

# THE ROLE OF THE UNIVERSITY FOREST ENTERPRISE OF THE TECHNICAL UNIVERSITY IN ZVOLEN

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## Abstract

The University Forest Enterprise (UFE) is a special-purpose facility at the Technical University in Zvolen (TUZVO). The UFE is aimed at the practical education of students, scientific research associated with all forestry activities, demonstration objects, and management of the forest fund. It is thus possible to demonstrate several aspects of forestry such as forest management, management of forest reproductive material, silviculture, logging operations, forestry constructions and ameliorations, landscape management, game management, fishery, and beekeeping. To follow these goals, 67 permanent research plots, 18 temporary plots, and 103 demonstration objects are currently maintained at the territory of the enterprise, all connected to the network of excursion and demonstration paths. The UFE manages the forest land fund (9,729 ha) according to the needs of the Technical University, and with respect to the purpose of the enterprise, 80% of the forest area managed by the enterprise is classified into the category of special-purpose forests. The forest land fund is composed of state-owned forest land as well as forest properties of other owners. Forest plant communities of the UFE belong to five altitudinal vegetation zones (298–1035 m above sea level). Broadleaved tree species evidently predominate. Due to the special focus of management, the UFE uses as much as possible the concepts of the close-to-nature silviculture. Due to varied natural conditions, it is possible to apply several silvicultural systems. The application of shelterwood and selection systems with maximum utilisation of the natural potential of indigenous tree species is strongly preferred.

Key words: special-purpose facility, practical education, close-to-nature silviculture

## The focus of the Technical University in Zvolen and the Faculty of Forestry

The Technical University in Zvolen (TUZVO) is the only university in Slovakia providing education in the field of forestry, wood sciences, ecology as well as environmental and manufacturing technology. It follows up a rich and very old tradition of technical university studies in Slovakia, which dates back to the establishment of the Mining Academy in Banská Štiavnica in 1762, where the Forestry Institute was established in 1807. In 1952 the University College of Forestry and Wood Technology was founded in the town of Zvolen and in 1991 the name of the university was changed to the Technical University in Zvolen (Anonymous, s.a.).

Currently, the university has four faculties, with different study branches and study programmes:

- Faculty of Forestry;
- Faculty of Wood Sciences and Technology;

- Faculty of Ecology and Environmental Sciences;
- Faculty of Environmental and Manufacturing Technology.

The main mission of the TUZVO is to provide university education in accredited study programmes as well as to develop scientific research in different fields and to introduce it into practice. The aim of the educational process is to provide graduates with a broad competence in forestry, wood science and technology, ecology and environment, environmental and manufacturing technology.

The Faculty of Forestry is a top forestry educational institution in Slovakia with the main mission to provide university education in the following study programmes:

- BSc programmes – Forestry, Applied Zoology and Game Management;
- MSc programmes – Forestry, Forest Ecology, Applied Zoology and Game Management, Geoinformatic and Mapping Technologies in Forestry;
- PhD programmes – Applied Zoology and Game Management, Forest Management, Forestry Phytology, Forestry Ameliorations, Silviculture and Forest Protection, Technique and Technologies of Forestry Production.

All mentioned programmes require field training and close contact with nature. The practical education of students should allow exploring of scientific, ecological, economic and social principles concerning forests and forest management and the acquisition of practical skills. For this reason, the UFE was established.

### **Characteristics of University Forest Enterprise**

The University Forest Enterprise (UFE) is a specialized facility of the Technical University in Zvolen. It was established on January 1st, 1958, as an independent economic entity. It serves mainly for the practical education of students, and also as a basis for research activities of the university academic staff. In addition to these main duties, it also fulfils tasks in the management of forest management plans. From the legal point of view, it forms a part of the public university and its management is financed through the sources created by its own business activities, while the practical education is financed through Ministry of Education subsidies (Saniga and Ivan, 2014). At the present time, the enterprise includes the headquarters, one forest district, and one service unit. The average number of employees is 54.

The University Forest Enterprise manages forests in three separate geographical units in the immediate vicinity of the city of Zvolen. All these mountain ranges have a stratovolcanic structure, formed of andesite and pyroclastic parent rocks. Their relief is considerably eroded and denudated. A great variation of parent rocks, climatic and vegetation conditions determines the diversity of plants ranging from thermophile and xenophile species on extremely dry sites over the communities on nutrient-rich sites up to the elements of the montane flora.

