

SYNERGY OF EDUCATION AND RECREATION IN LANDSCAPE PROTECTION: INTEGRATING DENDROLOGICAL COLLECTIONS OF ARBORETUM MLYŇANY INTO UNIVERSITY CURRICULA

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Abstract

As global environmental challenges redefine the requirements for landscape architecture and forestry, the role of arboreta as “living laboratories” becomes vital. This paper explores the integration of the dendrological collections of Arboretum Mlyňany into higher education, and public recreation. Through a comparative analysis of Central European models (e.g., Prague, Křtiny, Košice, Zvolen), the study evaluates the current integration of Mlyňany's unique evergreen collections into curricula such as Systematic Dendrology and Landscape Management. The findings suggest that blending academic rigor with the site's aesthetic and recreative values significantly enhances protection. Furthermore, the study proposes that high-quality educational infrastructure can increase the site's attractiveness for paying visitors, generating resources for further gene pool conservation. The results highlight the necessity of transforming these specialized habitats into self-sustaining assets, indispensable for both scientific progress and the sustainable development of recreational landscapes.

Key words: Living laboratory, Dendrology, Public recreation, Environmental pedagogy, University education,

Introduction

The ongoing global environmental crisis and rapid urbanization are placing unprecedented pressure on landscape resilience and biodiversity. In this context, botanical gardens and arboreta have evolved from mere taxonomic collections into critical “living laboratories” that bridge the gap between scientific research and public awareness (Oldfield, 2009). These institutions serve as essential hubs for *ex-situ* conversation, but their role in modern society is increasingly defined by their ability to integrate education with public recreation (Ballantyne & Packer, 2016).

A fundamental challenge in landscape protection is moving beyond passive conservation toward active public engagement. The synergy of education and recreation – often termed “edutainment” in natural settings – allows for the transformation of protected areas into platforms for fostering environmental literacy (Packer & Ballantyne, 2016). For university students, these spaces provide a tangible and taxonomic framework that classroom lectures cannot replicate (Sellmann & Bogner, 2012).

Established in 1892, Arboretum Mlyňany (Slovak Academy of Sciences) represents a unique case study in Central Europe. Its vast collection of evergreen and exotic woody species provides an unparalleled resource for instruction in Systematic Dendrology, Phytopathology, and Landscape Management. Despite its historical and scientific prestige, the systematic integration of these collections into modern university curricula remains a developing process (Hořka et al., 2013). Comparing the Mlyňany model with other regional institutions – such as the university-managed Arboretum Borová Hora or the urban-focused Botanical Garden of Prague – reveals diverse approaches to balancing academic rigor with visitor attractiveness (Morgan et al., 2009). This paper explores how a high-quality educational infrastructure cannot enhance student competencies but also increase the site's appeal for paying visitors, thereby generating resources for the continued protection of the gene pool.

Material and Methods

The research question for this work was: To what extent are the dendrological collections of Arboretum Mlyňany currently integrated into the curricula of relevant university degree programs (e.g., landscape architecture, horticulture)?

The research methodology employs a mixed-methods approach, combining qualitative content analysis with a comparative benchmarking study. This framework was designed to evaluate the integration of Arboretum Mlyňany's dendrological collections into university curricula and its subsequent impact on landscape protection and public recreation. The research process was divided into three distinct phases:

The first phase focused on the evaluation of current university programs at Faculty of Horticulture and Landscape Engineering (SUA in Nitra). We performed a content analysis of course syllabi for core

subjects, including: Dendrology, Protection of ornamental plants, and Landscape Management. The objective was to quantify the frequency of “living laboratory” session (field lectures) held at Arboretum Mlyňany versus standard classroom-based instruction. The curricula analysis covered the academic year 2024/2025.

To assess the standing of Arboretum Mlyňany, a benchmarking analysis was conducted against regional institutions within Central European context (table 2):

- Slovak institutions: Botanical Garden UPJŠ Košice and Arboretum Borová Hora Zvolen.
- Czech Institutions: Botanical Garden Prague (Troja) and Arboretum Křtiny (Mendel University in Brno).

The comparison criteria focused on Governing Body, Primary Strategic Focus, and the Integration Model (classified as Passive, Active – with active student participation, or Direct) (Table 2). The Passive-Academic model was defined as a standard educational visit consisting primarily of observation and identification, without direct student involvement in collection management or maintenance tasks. In contrast, the Direct-Academic model (e.g., Arboretum Borová Hora) involves students as active participants in long-term research and stewardship. This allowed for the identification of best practices regarding the involvement of students in the actual management and digital mapping of collections.

Finally, a Synergy Matrix, shown in Table 1, was developed to categorize the multifunctional roles of arboreta. This matrix links specific Conservation Elements (e.g., introduced woody species) with their Recreational Function (e.g., sensory comfort) and Educational Outcomes (e.g., climate change adaptation).

