Technical University of Zvolen Faculty of Forestry

Number: 1531/2021Released 12.03.2021

Annual Report on the Activities of the Faculty of Forestry for 2020

Material for discussionProposal for resolutions of the Academic Senate of the LFAnnual Report accepts:

- no comments
- with comments

It shall be submitted on the basis of
§ 27 (1) (g) of the
Higher Education Act

Prepared and submitted by: prof. Ing. Marek Fabrika, PhD., Dean of the Faculty

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1. Foreword

The management of the faculty submits an evaluation of the faculty's activities for 2019 in accordance with Act No.131/2002 Coll. on Higher Education of 21 February 2002 and on Amendments and Supplements to Certain Acts. The annual report contains an evaluation of the main areas of the faculty's activities, in particular teaching and pedagogical activities, scientific research activities, external relations and the management of the faculty in the form in which they have been approved by the respective boards, i.e. the Dean's College or the Scientific Council of the Faculty of Forestry. Behind this format is an effort to share analytically processed information as fully as possible with the members of the AS and the academic community of the Faculty of Forestry.

2. Bodies of the Faculty

2.1 Academic Senate

Composition of the Academic Senate for the term of office from 01 October 2019 to 30 September 2023

Bureau

Kmet'a Jaroslav, prof. Ing. PhD. - Chairman
Hlaváč Pavol, Ing. PhD. - Secretary, representative of the Faculty of Arts in the Council of Universities of the Slovak Republic Střelcová Katarína, doc. Ing. PhD. - member
Bošeľa Michal, Ing. PhD. - member
Danilák Martin, Bc. - member (student representative)

Employee part
Kucbel Stanislav, doc. Ing. PhD.
Gejdoš Michal, doc. Ing. PhD.
Gömöry Dušan, prof. Ing. DrSc.
Gömöryová Erika, doc. Ing. CSc.
Holécy Ján, prof. Ing. CSc.
Kurjak Daniel, doc. Ing. PhD.
Lieskovský Martin, doc. Ing. PhD.
Lešo Peter, doc. Ing. PhD.
Máliš František, Ing. PhD.
Merganič Ján, doc. Ing. PhD.
Scheer Ľubomír, prof. Ing. CSc.
Šulek Rastislav, doc. Mgr. Ing. PhD.
Tuček Ján, prof. Ing. CSc.
Ujházy Karol, prof. Ing. PhD.

Student part Csölleová
Linda, Ing.
Ďurica Pavel, Ing. Gracík
Ivan, Bc.
Králik Daniel, Bc.
Prvý Matúš, Bc.
Rajčeková Veronika, Bc. Toma
Tomáš, Bc.
Urbančík Ján Matúš, Bc.

2.2 Faculty Management

Dean: prof. Ing. Prof. Marek Fabrika, PhD.
Vice-dean for pedagogical activities: doc. Prof. Ing. Bc. Miroslav Kardoš, PhD.
vice-dean for scientific research: prof. Dr. Mgr. Mgr. Jaroslav Ďurkovič
Associate Dean for External Relations: doc. Prof. Ing. Prof. Daniel Halaj, PhD. Secretary of the Faculty: Ing. Miroslava Babiaková

2.3 College of the Dean of the Faculty of Forestry

Babiaková Miroslava, Ing.
Ďurkovič Jaroslav, prof. Dr. Mgr.
Fabrika Marek, prof. Ing. PhD.
Halaj Daniel, doc. Ing. PhD.
Chudý František, doc. Ing. CSc.
Jaloviar Peter, doc. Ing. PhD.
Kardoš Miroslav, doc. Ing. Bc. PhD.
Kmet'a Jaroslav, prof. Ing. PhD. Kropil
Rudolf, Dr.h.c. prof. Ing.
PhD. Merganič Ján, doc. Ing. PhD.
Scheer Ľubomír, prof. Ing. CSc.
Škvarenina, prof. Ing. CSc.
Šálka Jaroslav, prof. Dr. Ing.
Ujházy Karol, prof. Ing. PhD.

2.4 Scientific Council of the Faculty of Forestry

The Chair:
Fabrika Marek, prof. Ing. PhD.

Members from LF:
Ďurkovič Jaroslav, prof. Dr. Mgr.
Fleischer Peter, doc. Ing. PhD.
Gömöry Dušan, prof. Ing. DrSc.
Gömöryová Erika, doc. Ing. CSc.
Halaj Daniel, doc. Ing. PhD.
Kardoš Miroslav, doc. Ing. Bc. PhD.
Kmet'a Jaroslav, prof. Ing. PhD.
Kropil Rudolf, Dr. h. c. prof. Ing. PhD.
Kucbel Stanislav, doc. Ing. PhD.
Messingerová Valéria, prof. Ing. CSc.
Pichler Viliam, prof. h. c. prof. Dr. Ing.
Saniga Milan, prof. Ing. DrSc.
Scheer Ľubomír, prof. Ing. CSc.
Střelcová Katarína, doc. Ing. PhD.

Šálka Jaroslav, prof. Dr. Ing.
Ujházy Karol, prof. Ing. PhD.
Members from other departments:

Apfel Eduard, Ing., chief engineer ML Banská Bystrica, member of Pro Silva Slovakia Committee Ditmarová Ľubica, RNDr. PhD., director - Institute of Forest Ecology SAV Zvolen Fabriciusová Vladimíra, Ing., PhD. - Protected Landscape Area - Biosphere Reserve Poľana
Jankovský Libor, prof. Dr. Ing., Faculty of Forestry and Wood Technology MU Brno Jendruch Jozef, Ing. PhD. managing director - Pro Populo s. r. o. neštátne lesy Poprad Kulla Ladislav, Ing. National Forestry Centre Zvolen
Marušák Róbert, prof. Ing. PhD. dean - Faculty of Forestry and Wood Technology ČZU Praha Rajský Dušan, doc. MVDr. PhD. - retired university associate professor

3. Educational activity

SUMMARY

The aim of the presented evaluation report is to summarize and evaluate the pedagogical process through indicators recorded in the University Information System (UIS) and the Dean's Office of the Faculty of Forestry for the academic year 2019/20. In the academic year (AY) 2019/20, teaching at the Faculty of Forestry took place in the Bachelor's degree programmes in Forestry and Applied Zoology and Hunting. In the second cycle of studies, education was provided in the study programmes Adaptive Forestry, Applied Zoology and Hunting and Forest Ecology.

In the bachelor's degree, the study programme Arboriculture and Communal Forestry was also available for applicants. Within the engineering study programmes, in addition to the open study programmes, students had the choice of Geoinformation and Mapping Techniques in Forestry, Forest Ecology, Forestry Technology and the study programme in English Forestry and Wildlife Management. Bachelor study programmes are offered in both full-time and part-time form. Only the study programmes Adaptive Forestry and Applied Zoology and Hunting can be studied externally in the second cycle of studies.

The academic year under review is specific compared to previous ones in several respects. One of them is the formation of the Slovak Accreditation Agency for Higher Education, whose task is to carry out external quality assurance activities for higher education in the Slovak Republic. In this context, it will be necessary to implement a number of processes, the formation of quality assessment structures or working groups of study disciplines in order to ensure compliance of study programmes with the standards of the accreditation agency.

The second specificity was the issuance of the Decree of the Ministry of Education, Science, Research and Sport of the Slovak Republic on the system of study disciplines of the Slovak Republic No. 244/2019 Coll., which reorganized the fields of study within which universities in the Slovak Republic can provide education within study programmes. Several LF staff (management, guarantors of study programmes) participated in the preparation of the description of the study programme, while the material was also discussed and approved by the Dean's College and the Scientific Council of the LF. The main content of the description of the field of study is the knowledge, skills and competences to be acquired by a graduate of the 1st, 2nd and 3rd level of higher education. These are logically linked to each other and also provide the prerequisites for the concrete application of graduates in practice. From the point of view of the Faculty of Forestry, one common field of study "Forestry" has been created, which replaces the 8 existing fields of study.

The third specificity of the academic year under review was the transition to distance learning in all forms of study due to the coronavirus pandemic. Half of the teaching part of the summer nurse from 16 March 2020 and also the following main exercises were carried out by distance learning (online via MS Teams, by providing annotated lectures to students, main exercises by alternative form of practical assignments).

At the Faculty of Forestry in the evaluated AR 2019/20, a total of 690 students studied in 1st and 2nd cycle of studies, years, as well as both forms of study, which is a decrease of 8 students compared to the previous AR 2017/18 (698 students). The success rate of students in the first cycle of study was 76.40% for full-time and part-time studies, and 93.13% in the second cycle. The number of students enrolled in the assessed AR 2019/20 increased in the first cycle of full-time and part-time studies by a total of 41 students or 23.8% (213 students compared to 172 in AR 2017/18). In the current AR 2019/20, a total of 159 students enrolled.

In terms of newly enrolled students, this is a more moderate decrease with the number of students at the level of AR 2017/18.

In the course of the AR we also focused on measures related to the even distribution of teaching time (indirect teaching by limiting the maximum number of theses), optimization of the number of students in study groups.

In AR 2019/20, a total of 12 2nd year engineering students enrolled in the OLH program, of which 5 students met the conditions defined by the OLH decree and completed their internship at the VŠLP. students communication with the Ministry of Agriculture and Rural Development on the decree on the professional forest manager. During the AR, courses in mathematics, biology and chemistry were conducted for 1st year students, a seminar on the principles of thesis writing for 3rd year Bachelor's degree students, as well as a pre-state exam concentration for 2nd year engineering degree students.

The deadline for applications for the next AR was on 31 March 2020, which was later extended across the University. Following this, student enrolments were held in two rounds (7/2019 and 9/2019). Traditional forms of promotion of studies at the Faculty of Forestry were used, with an emphasis on personal visits to secondary schools and the organisation of an open day at the Faculty of Forestry. Later, after the outbreak of the pandemic, we reached out to potential applicants mainly through targeted Facebook campaigns, advertising, direct outreach through edupage in collaboration with secondary schools.

In the academic year 2019/20, a total of 63 internal lecturers were involved in teaching. The total teaching load reached 57,586 points, while the average teaching load of 61.57 full-time in-house teaching staff is 935 points, which is a decrease of 28 points compared to the previous AR, which is related both to the lower number of students, but also to measures to optimize the number of study groups and the redistribution of indirect teaching.

EVALUATION OF EDUCATIONAL ACTIVITIES AT THE FACULTY OF FORESTRY HERE IN ZVOLENO FOR THE ACADEMIC YEAR 2019/20

1. Study programmes and fields of study in which teaching was provided at the Faculty of Arts in the academic year 2019/20

In the academic year 2019/20, the Faculty of Forestry provided teaching according to the following accredited study programmes:

1. degree (Bachelor's degree):
   - Study programme ***Forestry***, full-time and part-time
   - Study programme ***Applied Zoology and Hunting***, full-time and part-time

2. degree (engineering):
   - Study programme ***Adaptive Forestry***, full-time and part-time
   - Study programme ***Applied Zoology and Hunting***, full-time and part-time
   - Study programme ***Geoinformation and mapping techniques in forestry***, full-time form • Study programme ***Forest Ecology***, full-time form

2. Number of students at LF in the academic year 2019/20 (as of 31.10. 2019)

The numbers of students in each form, degree and study programme are shown in Figure 1a, b,c. *(note: the data, also for the previous AR, are adjusted for duplicate students registered in the UIS, e.g. due to transfer to external studies)*

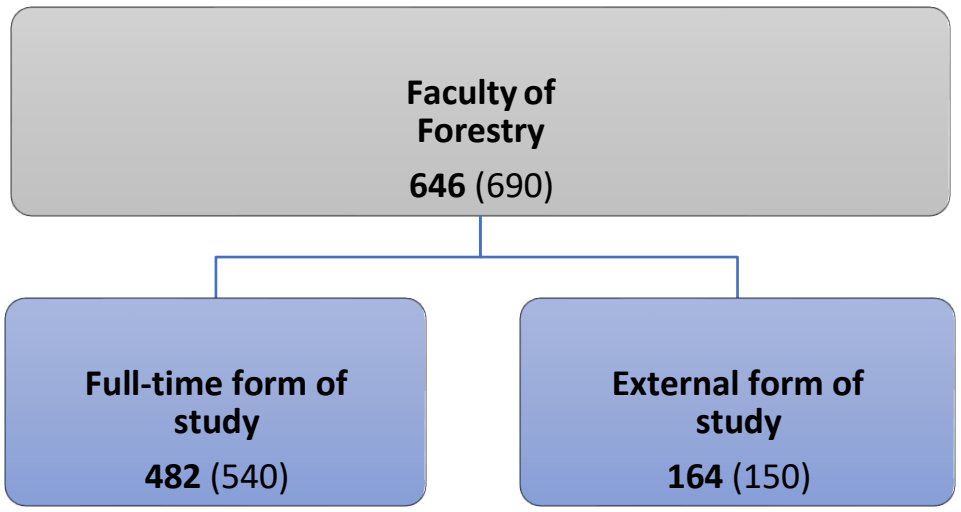


Fig. 1a Number of students at the Faculty of Arts by form of study in AR 2019/20
Note: Figures in brackets are for the 2018/19 academic year

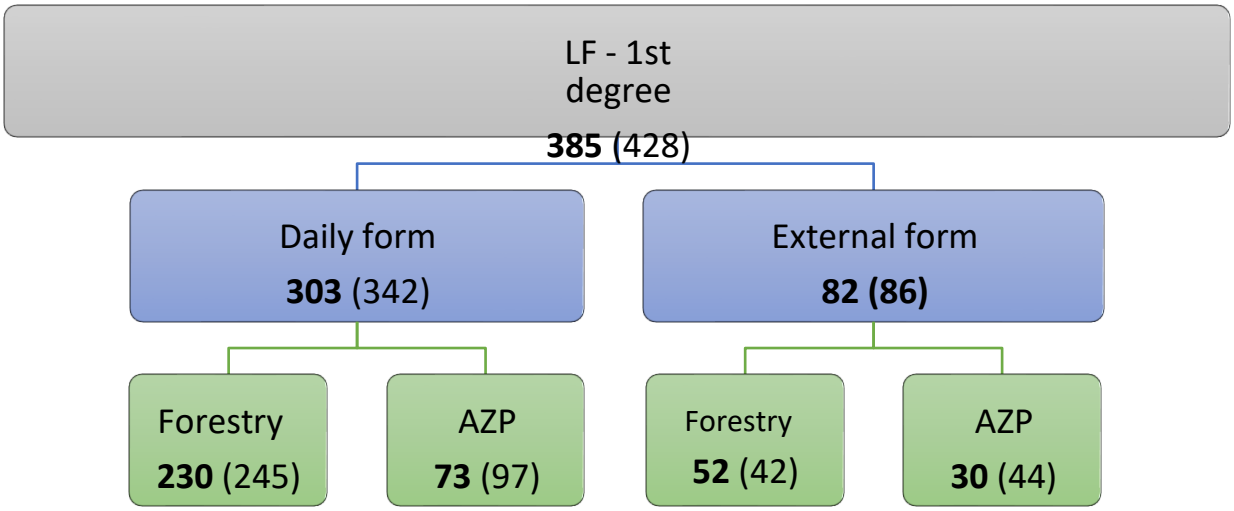


Fig. 1b Number of students at the Faculty of Arts in the academic year 2019/20 in the first cycle of studies

Note: Figures in brackets are for the previous academic year 2018/19

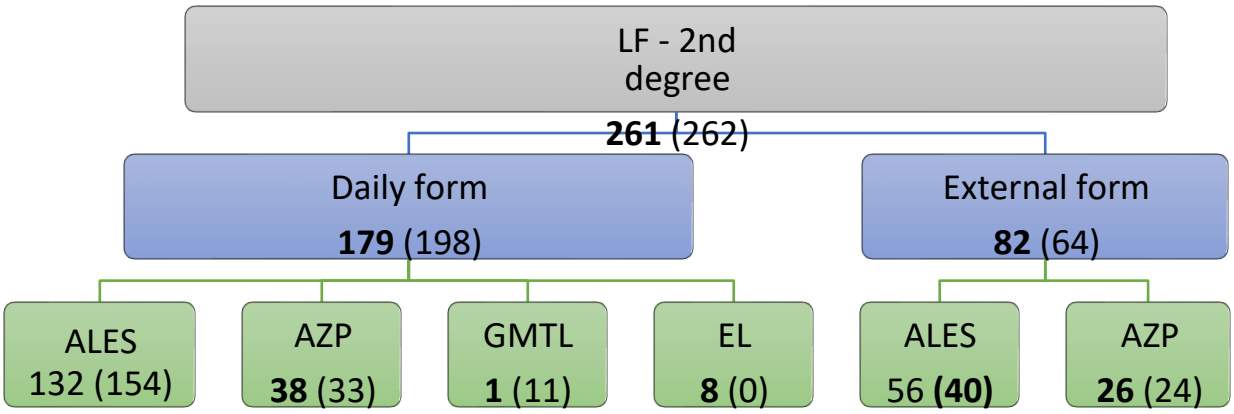


Fig. 1c Number of students at the Faculty of Arts in the academic year 2019/20 in the second cycle of studies

Note: Figures in brackets are for the previous academic year 2018/19

3. Study programmes

3.1. Bachelor's degree programmes

Table 1 presents the figures for students enrolled on Bachelor's degree programmes in the 2019/20 academic year.

Tab. 1 Number of students enrolled in the academic year 2019/20- I. degree

study programme	enrolled students	Completion of the academic year 2019/2020							
		successful completion of AR		have interrupted their studies		left study, they were excluded		code 79 - transfer	
		number	%	number	%	number	%	number	
I. degree - full-time study									
Forestry	230	176	77	1		53	23		
applied zoology and hunting	73	55	75	5	7	13	18	2	
full-time study total	**303**	**231**	**76**	**6**	**2**	**66**	**22**	**2**	
I. degree - external study									
Forestry	52	27	52	3	6	22	42		
applied zoology and hunting	30	14	47			16	53		
external study total	**82**	**41**	**50**	**3**	**4**	**38**	**46**		
ES + ES TOTAL	**385**	**272**	**71**	**9**	**2**	**104**	**27**	**2**	

In full-time studies, out of a total of 303 students of the first cycle of studies, 76% of students successfully completed the academic year (80.41% in the previous year); in external studies, 50% of 82 enrolled students successfully completed the academic year (60.47% in the previous year). Out of the total number of first cycle students (385) enrolled in the academic year 2019/20, 71% (76.40% last year) successfully completed the academic year.

A total of 66 full-time students (59 AR 2018/19) and 38 part-time students (31 AR 2018/19) dropped out or were withdrawn, i.e. a total of 104 students (90 AR 2018/19) out of a total of 385 students enrolled in both forms of study, which represents 27% compared to 21% in the last AR 2018/19.

The number of expelled students is partly related to the difficulty of studying at the Faculty of Forestry, but it has also been influenced to some extent by the coronavirus pandemic in the current AR. Communication with students, motivation of students through semester-long sub-assessments, positive evaluation and support of students even for small achievements with the aim of gradual student progression remains an important task in this regard for lecturers. Focusing on the practical overlap of the taught content of the course and pointing out the overall context in relation to other subjects in the curriculum.

3.2. Engineering study programmes

Table 2 presents the figures for students on engineering degree programmes in the 2019/20 academic year. In full-time studies, out of a total of 179 students in the second cycle of study, 94% of students successfully completed the academic year (95.45% in AR 2018/19),

and in part-time studies, out of 82 enrolled students, 82% successfully completed the academic year (85.94% in AR 2018/19).

Out of the total number of 261 enrolled 2nd cycle students in the academic year 2019/20, 90% of students successfully completed the academic year (93.13% of students in the last AR).

