

## ECOLOGICAL AND AESTHETIC ROLE OF SPONTANEOUS FLORA IN URBAN SUSTAINABLE LANDSCAPES DEVELOPMENT

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**Abstract:** The aim of this scientific paper is to promote sustainable methods with beneficial effects on the environment, with aesthetic effect on urban and rural landscapes. This paper highlights and promotes ecological and aesthetic role of spontaneous flora in sustainable landscape planning. This method in which spontaneous flora is an important environmental factor is minimal valued in terms of landscape, even less implemented in Romania. By covering current bibliographic references, by analysing contemporary urban landscape in Cluj-Napoca, Romania, in the present study, are exposed principles, benefits, constraints and legitimate questions about sustainable landscapes by introducing spontaneous flora or, more simply, through its conservation, practical examples of successful integration in the contemporary landscape of ruderal landscapes. Conclusions from this study refer specifically to the role of spontaneous landscapes in urban ecology, to the management of these landscapes and exposure of minimum guidelines so that this method has a decent start in Romania.

**Key words:** spontaneous flora, ruderal, landscaping, ecology, conservation

### Introduction

Given the negative changes that occur in the natural environment due, in particular, to noxious anthropogenic factors, the main purpose of this paper is to highlight the ecological and aesthetic values of spontaneous vegetation and use/conservation of this type of vegetation in sustainable landscape.

In this paper is treated particularly the spontaneous flora from urban and ruderal landscapes that can be successfully valued to greening cities. In most urban areas, a cosmopolitan range of wild plants provide important ecological services, services which, in light of the expected impact of climate change could become increasingly important in the future. Peter Del Tredici asserts that the management of spontaneous vegetation in urban areas to increase its ecological and social values is a sustainable strategy rather than an attempt to restore historical ecosystems existing before the establishment of current cities [DEL TREDICI, 2010].

European ecologists have been analysing the historical development and spatial distribution of spontaneous urban vegetation over several decades [CHOCHOLOUŠKOVA & PYŠEK, 2003; PYŠEK & al. 2004; SUKOPP, 2002] and recently began documenting the coverage in urban ecosystems using GIS technology [HERBST & HERBST, 2006; RINK, 2009]. Peter Del Tredici make a comparison between European and North American ecologists showing that the last ones have been slow to adopt urban ecology and began to

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focus seriously on the subject since the 1990's [ALBERTI & al. 2003; GRIMM & al. 2000; ZIPPERER & al. 1997; DEL TREDICI, 2010].

Applying the comparison, we see that in Romania the interest in the spontaneous landscape environmental values is recent and is not yet well defined.

This paper supports the idea that spontaneous urban vegetation can effectively achieve many of the environmental objectives of traditional restoring with minimum financial investment and a greater chance of long-term success [CHOI, 2004; SAGOFF, 2005]. The information presented urges ecologists, landscape architects, and other professionals interested, taking into account, without prejudice, all biological resources and to recognize that cities spontaneous flora has the ability to make significant contributions to urban ecological functionality.

### **Material and methods**

The paper is based on the study of scientific literature existing in Romania and internationally, and analysis and identification of Cluj-Napoca spontaneous landscape for application of sustainable methods in landscape planning.

Using these research methods, the paper highlights the characteristics of the urban environment, urban spontaneous vegetation, its management, and examples of successful integration of ruderal urban landscape in Germany and the United States of America, and presents elements that differentiate new designed landscapes that used spontaneous flora from spontaneous landscapes preserved and managed for aesthetics and urban greening.

### **Results and discussions**

From a strictly functional perspective, most vegetated urban lands can be classified into one of the three broad categories: remnant native landscapes, managed horticultural landscapes, and abandoned ruderal landscapes [KOWARIK, 2005; KÜHN, 2006; WHITNEY, 1985; ZIPPERER & al. 1997]. These landscape types can be distinguished analysing: 1) their past land-use history; 2) the types of vegetation they contain; 3) the characteristics of their soils; 4) the levels of maintenance they require in order to preserve their integrity. All three types of landscapes are found in urban areas of Cluj-Napoca (Fig. 1).

