

**A SUSTAINABLE LANDSCAPE MANAGEMENT PLAN FOR USAMV
BUCHAREST CAMPUS**

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ABSTRACT

The study focuses on the sustainable management of vegetation at the USAMV Bucharest Agronomy-Herăstrău campus, an urban green space with exceptionally high biodiversity. The campus plays a crucial role in maintaining local ecological balance and provides significant recreational and educational benefits. The research involved a detailed assessment of the vegetation, strategic planning of necessary interventions, and ongoing monitoring of vegetation health. The management plan was developed based on differentiated zoning of the campus, considering the specific characteristics and ecological and recreational needs of each zone. Proposed interventions include restoring degraded areas, creating new green spaces, implementing an educational thematic trail, and installing informative labels for trees and shrubs. Monitoring the vegetation and enhancing species collections are essential for maintaining and improving biodiversity on the campus.

INTRODUCTION

Sustainable management of urban green spaces has become increasingly important due to the growing awareness of their ecological and social benefits (Jim & Chen, 2009). Urban green spaces, such as the Agronomy-Herăstrău campus of USAMV Bucharest, contribute to biodiversity conservation, provide recreational areas, and enhance environmental quality (Niemelä, 2014). The campus stands out with its high plant biodiversity compared to other urban areas in Bucharest, indicating a healthy and balanced ecosystem (Sukopp, 2004).

Efficient management of these green spaces requires a strategic approach, including detailed vegetation assessment, strategic planning, and ongoing monitoring (Cilliers et al., 2004). Previous studies have highlighted the need for differentiated management based on landscape characteristics and usage patterns to optimize both ecological and recreational functions (Gill et al., 2007). This study focuses on the inventory and management of dendrological vegetation at the USAMV Bucharest campus, highlighting the methodologies used and strategic interventions designed to enhance both ecological sustainability and quality of life for the campus community.

The research aims to provide detailed insights into the current state of vegetation, encountered challenges, and long-term management strategies needed to maintain and improve the green infrastructure of the campus (McKinney, 2002).

By integrating these strategies, the campus not only supports biodiversity but also contributes to the broader urban ecosystem, offering significant environmental, educational, and social benefits (Tzoulas et al., 2007).

MATERIAL AND METHODS

At the USAMV Bucharest campus, vegetation management was approached with a focus on integrating sustainable strategies and improving the functionality of green spaces. The development of landscape management plans was carried out through a well-structured methodology, based on detailed assessment, strategic planning, and efficient implementation. A comprehensive assessment of the existing vegetation was initiated, involving field inspections, satellite imagery analysis, and review of previous documentation. This assessment was crucial for understanding the current state of green spaces and identifying areas needing improvement. The general management plan was developed to address both ecological and recreational needs of the university community. Key objectives included restoring degraded areas, creating new green spaces, and improving existing infrastructure.

These measures were designed to promote biodiversity, provide relaxation areas, and enhance existing vegetation in the campus structure. Additionally, periodic maintenance measures were established, including pruning, fertilizing, and pest control. These measures were developed separately for each parcel within the campus, following a differentiated management plan. The plan included classifying areas based on intervention intensity and priority for managing each space, leading to a classification of overall intervention levels for each parcel. Based on the general plan, detailed recommendations for specific interventions were formulated, focusing on restoring degraded areas with native and resilient species.

The plan also included proposals for creating new green spaces to serve educational, relaxation, study, and social purposes for students and staff. Each intervention was tailored to the specific characteristics of each campus area to ensure the effectiveness and relevance of the proposed measures. To ensure effective plan implementation, the work was divided into distinct phases over a 10-year period. The initial planning phase involved necessary field assessments and drafting the work schedule. This phase was crucial for resource allocation and preparing the ground for implementation.

RESULTS AND DISCUSSIONS

Approaching various elements of the USAMV campus such as vegetation typologies, spaces, and buildings according to their purpose and use, landscape elements, visitor needs, and impacts, management activities are distinct and organized by zones based on:

- Landscape type (intensively planted areas, extensively planted areas, built spaces, purpose – education, dormitories, sports, teaching field)
- Boundaries between zones defined by street layouts and other built elements like walls, fences, buildings
- Management needs

Developing a plan with differentiated management zones for the USAMV campus provides a clear vision of the landscape and identifies specific intervention needs for each zone. An annual management plan is necessary and includes all tasks required for seasonal maintenance of each zone. (Table 1)

Long-term projects include tasks to be completed for each zone within a 2-5 year period. These tasks involve landscape improvement, plant acquisition, vegetation management, restoration projects, and pest and disease control.