Table 2 Number of students enrolled in the academic year 2019/20 - II. degree

study programme	**enrolled students**	**Completion of the academic year 2019/2020**							
		successful completion of AR		have interrupted their studies		left their studies, were Exclusions		code 79 - transfer	
		number	%	number	%	number	%	number	
I. degree - full-time study									
adaptive forestry	132	123	93			8	6	[11)]	
Geoinformation and mapping techniques in forestry	1	1	100						
applied zoology and hunting	38	35	92	1	3	2	5		
forest ecology	8	9 [1)]							
full-time study total	**179**	**168**	**94**	**1**		**10**	**6**	**1**	
I. degree - external study									
Forestry	56	45	80	1	2	10	18		
applied zoology and hunting	26	22	85			4	15		
external study total	**82**	**67**	**82**	**1**	**1**	**14**	**17**		
ES + ES TOTAL	**261**	**235**	**90**	**2**	**1**	**24**	**9**	**1**	

[1)] *Based on the results of the PK, 8 students were admitted, on the basis of the application by the Dean of the Faculty of Forestry allowed to transfer from the study programme Adaptive Forestry to the study programme Forest Ecology*

The average grades by year and programme for the 2019/20 academic year are shown in Table 3a. The overall average grade of LF students in the Bachelor's degree is 2.67, which ranks it at the level of previous ARs (Table 3b). The best average grade was achieved by students in the full-time AZP programme (2.52, also the lowest repetition index of 1.62). The overall average grade of students in the LF engineering degree is 2.27, in line with the previous AR 2018/19, but with a lower repetition index of 1.33. The best results were achieved by students in the Forest Ecology engineering degree programme with an average grade of 1.63 and a repetition index of 1.05. There remains one student in the Geoinformation and Mapping Techniques degree programme who has passed all examinations but did not appear for the DP defence and state examination this year.

Table 3a Average grades by year, study programme, field of study in the academic year 2019/20 for full-time and part-time studies combined

study programme (field)	Prooc ess								
	Level I					**Level II**			
	I.	**II.**	**III.**	**IV.**	**Together**	**I.**	**II.**	**III.**	**Together**
forestry - B-FORESTRY	2,80	2,72	2,49		**2,66**				
	1,91	1,76	1,50		**1,70**				
forestry - B-FORESTRY	2,97	2,89	2,82	2,79	**2,85**				
	2,01	1,91	1,53	1,41	**1,66**				
app. zoology and hunting B- AZP	2,77	2,48	2,32		**2,52**				
	1,93	1,70	1,26		**1,62**				
app. zoology and hunting B-AZPE	3,51	2,90	3,00	2,50	**2,80**				
	2,50	1,80	2,27	1,46	**1,76**				
S P O L U - I. Grade (ES + ES)	2,85	2,70	2,50	2,67	**2,67**				
	1,96	1,76	1,47	1,43	**1,68**				
Adaptive Forestry I-ALES						2,41	2,16		**2,25**
						1,44	1,21		**1,30**
Forest ecology I-EL						1,63			**1,63**
						1,05			**1,05**
Adaptive Forestry I-ALES (ES)						2,47	2,57	2,27	**2,40**
						1,48	1,60	1,26	**1,41**
geoinformation and mapping techniques in forestry							4,00		**4,00**
							3,00		**3,00**
app. zoology and hunting. IAZP						2,23	2,20		**2,22**
						1,33	1,28		**1,31**
app. Zoology						2,84	2,85	1,82	**2,42**

and hunting. I-AZPE						1,91	1,74	1,10	**1,52**
S P O L U - II. Grade (ES + ES)						**2,32**	**2,25**	**2,16**	**2,27**
						1,40	**1,30**	**1,22**	**1,33**

Note: the first row is the average mark, the second row is the repetition index **Table 3b average grades and repetition index for the past 4 academic years**

Level 1

	2015/16	2016/17	2017/18	2018/19	2019/20
average	2,7	2,63	2,6	2,62	2,67
Index op.	1,7	1,59	1,55	1,55	1,68

Level 2

	2015/16	2016/17	2017/18	2018/19	2019/20
Average	2,1	2,13	2,14	2,27	2,27
Index op.	1,26	1,27	1,25	1,39	1,33

4. Evaluation of the main exercises

Main Exercises took place in the academic year 2019/20

By approved schedule and study plans for individual years, disciplines and forms of study only in the winter semester. Course tutors have been directed to plan effectively for bus applications, including specification of road surface and passability to meet procurement needs. The transport was paid for by the University Forestry Enterprise grant. On transportation requests, the requirement for entry to the HCLP needs to be defined due to production scheduling and student safety during HC. The settlement of earmarked activity funds (including for transport to HC) takes place annually during October for the previous period with the participation of the management of the VŠLP. In connection with the electronic enrolment of students for scheduling events, we had to proceed with the creation of separate block events for HC and a new distribution of students prepared from the level of the study department. Also in this AR, collaborative teaching continued in some HCs e.g. in the subject Bioclimatology and the use of purpose-built facilities at TUZVO. For the future, we consider it important to increase the proportion of collaborative teaching within HCs.

The main exercises in the summer semester of AR 2019/20 were specific due to the coronavirus pandemic and the transition to distance learning. Course Gestors were approached to send their opinion on how they plan to implement HC in distance learning mode, offering alternative solutions to HC e.g. assignment to work in stands around the student's residence, solving the problem based on existing measured data from the HEI, sending instructional videos, possibility to take HC, practical courses after returning to standard full-time teaching mode in the next AR, etc. A number of lecturers approached the alternative HC solution very responsibly as evidenced by the positive feedback from students.

4.1 Graduates and practice

According to the Dean's guidelines on the involvement of students in the OLH certificate programme during their studies, students of engineering study programmes have the opportunity, after meeting the basic requirements (e.g. an average for undergraduate studies up to 1.5), to apply for and subsequently undergo work experience in various positions within the VŠLP. These internships will allow students to gain practical knowledge of OLH activities during their studies. In the given AR, a total of 12 students enrolled in the programme, who were guided by the head of the Budča Forest Administration Ing. Bet'ko. The 25-day internship covers all areas defined by the OLH Decree, i.e. forest cultivation, forest management, forest harvesting and transport, forest protection, legislation. Following the completion of the internship, a special state examination committee has been formed, where students answer questions from thematic units that are in line with the requirements for the OLH examination according to the OLH Decree and the requirements of the Ministry of Forests and Forestry of the Slovak Republic.

Of course there is a compulsory operational practice I. in the 1st year of study, which is carried out at the University Forestry Enterprise TU in Zvolen in order to gain practical experience in basic forestry activities. From the 2nd year of bachelor's studies, students are obliged to undergo Operational Practice 2 after a period of study leave. They can complete the internship at individual organizational units of the State Forests of the Slovak Republic or at private communities, urban gardens, conservation organizations, national parks, etc. This work experience is carried out on the basis of an agreement on the placement of the student for operational practice with the respective organisation. The agreement also includes guidance on the specific content of the internship, so that it corresponds to the profile of the graduate of the relevant field of study. Students are then required to submit a written report and a certificate of completion of the internship, on the basis of which the internship can be recognised. In this academic year, due to the pandemic, it was not possible to carry out the work experience in the above-mentioned form, so the students were given an alternative assignment, which was prepared in cooperation with the Vice-Dean for Teaching by the tutors of the individual courses that the students had taken in the given year. The task of the first year students was to prepare a project, which consisted of the selection of a site in the place of residence and its characterization in relation to the acquired knowledge from the subject Geology, Bioclimatology, characterization of soil conditions on the basis of soil probes, photo-documentation and characterization of trees and herbs. The 2nd year students worked out a concrete solution for the calculation of stand characteristics on the example of a selected stand through forestry GIS in the locality of residence, as well as the identification and photodocumentation of abiotic and biotic harmful agents in the given stand. The completed field reports were emailed by the students to the Associate Dean for Educational Work for which they were awarded 2 credits.

Students of the 1st year of the 2nd degree study completed a pre-diploma practice in the scope of 3 weeks in the months of July - August 2019. The pre-diploma practice serves to obtain the basis for the preparation of the diploma thesis. The pre-diploma practice is supervised and credit is awarded by the thesis supervisor.

Within the framework of linking education with practice and increasing the share of practical teaching, the subject of adaptive forest management in forestry practice has been introduced, where lecturers from the external environment (forestry operation, nature and landscape protection) are invited, who point out positive examples of nature-friendly forest management in practice through their lectures and discussions with students.

Traditionally, the main customer of LF graduates is LESY SR, š.p., which after a joint negotiation with representatives of the LF management undertook to hire 3-5 best graduates for the position of trainee with the prospect of further promotion. The students thus have a guarantee of employment and at the same time motivation for better study results. The students were approached with this offer after the completion of their studies at LF and several of them took up the offer.

5. Evaluation of the quality of teaching

Evaluation of the quality of teaching, continuous monitoring and assessment of the quality of study programmes is one of the criteria of the accreditation standards. Feedback from students and the translation of measures to improve the quality of learning into study programmes play an important role here. In this context, at the Faculty of Forestry we have started in the previous AR to implement a process of so-called optimisation of the pedagogical process, in which about

40 teachers, practitioners and students participated. On the basis of an extensive discussion, theses were formulated, which are gradually being implemented and reflected in the teaching or optimisation of study programmes. The basic themes include raising the knowledge level of students, facilitating the personal development of students, intensifying the transfer of research and development knowledge into teaching and practice

through graduates, improving the conditions for a successful course of study. It also includes the permanent collection of feedback from students through the UIS or questionnaires for graduates of the 1st and 2nd cycle of studies. The material has been discussed and approved by the Dean's College as well as the Scientific Council and is a tool through which we are continuously meeting our objectives in relation to raising the standards for the quality of studies at the Faculty of Arts.

As part of the ongoing evaluation and quality assurance of the pedagogical process, we have carried out the following steps within the AR:

1. **Control of the number of theses supervised**

An important criterion is the adequacy of the number of university teachers, researchers or artists supervising theses in relation to the number of students. In this context, however, we have continued to implement measures (by means of a regulation of the Dean of the Faculty of Arts) to redistribute indirect teaching more evenly, i.e. to limit the maximum number of theses supervised. By the instruction of the Dean of the Faculty of Arts, from the AR 2018/19 onwards, a maximum of 5 students with their theses can be enrolled with one thesis supervisor (B.Sc. and Eng. theses together).

2. Control of the deadline for the submission of bachelor's and master's theses

Based on the results of the final thesis submission check, we would like to draw the attention of the teachers to instruct their graduates and undergraduates to submit their bachelor and master theses on time, as well as upload them into the university information system. Many students submit theses at the last minute, which is associated with stress, reduced formal quality of the submitted theses. It is necessary to make the maximum use of diploma practice for students of the second cycle of studies and not to postpone consultations until the summer semester in the final year of studies.

3. Checking the handing in of examination sheets at the Dean's Office of the Faculty of Forestry We also repeatedly remind lecturers to fulfil their obligations to students (entering the assessment in the UIS) consistently, as soon as possible after the examination has been taken, which
become even more important in the context of the abolition of paper idenxes. It is also the importance of submitting the exam sheets by the specified deadlines due to the obligation to archive them.

4. Finding out the number of announced examination dates (number of places for registered students)

From the level of the Dean's Office, a survey was carried out via the UIS to determine the number of dates during study leave.

- Both 1st and 2nd make-up dates should be posted during study leave so that students can plan their exam schedule.
- Examinations, including make-up dates, can be taken up to 31 July of the academic year in question, please advise teachers by email communication to announce the dates continuously during this period, or in the case of student interest.

Evaluation of the quality of teaching by students

The evaluation of the quality of teaching by students, or the evaluation of individual teachers, is carried out on the basis of a survey in the UIS, which includes the evaluation of the

quality of studies for the academic year 2019/20. Students have the opportunity to comment on a specific subject, but also on additional questions.

regarding satisfaction with the faculty, etc. At the same time, the questionnaires for teacher and subject evaluation were updated in the AR under review.

Questionnaire for the evaluation of teachers and subjects of the ZS and LS 2019/2020:

1. Did the lecturer manage to arouse your interest in the subject?
2. Did the practitioner succeed in arousing your interest in the subject?
3. Is the speaker's form of expression (verbal, written, ...) appropriate to your requirements?
4. Is the form of the practitioner's expression (verbal, written, ...) appropriate to your requirements?
5. Lecturer's approach to students is correct, tactful, within the limits of "fair-play" ...
6. The practitioner's approach to the students is correct, tactful, within the limits of "fair-play" ...
7. To what extent did you attend lectures?
8. Is the knowledge and information acquired in the course new and not repetitive (not duplicated with another course)?
9. Do you get the impression that the lecturer is interested in the students mastering the material?
10. Did the lectures provide you with more than just studying the recommended literature?
11. Did the exercises provide you with more than just studying the recommended literature?
12. Practical examples are used in teaching the subject?
13. In your opinion, how does the lecturer handle the subject?
14. How, in your opinion, does the practitioner handle the subject matter?
15. You rate the interpretation of the course content as ...
16. This subject ma ...
17. The difficulty of the subject, in your opinion, is ...
18. What did you like and dislike about the course (lecture)? (Your observations, comments, suggestions, criticism, ...) What new things would you suggest to revive the teaching of the subject in the future?
19. What did you like and dislike about the course (exercise)? (Your observations, comments, suggestions, criticism, ...) Or what new things would you suggest to revive the teaching of the subject in the future?

Part of the evaluation is the opportunity to comment on the quality of the teaching process at the faculty.

1. How satisfied are you with your choice of faculty (university)?
2. How satisfied are you with your choice of the programme you are studying?
3. How satisfied are you with the information at the faculty, university?
4. Do you feel that if you want to, you have the possibility and opportunity to express your opinion on the quality of the educational content at the faculty, university?
5. What do you think is the provision of didactic and computer technology? 6. How satisfied are you with the services of the study department at your faculty, university?

Period: LF - LS 2019/2020			**AR2018/19**	
Course evaluation				
Potential number of respondents:	695	**6%**	723	**15%**
Actual number of respondents:	42		111	
Number of courses duly enrolled in the period:	73		62	

Number of subjects with answers:	28	**38%**	33	**53%**
Number of completed survey ballots:	102		347	
Average number of tickets per subject:	1.4		5.6	
Additional questions				
Potential number of respondents:	640	**3%**	677	**7%**
Actual number of respondents:	24		53	
Period: LF - ZS 2019/2020				
Course evaluation				
Potential number of respondents:	703	**14%**	715	**22%**
Actual number of respondents:	105		158	
Number of courses duly enrolled in the period:	68	**75%**	59	**69%**
Number of subjects with answers:	51		41	
Number of completed survey ballots:	332		628	
Average number of tickets per subject:	4.88		10.64	
Assessment of individual subjects				
Additional questions				
Potential number of respondents:	650	**8%**	697	**16%**
Actual number of respondents:	56		112	

Students are invited to complete the above questionnaires via UIS automatically after the end of the semester. We have also taken the opportunity to mobilize students for course evaluations through the SMS gateway. The response rate has decreased from 22% to 14% in WL and from 15% to 6% in LS compared to the previous AR. The response rate to the supplementary questions was 8% in ZS and 3% in LS. We also see a decrease in the response rate in the subjects in relation to the move to distance learning as well as a number of other questionnaires that were addressed to students in relation to teaching provision.

We recommend that lecturers themselves encourage their students to complete the survey after the lectures and tutorials (e.g. during the last week of the semester tutorials). Student evaluations are an important tool not only for the educator himself, but also for the continuous improvement of quality and standards in the curricula.

In addition to the course evaluations in UIS, we also used our own tools to gather feedback, especially from students of the 1st and 2nd cycle of study. The results of these questionnaires are discussed by the management of the Faculty of Arts and are part of the proposals for changes that we continuously submit to the academic community (e.g. corrections of study plans, proposals for changes in the process of conducting state examinations at the Faculty of Arts, which are approved by the Academic Senate of the Faculty of Arts).

Graduates of both 1st and 2nd degree studies were contacted after successful defence of their bachelor thesis and passing the state examination to express their opinion especially on the state examinations, but also on the overall pedagogical process for the whole study through an anonymous questionnaire via Google form application. A total of 28 Bachelor's degree graduates and 35 Engineering degree graduates participated in the survey.

In the questionnaire, students were asked the following questions:

1. How do you evaluate the prepared training camp before the state exams through MS Teams?
2. How do you evaluate the lecture of doc. Ujházy's lecture on writing a thesis?
3. Based on your experience, what is the method of graduation from the Bachelor's degree at LF do you prefer?
4. Are you in favour of holding the annual re-examination of the state examinations during the month of August?
5. Write the name of 1-3 teachers who have most positively influenced you during your studies at LF (you can also give a reason).
6. Write the name of 1-3 teachers who have left negative memories in you during your studies at LF (if you also give a reason it will be better).
7. What is your plan after completing your bachelor's degree at LF, alt. Ing. Do you have a plan after graduation
   LF job offer?
8. In case you are not considering continuing to LF, please indicate the reason, alt. Ing. In case you are not considering a career in forestry, please indicate the reason.
9. If you had to decide again, would you choose to study at LF again?
10. If you are a high school forestry graduate, was studying at LF beneficial to you compared to studying in high school?
11. Please express your any comments or suggestions that can help us to improve the course of study at LF.

(d) Evaluation of state examinations by members of state examination boards

Also in the 2019/20 academic year, the chairs of the state examination boards were asked to evaluate the state examinations from the perspective of the individual state examination boards.

The chairs of the commissions positively evaluated the preparatory training before the state examinations, which was held with additional time before the state examination.

From the level of the study department of the Faculty of Arts, the subject unit coordinators for the state examinations are approached annually with the request for corrections of the subject units.

Based on the comments of the members of the State Examination Boards, the students were distributed more evenly among the Boards over more days, and the examination days were shortened to ensure greater hygiene of the working process.

7. Evaluation of final state examinations

7.1 Evaluation of the State Examination in the Bachelor's Degree

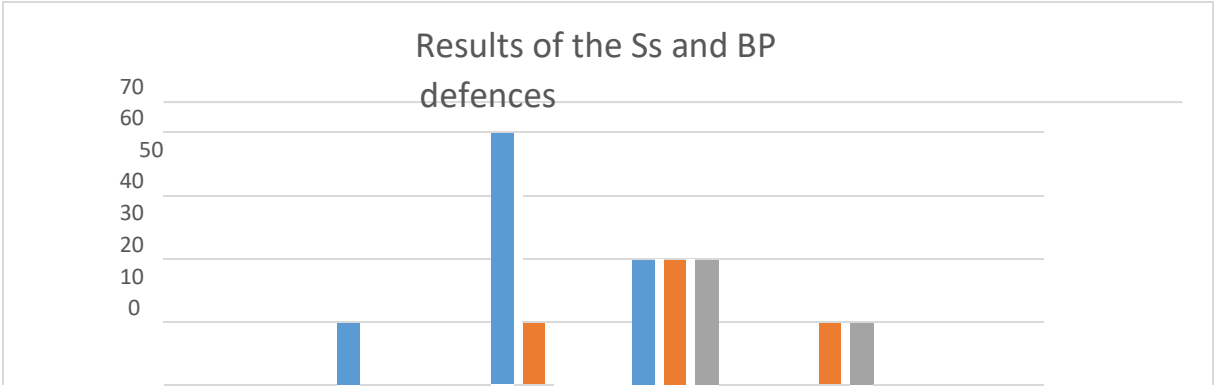
The bachelor state examinations, which included the defence of bachelor theses, were held on 24 June - 27 June 2019 and the corrective state examinations on 20 August 2019. A total of 89 full-time students and 14 part-time students took part in the defence of bachelor theses. A total of 103 students participated in the Bachelor's thesis defences and the state examination. 5 full-time students graduated with honours. The number of students according to the affiliation of the study programmes and the form of study, together with the evaluation, is a v a i l a b l e in Tab. 5 and Fig. 4a.