Forest plant communities belong to five vertical vegetation zones, altitude from 298 to 1035 m. The number of broadleaved tree species clearly exceeds that of conifers. Based on growing stock, the predominant broadleaved species is European beech (55%), which is supposed to be a stabilizing element of Slovak forests also in the future, considering the expected climate change. Beech forests with an admixture of valuable hardwoods (maples, ash, elm...) and silver fir create conditions for stable stands with the possibility of increasing their value production. Among the conifers, Norway spruce is the most represented (8%).

From a total area of the managed forest land of 9,729 ha, the state-owned forests represent 9,111 ha. With respect to the purpose and main tasks of the enterprise, 80% of the forests managed by the enterprise are classified into the category of special-purpose forests.

The practical tasks of the enterprise comprise education, including practical training of the students of the university faculties, development and maintenance of the demonstration objects as well as development of the used forests so that the following activities might be demonstrated: forest management, management of forest reproductive material, silviculture, logging operations, forest machinery, forestry constructions and ameliorations, game management and fishery, beekeeping etc. To follow these goals, 67 permanent research plots, 18 operating plots and 103 demonstration objects are provided within the enterprise. A network of excursion and demonstration paths is a natural component of education and scientific events (Macko and Šulek, 2008).

Special objects are three National Nature Reserves under different environmental conditions which serve especially for the teaching of environmental science:

- Boky – vegetation zone of oaks – thermo and xerophilous communities;
- Mláčik – vegetation zone of fir and beech.

The principal target of forestry activities under the conditions of the UFE is an active application of the principles of silviculture based on natural processes. Professional employees of the enterprise, in a close cooperation with the teachers and scientists from the Faculty of Forestry, directly participate in the preparation of ten-year forest management plans in order to support the application of shelterwood and selection systems along with a maximum utilization of the natural potential of indigenous tree species. This strategy of the management of forests is based on the ecosystem perception of the forest with all ecological links. Through an optimal utilization of natural forces and ecological laws, it is aiming at forming the forest in such a way, that it will permanently be capable to fulfil all the required functions.

The average annual extent of tasks concerning main forestry activities is as follows:

Regeneration of forests:	40 ha
Tending:	60 ha
Thinning:	350 ha
Timber logging:	60,000 m <sup>3</sup>

The share of natural regeneration ranges from 75 to 80%. In artificial regeneration, the enterprise focuses on a precise record-keeping and care about seed sources including gene reserves and seed orchards. The total area of gene reserves for beech as the main broadleaved species in the UFE is 483 ha. The total productive area of three forest nurseries amounts to 2.45 ha and is used especially for growing of seedlings from seeds collected in the own approved seed forest stands (their area amounts to 722 ha), own seed orchards or from seed trees (74 trees) (Macko and Šulek, 2008).

Management of hunting ground together with game management is based on the special purpose of the enterprise – it is realized in accordance with the needs of the Department of Forest Protection and Hunting, in association with the education of professionals in the study field of Applied Zoology and Hunting.

The University Forest Enterprise thus provides a wide range of options and students come into contact with almost all aspects of the usual forestry operations but also new approaches.

### **Practical education at the University Forest Enterprise**

In general almost all the universities across the World offers both theory and practical exercises in their academic education. Practice orientation has been and still is a traditional attribute and strength of forestry curricula (Eid, 2016; Lewark, 2016). Practical education are more effectively, making the student understand better with a lot deeper and longer-lasting impact (Slobodová Nováková and Giertlová, 2016). Just by reading or hearing about a phenomenon, it will not get straight into mind even though it may be explained in the best manner. Also, training and exercise are meant to improve student skills which cannot be obtained just by theoretical knowledge. Practical experiments or interactive exercises are important features of education which ensure the involvement of students, making them learn and understand more. At the Technical University in Zvolen, a lot of the activities involve also team projects or courses where students are required to work in a team (Figure 1). On one hand, it improves a student's ability to interact with his/her fellow students and encourages them all for teamwork, which will be very important in their future professions. On the other hand, it also makes the learning process more fun as students are able to grasp more while learning it in a group.

The Information Technology (IT) may expand communication and the way in which group members work together. When used effectively, technology can bring students together in cooperative efforts and enhance student experiences. Accessing information through the Internet can broaden the curriculum deepen students' learning (Johnson and Johnson, 2014). IT can provide students with immediate feedback. Teachers can use new approaches to track the work of students and cooperative groups and create learning communities both within the classroom and the university. For example, at the Technical University in Zvolen, students can

even communicate directly with the dean through projects like “Dean on Twitter” or SMS Gateway to share their views and experiences (Anonymous, s.a).