The least studied of these types is the abandoned ruderal landscape represented by marginal or degraded urban land that receives little or no maintenance, dominated by spontaneous vegetation - a mix of species that grow and reproduce without human care or intent.

In Cluj-Napoca this type of landscape, ruderal, is common and we can clearly associate with the margins of transportation infrastructure, abandoned or vacant residential, commercial, and industrial property, and the interstitial spaces that separate one land-use function from another (Fig. 2, 3). While ruderal landscapes are often referred to as "wastelands" the progress of urban ecology place in a new light this neglected resource. Perhaps the most obvious aspect of the distinctive urban environments is the ubiquitous physical disturbance associated with the construction and/or maintenance of their infrastructure.

Being a city with relatively well developed economy, in Cluj-Napoca, a significant part of the factories are always in a process of dismantling and reconstruction, which tends to generate a constantly shifting mosaic composed of opportunistic plant associations dominated by disturbance-tolerant, early successional species. An edifying example of

tolerance and adaptability to extreme conditions offered by the urban areas is the way that a fern manages to survive on the wall of a building in Cluj-Napoca (Fig. 4, 5). The images were captured in 2009 and 2011, demonstrating the resilience and adaptation of this species in adverse conditions. After analysing the urban landscape of Cluj-Napoca we find that in neighbourhoods with the highest property value - spontaneous vegetation is found in relatively small quantities, while in the poorer neighbourhoods and industrial areas this type of vegetation abounds (Fig. 6). The origin and global dispersal of the spontaneous vegetation that dominates abandoned urban land is both a cultural and a biological phenomenon [KOWARIK, 2003; KOWARIK & LANGER, 2005; MACK & ERNEBERG, 2002]. This vegetation is represented by a cosmopolitan range of species, as follows: 1) native to the area; 2) formerly or currently cultivated for agricultural or horticultural purposes; 3) unintentionally introduced, disturbance adapted weeds.

An exhaustive literature review of the vegetation of 54 cities in Central Europe indicates a “remarkable concentration of aliens in urban areas” [PYŠEK, 1998]. In recent years, a number of European researchers have gone so far as to propose that certain inner-city areas with relatively old patches of spontaneous vegetation be actively conserved because of the role they play in generating and maintaining urban biodiversity [KOWARIK, 2005; MURATET & al. 2007; RINK, 2009].

PETER DEL TREDICI (2010) shows that the spontaneous vegetation of North American cities has not been studied as extensively as that of European cities. CLEMANTS & MOORE (2003) found that the non-native species richness of urban areas in the U.S. is probably more influenced by historical and socio-economic factors than by climate or latitude. Part of the spontaneous flora that dominates American urban landscapes is due to successive waves of immigrants, which along with their traditional cultures have introduced associated weeds [MACK, 2000; MACK, 2003; MACK & ERNEBERG, 2002]. Also, Del Tredici notes that in contrast to the large number of European plants introduced in North America, few species native to this region were able to penetrate and be naturalized in Europe [WITTIG, 2004; DEL TREDICI, 2010]. The asymmetry of the biological exchange between the two continents is partly a reflection of the lopsided nature of the cultural exchange between the two continents and partly a result of the fact that Europe, for reasons relating to both cultural and evolutionary history, seems to be unusually rich in disturbance-adapted herbaceous species [WEBER, 1997].

The idea that self-sustaining, historically accurate plant associations can be restored to urban areas is an idea with little credibility in light of the facts that 1) the density of the human population and the infrastructure necessary to support it have led to the removal of the original vegetation; 2) the abiotic growing conditions of urban areas are completely different from what they were originally; and 3) the large numbers of non-native species that have naturalized in cities provide intense competition for the native species that grew there prior to urbanization. [DEL TREDICI, 2010]. Ecosystem services provided by the urban spontaneous vegetation include: temperature reduction; food and/or habitat for wildlife; erosion control on slopes and disturbed ground; stream and river bank stabilization; excess nutrient absorption in wetlands (mainly nitrogen and phosphorus); soil building on degraded land; improved air and water quality; sound reduction; phytoremediation of contaminated soil [POREÇBSKA & OSTROWSKA, 1999]; and carbon sequestration. At the functional level, spontaneous urban vegetation can be considered sustainable in the sense that it is performing a wide range of quantifiable ecosystem services on marginal land with a minimal input of maintenance resources [DEL TREDICI, 2010; RINK, 2009].