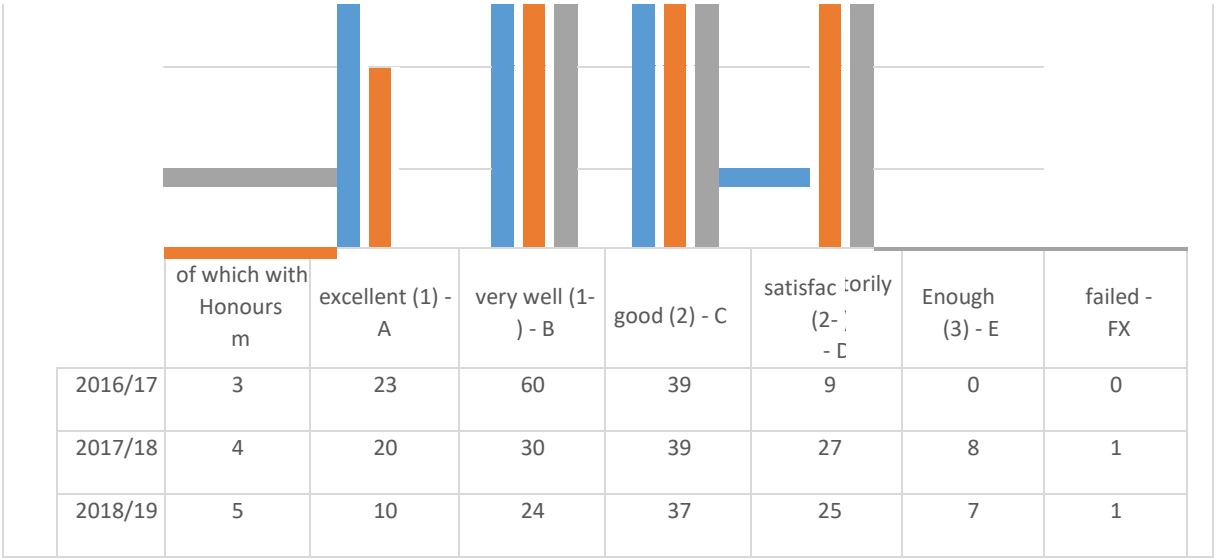
Tab. 5 Results of bachelor thesis defences and state examinations in the academic year 2019/20

Results of BP and ŠS defences	Full-time study			External study			DS + ES SPOL U
	Forestry	AZP	DŠ SPOL U	Forestry	AZP	ES SPOL U	
of which with distinction	2	3	**5**				**5**
excellent (1) - A	5	5	**10**				**10**
very good (1-) - B	19	5	**24**				**24**
good (2) - C	15	14	**29**	3	5	**8**	**37**
satisfactory (2-) - D	15	4	**19**	2	4	**6**	**25**
sufficiently (3) - E	5	2	**7**				**7**
failed - FX	1		**1*)**				**1**
S P O L U - students who have successfully completed Study	**59**	**30**	**89**	**5**	**9**	**14**	**103**

Note: *8 full-time students of the study programme Forestry, 1 full-time student of the study programme AZP and 1 part-time student of the study programme AZP took part in the corrective state examinations held on 20.08.2019.*

1*)* One full-time student in the forestry study programme did not participate in the state examinations.





	of which with Honours m	excellent (1) - A	very well (1-) - B	good (2) - C	satisfac torily (2- - D	Enough (3) - E	failed - FX
2016/17	3	23	60	39	9	0	0
2017/18	4	20	30	39	27	8	1
2018/19	5	10	24	37	25	7	1

Fig. 4a Evaluation of the defences of BP and SS 125 bachelor graduates

7.2 Evaluation of the State Examination in the Engineering Degree of Study

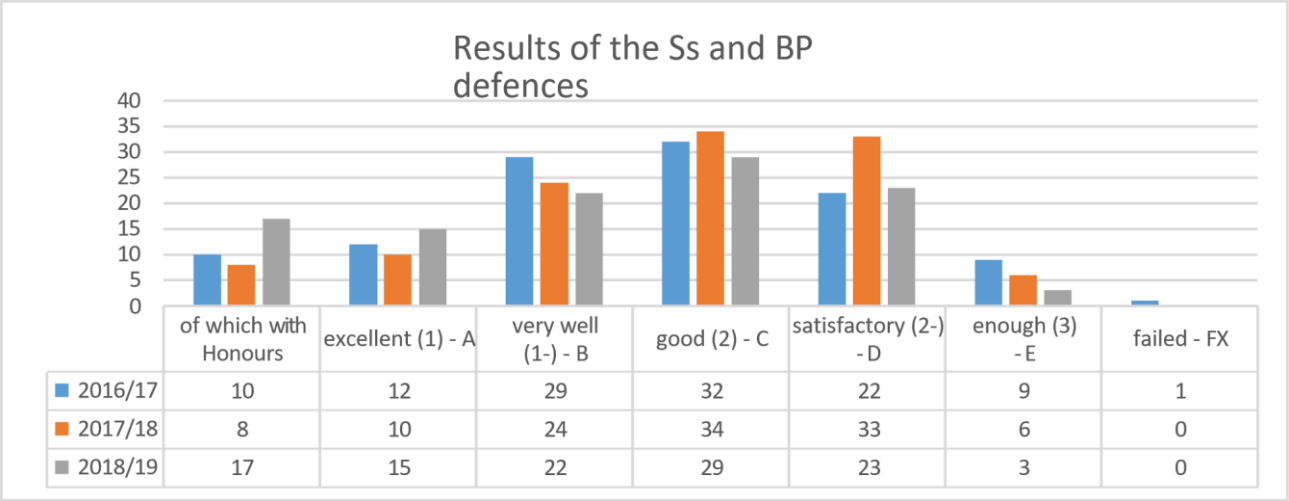
State examinations and thesis defences were held on 17-21 June 2019 and the remedial state examinations were held on 20 August 2019. A total of 92 full-time students participated in the defences (Table 6, Fig.4b). In the full-time form, the defence and the state examination took place in the study programmes Adaptive Forestry, Applied Zoology and Hunting and Geoinformation and Mapping Techniques in Forestry. In the external form, no students finished in this AR, because according to the new accreditation, the engineering studies in this form are 3 years long. The next engineers in the external form will graduate in AR 2019/20. 9 students in the full-time form graduated with honours.

Table 6 Results of thesis defences and state examinations in the academic year 2019/20

Results of the CS and DP defences	**Full-time study**				**External study**					**DS+ES Together**
	AL	**GMTL**	**AZaP**	**MS Together**	**Woods.**	**Ek. Forest**	**GMTL**	**AZaP**	**ES Together**	
of which with distinction	9	5	3	**17**						**17**
excellent (1) - A	13	1	1	**15**						**15**
very good (1-) - B	10	5	7	**22**						**22**
good (2) - C	19	3	7	**29**						**29**
satisfactory (2-) - D	20	1	2	**23**						**23**
sufficiently (3) - E	2		1	**3**						**3**
failed - FX										
S P O L U - students who have successfully completed Study	**64**	**10**	**18**	**92**						**92**

Note: *9 full-time students of the study programme Adaptive Forestry took part in the remedial state examinations held on 20.08.2019.*

In the second stage, the state examinations were not attended by students of external studies, who, according to the new accreditation, have their studies extended to 3 years.



	of which with Honours	excellent (1) - A	very well (1-) - B	good (2) - C	satisfactory (2-) - D	enough (3) - E	failed - FX
2016/17	10	12	29	32	22	9	1
2017/18	8	10	24	34	33	6	0
2018/19	17	15	22	29	23	3	0

Fig. 4b Evaluation of defences of DP and SS 107 engineering graduates

8. Qualification structure of scientific-teaching staff in the academic year 2017/18

In the academic year 2019/20, a total of 64 in-house scientific-teaching staff with a total working time of 61.25 provided teaching as of 31 October 2018. Of these, 13 are professors, 20 associate professors and 31 assistant professors. An overview of the staff at the Faculty of Forestry of the University of Technology in Zvolen is given in Table 7.

In terms of ensuring the accreditation of study programmes and the quality of teaching, it is necessary to continue to focus on improving the qualifications of scientific and pedagogical staff, or to provide teaching assistants in departments with a high teaching load calculated per individual scientific and pedagogical worker.

Tab. 7 Number of internal teaching staff at the Faculty of Forestry - status by departments as of 31 October 2018

Department	Category				
	Professors		Associate Professors		Professional assistants
	DrSc.	CSc., PhD.	Dr. Sc.	CSc., PhD.	CSc., PhD.
KPP		2 (2)		3 (2,95)	1 (1)
KF	1 (1)			2 (2)	4 (4)
KPL	1 (1)			4 (4)	2 (1,5)
KAZMZ		2 (2)		1 (1)	5 (3,6)
KIOLK		1 (1)		2 (2)	4 (3,6)
KLŤLM		2 (2)		2 (2)	4 (3,8)
KHÚLG		2 (2)		4 (4)	5 (5)
KERLH		2 (2)		2 (2)	6 (5,8)
Total	**2 (2)**	**11(11)**		**20 (19,95)**	**31 (28,3)**

Note: Figures in brackets represent actual working time

9 . Evaluation of the admission procedure

9.1 Admission procedure for Bachelor's studies

Candidates were admitted to bachelor's degree programmes on the basis of the achievement of a set level of merit according to the type of secondary school (annual report cards and matriculation examination merit). Table 8 gives a detailed overview of the number of applicants to the Bachelor's degree programme at the Faculty of Arts and the number of students admitted and enrolled starting in the academic year 2019/20, Tab. 9 shows the numbers of students in the current AR 2019/20.

Table 8 Number of students enrolled, admitted and enrolled in AR 2019/20 at the 1st cycle of studies

Programme and form of study	**Academic year 2018/2019**			
	Number of logged in	**Number of participants**	**Number of accepted plan/actual**	**Number of Enrolled**
full-time study - Bachelor				
Forestry	154	154	120/137	**118**
Applied zoology and hunting	63	63	70/51	**44**
Arboriculture and communal forestry	1	1	20/0	**0**
full-time study total	**218**	**218**	**210/188**	**162**
external study - bachelor				
Forestry	37	37	20/36	**29**
Applied zoology and hunting	28	28	20/27	**22**
Arboriculture and communal forestry	0	0	20/0	**0**
external study total	**65**	**65**	**60/63**	**51**
DS + ES together	**283**	**283**	**270/251**	**213**

Tab. 9 Number of enrolled, admitted and enrolled students in AR 2019/20 at the 1st level of study

Programme and form of study	**Academic year 2019/2020**			
	Number of logged in	**Number of Participants**	**Number of accepted plan/actual**	**Number of Enrolled**

full-time study - Bachelor				
Forestry	121	106	120/106	95
Applied zoology and hunting	38	30	70/30	27
Arboriculture and municipal forestry			20/0	
Applied geoinformatics and geodesy	7		40/0	
full-time study total	**166**	**136**	**250/136**	**122**
external study - bachelor				
Forestry	27	26	20/26	23
Applied zoology and hunting	17	17	20/17	14
Arboriculture and municipal Forestry	1		20/0	
external study total	**45**	**43**	**60/43**	**37**
DS + ES together	**211**	**179**	**310/179**	**159**

The number of students enrolled in the current AR in the 1st cycle of full-time and part-time studies decreased by 54 students in total compared to the previous year.
Figure 6a provides an overview of students admitted and enrolled in the current academic year and 8 academic years back.

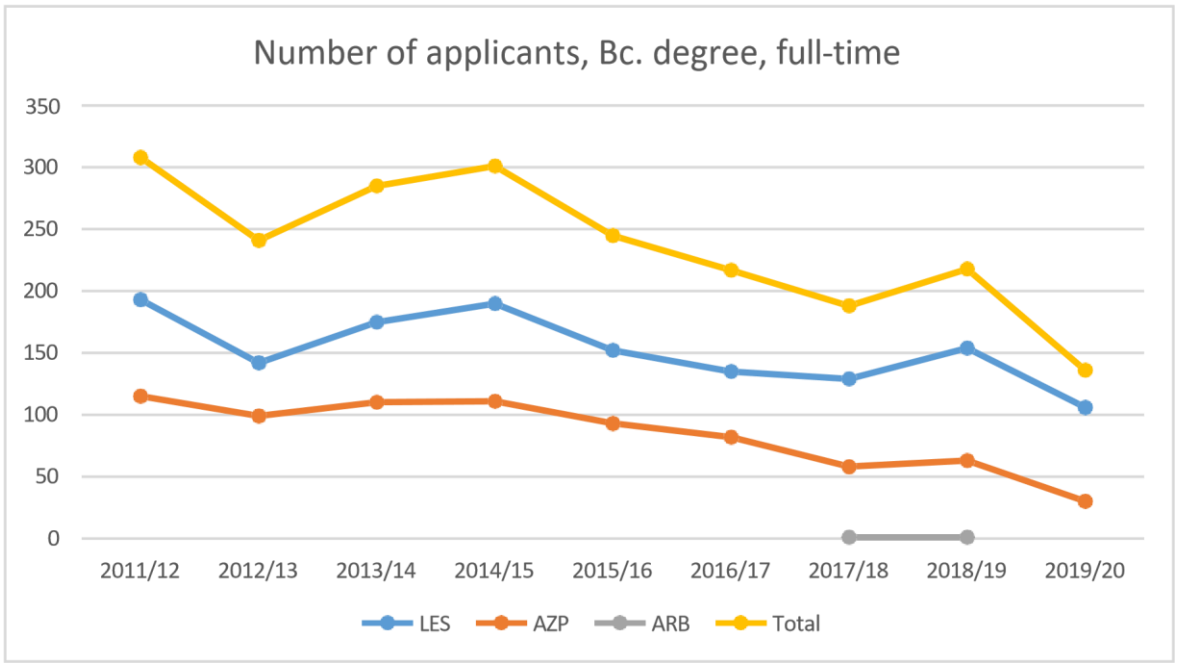


Fig. 6b Number of enrolled students AR 2011/12 to 2019/20 in the first cycle of studies - full-time form

Figure 6b shows an overview of students enrolled in individual study programmes in the first cycle of study. In the current academic year, we have seen a decrease in applications for both open Bachelor's degree programmes.

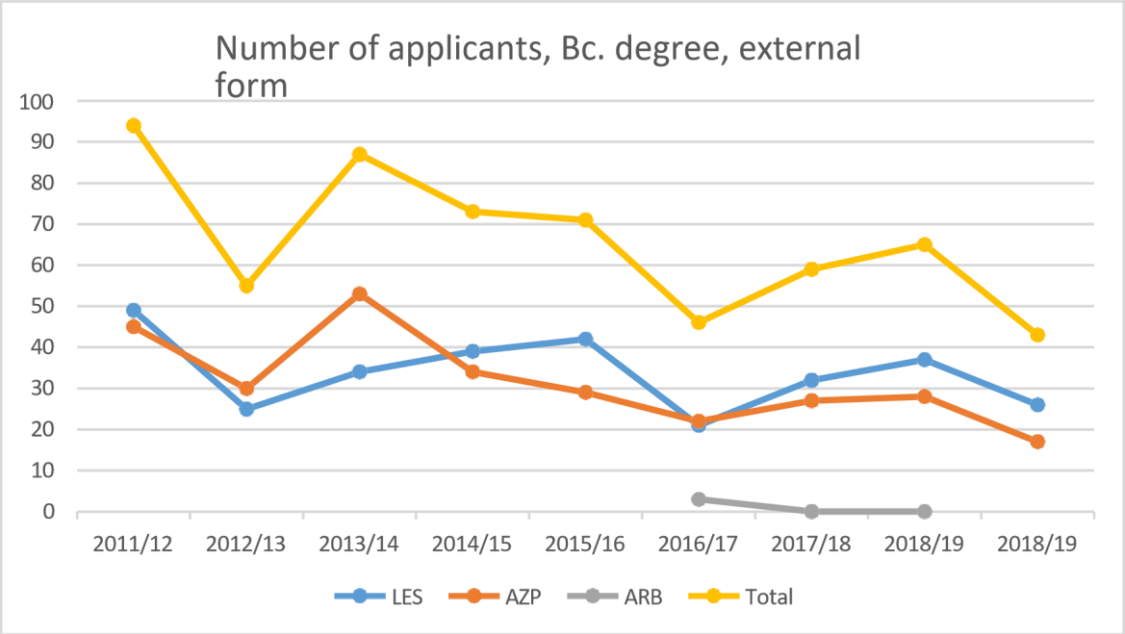


Fig. 6c Number of enrolled students in AR 2011/12 to 2019/20 in the first cycle of studies - external form

In the case of the external form of study (Figure 6c), we have also seen a decrease in the number of applications in both study programmes in which teaching takes place.

The tables and graphs presented so far informing about the numbers of admitted and enrolled students provided information about all students who were enrolled in the first year in the first cycle of studies. However, the data presented also include students who have reenrolled in the Faculty of Arts after having been expelled (most often due to failing 2 times in the course they were enrolled in). These students are placed in the appropriate higher year after enrolment on the basis of examination recognition. In terms of newly enrolled students, we achieved a number analogous to the 2017/18 academic year (Figure 6d,e).

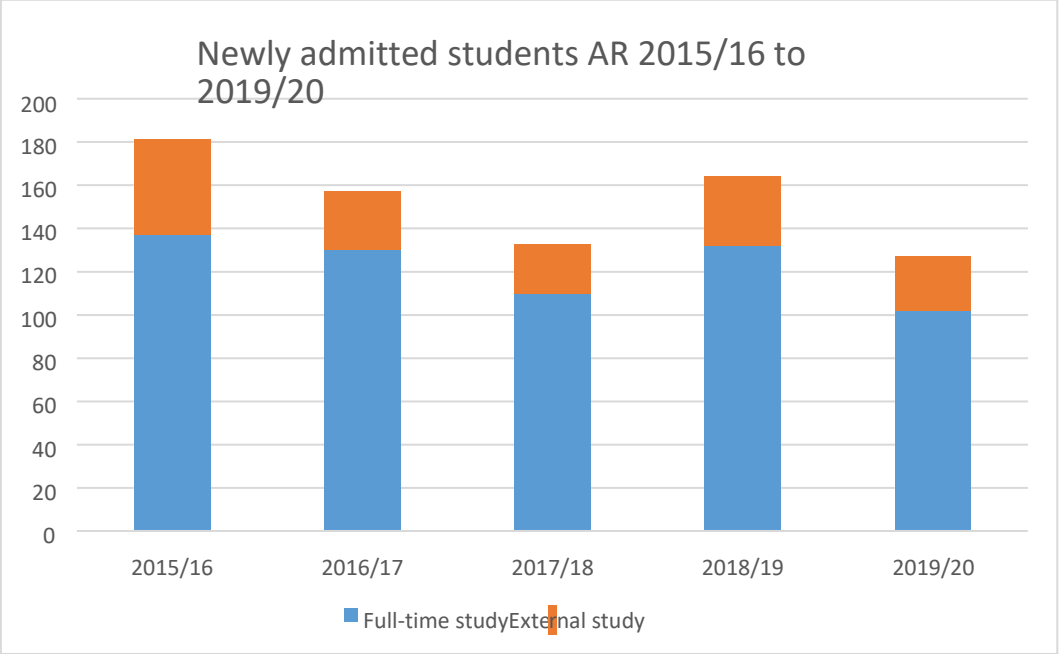


Fig. 6d Newly admitted students to the 1st cycle of studies at the Faculty of Forestry

B A C K A L A R S study

	2015/2016					2016/2017					2017/2018					2018/2019					2019/2020				
			enrolled					enrolled					enrolled					enrolled					enrolled		
	compl .pr.	admission	Together	Novopr.	at Classification.	compl .pr.	admission	Together	Novopr.	at Classification.	compl. pr.	admission	Together	Novopr.	at Classification.	compl .pr.	admission	Together	Novopr.	at Classification.	compl .pr.	admission	Together	Novopr.	at Classification.
AZP DS	92	80	55	35	20	80	75	60	43	17	55	50	43	28	15	58	51	45	34	11	36	28	22	19	3
LESN DŠ	151	137	113	102	11	134	127	101	87	14	120	115	97	82	15	130	137	122	98	24	120	104	92	83	9
EL DS	0	0	0	0	0	0	0	0	0	0	0	0													
ARB MS	0	0	0	0	0	0	0	0	0	0	0	0				1									
APL.GEOIN.																					7				
TOTAL DS	**243**	**217**	**168**	**137**	**31**	**214**	**202**	**161**	**130**	**31**	**175**	**165**	**140**	**110**	**30**	**189**	**188**	**167**	**132**	**35**	**163**	**132**	**114**	**102**	**12**
AZP ES	29	27	22	20	2	22	24	23	14	9	23	26	20	10	10	26	27	22	14	8	16	16	13	8	5
LESN ESH	41	38	32	24	8	24	21	14	10	4	27	28	16	13	3	35	36	29	18	11	22	24	22	17	5
EL ES	0	0	0	0	0	0	0	0	0	0	0	0													
ARB ES	0	0	0	0	0	3	3	3	3	0	1	0									1				
ES TOTAL	**70**	**65**	**54**	**44**	**10**	**49**	**48**	**40**	**27**	**13**	**51**	**54**	**36**	**23**	**13**	**61**	**63**	**51**	**32**	**19**	**39**	**40**	**35**	**25**	**10**
ES+ES	**313**	**282**	**222**	**181**	**41**	**263**	**250**	**201**	**157**	**44**	**226**	**219**	**176**	**133**	**43**	**250**	**251**	**218**	**164**	**54**	**202**	**172**	**149**	**127**	**22**

Fig. 6e Number of newly enrolled students from AR 2015/16 to present (data for AR 2019/20 as of 13 September 2019)

Traditionally, when enrolling students in the first year of the Bachelor's degree, students are approached through an anonymous questionnaire that focuses on the reasons for enrolment, the district from which the students come and how they obtained information about their studies.