Figure 1: Teamwork of students.

The practical education in the UFE is done through a way of excursions and practical exercises. Excursions represent demonstrations of different objects and phenomenon which are important to see, always accompanied by professional commentary. In the area of the UFE, these objects are thematically connected and they create a complex system of excursions in order to provide the most comprehensive information. The student’s duty is to take part in the excursion, but their participation is not evaluated. Excursion only helps students to better understand and remember what will be reflected in the final student’s assessment. Practical exercises require participation on the real work in forest stands or research plots. The obtained partial assessment for practical exercises is an important part of the final student’s assessment (usually around 20%). For practical exercises, students are transported by school buses which are provided freely by the University Forest Enterprise.

A total of 107 courses mostly related to the forest management, silviculture, logging operations, forestry constructions and ameliorations, and game management are realized yearly in the area of the UFE, which is 67,300 hours for all students yearly (Anonymous, s.a.). Forests of the UFE are most often used for silvicultural courses. As an example, therefore, the course “Silviculture 1” is selected. The fact sheet of the course is given in Table 1.

Theoretical lectures (22 hours per semester) are given usually by teachers in the lecture rooms of the Technical University. Almost exclusively the practical education is provided through outdoor exercises and it is usually provided by university staff. The UFE staff and occasionally external experts also participate in the practical education. Practical exercises (22 hours per semester) include practical demonstrations or execution of forestry interventions, or scientific measurements and observations (Figure 2). Students are required to perform specific forestry interventions and/or to measure and evaluate them. The aim of these exercises is not

only a better understanding a theoretical knowledge but also gaining of practical skills and experiences.

Table 1: Shortened factsheet on the course “Silviculture 1” which uses mainly in-forest seminars for education (Benčať *et al.*, 2004).

University:	Technical University in Zvolen
Faculty:	Faculty of Forestry
Supervising department:	Department of Silviculture
Course unit code:	PEL1
Course unit title:	Silviculture 1.
Planned learning activities and teaching methods:	
lectures	2 hours weekly 22 hours per semester of study
practical exercises	2 hours weekly 22 hours per semester of study
all-day practical exercises	24 hours per semester of study in 3 days
Credits allocated:	6
Level of study:	bachelor
Prerequisites for registration:	none
Assessment methods:	
Continuous assessment of students in terms of ECTS is based on the students or class projects evaluation (preparation and defence of the project).	
Learning outcomes of the course:	
The result of student education in this course is understanding of growth relationships and processes which work in forest ecosystems. Based on the ecosystem approach, in this level of study student should be able to apply the basic knowledge and practical experiences regarding the issues of silviculture in forest management.	
Course contents:	
The basic knowledge of management of the young forest stands (cleaning, thinning methods), forest stand regeneration, management of selection forests, conversion of forest stands	

During each semester students have to solve several semester projects on the different topics. The all-day practical exercises take three days. It is a demonstration of the existing knowledge in the field of close-to-nature silviculture. Below there is a list of some semester work topics that were given to students in the academic year 2017/2018:

- The effect of different intensity and type of thinning on the diameter and height structure of the spruce small-diameter stand;
- Structure analysis of the beech selection forest;
- Analysis of natural regeneration of the beech stand in the performing of shelterwood strip system;
- The effect of increment thinning on the diameter structure of target oak and beech trees.

Figure 2: Teamwork during the course Silviculture.



## Conclusions

Facilities like the University Forest Enterprise have a long tradition in forestry education system in our territory. The functioning of the UFE is in line with the long-term strategic plan of the Technical University in Zvolen whose mission aims are:

- Acceptation in the national and international context;
- High quality of educational and research activities;
- Graduates employable in practice;
- Supporting the development of knowledge and innovative economy;
- Effective and environmentally-friendly utilising natural resources.

For these reasons, it is important to keep the direction of the UFE with the incorporation of new challenges given by society and changing environmental conditions. Thanks to a special focus and efforts to promote close-to-nature silviculture, demonstration objects have become the real treasure and pride of the university (Saniga and Ivan, 2014). At the same time, the UFE produces surpluses that greatly support the running of the university and the state is not interested in changing this well-run system of financing. Therefore, there is no risk that the state forest will take these resources back and the UFE will provide practical education for next generations of students.



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