Tab. 1: Synergy Matrix of Landscape Protection, Recreation, and Education

Conservation Element	Recreation Function	Educational Outcome
Introduced Woody Plants	Aesthetic experience, shade, and sensory comfort	Species identification, understanding adaptation to climate change
Landscape Composition	Space for relaxation, hiking, and mental regeneration	Principles of landscape planning and spatial protection
Protected Area	Building a personal connection to nature and heritage	Understanding legislative protection and environmental management

Results and Discussion

The developed Synergy Matrix (Table 1) identifies how specific conservation elements, such as introduced woody species, serve dual purposes:

- Scientific Value: Providing a taxonomic framework for Dendrology and Phytopathology.
- Recreational Value: Enhancing visitor sensory comfort and aesthetic experience.

The integration of these roles is most advanced at Botanical Garden Prague and Botanical Garden Košice, where “edutainment” and thematic events (e.g., butterfly exhibitions or wine festivals) are used to found pedagogical staff and modern infrastructure. Our results suggest that Arboretum Mlyňany could adopt a similar strategy by utilizing its historical manor house and rhododendron collections to create “anchor events”. This would transition the institution from a passive recipient of state subsidies into a dynamic entity where recreational revenue directly subsidizes the protection at the gene pool.

The research confirms that while Arboretum possesses underutilized potential, the path forward lies in Institutional Linking and Digitalization. Implementing GIS-based systems and “educational hotspots” would concentrate student activities in specific areas, thereby protecting more sensitive research plots from the general public.

Comparative Analysis: Benchmarking Integration Models

To evaluate the current standing of Arboretum Mlyňany, we compared its integration strategies with other two Slovak and two Czech institutions (see table 2). The inclusion of Czech institutions provide a crucial regional benchmark, as they operate within similar ecological zones and legislative frameworks.

The evaluation of Arboretum Mlyňany in the regional context of Central European dendrological collections reveals a distinct “governance-integration” gap. As shown in Table 2, Arboretum Mlyňany operates under a Passive-Academic model, where university involvement is primarily limited to observational field trips.

Tab. 2: Comparative table (Slovak and Czech Institutions)

Institution	Governing Body	Primary Strategic Focus	Integration Model
Arboretum Mlyňany	Slovak Academy of Sciences	Research and Conservation	Passive - Academic: Indirectly supports various universities
BG Košice	UPJŠ University	Public Outreach and Education	Active - Urban: High public engagement thematic exhibition
Arboretum Borová Hora	TUZVO University	Forestry and Native Gene Pool	Direct - Academic: Practical lab for forestry students.
Arboretum Křtiny	Mendel University (CZ)	Functional Forestry	Applied-Technical: Focus on landscape management
BG Prague	City of Prague (CZ)	Tourism and Modern Edutainment	Economic-Educational: High tech visitor infrastructure

In contrast, university-managed institutions such as Arboretum Borová Hora (TUZVO) and Arboretum Křtiny (Mendel University) exhibit a Direct or Applied-Technical model. In these cases, students are active participants in long-term research plots and collections cataloguing. This aligns with the findings of Sellmann and Bogner (2013), who argue that tangible, hands-on frameworks in “living laboratories” provide educational outcomes that classroom lectures cannot replicate.

By blending academic rigor with the site’s aesthetic values, Arboretum Mlyňany can achieve a self-sustaining cycle of conservation. As highlighted by Ballantyne and Packer (2016), the ability to integrate formal education with public recreation is increasingly defining the role of modern botanical gardens in society. Transforming Arboretum Mlyňany into a self-sustaining asset is therefore indispensable for both specific progress and the sustainable development of recreational landscapes for future generations.

Conclusion

The research confirms that Arboretum Mlyňany possesses unique but underutilized potential for higher education. While the comparative analysis demonstrated that international institutions successfully integrate digital technologies and project-based learning, the model in Mlyňany remains largely at the level of passive field trips. The synergy of education and recreation represents a pathway to increasing the arboretum’s social value without compromising its conservation function.

Institution Linking - Establishing strategic partnerships (Memorandums) with universities to define the arboretum as an “external campus” for selected courses.

Digitalization and Smart Education – Implementing an interactive information system (GIS, QR codes) providing students with professional dendrological data and general visitors with engaging popular-science content.

Zoning activities – Creating “educational hotspots”, like outdoor classrooms, to concentrate student activities in scientific areas, thereby protecting more sensitive research plots.

Student-Led Management – Involving senior students in the actual management of collections through their theses.

The development of high-quality educational infrastructure can significantly enhance the attractiveness of the site for paying visitors, thereby generating resources for future gene pool conservation. This self-sustaining cycle transforms the arboretum from a passive recipient of subsidies into a dynamic institution where the recreational experience directly subsidizes scientific research and conservation efforts.

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Souhrn

Výzkum potvrdzuje, že Arboretum Mlyňany má jedinečný, ale nedostatečně využitý potenciál pro vysokoškolské vzdělávání. Zatímco srovnávací analýza prokázala, že mezinárodní instituce úspěšně integrují digitální technologie a projektovou výuku, model v Mlyňanech zůstává převážně na úrovni pasivních exkurzí. Synergie vzdělávání a rekreace představuje cestu ke zvýšení společenské hodnoty arboreta, aniž by byla ohrožena jeho ochranná funkce.

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