In the following figures we present the students' answers:

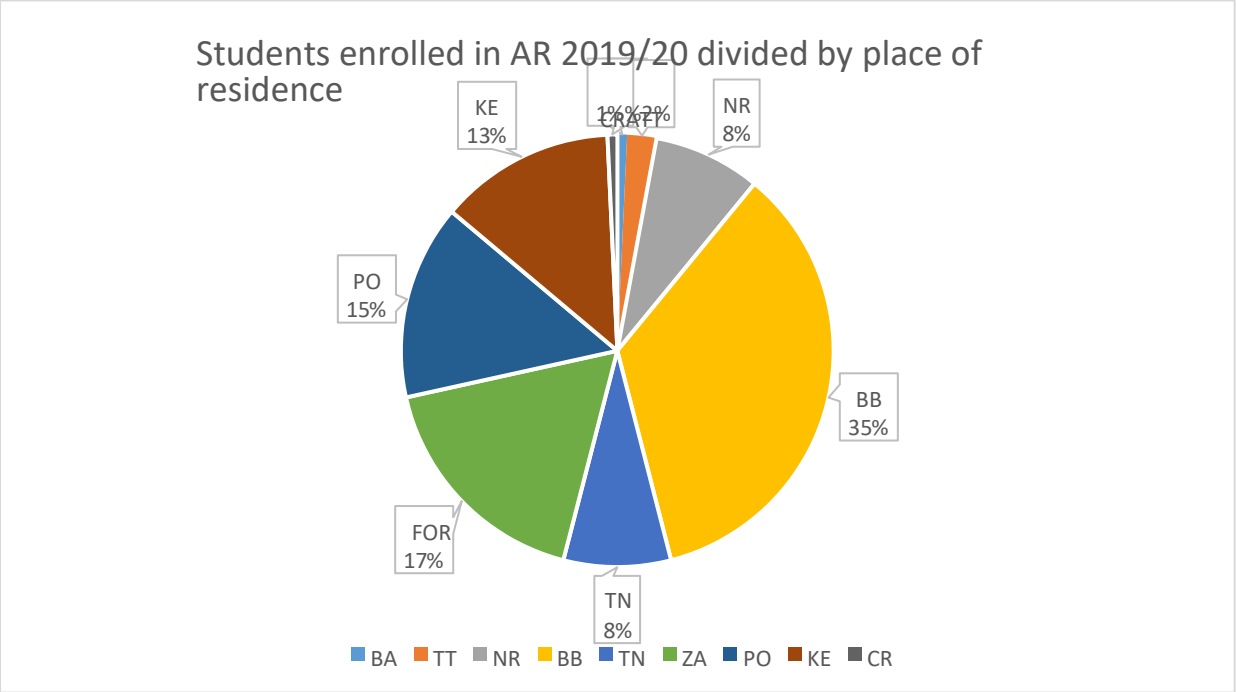


Fig. 6e Distribution of enrolled students by place of residence

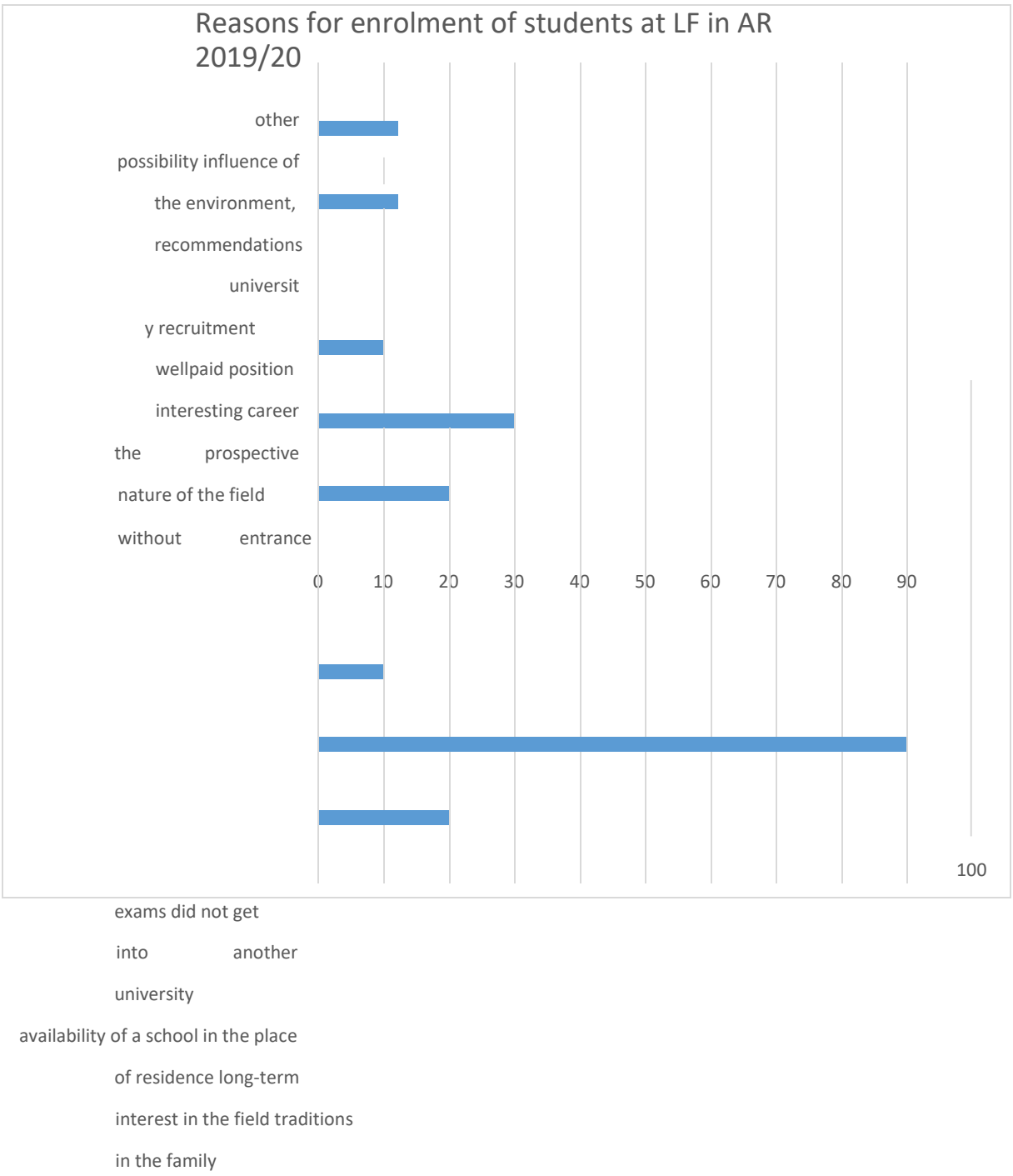


Fig. 6f Reasons for students enrolling at the Faculty of Forestry in AR 2019/20

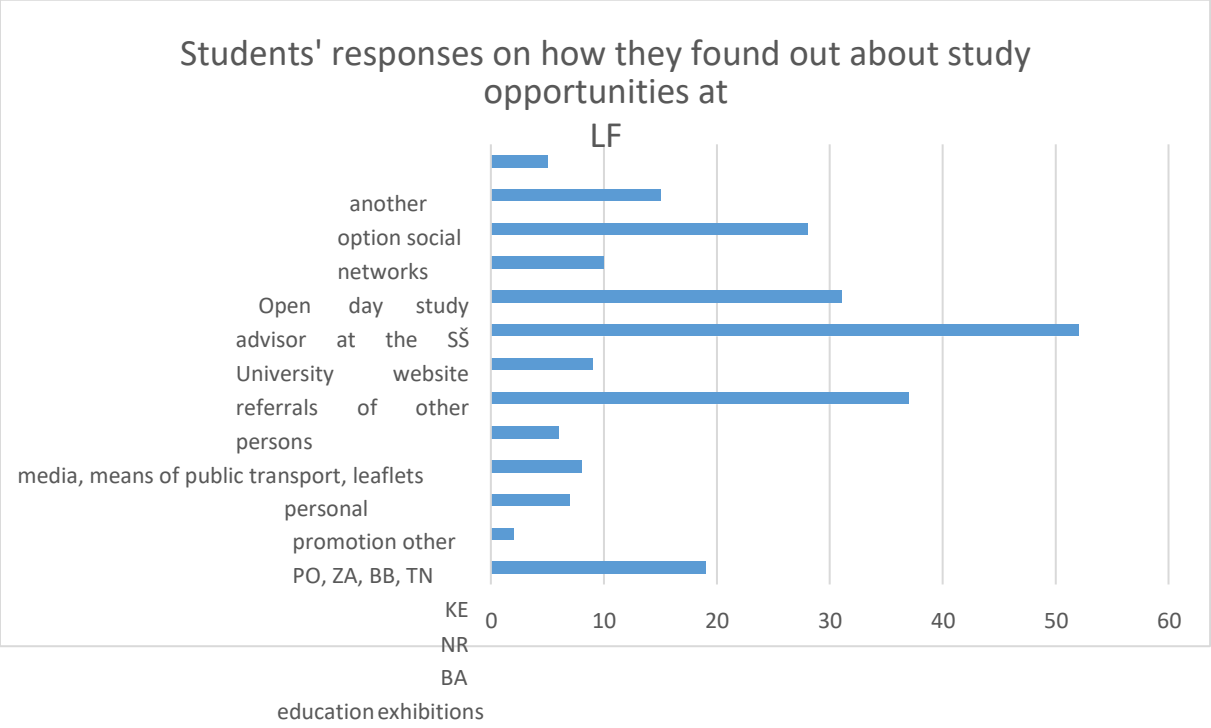


Fig. 6g Overview of students' responses to sources of information about studying at the Faculty of Arts

9.2 Admission procedure for engineering studies

Table 10 provides an overview of the number of applicants applied, accepted and enrolled for engineering studies in the academic year 2019/20 and Table 11 provides data relating to the current academic year 2019/20. In AR 2019/20, a total of 99 full-time students and 37 part-time students were enrolled in the first year of Level II studies. 2 study programmes were opened in both full-time and part-time study (Adaptive Forestry, AZP). In the current AR, 90 students were enrolled in full-time studies (Fig. 7a,b). In the external form, 21 students were enrolled, which is 16 fewer than in the AR 2019/20.

Table 10 Overview of the number of applicants for the 2nd cycle of studies for AR 2018/2019

Programme and form of study	**Academic year 2018/2019**			
	Number of logged in	**Number of participants**	**Number of plan/actions adopted**	**Number of Enrolled**
full-time study - engineering				
Adaptive forestry	87	87	80/87	**84**
Geoinformation and mapping techniques	2	2	15/13	**0**
Forest ecology	0	0	15/0	**0**
Applied zoology and hunting	16	16	30/16	**15**

Forestry technology	0	0	15/0	**0**
Forestry and wildlife management	0	0	10/0	**0**
full-time study total	**105**	**105**	**165/103**	**99**
external study - engineering				
Adaptive forestry	25	25	20/24	**24**
geoinformation and mapping techniques	0	0	0/0	**0**
forest ecology	0	0	0/0	**0**
applied zoology and hunting	13	13	20/13	**12**
Forestry technology	0	0	10/0	**0**
Forestry and wildlife management	0	0	0/0	**0**
external study total	**38**	**38**	**50/37**	**37**
DS + ES together	**143**	**143**	**215/140**	**136**

Table 11 Overview of the number of applicants for the 2nd cycle of studies for AR 2019/20

Programme and form of study	**Academic year 2019/2020**			
	Number of logged in	**Number of Participants**	**Number of Received plan/actual**	**Number of Enrolled**
full-time study - engineering				
Adaptive forestry	59	59	80/59	58
Geoinformation and mapping techniques			0	
Forest ecology	8	8	15/8	8
Applied zoology and hunting	24	24	30/24	24
Forestry technology			15/0	
Applied geoinformatics and	3		40/0	

Forestry and wildlife management			10/0	
full-time study total	**94**	**91**	**190/91**	**90**
external study - engineering				
Adaptive forestry	18	18	20/18	16
geoinformation and mapping techniques in forestry				
forest ecology				
applied zoology and hunting	7	6	20/6	5
Forestry technology			10/0	
Forestry and wildlife management				
external study total	**25**	**24**	**50/24**	**21**
ES + ES together	**119**	**115**	**240/115**	**111**

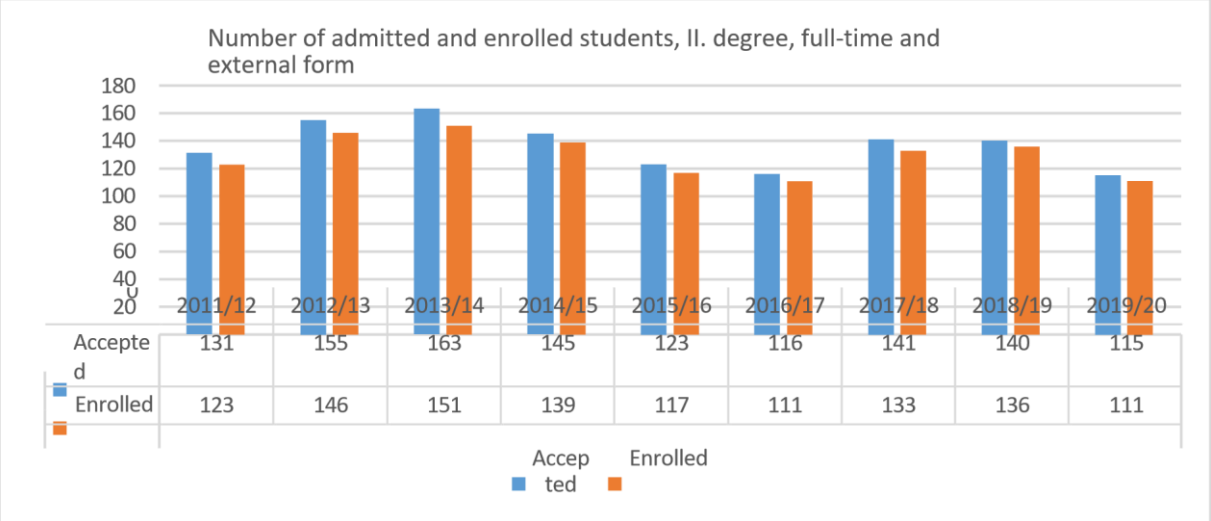


Fig. 7a Number of students admitted and enrolled in AR 2011/12 to 2019/20 at level II

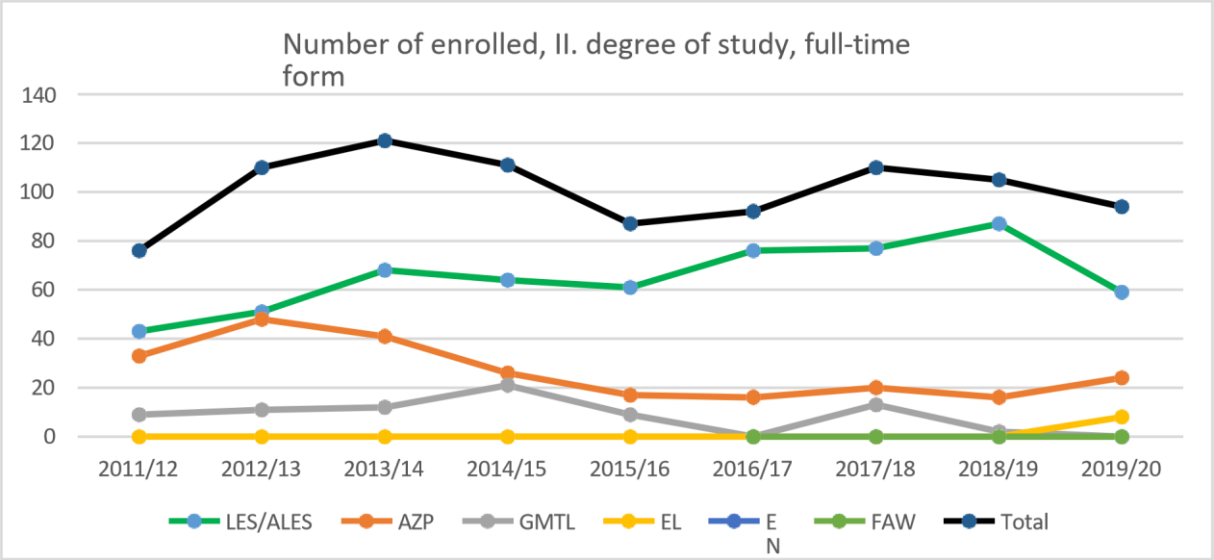


Fig. 7b Number of students enrolled in AR 2011/12 to 2019/20 for individual study programmes in the second cycle of study, full-time form

The greatest interest of students in the second cycle of study is traditionally in the study programme Adaptive Forestry, followed by the study programme Applied Zoology and Hunting. This year, after a long break, the study programme Forest Ecology was again successful thanks to the interest of students.

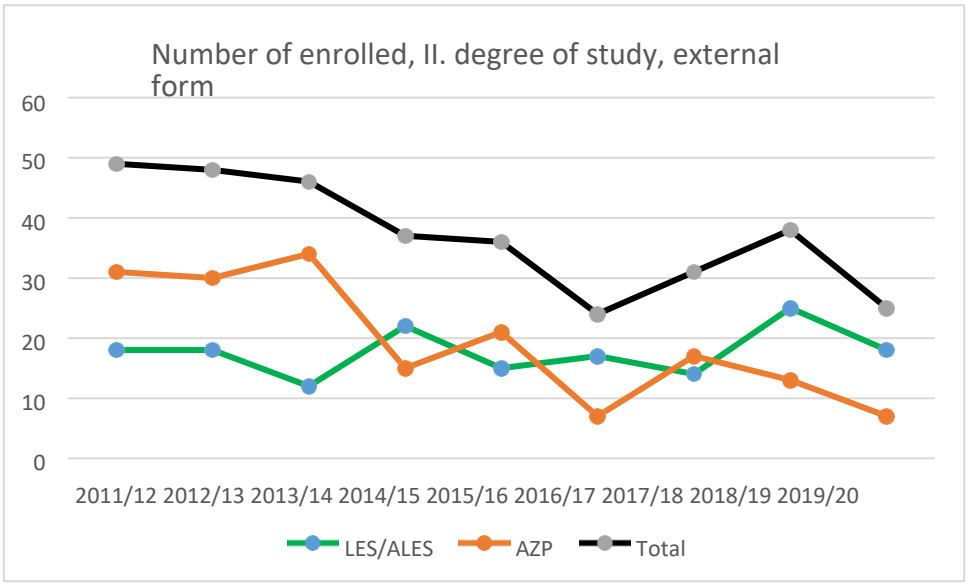


Fig. 7c Number of students enrolled in engineering studies for AR 2011/12 to 2019/20 for individual study programmes in the second cycle of study, external form

10. Evaluation of full-time teaching positions at the Faculty of Forestry of the TU in Zvolen for the academic year 2017/18

Deduction of teaching time at the Faculty of Forestry of the TU Zvolen in the academic year 2019/20 is processed for the entire faculty and for individual departments (Fig. 8a,b,c). At the Faculty of Forestry, in the previous academic year 2017/18, there were a total of 62 internal scientific and pedagogical staff with a total teaching time of 61.05. In the evaluated AR 2019/20, a total of 64 scientific-pedagogical staff worked as of 31.10.2018 with an actual working time of 61,25.

