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Learning forestry practical skills through field trips

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Abstract
Taking students to different outdoor settings is an effective strategy for enhancing their motivation to learn, fostering a more positive attitude toward science and nature, and supporting the acquisition of knowledge and skills. Moreover, field trips contribute to improved student attitudes toward the sites visited and serve as valuable tools for creating innovative learning experiences. In this study, we examine three field trips undertaken by second-year students in the Forestry Program as part of their learning process. Disciplines such as afforestation, forest ecology, biodiversity conservation, and entomology emphasize linking theoretical knowledge with practical field experience. Accordingly, field trips were organized to immerse students in forest ecosystems, enabling them to apply scientific methods, collect data, and observe ecological processes directly. During visits to the Timișoara Research-Development and Experimentation-Production Station, the Bazoș Arboretum, the Recaș nursery, and the Gladna Montană afforestation site, students engaged with various branches of forestry and acquired practical, experiential knowledge. These activities strengthened their understanding of ecosystem dynamics, species diversity, and conservation challenges, while fostering teamwork, analytical thinking, and a commitment to sustainable forest management.

Keywords: outdoor education, practical training, nursery, arboretum, afforestation, forest landscape

Introduction

Outdoor learning constitutes a fundamental aspect of forestry education, as it connects theoretical instruction with practical application [8, 11, 12, 13]. Although modern teaching methods based on technology make courses attractive and provide updated and relevant information on the topics addressed, study visits remain indispensable for the professional training of a forestry engineer.

Learning during field trips is influenced by many factors, including students' prior knowledge and interests, the social context of the visit, the teachers' objectives, the students' experiences during the trip, and the presence, absence, or quality of preparation and follow-up activities [4, 5, 9]. As a successful and high-quality field trip depends on careful planning by the teaching staff and active interaction with students, we guided them through each activity, outlining the structure of the experience and ensuring that the novelty of each setting positively influenced their learning [3, 6, 7]. Additionally, informing students of the main objectives to be visited prior to each trip contributed to maximizing educational benefits [1, 2, 10]. To ensure that the field trips provide the intended learning experiences, we selected destinations that are closely aligned with the subjects being studied, including the Timișoara Research-Development and Experimentation-Production Station (RDEPS), Bazoș Arboretum, Recaș Nursery, and the Gladna Montană afforestation site. As key educational outcomes, we observed increased interest and engagement in afforestation, forest ecology, forest genetics, and forest protection, as well as more positive attitudes toward biodiversity conservation and natural landscapes. Furthermore, these experiences can be recalled and remain useful long after the field trips, supporting students in their forestry careers and fostering sustainable forest development.

Material and Method

In this paper, we present how three field trips attended by second-year Forestry students during the 2024–2025 academic year contributed to their learning process. The field trips were organized by the academic

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staff of the Faculty of Engineering and Applied Technologies, as follows: Prof. Habil. PhD Eng. George Ciprian Fora, Prof. Habil. PhD Eng. Ioan Sărac, Assoc. Prof. Habil. PhD Eng. Alina-Maria Țenche-Constantinescu, and Asst. Prof. PhD Eng. Alexandru Panici. Depending on the specific characteristics of each destination, we benefited from the scientific support of the professional staff at each site we visited.

The purpose of the first trip on 17.03.2025 to the Timișoara Research-Development and Experimentation-Production Station (RDEPS) was for students to learn about its research directions, objectives, development activities, infrastructure, and services. Senior Researcher II, PhD Turcu Daniel Ond, a forestry engineer and the RDEPS director, presented to the students the research directions and objectives of the "Forest Ecology," "Forest Genetics," and "Forest Protection" research teams. He also provided an explanation of the research infrastructure within the Forest Ecology and Forest Protection teams.

The second trip, organized on March 31, 2025, was to the Bazoș Arboretum, where students observed the dendrological collection and learned about the importance of acclimatization and the productivity of exotic tree species of forestry interest. During the visit, PhD forestry engineer Nicolae Cadar presented the history of the arboretum and emphasized its ecological and landscape significance, providing students with a deeper understanding of its scientific and environmental value. In addition, a reforestation plot within the arboretum was showcased to demonstrate practical forestry techniques.

