area should be valorized. In the elaboration of the present paper, the three following methods of research have been used: theoretical documentation/information gathering, practical documentation (on site observations) and the processing and synthetisation of the information gathered as a consequence of the two types of documentation. The theoretical documentation required the study of the bibliography: the inspection of documents, as well as specialised literature and case studies, while the practical documentation involved information gathering about the site from libraries and archives (plans, maps, archive registers, management plans, etc) on-site direct research and on-site analyses: visual and sensorial analysis, subjective analysis, the analysis of vegetation. In the end, after a rigorous selection of the obtained data, the processing, and the synthetisation processes took place. All the figures presented in the paper are original contributions and are made by combining a series of graphics softwares such as Adobe Illustrator, Adobe Photoshop and Autocad.

The studied site lies in the central-southern part of Romania, between the Southern Carpathians and the Danube, in the southern region of the subcarpathians, situated at the confluence of Arges River and Doamnei River, the studied area consists of the City of Pitesti, Trivale Forest and Trivale Park. The city is situated at an altitude of 250 m, the level of the minor riverbed of the Arges, in the southern part, and of 356 m, in the Trivale neighborhood, in the western part. The climate is characterized as being moderate and specific to a valley, with an annual average temperature of 9 to 10°C, while the volume of rainfall exceeds the country's average, oscillating between 680 and 700 mm per annum. The studied area is spread on 11 300 ha, out of which 200 ha are occupied by a part of the Trivale Forest, and 12 ha are occupied by Trivale Park. The city exerts a permanent pressure upon the forest through its tendency towards uncontrolled urban development (urban sprawl) in the last two decades in which the two neighborhoods that border the site, Trivale neighborhood and Gavana neighbourhood, have developed at a galloping rate. The peri-urban forest area is situated between the zoological garden and the center of the city of Pitesti, just 2 km away from the Arges river. There is good accessibility, with the site being well connected to the transportation and pedestrian network, the latter being neglected up to now.

3. RESULTS AND DISCUSSIONS

ANALYSES – CURRENT SITUATION

Circulations and accessibilities. For a better understanding of the way in which the circulation and accessibility take place in the studied area, the following classification of the concepts has been employed: the type of circulation: pedestrian, bicycle, roadway, and the intensity of the traffic: intense, medium, low. The main access points to Trivale Park are those from the center of the city and from Trivale neighborhood. The most intensely circulated pedestrian pathways are those in the

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park, while the forest tracks are the least circulated, and the access points from Gavana neighborhood are rarely used.

Urban functions: The forest-park is situated between the two neighborhoods with collective and individual dwellings, near the city center, an area which has mixed functions.

Relief - level curves and hydrographical network. The studied area has a level difference of 100 m, out of which 50 m represent the level difference in the forest park. There has been registered the presence of a hydrographical network that flows into the Trivale Stream.

The juridical regime and the management of the vegetation in Trivale Park. The largest part of the Forest is part of the property of state being administered by Romsilva, apart from the northern part which contains private woodland. The vast majority of the areas undergo conservation cuttings, and areas 20C, 2C, as well as the Trivale Park, undergo sanitary cuttings.

The composition of forest vegetation. The site represents a broad-leafed forest with the dominant species being *Quercus robur* and *Quercus petraea*, followed by *Fagus sylvatica, Carpinus betulus* and *Robinia pseudoacacia* (Figure 1). Through anthropic interventions, in the present, there can be found sporadically species of pine (*Pinus nigra, Pinus sylvestris*). The existing dendrological vegetation is organized in the form of forest compositions in which every species is used in different proportions, while the herbaceous stratum is composed of Poa pratensis. The composition of the forest vegetation is mainly formed of oak and durmast, completed by European beech, and the herbaceous stratum is mainly represented by the common meadow-grass (Piteşti Forest District, 2013).