Total full-time teaching activity in AR 2017/18 reached 65,000 points.
After subtracting the full-time external lecturers working at the Faculty of Forestry 58457 points.

In the evaluated AR 2019/20 the total amount of teaching staff is 66175 points, excluding external staff 59078 points. In calculating the teaching FTEs, we have relied on the University's information system for the past academic year. During the course of the AR, departmental staff and course tutors were reminded on several occasions to be diligent about assigning teachers to individual timetable events in the UIS.

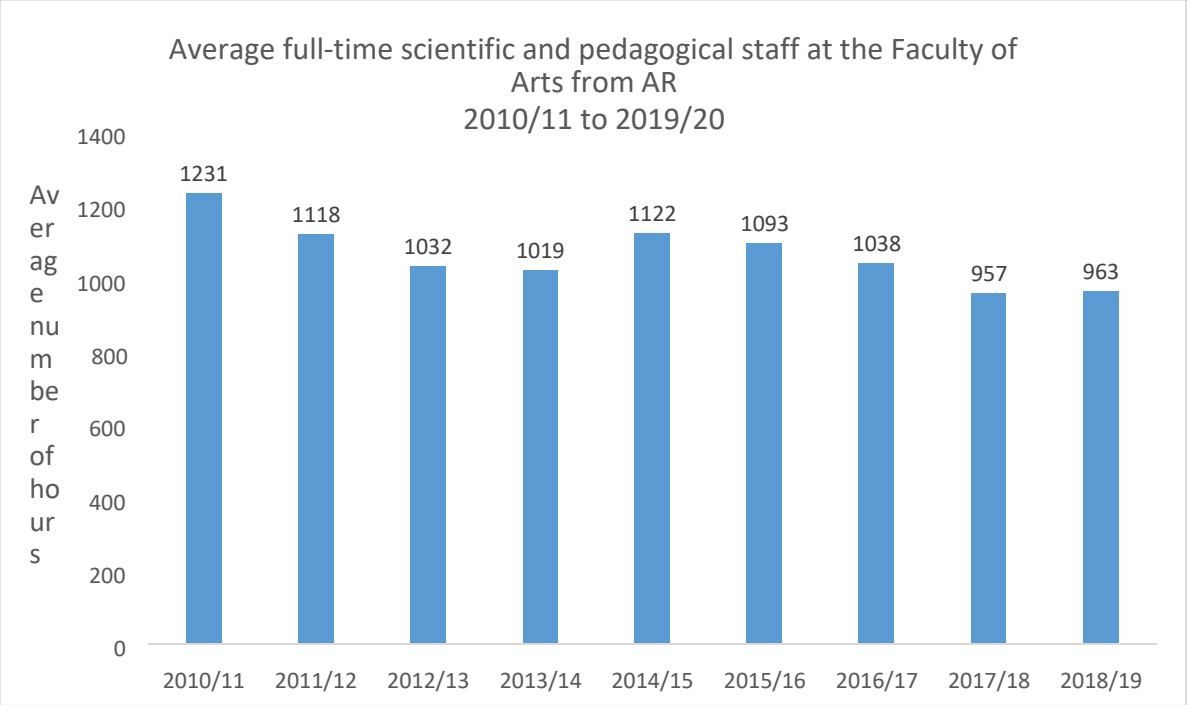
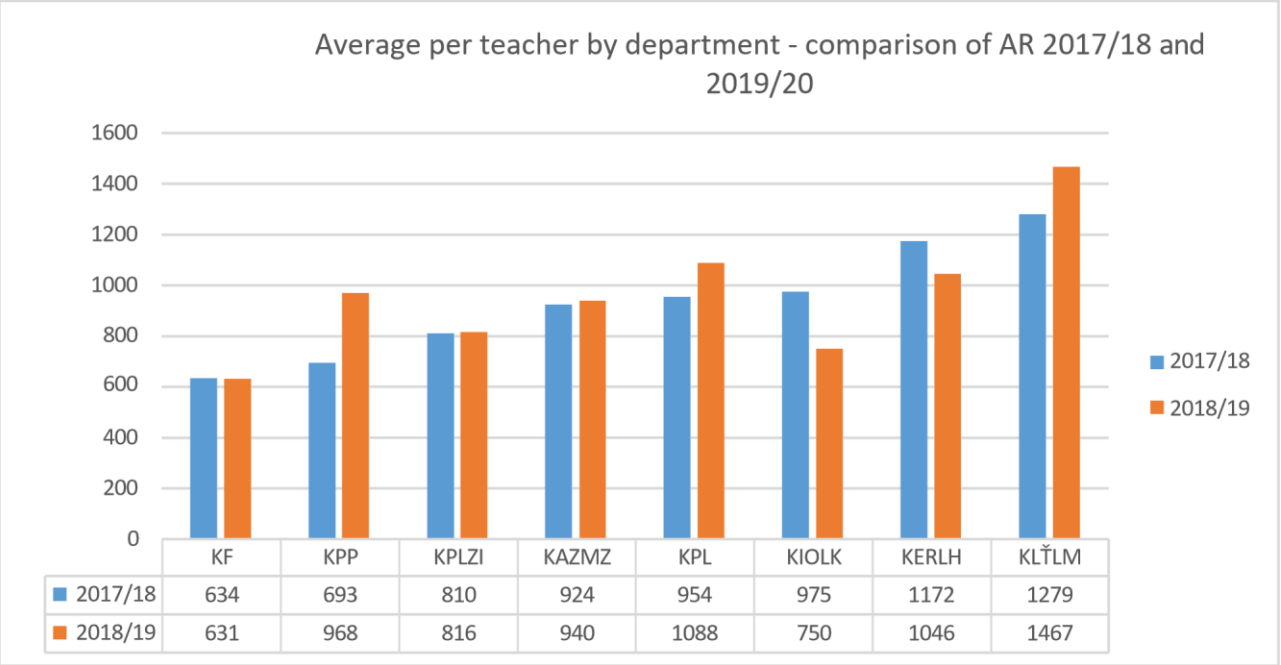


Fig. 8a Evolution of the average number of internal scientific and teaching staff of the Faculty of Arts for the period 2010/11 to 2019/20

The average teaching load reached 965 points, similar to the previous AR. According to Fig. 8b, c, it is evident that the distribution of teaching work is not even in the departments. For some departments, the apparent increase is due to higher staff involvement in indirect teaching, or a reduction in teaching capacity - reduction in assistant professor positions.

In the 2017/18 academic year, a total of 101 staff, including PhD students, had at least some teaching time, with scores ranging from 5 to 2038. A total of 74 LF staff (including post-doctoral students) were involved in indirect teaching.

In the 2017/18 academic year, a total of 98 staff, including PhD students, had at least some teaching time, with scores ranging from 3.3 to 1548. At A total of 69 LF employees (including PhD students after the dissertation examination) participated in indirect teaching.



	KF	KPP	KPLZI	KAZMZ	KPL	KIOLK	KERLH	KLŤLM
2017/18	634	693	810	924	954	975	1172	1279
2018/19	631	968	816	940	1088	750	1046	1467

Fig. 8b Average time per internal research and teaching staff member by department, comparison between AR 2017/18 and 2019/20

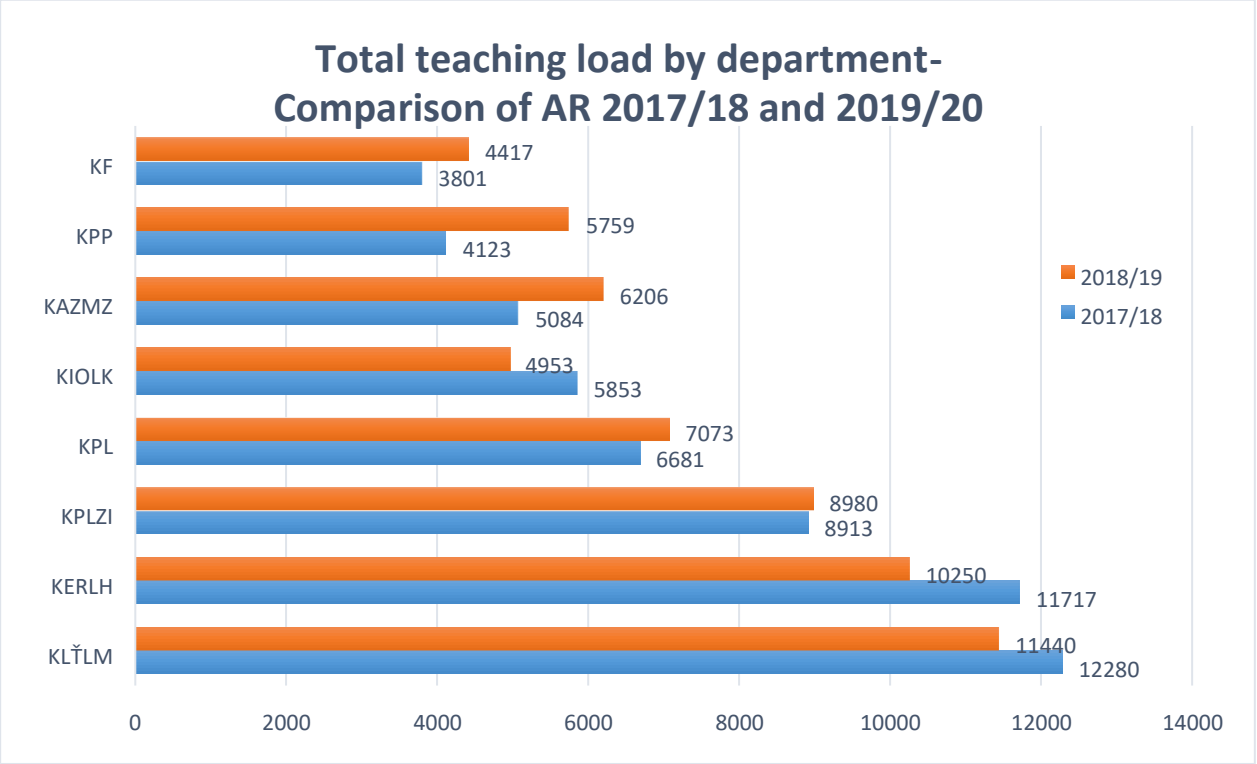


Fig. 8c Overview of the total amount of full-time teaching staff (all research and teaching staff) by department, comparison between AR 2017/18 and 2019/20

11. Tasks of LF TU in Zvolen in the framework of educational activities

Completion of tasks for AR 2018/2019

- **Organise an open day in January.**

  The Open Day took place on 28 January 2019. The date was announced in advance through study guides, on the faculty website, education fairs, and by personal invitation to students during meetings at high schools. More than 150 interested students participated. Students, PhD students and departmental staff prepared a rich programme for the visitors in the form of visits to individual departments, including demonstrations of instrumentation and presentations of research results.

- **Promotion of LF in secondary schools. Updating of information materials on studying at the LF**

  The material "Guide to studying at LF" was published and updated. Added new study program, updated information and photo documentation on the renovated premises of TUZVO, dormitories, new relax zone. We participated in education fairs in Nitra, Bratislava, Košice, Žilina, Banská Bystrica. New information leaflets - bookmarks were printed. All new print and visual documents will continue to be distributed through appropriate channels to potential applicants. Visits will be made to selected secondary schools. Visits to secondary schools and promotion of study at LF.

• **Implementation of other measures to optimise the pedagogical process**

We continued to implement preparatory courses for 1st year LF students in Biology, Chemistry and Mathematics. A seminar on thesis writing and principles of thesis presentation was held. We prepared a concentration before the state exams for engineering students.

• **Correction of study plans in the study programmes of the Bachelor's degree (Forestry, Applied Zoology and Hunting)**

We have opened the curricula of Bachelor's degree programmes. Guarantors of study programmes, heads of departments, students were contacted by email, through student representatives in the Academic Senate. The proposed changes have been incorporated and agreed by the guarantors of the study programmes and are valid from AR 2019/20 (reorganization of courses, addition of foreign languages, new course with practical teachers, addition of the scope of lectures and main exercises).

Tasks for AR 2019/20

• **To organize an open day of the Faculty of Forestry in the month of January.** The Open Day in the current AR will take place on 28 January 2020.

Responsible: vice-dean for pedagogical work and vice-dean for external relations Term: january 2020

• **Promotion LF at secondary schoolsand education exhibitions . Updating of information materials on studying at LF**

Responsible: vice-dean for pedagogical work and vice-dean for external relations Term: september 2019 - march 2020

• **Implementation of measures to optimise the pedagogical process**

Implementation of preparatory courses for 1st year LF students in Biology, Chemistry and Mathematics. Seminar on thesis writing and the principles of its presentation. Filling the database of video lectures on the portal lesnickeprednasky.sk. Concentration before the state exams.

Responsible: vice-dean for pedagogical work Term: november 2019 - august 2020

• **Correction of study plans in the study programmes of the Bachelor's degree (Forestry, Applied Zoology and Hunting)**

Re-establishment of the Bachelor's degree curricula with the validity of the changes from 1.9. 2020

Responsible: vice-dean of the Faculty of Arts for pedagogical work and guarantors of SP Term: january - february 2020

4. Scientific research activity

Scientific research activities and doctoral studies at the Faculty of Forestry of the Technical University of Zvolen are evaluated according to the relevant regulations of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the requirements of the management of the Technical University. The annual evaluation consists of the following parts:

- involvement and results of faculty and departments in projects in the field of scientific research activities at national and international level,
- Evaluation of scientific research and publication activities in 2020,
- Evaluation of doctoral studies and student scientific and professional activities in 2020,
- 2020 targets and 2021 actions.

The report for the year 2020 is submitted to the members of the College of the Dean of the Faculty of Forestry, the members of the Scientific Council of the Faculty of Forestry of the Technical University of Zvolen and to the superior organizational units (the management of the Technical University) and contains information on the organization and basic results of the scientific research activities from the previous year. It is the basis for comparison of some parameters and indicators from the previous period. The results are the basis for periodic evaluation of the Faculty of Forestry of TU and improvement of research activities.

I. Basic characteristics of the scientific research activities of the Faculty of Forestry of TU in 2020

Scientific research activities at the Faculty of Forestry of the Technical University of Zvolen are related to the pedagogical activities of the departments in individual fields of study and programmes. Their content is based on the connection of pedagogical and scientific focus.

The implementation of scientific research activities is carried out through projects of domestic and foreign agencies. It should be emphasized that the Faculty of Arts has its representatives in the commissions and councils of these agencies. An important contribution is also made by the scientific research activities through the international programmes of the European Commission and the Framework Programmes. The faculty's scientific research activities are complemented by the projects of the Internal Project Agency (IPA) and the faculty's FLproject, which is mainly of an applied nature, and is also complemented by projects within the special-purpose activities of the VŠLP TU, or within the framework of entrepreneurial activities. Also in 2020, we recorded some results in scientific research activities that are worthy of documentation.

The approved research direction of the Faculty of Forestry for the years 2011-2020: **adaptive management of forest ecosystems** is to ensure the continuity of scientific research activities and to innovate the priorities of scientific research activities with regard to new challenges in international and national forestry research, society and economy. To this end, the websites http://forestryhorizon.org and http://lesnickyvyskum.sk have also been set up to provide basic information on scientific research activities. The websites serve as information resources for other departments both at home and abroad.

Scientific research activities are provided by the departments of the Faculty of Forestry through national and international scientific research projects in natural, technical and social sciences:

- Department of Forest Economics and Management

- Department of Phycology
- Department of Integrated Forest and Landscape Conservation
- Department of Forest Resource Planning and Informatics
- Department of Forest Harvesting, Logistics and Reclamation
- Department of Applied Zoology and Game Management
- Department of Silviculture
- Department of Natural Environment

Department of Forest Economics and Management

Strategic research goal: ***Economic and social aspects of adaptive management of forest ecosystems***

The Department develops its scientific research activities with an emphasis on sustainable development of forestry and its adaptive management in the field of forest economics, management and financing of forest enterprises and forestry policy.

The field of forest economics

- Analyses of the economic and legal conditions for the functioning of markets in the forestry sector.
- Analyses of property rights and their limitations in forestry.
- Economic analysis of forestry projects in relation to specific forest land management risk.
- Mathematical Modelling Economic Vulnerability Forest a development efficient mathematical models of forest insurance against the risk of forest land management.
- Valuation and valuation of non-market forestry goods and services analysis of their internalization.
- Analysis of the use of renewable energy sources, economic analysis of the use of forest and agricultural biomass for energy purposes.

Forest enterprise management and financing

- Analysis and quantification of the externalities of the global economy on the financial flows of forest enterprises.
- Analysis of marketing tools to promote the use of wood as a renewable energy source.
- Analysis and possibilities of obtaining financial resources in relation to the operating conditions of forest land management entities.
- Modeling and optimization of the property and capital structure of forest enterprises in relation to legal forms of business and efficient organizational structures.
- Analysis of the use of renewable energy sources, individual energy systems and technologies, economic analysis of the use of forest and agricultural biomass for energy purposes.

Forestry policy area

- Formulation, implementation and evaluation analyses of public policy measures in forestry.

- Analyses of actors in forestry policy (public administration, interest groups, civil society associations).
- Analysis Processes in forestry policy (Hierarchy, Negotiation, participation, intersectoral coordination, interactive planning).
- Analyses of changes in the political system and their impact on forest policy (internationalisation, Europeanisation, decentralisation, multi-level governance).

Department of Phycology

Strategic research goal: ***Research on the structure and function of forest ecosystems on a broader natural science basis***

The Department develops its scientific research activities with emphasis on sustainable development of forestry in the field of management and use of forest ecosystems.

Genetics and breeding of forest tree species

- Rating mechanisms Adaptation of forest of tree species at environment at based on provenance research and variability of adaptive genetic markers
- Identification of trends in neutral and adaptive genetic variation in forest tree species and game species, or rare and protected animal species
- Analysis of the direction and extent of gene flow between genetically differentiated populations and taxa
- Assessment of evolutionary trends of forest tree species and animals
- Analysis of the functioning of seed orchards as a basic tool for forest tree breeding
- Analysis of ontogenetic trends, especially developmental lignification of trees
- The use of *in vitro* propagation methodologies as an efficient way of propagating breeding material

The field of botany and phytocenology and forest typology

- Research on taxonomy, variability and ecological requirements of selected woody plant species,
- Analysis of the impact of management interventions on the biodiversity of forest phytocenoses,
- Assessment of forest ecosystems in terms of ecological stability and proposal of conservation measures,
- Assessment of the response of forest phytocenosis diversity to changes in e d a p h i c c l i m a t i c conditions in Slovakia,
- Use empirical materialsfrom typologicalrepresentative plots to assess the habitat-ecological suitability of tree species composition,
- Monitoring the dynamics of forest community development and change in the light of global climate change,
- Application of the results obtained in the field of nature conservation in the zonation of protected areas

The field of game and wildlife genetics

- Research of genetic diversity and differentiation of selected animal species as a basis for their species conservation or management of game populations,
- Research on population-level processes in wildlife populations (mating system and gene flow)

- Research on the application of non-invasive genetic research methods in the study of wildlife populations

Department of Integrated Forest and Landscape Conservation

Strategic research objective: ***Adaptive management of forest ecosystems under disturbance processes in changing ecological conditions for sustainable management and stability of forest ecosystems.***

The Department develops its scientific research activities with an emphasis on sustainable development of forestry and its adaptive management in the field of forest and landscape protection, disturbance ecology and ecophysiology of forest ecosystems.