During the third field trip on 10.04.2025, students visited the Recaș Nursery and the Gladna Montană afforestation site to gain a comprehensive understanding of how seedlings are produced, transported, and subsequently planted at the afforestation site. Forestry engineer Fulviu Olimpiu Moga presented the Recaș Nursery and explained its primary goal: to produce healthy, high-quality planting material capable of thriving when transplanted into the field. Professor habil. PhD engineer Ioan Sărac presented to the students the importance of conserving forest genetic resources, emphasizing that the genetic heritage of woody species constitutes a valuable reservoir of germplasm. Furthermore, he outlined the main approaches to *in situ* and *ex situ* conservation. Professor habil. PhD forestry engineer George Ciprian Fora explained to the students how seedlings should be protected in order to prevent pest and pathogen attacks. He also presented methods for combating such issues if they occur, emphasizing the importance of integrated management practices and preventive measures in sustainable forestry.

At the Gladna Montană afforestation site, students observed the process of establishing a forest from the very beginning. PhD forestry engineer Radu Remus Brad provided detailed explanations about tree species selection, site preparation, planting techniques, and early-stage forest management practices.

At the end of each field trip, students were encouraged to reflect on the knowledge they had acquired and the new insights they had gained, which served as a valuable feedback mechanism in the learning process.

Results and Discussion

During ***Field Trip No. 1 to the RDEPS – National Forestry Research-Development Institute (INCDS) 'Marin Drăcea' on 17.03.2025***, the students were presented with a wide range of research topics in forest ecology, genetics, and protection, as shown in Fig. 1.

Figure 1. Field trip no 1 RDEPS - INCDS „Marin Drăcea" - 17.03.2025

These included the study of forest ecosystems with a high degree of naturalness, their structure, dynamics, and biodiversity; long-term inter- and transdisciplinary ecological research to assess the condition of forests under the influence of climate change, atmospheric pollution, and other risk factors; the foundation of management plans for protected areas in Western Romania; identification, mapping, and characterization of virgin and quasi-virgin forests and their registration in the National Catalog of long-term protection and conservation; strategies for *in situ* and *ex situ* conservation of forest genetic resources (FGR); evaluation of

genetic diversity and selection of valuable genotypes; development of new biotechnologies for *ex situ* conservation, micropropagation, somaclonal selection, and advanced propagation techniques for ornamental and forest species; improvements in nursery cultivation; and methods for detecting, managing, and monitoring harmful and invasive species, as well as biodiversity assessment. The research infrastructure, comprising Vertex hypsometers, a Pressler drill, forest calipers, binoculars, and specific laboratory equipment for forest protection analyses, was presented to the students.

By being introduced to these research areas, the students gained valuable knowledge and practical insight, which could guide them in pursuing similar directions in their future scientific or professional careers. At the same time, they were able to connect the theoretical concepts they had acquired in their studies with their practical applications.

The learning outcomes attained by the students following ***Field Trip No. 2 to the Bazoș Arboretum on 31.03.2025*** included an understanding that this collection of indigenous and exotic woody species, introduced in groups with a limited number of specimens, is specifically intended for conducting observations and measurements to study the behavior of the introduced taxa.

The Bazoș Arboretum was designed in the landscape style between 1909 and 1914 on the estate of Count Ludovic Ambrosy, initially comprising approximately 120 species of trees and shrubs of North American origin. Today, the arboretum is state property and is administered by the National Forest Administration Romsilva, through the “Marin Drăcea” National Institute for Research and Development in Forestry. It covers 62 hectares within the boundaries of Bazoșu Nou village and Bucovăț commune, Timiș County, and includes the Main Park, the American Park, and nurseries for cultivating exotic species, as shown in Fig. 2.

Over time, through international exchanges, the dendrological collection has been enriched and now includes nearly 800 taxa from five continents. It houses the largest collection of oaks in the country (19 species) and caries (8 species). Notable rare species include *Pinus taeda* L., *Pinus jeffreyi*, *Castanea dentata* Borch., *Castanea pumila* Mill., *Clethra alnifolia* L., and *Picea koreensis* S. Since 1994, the arboretum has been designated a protected area to preserve biodiversity, genetic resources, and ecological assets, as well as to maintain the ecological balance in Timiș county. It is also a member of the International Association of Botanical Gardens and represents a major tourist attraction, offering visitors scenic landscapes with exotic trees and shrubs, clearings, and unique landscape compositions.