The composition of dendrological vegetation in the park. A part of the dendrological species found in the Trivale Park are spontaneous species, *Quercus robur, Carpinus betulus, Fagus sylvatica, Malus domestica, Pinus nigra, Buxus sempervirens, Forsythia x intermedia, Juniperus sabina, Prunus avium, Thuja orientalis* and species found in the alignments of the main pathways that cross the park, *Tilia tomentosa* and *Aesculus hippocastanum* represent clear interventions that have taken place over the years. The dominant dendrological species in the park are oak and hornbeam, followed by European beech, European horse-chestnut can be seen in the two alignments adjacent to the main pathways.

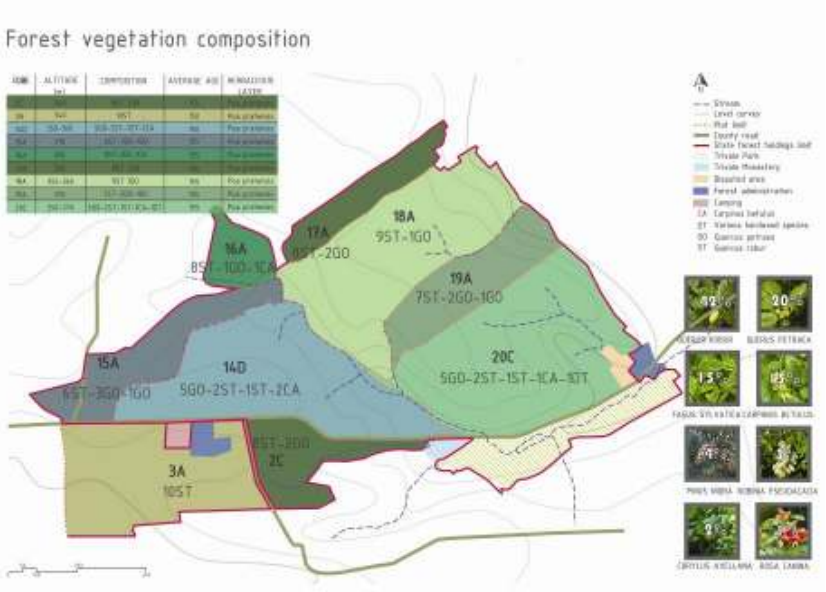

Figure 1. Trivale forest. Vegetation units

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The composition of the herbaceous vegetation in the park. The herbaceous species found in the park vary with respect to the medium in which they can be found. Therefore, *Hedera helix* can be found along the stream that crosses the park, and the wood anemone/thimbleweed *Anemona nemororsa* can be found on the entire surface of the park alternately combined with *Chelidonium majus, Poa pratensis, Vinca minor, Lamium maculatum* and *Ranunculus ficaria*. In the park area, the dominant herbaceous species are the wood anemone which can be found all over the park except the lake area. The common ivy can be found along the Trivale Stream, and the figwort, which is spread on the largest surface of the park.

Figure 3. The socio-ecological role of Trivale Forest-Park

The balance of the dendrological and herbaceous vegetation. The predominant dendrological species in the forest and in the park is the oak, followed by the European beech and the hornbeam, and in smaller percentage there can be found touches of pine, while as far as the herbaceous species are concerned, the common ivy and the wood anemone are predominant in the area of the Trivale Park.