Forest conservation and disturbance ecology

- Analyses of causes and consequences of disturbance processes caused by natural damaging agents in management and natural forests in relation to adaptive management of forest ecosystems.
- Analysis of the impacts of anthropogenic pollutants in forest ecosystems affected by changing climatic conditions.
- Analysis of population dynamics and gradation potential of insect pests in forest ecosystems under changing ecological conditions in order to forecast and effectively manage their overpopulation with special attention to destructive pest species.
- Analysis of the spectrum of macromycete species in forest stands under the influence of disturbance processes, the possibility of using fungi in the process of forest and landscape restoration, as well as improving the quality of human life.
- Analysis of the contribution of wood-destroying fungi to forest emergencies - wind calamities, forest fires.

Physiology and ecophysiology of forest trees and stands

- Research on the physiology and ecophysiology of forest tree species on the role of drought as a stressor and other drivers of global change.
- Investigation of complex relationships between woody plants and the environment (mycorrhiza) in elucidating the growth of beech and spruce seedlings under soil water deficit.
- Research on physiological and growth variability as a basis for selection of drought tolerant forest tree ecotypes.
- Analysis of selected physiological-biochemical properties of forest ecosystem components in Slovakia in relation to the Monitoring of Forest Health in Slovakia.

Area of nature conservation and landscape and countryside management

- Analysis of nature and landscape conservation relationships and environmental functions of forest ecosystems.
- Analysis of the functional potential and functional effect of the recreational function of the forest in relation to the rational use of the forest as a natural resource.
- Analysis of multifunctional agriculture and forestry in agro-tourism and rural development.

- Specially Protected Areas of Nature and Landscape in the Forest Fund and Sustainable Use of Forests.

Department of Forest Resource Planning and Informatics

Strategic research objective: ***Planning and control tools for adaptive management of forest ecosystems.***

The Department develops its scientific research activities with an emphasis on sustainable development of forestry and its adaptive management in the field of forest management, forest mapping, forest inventory, geoinformatics and forest modelling.

Forest management area

- Spatial, temporal and harvesting arrangements in the current renewed ownership relations, with respect to permanent forest management,
- Harvesting regulation in forest spatial distribution units using finer management practices,
- Forest harvesting in irregular forest age structures in relation to the current spatial distribution of the forest,
- Multipurpose Sustainable Forest Management (MSFM) using forest modelling tools, decision support and information technology.

Forestry mapping area

- Assessment of the impact of varying forest environment conditions on the accuracy of Global Navigation Satellite Systems (GNSS), electronic tachymeters and field-mapping technology measurements,
- Optimal procedures for the determination of point field and forest detail, especially forest land boundaries, by a combination of GNSS and classical terrestrial measurement methods,
- Optimal procedures for the evaluation of aerial images of various kinds and other remote sensing materials by digital photogrammetry methods for the creation of forestry maps and other activities related to adaptive forest management.

Forest inventory area

- Selection designs and procedures for terrestrial forest inventory with respect to sustainable and adaptive forest management needs,
- Sophisticated and efficient methods for non-contact forest inventory (terrain and airborne laser scanning, remote sensing methods) for sustainable and adaptive forest management,
- Use of biometrics, geostatistics and forest modelling methods to process data from terrestrial and non-contact forest inventory for the needs of forest function assessment, planning and control of forest management.

The field of geoinformatics

- Developing geoinformatics methods for spatial data collection and processing with respect to more detailed information and precision forestry,
- Use of new sources of geographic information and procedures of their processing for the purposes of forest management, forest mapping and forest inventory,

- Use Resources geoinformatics for support spatial decisionmaking in adaptive forest management.

Forest modelling area

- Developing forest models with respect to empirical, process and structural approaches in forest modelling.
- Linking forest models to terrestrial and non-contact forest inventory methods.
- The use of virtual reality in forest modelling and forestry education.

Department of Forest Harvesting, Logistics and Reclamation

Strategic research goal: ***Thorough analysis and systematic processing of theoretical and practical knowledge from the sub-areas of the main research direction of forest harvesting and forestry mechanization. Aspects of forestry structures, land reclamation and gully fencing in the context of adaptive management of forest ecosystems***

The Department develops its scientific research activities with an emphasis on sustainable development of forestry and its adaptive management in the field of logging and transport and production technologies, forest mechanization, ergonomics and occupational safety, complex use of biomass, forestry structures, forestry damming and land reclamation.

Mining, transport and production technologies

- Harmonization of biological and production requirements of harvesting and transport technologies in the Slovak Republic.
- Research on the efficiency of timber production and processing under forest land management risk conditions.
- Development of sophisticated forest ecosystem data collection approaches and in-depth analysis, including design and validation of a mobile system for data collection and processing as well as implementation of precision forestry applications.
- Refinement of the field and technological typing system based on the spatial decision support system.
- Validation of precision forestry applications and design of decision support systems for harvesting and logging technologies, forest access and fire management.
- Quantification and assessment of the negative impact of forestry machinery and technology on the environment. Determination of exact methodologies and limits of environmental damage differentiated by functional forest types.

Area of forestry mechanisation

- Basic and applied research on environmentally clean and economically efficient equipment, including new technical principles.
- Research and development of special rope equipment, special rope trolleys and deltastats, including research and application of forestry robot principles.
- Research and development of principles and means for the use of alternative energy sources on the example of energy-saving devices - recuperation rope devices.

Ergonomics and occupational safety

- Analysis of occupational diseases and occupational illnesses in the forestry and woodworking industries.
- Analysis of occupational injuries in the forestry and wood processing industry.
- Analysis of health and safety risks in biomass production, manufacturing and processing.
- Analysis of the state of forestry in the Slovak Republic in the field of implementation of the Community strategy on health and safety at work (EU Strategy 2007-2012).
- Formulation of recommendations and implementation of knowledge in this area for forestry entities in the Slovak Republic.

Area of comprehensive biomass utilisation

- Analysis and development of theoretical principles and practical methods for assessing the quality and quantity of raw wood assortments.
- Analysis of the possibilities of establishing plantations of fast-growing trees on forest land and low-productive agricultural areas.
- Evaluation of quality parameters of biomass fuels.
- Impact of selected factors on forest biomass degradation and health and safety risks associated with biomass processing for energy purposes.
- Evaluation of the economic efficiency of energy chips production in forestry.
- Modeling and optimization of forest chips production as raw material base for energy recovery.

Area of forestry structures, land reclamation and bunds

- Optimisation of forestry structures, land reclamation and stream protection activities in terms of cost-effectiveness, functionality, design, efficiency and integration into the landscape
- Analysis of forestry structures, land reclamation and gully fencing with regard to regional, ecological and environmental aspects.
- Integrated management of small river basins in the context of flood protection, with emphasis on the water management and water conservation function of forest ecosystems and increasing the available water supply and quality.
- Integrated management of small watersheds in the context of erosion control with emphasis on the erosion control function of forest ecosystems.
- Integrated management of small river basins in the context of flood protection with emphasis on the flood protection function of forest ecosystems and nature-based flood protection measures

Department of Applied Zoology and Game Management

Strategic research objective: ***Adaptive management of game populations under the influence of disturbance processes in changing ecological conditions for biodiversity conservation.***

The Department develops its scientific and research activities with an emphasis on adaptive management in the field of applied zoology, hunting, nature and landscape conservation and landscape care.

The field of applied zoology

- Diversity and ecology of insectivorous guilds of selected forest groups of higher animals
- Assessment of the damaging activity of selected vertebrate species on forest stands
- Diversity and ecology of selected forest vertebrates in natural forests of the Western Carpathians
- Ecology, management and conservation of selected game and carnivore species in forest ecosystems of the Western Carpathians

Hunting area

- Management and conservation of selected game species in forest ecosystems of the Western Carpathians from the aspect of ruminant abundance dynamics and environmental status and regional trophy quality of game animals.
- Management and conservation of selected carnivore species in forest ecosystems in terms of spatio-temporal and habitat requirements.

Department of Silviculture

Strategic goal of the research: ***research of the structure and processes in forests in Slovakia, development, verification and optimization of silvicultural models in forests with different functional focus, taking into account the changing climatic situation. Research on shape and growth variability of rare tree species.***

The Department develops its scientific research activities with an emphasis on sustainable development of forestry and its adaptive management in the field of silviculture, forest establishment and forestry dendrology.

Forest cultivation area

- Structure, texture, regeneration processes and disturbance regime focused on frequency and size of gaps /gap and patch dynamics/, history of their formation /dendrochronology/ of selected forest types in Slovakia.
- Research and optimization of the cultivation models needed for the formation and structuring of forests with different functional orientations, taking into account climate change.
- Optimisation and shaping of forest structure in the reservoir area
- Research on the rhizosphere of basic tree species in forests and woodlands with different functional focus.
- Research of high mountain spruce forests, their disturbance dynamics, the size and frequency of stand gaps, the manner of their formation and the subsequent development of natural regeneration in stand gaps.

Forest establishment area

- Testing of stimulating (mainly microbial) preparations and artificial mycorrhization in the cultivation of generative and vegetative planting material of forest tree species.
- Testing of seedlings of different tree species, planting dates and preparations (soil conditioners) in planting areas with unfavourable environmental conditions.
- Comprehensive assessment of the quality of planting material (biometrics, root system - ectomycorrhizae, chemical analyses, physiology) in relation to its establishment and initial growth.

The field of forestry dendrology

- Research on variability and ecology of selected tree species in Slovakia.
- Research on the variability of species, forms and cultivars of woody plants in the Borová hora Arboretum.

Department of Natural Environment

Strategic objective of the research: ***status and changes in the natural environment of forest ecosystems in Slovakia in the process of adaptive management of forest ecosystems***.

The Department develops its scientific research activities with an emphasis on adaptive management of forest ecosystems and sustainable development of forestry in the following areas: forest and environmental applied geology and geomorphology, biometeorology and bioclimatology, water cycle in nature, soil science and forest ecology.

Geology, geomorphology and pedology

- Study of the reflection of geological structure and relief types in the diversity of potential vegetation
- Analysis of geobarriers in the natural environment from the perspective of risk analysis and management - with emphasis on the management of environmental burdens in the landscape
- Analysis of physicochemical and biological properties of soils - with emphasis on habitat (ecological) characteristics of soils and physiological depth of soils from the perspective of sustainable forestry development
- Study of the water regime of forest soils under changing environmental conditions, determination of vertical and horizontal permeability of soils
- Analysis of transformation, transport, distribution and accumulation processes in forest soils and the interaction of soil organic matter with the mineral fraction of soils from the perspective of sustainable forestry development, with emphasis on nutrient potential and stocks
- Use of modern geochemical and geophysical methods for express classification of forest soils in the morphogenetic classification system of forest soils of the Slovak Republic

Biometeorology, bioclimatology and landscape water balance •

Natural risk analysis of forest ecosystems under climate change:

- Drought and fire risk assessment in forest ecosystems and landscapes
- Analyses of water balance processes in forest ecosystems with respect to the occurrence of extreme drought and floods in the landscape
- Analysis of extreme rainfall, flooding, snow cover, mountain snow avalanche risk in changing weather conditions
- Analysis of the influence of bioclimatic stress factors on physiological processes, growth, phenological manifestations and health status of forest stands under climate change
- Undermining the protective functions of the atmosphere and impacts on adaptive forestry
- Modelling soil-plant-atmosphere processes under climate change

The field of forest geoecology

- Analysis of ecological functions of forest soils under climate change
- Studying the impact of global climate change on forest ecosystems and their ecological stability
- Study of the microbial community of forest soils as a determining factor in the cycling of substances and energy in forest ecosystems
- Analysis and optimization of different land management practices in terms of their impact on the carbon balance in soils of temperate and semi-arid zones of climax and cultivated forests

  Elucidation of survival conditions and vitality of the forest biome under extreme conditions of the polar and semiarid zones

In 2020, the scientific objectives of the departments were addressed through the following projects:

A. *2 international EU projects under Horizon 2020*

B. *1 international LIFE project in the Programme priority area - Nature and Biodiversity*
C. *4 international EU projects - COST*
D. *2 international EFI Network Fund projects*
E. *20 APVV projects*
F. *22 VEGA projects of the Slovak Ministry of Education and Science and the Slovak Academy of Sciences*
G. *5 KEGA projects of the Ministry of Education of the Slovak Republic*
H. *1 independent institutional project of the Faculty of Forestry* ***I.*** *3 business activity projects*

These projects are as follows:

Faculty of Forestry

- Beech forestry VšLP - **prof. M. Saniga (FL)**

  The project was continued within the framework of the implementation of partial stages at individual departments of the Faculty of Forestry, mainly within the framework of the special-purpose activities of the VšLP.

Department of Forest Economics and Management

- **COST Action CA 15206** - Payments for Ecosystem Services (Forests for Water), (PESFOR-W) - **prof. J. Šálka, 2016-2021**

  Annotation of 2020 results:
  The PESFOR-W COST Action aims to synthesise knowledge, provide guidance and support joint research to improve Europe's ability to use Payment for Ecosystem Services (PES) to achieve the objectives of the Water Directive and other policy objectives through incentives for planting forests to reduce pollution from agriculture into watercourses. The EU's Water Framework Directive (WFD) aims to ensure that Europe's water bodies are restored to "good ecological status" by 2027.
  No working group meetings were held in 2020 due to the worsened pandemic situation. TUZVO researchers are active in the first working group - governance of payments for forest-water ecosystem services. A scientific paper on institutional conditions for the implementation of PES schemes is still in progress. As one of the outputs, a manual for the design and successful implementation of water-oriented PES schemes is being prepared. Information is available at https://forestry.gov.uk/fr/pesforw.

- **EFI Network Fund** Perception of the role of the forestry sector in the bioeconomy (PerForm) - **prof.**
  J. Cup, 2018 - 2020

  Annotation of 2020 results:
  In 2020, work on the preparation of a special issue in the scientific journal AMBIO was underway, where researchers from TUZVO are involved in three articles in preparation.

- **APVV-17-0232** Testing of new policies and business models for the provision of selected forest ecosystem services (TestPESLes) - **prof. J. Šálka, 2018 - 2021**
  Annotation of 2020 results:
  In 2020, work was carried out on forecasting the performance of individual forest ecosystem services (ESL) in selected areas of interest of the research customers, namely the Banská Bystrica Urban Forests and the surroundings of Štrbské Pleso, using the SIBYLA growth simulator. In the framework of elaboration of new business approaches to ESL trading, variant carbon trading models and a user manual for water ESL were prepared in cooperation within the COST PESforW action, defining the basic steps of establishing a functioning PES scheme. In cooperation with Mestské lesy Banská Bystrica s.r.o., and the City of Banská Bystrica, a pilot online survey on the perception of payments for forest ecosystem services was carried out within the framework of the project. The aim of the survey was to understand the relationship of the inhabitants of the town of Banská Bystrica to the management of the surrounding forests and their perception of the services provided by the forests. Promotion of the results among the professional public was addressed by presenting the interim results in scientific journals, online meetings and sessions. Publications and presentations from this project are published on the project website. For more details see http://www.ipoles.sk/testpesles.

- **APVV-18-0520** Innovative Methods of Performance Analysis of Forestry and Forestry Complex Using Green Growth Principles (INECOFOWOS) - **prof. I. Hajdúchová, 2019 - 2022**

  Annotation of 2020 results:
  In 2020, the first and second phases of the project were completed. The result is a database of data on the development and current state of forest stands and timber stocks in the Slovak Republic, as well as the development of the price level of individual timber products. The researchers also focused on the issue of forestry production at the level of relations between supply (timber production) and cultural (recreational potential) ecosystem services of forests in the context of the legal aspects of public use of forests and the legal regulation of forestry business. A model of coniferous and broadleaved log prices was constructed and quantified, confirming the influence of the main factors causing changes in the price level for each species based on the analysed data of the 20012018 time series. The analysis of the wood processing capacities of the wood and energy industry focused on mapping the interest in selected commodities of the timber industry, in wood colour shades among potential customers and in the practice of wood and furniture enterprises, exploring the perception of wood houses in relation to brick houses by customers in relation to sustainability in the context of economic and social aspects in the Slovak Republic, analysis of the perception of environmentally friendly wood products by consumers as well as analysis of the use of wood as a renewable energy source.

- **APVV-19-0612** Modelling the impact of the risk of occurrence of destructive natural elements on the economic complex of forestry and timber in the conditions of continuing climate change (CLIMARISKFOR) - **prof. J. Holécy, 2020 - 2023**

  Annotation of 2020 results:

Within the first year of the project, the first phase of the project was partially implemented by the end of 2020. This mainly consisted of activities related to the collection of historical data on physical and economic indicators of the economic performance of the Slovak forestry and wood processing industry in Slovakia in the period 1997-2019. From the collected data, a robust project database was created so that its structure corresponded to the needs and requirements of the statistical analyses of the economic performance of the Slovak forestry and wood processing industry in the period 1997-2019.

processes in forestry and wood processing. The collected data were sorted, organized and subsequently entered into a database in the form of time series of all observed economic and climatic variables. The typological consistency of the database files was checked and the redundancy of the stored data was removed. Consolidation of the whole database was then carried out. A part of the historical analogue data on forest land stock from the period before 1991 was transformed into digital data, which, after their processing in the form of vectors, were incorporated into the structure of the database created by the project.

- **VEGA 1/0457/20** Economic and legal conditions of forest ecosystem services provision in land communities in Slovakia - **doc. R. Šulek, 2020-2022** *Annotation of 2020 results:*
  The aim of the project is to analyse the principles and conditions of sustainable and efficient provision of forest ecosystem services in specific economic and legal conditions of land communities as an important legal form of forest enterprises in Slovakia. The prerequisite for understanding the effective provision of forest ecosystem services is the analysis of individual economic instruments and legal conditions that determine the very nature of forest ecosystem services as a public good. In 2020, an analysis of the historical development and current status of the concept of provision of forest ecosystem services in relation to access to land and property rights was carried out (the issue of comparison of legal aspects of public use of forests in Slovakia and the Czech Republic), as well as an analysis of the factors of tax policy in forestry in relation to the essence of the provision of forest ecosystem services in land communities in Slovakia (the issue of the tax burden on land communities). In addition, the stage of identification and analysis of relevant legal institutes that influence the provision of forest ecosystem services (regulatory instruments) with emphasis on specific ownership and use relations in land communities, including the identification of relevant possible legislative constraints to the provision of forest ecosystem services (the issue of legal regulation of business in land communities in Slovakia and the issue of the legislative framework of selected indicators of forest certification) has been initiated.

- **VEGA 1/0655/20** Concept of bioeconomy in the conditions of forestry and forestry sector of the Slovak Republic - **Ing. B. Giertliová, 2020-2022**

  Annotation of 2020 results:
  Part of the project solution in 2020 was the analysis of strategic documents of the Slovak Republic focused on the field of bioeconomy. The bioeconomy includes the production of renewable biological resources and the transformation of these resources, including waste, into value-added products such as food, feed, bioproducts and bioenergy. Bioeconomy sectors and industries have strong innovation potential through the use of science and research, industrial technologies as well as local knowledge" (European Commission, 2012). Slovakia does not currently have a comprehensive bioeconomy strategy, but this issue is elaborated in several documents. These include strategic documents such as the Action Plan of the National Programme for the Utilisation of the Potential of Wood in the Slovak Republic (2014), the Updated National Strategy for Biodiversity Conservation until 2020 (2013), the Strategy for Adaptation of the Slovak Republic to the Adverse Consequences of Climate Change (update 2017), the National Forestry Programme of the Slovak Republic (2007), etc. The analysis includes a comparison of the approach to bioeconomy issues between Slovakia and selected countries. Significant differences in the

strategies of these countries have been identified in terms of content, set objectives and instruments.