During the visit, a reforestation plot within the arboretum was presented with the following characteristics: area: 0.5 ha; planting scheme: 2 × 1.5 m; species: Pedunculate oak (*Quercus robur*); stand age: 3 years since planting. Management activities carried out on this plot included weeding, soil loosening around the seedlings, and irrigation.

This experience offered students the opportunity to spend quality time in nature, observe exotic ornamental tree and shrub species and understand their importance as genetic resources derived from artificial cultures, as well as visit a reforestation plot, all of which made this field trip an important learning experience.

Field trip No. 3 – Recaș Nursery and Gladna Montană Afforestation Site held on 10.04.2025, offered students the opportunity to understand the entire process, from the selection of genitors to seedling production and, finally, the establishment of an afforestation site.

The learning outcomes attained following the field trip include an understanding of *genetic resources* as valuable gene pools, characterized by their genetic diversity, high bioaccumulation capacity, exceptional wood quality, superior adaptive traits, and a high level of adaptive genetic homeostasis. Furthermore, students were introduced to the main approaches to *in situ* conservation, including the preservation of entire forest ecosystems in all their structural and functional complexity, forests designated as natural monuments, and selected natural seed stands and seed reserves. They also learned about *ex situ* conservation methods, such as arboretums, botanical gardens, comparative provenance trials, comparative progeny trials (half-sib and full-sib), comparative hybrid trials, seed orchards, clone parks, and gene banks, including collections of pollen, seeds, tissues, or DNA preserved under controlled environmental conditions, such as cryopreservation for pollen or DNA molecules. Following this introduction, students were presented with the Recaș Nursery, as shown in Fig. 3.

The Recaș Nursery, located within U.P. III Bazoș-Hitiaș, has been operational since 1965. The nursery covers a total area of 50 ha, of which 36 ha are cultivable. The remaining 14 ha are occupied by a protective shelterbelt established along the Bega Canal, as well as by the network of main and secondary roads, technological facilities, auxiliary buildings, and yards. The entire nursery area is enclosed by a protective fence.

Forest seedling production is organized into three plots: two plots allocated to forest seedlings and one plot maintained under soil improvement through green manure crops.

Over time, ornamental crops have been grown; willow crops; fruit shrub crops (raspberry, blackberry, blackcurrant); medicinal and aromatic plant crops (mint, lavender) and a cherry clonal seed orchard. The

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number of seedlings produced has varied with time. Currently, there are forest crops on 5.5 ha, of which 4.5 ha are sowings.