For the differentiated management plan, the campus was zoned according to vegetation structure and the usage type of each parcel. (Figure 1)

For managing zones according to their specifics, the following classification is proposed:

- Priority of zone management (high, medium, low)
- Management intensity, referring to the amount of resources needed to maintain a zone to the desired standard (high – intensive care requirements; medium – low maintenance trees and shrubs; low – natural and semi-natural urban areas).

For the next 10 years, various types of minimal and medium-impact interventions are proposed for the majority of the campus parcels (Figure 2, Table 2). These include interventions on vegetation, water features, furniture, lighting, and mineral surfaces. Medium-impact interventions are focused on the most frequented areas of the campus, such as: zone A1 – the lawn in front of the Rector's Office building, zone A5 – the lawn in front of the Faculty of Land Reclamation and Environmental Engineering building, and zone B1 – near the canteen and dormitories A7, A6, and A5.

Table 1
Landscape management measures in the USAMV Bucharest campus

LANDSCAPE MANAGEMENT MEASURES	CALENDAR				CAMPUS AREAS - UNIVERSITY OF AGRONOMIC SCIENCES OF BUCHAREST																								
	Spring	Summer	Autumn	Winter	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	C1	C2	D1	D2	D3	D4	D5	D6	D7	E1	E2	E3
LAWNS																													
Lawn scarification																													
Collecting leaves from the lawn and transporting them																													
Lawn mowing (2-3 times / month)																													
Lawn fertilization																													
Overseeding, if necessary																													
Testing of irrigation systems																													
Checking soil moisture																													
Lawn irrigation																													
Switching off the irrigation system																													
Grassy plants trimming																													
TREES AND SHRUBS																													
Mulching the trees																													
Mulching the shrubs																													
Collecting fallen leaves from the base of shrubs																													
Elimination of spontaneous invasive or invasive vegetation from the base of trees and shrubs																													
Elimination of invasive dragons																													
Shrub irrigation																													
Switching off the irrigation system																													
Monitoring recent plantations																													
Disease and pest monitoring																													
Application of fertilizers and treatments																													
Pruning young trees																													
Maintenance pruning (including removal of dry branches)																													
WATER FEATURES																													
Commissioning of the water features (waterfall-pond-water jets)																													
Stopping the water supply of the water features (waterfall-ponds-water jets)																													
Collection of suspensions and plant debris from water features																													
CONSTRUCTIONS AND ALLEYS																													
Treatment of wooden furniture elements with protective substances																													
Gravel replacement on the alleys and restoration, if necessary																													
Application of herbicides near alleys																													
Snow removal operations on the main alleys																													

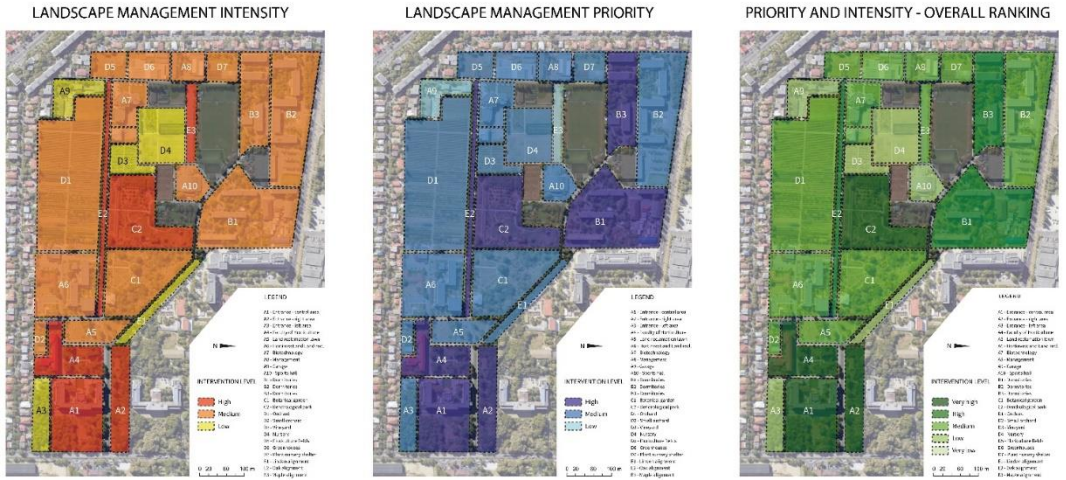
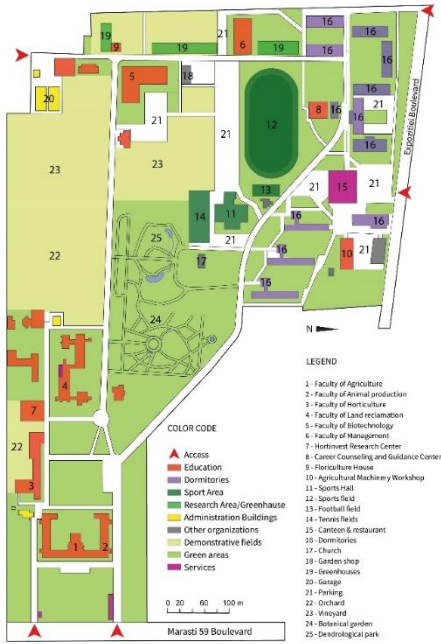