- **VEGA 1/0665/20** Innovative potential of payments for ecosystem services - "water and forests" (InoVoLes) - **Ing. M. Štěrbová, 2020-2022**

  Annotation of 2020 results:
  The project aims to identify and model differentiated forest management alternatives in a growth simulator for a selected area significant in terms of the impact of forest ecosystems on water quality and quantity through water quality and quantity indicators. In the first year of the project, a literature search and previous projects focusing on the impact of forest on water quality and quantity were carried out. Selection of forest stands for the purpose of analysis in the Hriňová reservoir basin, which have the greatest potential impact on water quality and quantity, was carried out. Furthermore, an analysis of water quality and quantity, water treatment costs, and water treatment resources was conducted for the time series 2010-2018. Forest stands and their management in the time series 20102018 were also analyzed. Based on the analysis of water quality and water quantity parameters of the reservoir and data on the structure of stands (tree species composition, shrub cover, vertical structure, age...) and the way they are managed, the determination of the water quality indicator and water quantity indicator was carried out. Work has started on the analysis of trade-offs between timber production and water quality and quantity. At the same time, an analysis of the current status of the issue of payments for forest ecosystem services, innovation potential and the innovation system has also been carried out. The preconditions for an innovation system to support the innovation mechanisms of the PES "water and forests" were defined.

- **KEGA 013TU Z-4/2018** Innovative methods in teaching financial management - **prof. I. Hajdúchová, 2018-2020**

  Annotation of 2020 results:
  As a result of the project in 2020, the university textbook Financial Management of the Enterprise was delivered to the press in December 2020.

- **KEGA 009TU Z-4/2019** Modernization of teaching of environmental economics at technically oriented universities in Slovak Republic - **prof. J. Šálka, 2019-2021**

  Annotation of 2020 results:
  A textbook on environmental economics was to be published in 2020. The textbook is in the final stages of content editing and has yet to go to the graphic design stage. The targets for 2020 were only 90% met. The textbook is expected to be published in March 2021. 2020 was a busy year for work on the textbook, as communication with co-authors was difficult and other mainly pedagogical activities at the university required more time. The main objective will be supported by meeting the following sub-objectives:
  - Development and publication of the university textbook "Environmental Economics".
  - Developing and publishing "Guides to Exercises in Environmental Economics".
  - Creation of the e-learning project Environmental Economics in the university information system.

- **Project of business activity:** action plan for the promotion of forest protection on the territory of the Bratislava Self-Governing Region in the sense of the Memorandum on cooperation and joint action in the protection of forests - **prof. J. Šálka, 2020**

  Annotation of 2020 results:

  The Technical University in Zvolen prepared for the Bratislava Self-Governing Region on the basis of the offer for the contract "Action plan for the promotion of forest protection on the territory of the BSK - analytical part (hereinafter referred to as "BSK") in the sense of the Memorandum of cooperation and joint approach to forest protection (hereinafter referred to as "the study"). The terms of reference of the Study were discussed at a meeting of the members of the External Independent Advisory Body of the President of the BSK for the protection and use of forests. The document consists of 7 parts: 1. Description of the objectives of the Action Plan in relation to the objectives of the Memorandum; 2. Relation of the document to related legislation, strategic documents of the EU, SR and BSK; 3. Description of the territory and definition of the BSK area; 4. Map documentation of the current state and distribution of forests in BSK; 5. Optimisation of forest production and non-production functions; 6. Proposals for general and specific measures for protection of BSK forests and provision of non-productive functions of forests; 7. Proposals of principles of binding regulations for the current UPN R BSK to support the use of non-productive functions of forests.

  The study was carried out with the participation of TUZVO staff from four departments of the Faculty of Forestry: KERLH, KPLZI, KLŤLM and KAZMZ.

  The document is available on the BSK website: https://bratislavskykraj.sk/mdocsposts/akcny-plan- on-promoting-forest-protection-on-the-land-of-the-bratislava-selfadministrative-county-in-the-meaning-of-memoranda-about-collaboration-andcollaborative-progress-in-forest-protection-analytic-cast/

Department of Phycology

- **COST Action CA 19128** - Pan-European Network for Climate Adaptive Forest Restoration and Reforestation (PEN-CAFoRR) - **prof. D. Gömöry, 2020-2024**

  Annotation of 2020 results:

  The COST Action focuses on reforestation and reforestation under climate change. Due to the start of the Action in October 2020, only the kick-off meeting and the first working group meetings have taken place so far. It has been agreed to prepare the harmonisation of terminology concerning forest reproductive material, its cultivation and use and afforestation techniques at European level. Another agreed activity is the preparation of a meta-study on the impact of artificial reforestation on the genetic diversity of tree species.

- **APVV-15-0270** Anthropogenic eutrophication of the environment and its impacts on the species diversity of temperate deciduous forests - **prof. K. Ujházy, 20162020**

  Annotation of 2020 results:

  The last six months of the solution were extended to 11 months due to the pandemic. Initially, we planned to publish and present the results for the whole period of the solution at scientific conferences in Slovakia and abroad. Since no foreign ones were realized, we

presented the evaluation of changes in phytocenoses on the experimental plots of the VšLP only at the conference of the Botanical Garden of the UPJŠ in Košice.
The project was extended by 5 months, which we used for field data collection. In the fall, we completed data collection on the experiment and implemented annual management interventions. We also restored several dozen TRPs in collaboration with the NLC collective. At the same time, data editing and replenishment of the database, which currently contains more than 14,300 plots (including replicates), continued. The database is continuously archived on the Forest Typology website.

This year, due to technical problems on the NLC server, we moved the site to the server of TU in Zvolen, where the domain https://lestypo.tuzvo.sk/ was created, where higher data security is ensured thanks to regular backup of the site.
Thanks to very effective international cooperation, phytocenological and environmental data from Slovakia have been included in pan-European and global analyses, the results of which have been published in top scientific journals - *Science*, *Nature Ecology and Evolution and Journal of Ecology*, several of which have been publicized at both Slovak and European level.

- **APVV-16-0306** Identification Environmental Vulnerabilities a adaptive potential of spruce (Picea abies Karst. L.) populations under changing climate **- prof. D. Gömöry, (RNDr. Ľ. Ditmarová**, **IEL SAV Zvolen)**, **2017-2021**

Annotation of 2020 results:
Within the project, individuals of Norway spruce exposed to drought stress and controls (a total of 90 individuals from 5 provenances distributed along the transect 550- 1280 m a.s.l.) were compared, their physiological parameters were measured on the phenotyping line of Agrobiotech SPU Nitra (gasometric measurements, fast and slow kinetics of chlorophyll a fluorescence, hyperspectral cameras, monoterpenes). PLS-DA analysis of the results showed a shift of gsazometric parameters and chlorophyll fluorescence between the beginning and the end of the measurements (20 days) due to drought, in contrast, parameters based on hyperspectral recordings did not show differences between drought and control. Material was collected from the measured individuals for ddRAD sequencing. A total of 16447 fragments randomly distributed in the genome were sequenced, within which 34127 single-point polymorphisms (SNPs) were identified. Two SNPs showed consistent association with physiological or climatic variables and concomitant significant differentiation, while a further 84 SNPs within 64 linkage groups showed only associations with physiological parameters or climate. Among the physiological parameters, associations with monoterpene content (especially Δ-3-carene and γ-terpinene), to a lesser extent with total carotenoid content, phytohormone content (jasmonic acid, abscisic acid), or with climate variables are strikingly frequent. In collaboration with the Hørhsolm Arboretum (DK), an experiment was organised to evaluate the effect of high temperatures on the thickness growth, assimilation and respiration of spruce and fir seedlings. Based on the results, a prediction model for assimilation and respiration based on air temperature, relative humidity and PAR was developed and verified.

- **APVV-19-0319** Importance of long-term human use of the landscape on the decline of species diversity of temperate forest vegetation in times of global environmental change - **Ing.**
F. Máliš, 2020-2024

Annotation of 2020 results:
The project has been running since 1 July 2020 and so no publication outputs were planned or achieved in the first year. The project consists of three distinct parts that focus on three different temporal planes, namely i) palaeoecological research, ii) replication of permanent

plots from the last century, and iii) contemporary field experimentation. The work in 2020 focused on

especially for the collection of material for paleoecological research. Peat sediments were collected from three sites in Slovakia and are currently undergoing palynological processing. Collection and analysis of 35 soil samples for anthracological assessment of the distribution of woody plants during the Holocene in the area of the current contact between oak and beech forests was also carried out. In the framework of international cooperation with the ForestREplot and SoilTemp initiatives, the team of researchers participated in the preparation of six manuscripts of scientific papers, which are in various stages of development.

- **VEGA 1/0639/17** Global environmental changes and their impacts on species composition and diversity of temperate deciduous forests - **prof. K. Ujházy, 2017-2020**

  Annotation of 2020 results:
  This was the last year of the solution. In this year we planned to publish and present the results of the whole period of the solution at scientific conferences in Slovakia and abroad. Unfortunately, due to anti-pandemic restrictions, the conferences were not realized. In the summer season we continued the restoration of typological plots in the field. Firstly, we completed about 20 plots in the oak woodlands of the *Fageto-Quercetum* stratum in the Slovak Central Mountains and secondly, we focused on repeating the records in the beech forests of the Kysuce bearded zone. This was the second repetition, now after about 15 years, carried out by the same authors on precisely restored plots. These accurately restored plots should reveal more reliably the course of change over the last decades. The pauperization process was tentatively confirmed here, as we observed a marked decrease in cover in most plots.

- **VEGA 2/0077/17** Evolutionary ecology of umbrella and flagship vertebrate species in Slovakia - **Ing. P. Klinga (Mgr. P. Kaňuch, ÚEL SAV Zvolen), 2017-2020**

  Annotation of 2020 results:
  In populations of selected vertebrate species whose conservation is important for the overall biodiversity of Slovakia or the Western Carpathians, we attempted to identify evolutionary and ecological factors that contribute to the reproductive success, phenotypic variability, fitness and survival of these populations. We studied these questions using molecular, phenotypic and behavioural data in conditions where significant environmental changes are currently occurring (deforestation, change in vegetation structure, drying landscapes, climate change). The project was carried out in cooperation between the Institute of Environmental Research of the Slovak Academy of Sciences, TUZVO and UPJŠ in Košice. The principal investigator of the project was UEL SAV and the co-principal investigator for the Department of Education was TUZVO. Primarily, we studied four selected species: the mountain deer, the lynx, the rusty bat and the bog turtle. At TUZVO we dealt with the mountain deer and the lynx.
  In the case of the red-cockaded woodpecker, we mainly studied evolutionary (population genetic) factors related to long-term reproduction and population stability, which is also important for assessing the success of species restitution in the peripheral parts of the range. Using landscape/environmental modelling in combination with distributional and genetic data, we identified biological corridors and assessed the importance of habitat patches for

gene flow in fragmented landscapes. Multivariate analyses confirmed the importance of larger patches of suitable habitat for gene flow and detected isolation of populations by habitat; distance from human settlements was one of the significant negative factors causing low connectivity between populations. We also compared the spatial

Genetic variation in relict Carpathian populations of the European Rough-legged Deer in two different demographic periods. We found that the current habitat connectivity has significantly decreased compared to the situation 50 years ago, as altered climatic and environmental factors significantly affect the population structure of this species. The results confirm that a narrow ecological niche is critical for the long-term survival of the species in the Carpathians.

In lynx, we compared the relationship between phenotypic variation, heritability, and environmental factors acting on fitness and survival of populations. Using photographic traps, we estimated the population density of lynx in Slovakia and found that in some peripheral areas this density is below the long-term survival of the species. Based on the results, it can be assumed that this unfavourable situation is mainly caused by human activities. We found that colouration and mottling of the lynx coat is a highly heritable phenotypic trait, but the expression of this trait has varied over the last 60 years in the Carpathian population in Slovakia. The Western Carpathians were originally characterized by a spotted phenotype but nowadays its proportion is decreasing and the rosette phenotype is beginning to predominate. The rapid change of the dominant phenotype, especially in the peripheral parts of the range, is very likely due to the disturbance of the genetic fitness of the populations, their small effective size and limited gene flow. We consider high traffic growth and human-caused lynx mortality as the primary factors responsible for the fragmentation of local populations. Thus, from an evolutionary perspective, our results demonstrate a close relationship between phenotypic expression and genetic characteristics of populations.

The objectives of the project were set in accordance with the planned staffing and funding of the research. All planned objectives were met and the results obtained were published. However, given the time involved in both field collection and laboratory analyses, it would have been preferable if the results of the project could have included results that will be published at some time after its official completion. The main results of the project have been published in Conservation Genetics, Landscape Ecology (Eurasian Hornbill), European Journal of Wildlife Research, Oryx (Lynx).

- **VEGA 2/0040/17** Dynamics of anthropically influenced biotopes of non-forest vegetation in the process of ecological restoration - **prof. K. Ujházy (Mgr. I. Škodová, BÚ SAV), 2017- 2020**

Annotation of 2020 results:

In this last year of the project, we focused our fieldwork on repeated records at the Príslopy site, where we are monitoring the restoration of the grassland after the clearing of successional stands of spruce. After annual monitoring within the project, we can now accurately reconstruct the course of grassland establishment, changes in species composition and diversity. It turns out that the first years, in which species from the seed bank and species able to exploit open niches become established on the plot, are crucial for the development of the community after a strong disturbance. Animal grazing is important, as a result of which grassland species are introduced to the area and, conversely, vernally spreading ruderal species are suppressed.

We concluded our long-term research on the impact of the gopher on plant communities by summarizing the results in our master thesis and subsequently submitted an article to the journal *Nature Conservation*.

P. Širka was mainly involved in the inventory of bryoflora from the Poľana region from published and unpublished data, and more than 200 species were found that were not yet recorded on previous inventory lists from this mountain range.

- **VEGA 1/0450/19** Evaluation of hybrid poplars in terms of defence responses and wood cell wall composition under climate change - **prof. J. Ďurkovič, 2019-2022**

  Annotation of 2020 results:

  In the second year of the project, we evaluated the seasonal pattern of gas exchange parameters such as photosynthetic CO_2 assimilation, stomatal conductance, transpiration, instantaneous water use efficiency, as well as chlorophyll *a* fluorescence yields in *Populus tremula* × (*Populus* × *canescens)* hybrid poplar specimens after inoculation with the pathogens *Phytophthora plurivora* and *Phytophthora cactorum*. The most marked differences between control and *Phytophthora plurivora-infected individuals* were identified at day 30 after inoculation, whereas for *Phytophthora cactorum-infected* individuals it was at day 38 after inoculation. The greatest separation between individuals infected with *Phytophthora plurivora* and *Phytophthora cactorum* were recorded only at the end of the growing season on day 99 after inoculation. Transpiration and yields of *Fv/Fm* and *Fv/F0 appeared* to be the most sensitive parameters. In addition, we identified 23 different volatiles in the first days after inoculation and 32 volatiles at the end of the growing season by HS-GC-MS method. Of these, 2 proved to be discriminative, i.e. the emission of which was induced specifically by infection with *Phytophthora* pathogens. Semi-quantification of these volatiles is currently underway as standards for chemical quantification of rare volatiles in small volumes in financially acceptable ranges are unfortunately not available anywhere in the world. With respect to the properties and chemical composition of the cell walls of poplar wood clones, we performed nanoFTIR spectroscopy in combination with AFM mechanical phase in addition to PeakForce QNM measurements. The experiments are currently under evaluation of the results.

- **VEGA 1/0029/20** Microevolutionary mechanisms shaping the spatial genetic structure of forest tree populations - **prof. D. Gömöry, 2020-2024**

  Annotation of 2020 results:

  As 2020 is the first year of the project, the work focused on material collection and initial analysis. The ddRADseq method was used to sequence part of the sticky alder material on the transect from the Pannonian region to southern Poland, which was collected in the framework of preparatory work or previous projects. In addition, ddRAD sequencing of 90 beech individuals from the BFH Tále and Vrchdobroč provenance trials was carried out. In both cases, further collection in other parts of the area is foreseen, therefore the data have not yet been evaluated. In addition, the collection of white fir and beech material has been carried out on a transect along the entire Apennine Peninsula. As part of an international collaboration, we analysed the variation of nuclear microsatellites in 25 populations of Norway maple in Bosnia and Herzegovina. Despite minimal differentiation, the results point to the origin of recent populations from at least two distinct glacial refugia.
- **Project R-4350/2016** "Determination of the subspecies affiliation of the sage grouse (relevant subspecies for the territory of the Czech Republic) and assessment of the degree of relatedness according to different biological samples on the example of artificial breeding (Moravian-Silesian Beskydy, Šumava) and samples coming from individuals from the wild." - **Ing. D. Krajmerová, PhD., 2016-2021**
  Annotation of 2020 results:

During 2020, we analysed invasive and non-invasive samples of mountain and red-backed hornbills coming from the mountain and red-backed hornbill nurseries in Řepčonka in the Moravian-Silesian Beskydy Mountains and Boubíno in Šumava. We analysed the relationships between individuals in the breeding flocks. As samples from all individuals in breeding flocks were not analysed, the determination of kinship relationships is not straightforward. Analyses of individuals within the breeding flock indicate a high degree of relatedness in the breeding flock in the Beskydy Mountains and suggest the need for replacement of individuals or strengthening of the breeding flock with unrelated individuals native to the Western Carpathians. Next year, genetic analyses of potential individuals to be purchased from the Wisla breeding farm, where they breed individuals belonging to the Western Carpathian population of the Eurasian Deerhound, are planned in order to select and include unrelated individuals in the breeding stock. If samples are available, we will continue to identify individuals released into the wild to obtain information on the dispersal and survival of released individuals.

Department of Forest Resource Planning and Informatics

- **H2020** Altenative models and robust decision-making for future forest management ALTERFOR - **prof. J. Tuček, 2016-2020**

Annotation of 2020 results:

The Alterfor project aims to identify and facilitate the implementation of forest management models (FMMs) in Europe that will be suitable to sustainably deliver the required EC in the next century. This will be achieved through the three main objectives of the project: (i) To identify and develop FMMs robust in their ability to deliver EC and reduce ecosystem vulnerability at stand and woodland level, (ii) To assess the impact of different combinations of FMMs on EC delivery at the European level, (iii) To facilitate the implementation of the required FMMs through the integration of scientific research with practical application.

The project is funded by the Horizon 2020 call H2020-ISIB-2015-2, Activity ISIB04b-2015. The duration of the solution is 4.5 years, total budget 4.0 million Euros, budget for TUZVO 149 440 Euros. The consortium consists of 20 partners, coordinated by the Swedish University of Agricultural Sciences (SLU).Researchers for TUZVO: Smreček - full-time researcher, (since October 2018 Ing. Juraj Čerňava), Tuček, Sedmák, Brodrechtová, Bošeľa, Bahýľ, Fabrika - tribal employees of TUZVO, LF.

For forest owners and managers, guidelines - User's Guide - have been developed in Slovak language focusing on two alternative forest management models (FMM) proposed in the previous phases of the project. Both proposals were presented and consulted with representatives of academic institutions and forestry practitioners at two workshops organized in the framework of WP4 on 16 May 2018 and 25 October 2018. The user manual in document form was deducted as output D1.3 on the requested date.

In order to disseminate it as widely as possible, a user guide was also published on the website dedicated to the overall project solution as part of the comprehensive information about the project and in particular about the creation of sample objects. The website is written in Slovak language and is available at http://gis.tuzvo.sk/alterfor-sk/.

In accordance with the project methodology and in agreement with the non-academic partner of the project, we created and documented a network of demonstration objects within the experimental area of Podpoľanie. The documentation of the demonstration sites was submitted as a report of the D1.4 solution in due time.

We are preparing two comprehensive publications - scientific monographs that document the broader context and results of the project in Slovakia. The first monograph Brodrechtova, Y.: Actors and the impact of their powers on forest management - empirical analysis and findings from the Podpoľanie region, which focuses on the issues of WP4, has already been reviewed and its content is currently being edited according to the reviewers' comments for print.