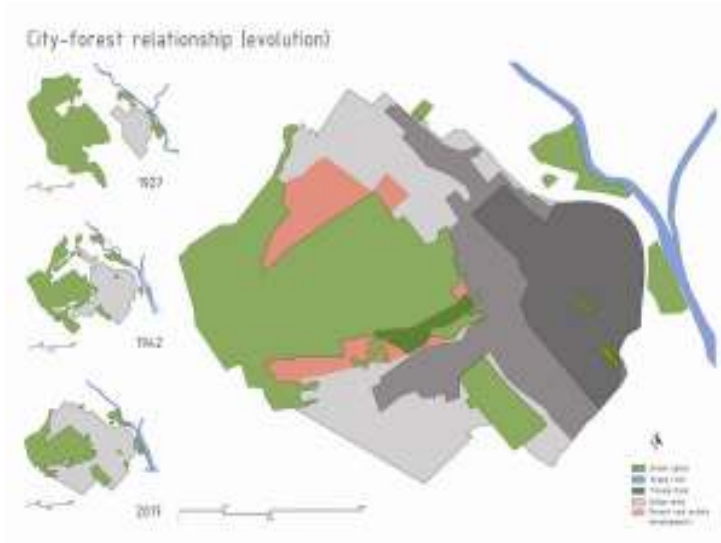

Figure 2. City-forest relationship (evolution)

Fauna. The Trivale Forest comprises of numerous species of mammals, birds, and reptiles, a part of which - insects and large mammals - are protected by law. Among the protected species we can enumerate the wildcat, and some of the species of cinegetic interest are the boar, the deer, and the eagle owl.

The socio-ecological role of the forest. The main roles of the forest-park are the amelioration of the local microclimate through the improvement of the quality of the air and the regeneration of the

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temperature, as well as the recreational role given by the functions of strolling, relaxation and other socio-cultural objectives (Figure 2).

The evolution of the forest-city relation. The Trivale Park was landscaped in 1900, when the Town Hall bought ornamental trees from Count Thedeus Graf Lubenschi of Austria, to be planted in the new park. Further interventions projected by landscape architect Edouard Redont take place in 1903, and ten years later architect Emile Pinard brings his contribution to the landscaping of the Trivale Park. In the last century, the forest park, as well as the city, have undergone notable changes in terms of form and surface. Taking into account the expansion of the city in the last century, we can see that there is an increase in the anthropic pressure upon the studied area. The forest-park loses ground to new neighborhoods and residential areas because of uncontrolled clear cuttings (Figure 3).

Elements of architecture and design. The architectural elements that can be found in the forest park have an important role as far as the ambient is concerned, comprising of a series of buildings and objects of historical value. Among them, the most important are: the Trivale Monastery which was constructed by a few monks from Cozia or Cotmeana, and later it was walled in/fortified with brick walls by Metropolitan Varlaam in the second part of the 18th century. The belltower was built in 1904. The main architectural and design elements spread around the park date back to the beginning of the 20th century, among which we can mention The Cold Grotto, The Bridges of Trivale Street, the lake and the embankments.

The sensitive analysis. Within the framework of the sensitive analysis, there have been identified 7 types of ambiances in the forest-park. They have been associated with movie genres in order to portray a more faithful image of the existing atmosphere. Among these movie genres, we can mention: documentary, drama, comedy, fantasy, horror, historical and romantic, associated with the areas near the park, the pavilion area, The Cold Grotto, the stream, the forest, the yard and the garden of the monastery and the main alley of the park, respectively.

S.W.O.T. ANALYSIS

(S) STRENGTHS

- A good accesibility level from the neighboring areas
- The forest trail infrastructure ensures a pedestrian transit flux
- Attraction points withtin the forest-park
- Attractive relief featrures
- The presence of a hidrographic network
- Most of the forest holdings belongs to Romsilva
- Numerous secular tree specimens
- Multiple enviornemntal and social benefits
- Numerous built elements with historical value
- Trivale forest-park is the largest green area in Pitest

(W) WEAKNESSES

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- Lack of functional connection between the park and attractions
- The historical heritage is unexploited
- Part of the vegetation is degraded
- The loss of the initial character of the landscape due to an improper management
- Lack of water in the lake bed
- Lack of various specific activities

(O) OPPORTUNITIES

- The presence of a1 highway (corridor iv in the pan-european network)
- The intention to declare the forest a protected area of national interest

Figure 4. Trivale Forest-Park. Synthesis of the current situation

(T) **THREATS**

- Increased anthropic pressure on the forest
- Increasing threats on the local biodiversity

The diagnosis resulted from the synthesis of the analyses reveals that the Trivale urban forest is a threatened and neglected green enclave (Figure 4). It is neglected in the present, and apart form the historical part, it is not frequented by visitors. It is threatened by the real-estate developments which took place in the last 20 years, which exert pressure over the silvic ecosystem. The urban forest is not integrated into the urban

Figure 5. Trivale Forest-Park. Landscape revitalization strategy

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context, the public transportation being scarce towards the outskirts of the city, and the infrastructure of the pedestrian routes and the functional attractiveness are reduced.