Figure 1 – Zoning according to management intensity, priority and overall ranking in the USAMV Bucharest campus

BUCHAREST UNIVERSITY OF AGRONOMY CAMPUS



LANDSCAPE DESIGN RECOMMENDATIONS

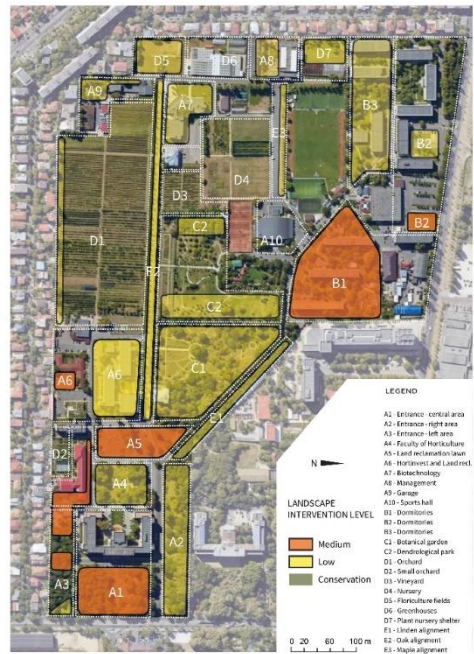


Figure 2 – Left: USAMV Bucharest campus map, Agronomie-Herăstrău Right: Zoning for landscape (re)development interventions in the USAMV Bucharest campus

Table 2

Recommendations regarding landscape (re)development interventions in the
USAMV Bucharest campus

RECOMMENDED LANDSCAPE INTERVENTIONS

RECOMMENDED LANDSCAPE INTERVENTIONS	CAMPUS AREAS - UNIVERSITY OF AGRONOMIC SCIENCES OF BUCHAREST																										
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	C1	C2	D1	D2	D3	D4	D5	D6	D7	E1	E2	E3		
VEGETATION																											
Completion of tree alignments																											
Establishments new tree alignments																											
Completion of tree groups																											
Completion of shrub groups																											
Inserting of shrub / perennial compositions																											
Introduction of new plant collections																											
Green roofs on the buildings																											
Rain gardens / bioswales																											
WATER FEATURES																											
Phyto-purification basin																											
Refurbishment of water features																											
PAVED AREAS																											
Completion of existing alleys																											
Rehabilitation of the existing alleys, where applicable																											
New alleys																											
URBAN FURNITURE AND LIGHTING																											
Ambient lighting																											
Trash cans																											
Benches																											
Garden pavilions																											
Technology (wifi, phone charging)																											
DEGREE OF INTERVENTION																											
Medium interventions																											
Minimal interventions																											
No interventions (conservation)																											

CONCLUSIONS

The Agronomy-Herăstrău campus stands out with exceptionally high plant biodiversity compared to other urban areas in Bucharest. This diversity is crucial not only for maintaining ecological balance but also for improving the quality of life for local residents. The vegetation condition on this campus is generally good and very good, indicating effective green space management and heightened attention to plant conservation.

Ecological benefits are relatively high for an urban green area, considering the role vegetation plays in air purification, noise reduction, and providing refuge for various animal species. To maintain and improve the current state of vegetation at the Agronomy-Herăstrău campus, continuous monitoring over the next 10 years is recommended. This will allow for early identification of potential issues and facilitate necessary interventions to conserve biodiversity.

Additionally, expanding species collections for educational and research purposes in both the Botanical Garden and the Dendrological Park is recommended. This will not only enrich educational offerings but also contribute to scientific research on local biodiversity. Finally, integrating the campus into Bucharest's tourist circuit

could bring significant local economic benefits and increase awareness of urban biodiversity importance.

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