While it is relatively easy to enumerate the ecological value of spontaneous vegetation, it is considerably more difficult to quantify its social and aesthetic value [KÖRNER, 2005]. Many of the people who live in cities tend to interpret the presence of spontaneous urban vegetation in their neighbourhood as a visible manifestation of dereliction and neglect, even though they may view the same plants growing in a suburban or rural context as “wildflowers” (Fig. 7). Unfortunately, the social and aesthetic values of spontaneous, ecologically functional urban landscapes often leave something to be desired. This raises the question of whether or not there is a way to harmonize the ecological functionality of spontaneous urban vegetation with people's desire to live in a safe and beautiful environment.

Perhaps the most famous example of the successful integration of spontaneous vegetation into a designed landscape is Peter Latz's Landschaftspark in Duisburg-Nord, in the Ruhr area of Germany, which transformed the contaminated ruins of an abandoned steel mill into a dynamic, heavily visited cultural center (Fig. 8). Another worthy of being followed example, is the High Line Park in New York (Fig. 9). It is noted in recent years, an encouraging evolution, but not sufficient, of these types of sustainable landscapes, in which the spontaneous flora is an important factor, being preserved and ruderal and post-industrial urban landscapes are rehabilitated with minimum interventions in behalf of an ecological environment.

### Conclusions

Environmental education in Romania, both of specialists and the general public, improves visible and continuously. Given the conditions - economic, political, social - from Romania we expect that concrete actions are needed for the increased interest on this issue will not remain at the “trend” scenario, projects, experiences and forecasts level but also to be applied in order to obtain tangible and extensive results of this type of sustainable landscape.

We recommend therefore that all those involved to overcome the divisive arguments on the relative value of native species versus exotic species, and to focus on the ecological functionality of spontaneous urban vegetation.

The task we face is not how to eliminate these plants, but rather how to manage them to increase their ecological, social, and aesthetic values. In the short term, after the scientific literature review and spontaneous landscape of Cluj-Napoca brief analysis, emerges a clear but not optimistic conclusion: due to simultaneous or separate action of several factors (economic, perceptual, political, social environmental, climatic, etc.) spontaneous vegetation is unlikely to play a significant role in future development of urban ecosystems in our country.

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ECOLOGICAL AND AESTHETIC ROLE OF SPONTANEOUS FLORA IN URBAN SUSTAINABLE...



**Fig. 1.** Remnant native landscape (a), abandoned ruderal landscape (b) and managed horticultural landscape (c) – also identified in Cluj-Napoca



**Fig. 2.** Ruderal landscape – margins of transportation infrastructure – Cluj-Napoca



**Fig. 3.** Ruderale landscape – abandoned industrial property (a), interstitial spaces (b) Cluj-Napoca



**Fig. 4.** Fern development on the Cluj-Napoca building wall, May, 2009



**Fig. 5.** Fern development on the Cluj-Napoca building wall, August, 2011



**Fig. 6.** Cluj-Napoca – spontaneous vegetation in zone with different values: (a) industrial areas and (b) in the poorer neighbourhoods, Cluj-Napoca





**Fig. 7.** Spontaneous vegetation in rural landscape and in urban landscape – different perceptions - (a) positive perception in rural landscape; (b) negative perception in urban landscape





**Fig. 8.** Landschaftspark-Duisburg  
Source: <http://www.landschaftspark.de/architektur-natur>



**Fig. 9.** High Line Park – New York  
Source: <http://flolo.blogspot.com/2010/09/life-on-high-line.html>