STRATEGY

The aim of the proposed vision (Figure 5) is to activate the urban forest as a green pole of the city, to achieve the connection and landscape revitalization of the Trivale forest park in the context of the city of Pitesti complying with the sustainable development. The mission is channeled into three directions as follows:

* At an urban level, the mission is to integrate and add value to the forest in the context of the city.
* At the level of the forest, the mission in to insert new functions in the forest through minimal sustainable interventions.
* At the level of the historical park, the mission is that of adding aesthetic value to the park in the context of the reintegration and revitalization of the forest-park.

A series of measures are necessary for the regeneration and reintegration of the forest-park in the urban context:

* Because of the fact that the north-west part of the forest is private property, and that it is crossed by several forest tracks that are used by pedestrians to connect the two neighborhoods, we propose the expropriation of several strips of land in order to create an unhindered connection between them.
* The establishment of a route that can ensure a visual and functional identity of all the socio-cultural objectives existing on the site.
* A more thorough connection between the zoological garden and the forest through hippic tracks that cross the entire urban-forest.
* The proposal of new bus stops intended for public transportation in the north-west area, where it is needed.
* The establishment of new landmarks inside the forest to extend visitors' area of interest and to increase their numbers.
* Minimal interventions in the proximity of the water courses in the Trivale Forest to enrich its ambiental characteristic and to integrate water as a dynamic element in the forested landscape.
* The use of the relief with the purpose of establishing bicycle paths.

Figure 6 - Trivale Forest. Proposed interventions

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PROPOSED INTERVENTIONS REGARDING LANDSCAPING

The solution scheme consists of a proposal for different categories of routes, as well as for the new functions and the proposed vegetation (Figure 6). Each of these aspects is dealt separately, but in relation to the others, to allow a better understanding of the proposals individually as well as collectively.

The solution scheme - Trivale Forest. The solution scheme brings transformations that are meant to considerably improve the degree of usage of the space as far as free movement and functionality are concerned. As it can be seen in the following lines, the proposals lead to the establishment of an attractive environment covering a wide variety of preferences and ways of spending leisure time in a public area.

Functions. The solution scheme referring to the distribution of functions and amenities stipulates the introduction of a series of seasonal and permanent functions, thus supporting the multi-seasonal character. Therefore the activity of the park, considerably reduced in winter, is maintained throughout the year. The spatial restructuring of the functions' structure aims at the conservation of the existing amenities and the insertion of new ones, without creating imbalances. Thus the creation of a coherent visual and functional approach aims at the harmonization of the existing amenities: The Children's Palace, the plateau, The Cold Grotto Restaurant, the Trivale Monastery, Cornul Vanatorului Complex and the Zoological Garden. The outcome of the valorification of the local potential combined with the newly proposed functions will be the reintegration and regeneration of the forest park in the urban context.

Circulation. In the framework of the solution scheme, a few changes have been brought to the pedestrian network of alleys for the integration of the whole forest and to offer a better accessibility to the visitors coming from neighboring areas. Moreover, we propose: a network of bicycle pathways and a hippic route. As far as the bicycle route is concerned, we want to focus on the differences between level curves of the relief with the aim of creating offroad routes intended for dedicated sports that enliven the forested landscape without damaging it. There is no need of clear-cutting in order to create the bicycle pathways, these being proposed in those areas that lack arborescent vegetation. The bicycle routes will connect the park and the forest, as well as a series of interest points, places that resemble adventure-parks. The hippic route is created for offering the visitors an attractive way of visiting the forest-park as well as creating a connection between the zoological garden and the forest. Another kind of route has been proposed so as to offer another perspective to the viewer. The observation tower, presented in the functions section, has been designed with two tree-top walks that start at a height of 16m and descend on a mild slope (5%) to the ground level, in the park, from where they can be easily accessed, as well (Figure 7). The common starting point of these pathways is the tower. The purpose of the two tree-top walks is to create a connection between the park and the forest as far as the circulation is concerned, with the first tree-top walk starting from the area of the Children's Palace, while the other starts near Trivale Monastery. Both areas are intensely circulated. Along the way, the tree-top walks can be easily accessed from different areas, as they have been designed with a series of circular stairways that