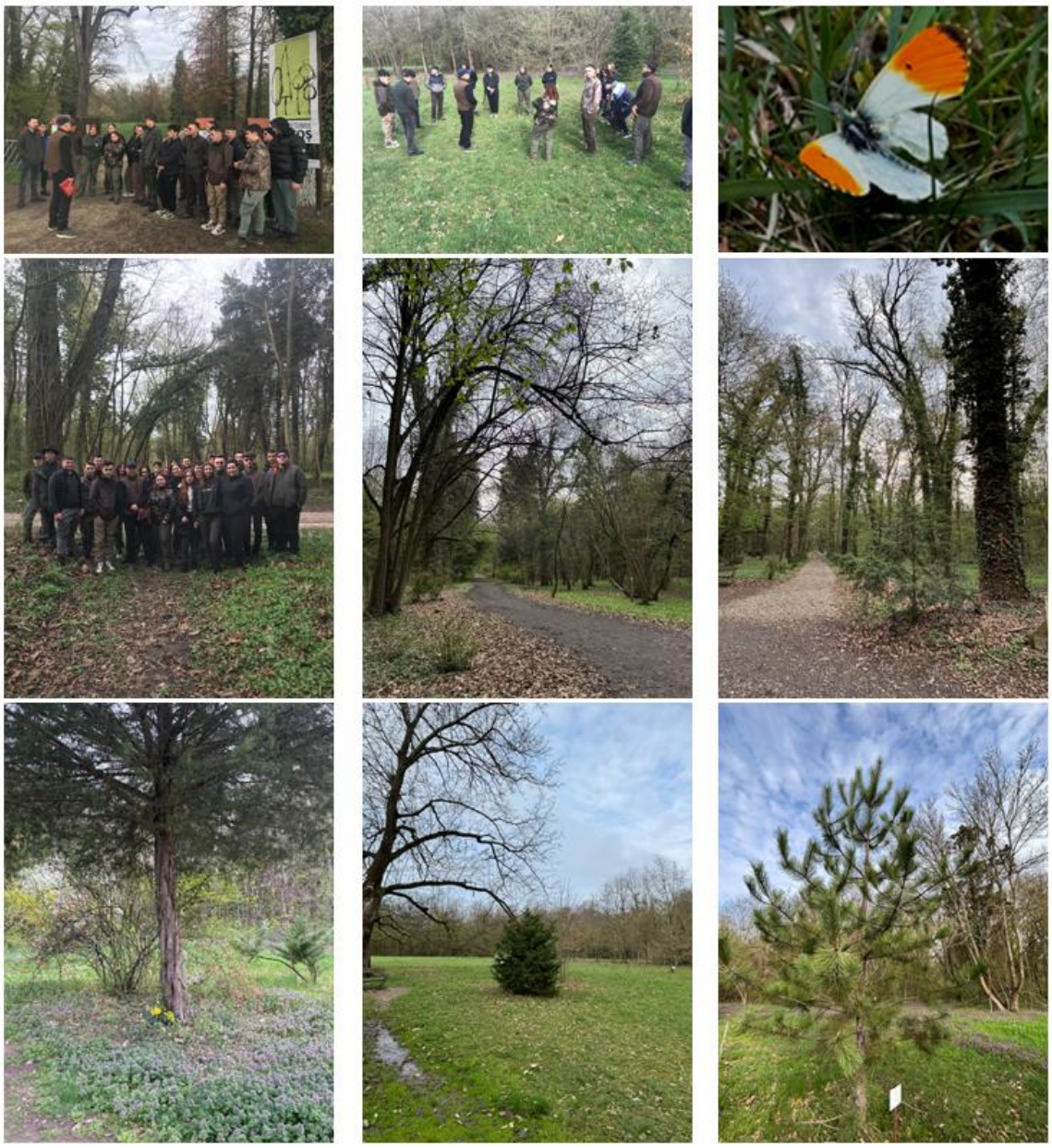

Figure 2. Field trip no 2 Bazoș Arboretum – 31.03.2025

Figure 3. Field trip no 3 Recaș Nursery – 10.04.2025

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Figure 4. Field trip no 4 Gladna Montană afforestation site – 10.04.2025

The Gladna Montană afforestation site is located in Timiș County, UP IV Gladna, u.a. 92 A, at an altitude of 230 meters, as shown in Fig. 4.

The total area is 19.32 hectares, of which 5 hectares were planted in 2025. A total of 25,000 seedlings were planted according to the afforestation composition: 6 GO, 1 FA, and 3 PAM (GO – *Quercus petraea*, FA – *Fagus sylvatica*, PAM – *Acer pseudoplatanus*). The specific fieldwork involved soil preparation in planting spots and weed control.

The ecological benefits resulting from the afforestation of the site include the restoration of natural habitats essential for maintaining the health of the local ecosystem, the support of diverse wildlife, soil stabilization, erosion prevention, and the preservation of watershed integrity. In addition, the aesthetic and cultural values of restored woodland landscapes contribute significantly to the overall well-being of society.

Conclusions

The field trips provided valuable experiential learning opportunities within the Forestry Programme, enhancing students' academic understanding while supporting their personal growth, social skills development, and emotional well-being. These experiences also prepare students to pursue productive and fulfilling careers in the field. Students had the opportunity to interact with potential employers and to experience what a day in the field of ecological research, seedling production, or afforestation actually entails. They were also able to ask questions to professionals with experience in these fields and clarify any misunderstandings. Engaging directly with nature and learning from natural environments provides an excellent way to support students' overall wellness and maintain a healthy academic life.

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