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enable both the access and exit of the tree-top walks, so that the visitor doesn't feel constrained to transit the whole route.

Vegetation. As far as the vegetation in the forest is concerned there is no need for major interventions, as the solution aims at preserving and protecting the area through minimal well-integrated interventions, rather than invasive ones which can damage or alter the character of the

Figure 7. Master plan proposal for Trivale Park. Tree-top walkway trail (red)

site. This means that the proposed functions will integrate into the actual context, with cuttings being made only in exceptional cases.

Solution Scheme - Trivale Park

As far as the park is concerned, the solution scheme presents separately the main types of interventions which concern a series of measures that have been taken for the existing landmarks.

Functions. The existing functions have been classified according to the type of measure that has been taken for each of them. Thus, the existing objectives pertaining to the historical park area will undergo, in turn, restoration, conservation and remodeling interventions, this being put into practice after a thorough assessment of their current state and necessities. The bridge that crosses the stream of Trivale Street, the embankments, as well as the pavilion situated near the access alley from Trivale Neighbourhood will benefit from restoration, because of their degrading state, while the Cold Grotto, the lake and the bridge nearby, as well as the access stairs, will undergo remodeling.

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These actions are necessary because the character of the landscape is negatively affected by the poor aesthetic aspect of the mentioned elements, not being able to fulfill the role for which they have been integrated into the landscape scenery of the park. The historical elements that are in a good condition: Trivale Monastery and the belltower (both of them being historical monuments), Trivale Stream, the statues called "Mesterul Manole" and "Odihna" sculpted by Ion Calinesti, the bridge that crosses the stream, the stairs and the door situated on the premises of the monastery, the pavilion and the embarkment situated in the proximity of the Grotto, will undergo conservation processes.

Circulation. As far as the circulation is concerned remodeling measures will be applied to the structure and materials used in the making of the park's alleys so that these will integrate better in the context of the forested landscape.

Vegetation. In the framework of the solution scheme, the main types of interventions regarding the vegetation are presented. The minimal interventions consist of applying measures for the conservation of the areas which are in a good condition, with the aim of conserving the arborescent elements that have a historical value and the deceleration of the degradation process through proper treatment. Medium interventions consist in remodeling the areas surrounding the most important objective in the park, which is the Cold Grotto. The set-up of these areas will be done in such a way as to satisfy the visitors' aesthetic and recreational needs. Major interventions imply the set-up of a vegetal revetment for the lake, the planting and completing, if necessary, of the existing tree alignments along the main alleys and the set-up of a garden with aromatic plants in the backyard of the Trivale Monastery.

4. CONCLUSIONS

The set-up of the forested areas, and of the areas which are in need of such a process, is extremely important for a balanced spatial development, as well as the establishment of a harmonious relationship between the existing habitat of the (forested) landscape and the anthropic interventions in the urban area (forest-park). the different types of set-up should be put into practice according to the specific and the potential of each forested area in order to integrate it in the local, regional and national context without altering, as far as possible, the existing flora and fauna, because these processes prove themselves fundamentally wrong through the negative impact they have in short, medium and long-term. Unfortunately, most of the times, they are irreversible. An in-depth study carried out with seriousness and dedication proves to be essential in the improvements brought to the natural areas which shelter various habitats and an abundant vegetation.

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