The content of the second monograph focuses on the whole complex of the Alterfor project. We planned to present the documented results at the final workshop of the project originally planned for October 2020. Due to the pandemic situation in Slovakia, we postponed this workshop indefinitely. We are still working on the content of the publication and the organisation of the workshop.

At the central level, work has been completed on up-scaling the local results of the country case studies to the European level and preparing guidelines for the implementation of the results in forestry practice, in particular through the construction of demonstration sites. During the final months of the project, the final report "ALTERFOR Road Map" was prepared and produced (see https://alterfor-project.eu/files/alterfor/download/Deliverables/D4.4%20Road%20Map_to%20publish.pdf which provides insight into how new approaches to forest management can be improved or introduced when applied in specific contexts. The report highlights just how to design forest management models at different scales, from stand to landscape level, using the example of ten research sites located in eight European (Ireland, Netherlands, Lithuania, Germany, Italy, Slovakia, Sweden) and one Asian country (Turkey)

These and other results were also presented at the final conference of the ALTERFOR project on 10-11 September 2020. Unfortunately the final conference planned in Augsburg, Germany was only organized in digital form due to COVID-19 restrictions. Therefore, the results of the ALTERFOR project and their impact on the environment, economy and society were summarized and discussed during the two days of the digital conference. The planned excursion to the Western Forests of Augsburg was organised as a virtual walk led by the organiser of the digital conference Prof. Peter Biber (Technical University of Munich). Thanks to the technical support, the conference participants had the opportunity to interact with the speakers regarding alternative forest management models and their impacts regarding production, conservation, climate change impacts, etc., as well as the possibilities of their implementation in the individual countries.

- **EFI Network Fund No. 01/2018 FORMASAM -** Forest Management Scenarios For Adaptation And Mitigation–**Dr. nat. techn. K. Megranicova, 2018-2020**

Annotation of 2020 results:

FORMASAM is an international project supported by the EFI call "EFI Network Fund". The project focused on Adaptation of forests to climate change and its mitigation through the application of different types of forest management. In 2020, the final conference of the project "Managing forests in the 21st century" was held in Potsdam from 02.03.2020 -

06.03.2020, where not only the results achieved within the project but also the broader context of forest ecosystem management were presented
in the context of climate change. Katarína Merganičová, as a representative of LF TU, gave a lecture on "Searching for an optimal harvest-regeneration system using multicriteria analysis", where she presented the results of multi-criteria optimization of harvestregeneration procedures using the Sibyla simulator. In addition, the simulation of forest development by different models under different management and climate scenarios and the processing of the results were continued at stand and European level.

- **APVV-15-0265** Modelling of tree growth in forest ecosystems of the Carpathian Mountains under variant climate change scenarios - **Ing. M. Bošeľa, 2016-2020**

  Annotation of 2020 results:
  The aim of the project was to investigate the long-term and short-term growth and productivity of spruce, fir and beech in the Carpathian Mountains and to try to predict the possible development of the increments of these species in the future. In the course of the project, we managed to expand international cooperation, thanks to which we have built a database of dendrochronological data containing more than 6000 samples not only from the Carpathian Arc, but also from other parts of Europe. The results generally indicated an improvement in the growth of fir and beech in the Carpathians as well as in Europe. However, they point to an unfavourable trend in spruce growth and productivity over the last century, especially in recent decades. Norway spruce in the Carpathian Arc has significantly increased its productivity after a period of subdued growth due to high concentrations of emissions in the 1950s-1980s. However, the fir tree's response to climate as well as its long-term growth is related to its postglacial origin and the type of management in the past. Of the three tree species studied, fir is the least sensitive to weather extremes and has so far responded positively to warming. Beech has seen an increase in productivity over the last century, but the results indicated a decline in beech productivity since 2000. Furthermore, dendroecological models suggest that beech at high altitudes can improve its growth even under RCP scenario 8.5, but there is likely to be a decline in productivity at lower altitudes (below 500 m). The spruce population in the Carpathians is threatened. Our results showed a significant decline in productivity after 2000 due to several extremely dry years, which probably triggered long-term negative processes. In terms of mitigating the impacts of climate change on the studied tree species and the forest ecosystems composed of these tree species, we recommend increasing the proportion of mixed forests. The greater the species diversity, the higher the production (higher amount of carbon stored in the forest) and especially the stability of the ecosystem against various disturbances. We also recommend age and spatial diversification of forests and the use of nature-friendly management practices.

- **APVV-19-0183** Relationship between biomass production and biodiversity in fir-beech forests under changing environmental conditions- **Ing. M. Bošeľa, 2020-2024**

  Annotation of 2020 results:
  Europe has the most extensive network of protected areas in the world. However, these areas were established in the past without taking into account the potential impact of climate change. The question therefore arises to what extent these areas will be able to fulfil their

function of biodiversity protection under changed environmental conditions in the future. This European network also includes very important mixed-species forests made up of Norway spruce (Picea abies (L.) Karst.), white fir (Abies alba Mill.) and beech (Fagus sylvatica L.). The forests made up of these three species cover 10 x 10^6 ha in Europe at altitudes between 600 and 1600 m above sea level. Despite the high ecological and economic importance of these forests

in Europe, they have so far received relatively little attention. Moreover, the relationship between biomass production and biodiversity, i.e. between mitigation potential and biodiversity conservation, has not yet been studied in these ecosystems. The present project therefore aims to provide new insights into the ability of individual components of fir-beech ecosystems to adapt to ongoing climate change and to continue to provide many ecosystem services. The results will thus inform the development of national biodiversity conservation strategies for fir-beech ecosystems. In addition, the project foresees the establishment of long-term intensive monitoring in forests and adjacent management forests in order to monitor the impacts of climate change on fir-beech ecosystems. In July 2020, the project was initiated, the solution methodology was set up and instruments and equipment for monitoring tree growth, forest microclimate and soil hydrological regime were procured.

- **APVV-19-0035** Simulation and Visualization Analytical Tool for Forestry Planning (SAVANT)- **prof. M. Fabrika, 2020-2024**

  Annotation of 2020 results:
  The main objective of the project is to develop a software solution for a forest condition prediction tool, to release it free of charge to the general public and to enable it to be implemented for forest planning and use in routine forestry operations. In 2020, work on the algorithms and source codes of the modules was carried out according to the planned schedule. These were the DARWIN and EDISON phases of the project. Within the DARWIN stage, which deals with the data sources for the growth simulator, work was done on the Agent module. The Agent module is used to import commonly available data sources into the growth simulator. A library of basic procedures and functions has also been developed. The module will continue to be worked on in 2021. The Prophet and Aggressor modules have been completed as part of the EDISON phase, which deals with model construction and development of the growth simulator software solution. The first module performs the actual growth simulations and the second deals with calamity risk modelling.

- **VEGA 1/0868/18** Innovative methods of mapping of anthropogenic and natural landforms and relief in the survey of the state of the landscape- **doc. F. Chudý, 2018-2021**

  Annotation of 2020 results:
  The scientific objectives for the year 2020 of the project have been met and even exceeded. Their scope was planned in line with the funding requested, but the funding provided was significantly lower. The achievement of the results was also made possible by the accumulation of the necessary funding from other sources (cooperation with practice, ...). The airborne DPZ data - airborne piloted photogrammetry and laser scanning - were obtained from previous projects. Newly acquired were ground and remotely piloted photogrammetry data (for tree and vegetation characteristics detection, creation of detailed digital models, mapping of anthropogenic and natural landforms and relief, ...). Contributions for the year 2020 based on the research solved in the project of the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences 1/0868/18 (VEGA): Innovative methods of mapping of anthropogenic and natural landforms and relief in the survey of the state of the landscape.

Julián Tomaštík, Juliána Chudá, Daniel Tunák, František Chudý, Miroslav Kardoš, "Advances in smartphone positioning in forests: dual-frequency receivers and raw GNSS

data", Forestry: An International Journal of Forest Research, 2020;, cpaa032, https://doi.org/10.1093/forestry/cpaa032 preliminary online access

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- **KEGA 011TU Z-4/2019** Visualization of forest using game engine Unity 3D for elearning, - **prof. M. Fabrika, 2019-2021**

Annotation of 2020 results:
The goal of the project is to create an application for displaying a virtual reality forest in the Unity 3D game engine, which will be dynamically created from an external database. The following objectives have been planned for 2020: a) creation of a database interface for retrieval of individual tree data in the Unity 3D environment, b) collection of terrain data based on near ground photogrammetry for creation of tree trunk models, c) creation of tree trunk models of other tree species, d) creation of complex tree models of other tree species. All the planned objectives have been met. Point a) was exceeded because, in addition to the database interface for retrieving tree data, a complete application for displaying the virtual reality of the forest with interaction with the forest components (marking of tree singeing, etc.) was also created. Only some other functionalities need to be completed (e.g. teleport to the future and past, updating the tree database and new state from interaction).

Department of Integrated Forest and Landscape Conservation

- **APVV-17-0644** Carbon balance of differentially managed forest ecosystems of TANAP after natural disturbances - **doc. P. Fleischer, 2018-2022**

Annotation of 2020 results:
The main objective of the project was to assess the carbon balance in differentially managed post-calamite plots using the eddy covariance method. Despite some differences in species composition in the study plots, the balance was positive, i.e. the sites fixed more C than they emitted. Monthly amounts during the growing season were very similar. Minimal differences were also found in mean soil respiration, which was measured manually this year and in the managed calamity plot using newly developed automated meters. We suggest that the equilibrium C balance (0.50 on the managed site and 0.44 g CO_2 m^{-2} h^{-1} on the unmanaged site) reflects the development of the 15-year-old coppice, where the original differences in microclimatic conditions have effectively disappeared (soil temperature, NET radiation, heat flux to the soil). Surprising is the finding of lower soil respiration in the mature, undamaged stand (0.39 g CO_2). We expected higher values in the mature forest as a consequence of autotrophic respiration of more biomass than in the calamity plots. However, dendrometric measurements indicated a much lower increment than we have recorded in the past.

Based on an experiment with increased temperature of seedlings in open ITEX greenhouses (2^{o} C increase compared to wild-type individuals), we found a greater height gain, but also negative changes in physiological conditions (photosystem II).

- **VEGA 2/0049/18** Indication of the influence of critical values of environmental factors on the level of physiological and growth traits in spruce populations of different geographical origin - **doc. D. Kurjak (RNDr. Ditmarová, ÚEL SAV Zvolen), 2018-2021** *Annotation of 2020 results:*

  In 2020, data from an experiment focusing on damaged spruce stands were processed. The physiological processes of mature trees growing at three altitudes in the High Tatras were evaluated. Chlorophyll fluorescence and pigment concentrations were measured and the sensitivity of photosystem II to high temperatures was also assessed. Seasonal dynamics of pigments with their gradual increase was observed only for the highest area. The lowest area showed the highest sensitivity to simulated high temperatures, which led to a decrease in the density of reaction centers and the photochemical performance index. We recorded similar values of nitrogen, phosphorus, potassium, sodium zinc and iron in tree needles at all three sites. Calcium, magnesium and manganese decreased significantly and aluminium concentration increased in the lower parts of the transect. Changes in stem circumference indicated a water deficit at all sites surveyed, but was least pronounced at the highest plot assessed. We confirmed differences in tree vigour, with the best physiological performance found in spruces from the highest plot.

- **VEGA 1/0535/20** How are adaptive traits of physiological resistance of woody plants influenced by climate, inter- and intraspecific variation? - **doc. D. Kurjak, 2020-2023**

  Annotation of 2020 results:

  In 2020, areas were selected and prepared for tree planting, which included obtaining permits, surveying, fencing, and re-mowing. An unfavorable pandemic situation prevented us from fall planting, which is thus planned for spring 2021. In addition to establishing plots, we have been assessing the intraspecific variability of fir and beech. In the case of fir, we found that provenances originating at higher altitudes responded well to the wetter and cooler climate of central Europe after transplantation; they showed higher assimilation and were less sensitive to moderate stress from high temperature and drought. It was confirmed that the origin of planted populations can be a planting management tool in the transfer of non-native populations. We also confirmed a number of significant relationships when assessing the vent characteristics of different provenances of beech growing on climatically contrasting plots. Populations transferred to drier and warmer areas adapted through decreases in stomatal conductance, stomatal cell length, leaf size and dry weight. The decrease in stomata density was proportional to the difference in aridity between the original site and the new site. Also, provenances with lower altitudes and less heterogeneous conditions showed higher values of phenotypic plasticity. We found a positive relationship between phenotypic plasticity and mortality on the drier plot, but not on the wetter plot.

Department of Forest Harvesting, Logistics and Reclamation

- **APVV-18-0305** The use of progressive methods to assess the impact of logging and transport process on forest ecosystems and road network - **doc. J. Merganič, 2019-2022**
  Annotation of 2020 results:
  Intentional logging, carried out in accordance with the Forest Care Programme, or accidental logging (calamity), both of which are carried out by means of forest ground equipment, which concentrates the harvested timber in a forest store. However, current technologies have a relatively wide variety of chassis, the negative impact of which is reflected in the passage on the ground surface and, under certain conditions, can cause considerable ecological damage. The project addresses two research objectives, i.e. monitoring the impact of forestry technology on selected components of the forest ecosystem and monitoring the impact of forestry technology on the condition of forest roads. In 2020, we are focusing on establishing a permanent research area to address the first research objective. The 2x25x25m TSP was established at the Štagiar site. It consists of two parts, a compacted area and a control area. The areas were measured for soil compaction with a penetrometer from Eijkelkamp in a 2.5x2.5m (100 point area) buried grid. At half of these points, soil samples were taken to a depth of 50cm. Analyses were made from 10cm horizons to detect pH, C and N. The points formed the centre of the plots to detect the amount and parameters of natural rejuvenation. Probes were established at these points to measure changes in CO2 concentration at 10 and 30cm depth. Furthermore, we took microsamples from the trees. In addition, t h e processing obtained last year (phototape) was continued.

- **VEGA 1/0031/18** Optimization of technological and operational steps and risk assessment in forest biomass production for energy purposes - **doc. M. Gejdoš, 2018-2020**

  Annotation of 2020 results:
  In the last year of the project, the last 2 experimental piles at the measurement site were dismantled again on 2 dates, 5 February 2020 and 5 August 2020, and the samples were sent for microbial analysis. The results confirmed the production of phytopathogens and moulds hazardous to human health during the whole experimental period. At the same time, the energetic properties of the stored wood chips deteriorated significantly. At the same time, samples were continuously taken from urban-type heating plants, where high concentrations of phytopathogens were also confirmed, although the supply and consumption of biomass is continuous in these plants. The results from this research have been published in a planned scientific monograph. The explicit risks of biomass production in terms of noise and vibration risk factors have been established. The basic economic parameters and pricing models for wood and biomass in the Central European trading area were also characterised. At the same time, 3 outputs were published in journals registered in CCC databases. One output each was published in BDF, AFC categories.

- **VEGA 1/0241/20** Optimization and environmental impact of technological procedures of logging and timber harvesting in nature-oriented forest management - **doc. J. Merganič, 2020- 2022**

  Annotation of 2020 results:
  The nature-based management system represents an alternative option for managing forest ecosystems in a period of ongoing climate change. However, this different management

system requires the adaptation of all technologies and the optimisation of technological procedures to ensure the implementation of the harvesting and transport process. A more refined management system also requires more refined technological practices. The main objective of the research project is to optimise the selection of technologies and to identify technological procedures for deployment in nature-based forest management, with a focus on monitoring the impact of

of these technologies on the occurrence of logging-traffic erosion, damage to the parent vegetation, economic intensity of production and soil regeneration after the implementation of logging-traffic intervention. In view of the situation, this year we focused on measuring the impact of different types of forestry equipment chassis on changes in the physical properties of forest soil and soil surface deformation. The measurement work was carried out at the University of Technology in Zvolen and we used the following technologies: UKT Zetor 7245 Horal System, LKT 81 ITL (with hydraulic arm), HSM 805 HD (with hydraulic arm). For each type of technology a separate approach line with a total length of 20 m was defined. The number of passes along the line was repeated 40 times. Soil penetration resistance measurements were made at selected locations using a Penetrollogger from Eijkelkamp and soil samples were taken. Near ground photogrammetry was used to measure soil surface deformations.

- **VEGA 1/0335/20** Prototype of multicamera system as a tool for creation of highly detailed model of individual trees and forest stand - **Ing. M. Mokroš, 2020-2022**

  Annotation of 2020 results:
  During the first year of the project, we have been setting up research plots and collecting data using a prototype multi-camera system, ground-based laser scanning, a handheld mobile scanner, an iPad LiDAR and a drone. A total of 32 research plots were established, measuring 25x25m, or 2 hectares. At the same time, one ADC paper and one AFC peerreviewed paper were published (WOS, Scopus).
  Articles
  Tomaštík, J., Chudá, J., Tunák, D., Chudý, F., & Kardoš, M. (2020). Advances in smartphone positioning in forests: dual-frequency receivers and raw GNSS data. An International Journal of Forest Research.
  Chudá, J., Hunčaga, M., Tuček, J., & Mokroš, M. (2020). The handheld mobile laser scanners as a tool for accurate positioning under forest canopy. The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 43, 211-218.

- **KEGA 006TU Z-4/2018** 3D functional models of flood protection as new methods and forms of university teaching - **prof. M. Jakubis, 2018-2020**

  Annotation of 2020 results:
  In 2020, within the framework of the project, a professional book publication Objects of Flood Protection - Excursion Guide was developed, the purpose of which is to use new methods and forms of teaching directly in the field to familiarize students of the Faculty of Civil Engineering of the Technical University of Zvolen, as well as other faculties within the Slovak Republic with the selected options of solutions for technical flood protection of the landscape on specific construction objects within the Slovak Republic. In addition, tests were carried out on 3D model objects of flood protection on the premises of the Arboretum Borová hora TU in Zvolen to verify the functionality of individual objects and to analyze the differences in the hydraulic characteristics of the model riverbeds. Graphical analyses of the results between calculated and measured average profile velocities were prepared. Graphical relationships between the longitudinal bottom slope of the model beds **I (%)** and the average profile velocity **v (m.s-1)** for different water depths **H (m)** were processed and

subsequently analysed. Subsequently, the relationships between water surface height **H (m)** and average profile velocity **v (m.s1)** for different longitudinal channel slopes **I (%)** were graphed and analyzed. All analyses were performed

based on two computational methods of average profile velocity - the Chezy velocity equation and the Scheuerlein velocity equation.

- **KEGA 007TU Z-4/2019** Laboratory of forestry mechanization and automation equipment - **doc. V. Štollmann, 2019-2021** *Annotation of 2020 results:*
  Work continued on the construction of the Laboratory of Forestry Machinery (LMP). In February 2020, the first practical work for students from the subject of recuperation rope equipment was carried out in the laboratory on a trial basis. As a result of the project in 2020, the project resulted in extensive publication activity: a) Grant of 1 invention patent and creation of a solution for which 2 new invention patent applications have been filed.
  b) 6 original scientific papers written. 2 papers accepted for publication, 1 paper rejected. 1 thesis written for the journal SCOPOS, 1 thesis accepted, 1 thesis rejected, 1 thesis accepted. which is indexed in VAK (in Russian-speaking countries analogy to carents), 4 works published at the IGC. These were 2 IGCs organized by the Belarusian State Technological University Minsk in February and May. Written 3 popularization articles for the Time. TUZVO aimed at popularization of international activities of the project. 1 public lecture was held in cooperation with the Regional Library L. Štúr Library in Zvolen promoting international activities of the project. Publication of the book publication Wisdom of the Old Oak. The book was published by the author. Elaboration of a cooperation agreement with the Arctic State Technological University of Yakutsk AGATU, which entered into force upon signing by the rectors of both parties on 16.07.2020. We also consider as a success the holding of the first working meeting between TUZVO and AGATU shortly after the conclusion of the cooperation agreement. The meeting was held in online mode with the participation of senior academic officials of both universities. The implementation of a distance course in Russian language (RJ) in cooperation with Izhevsk State Technical University M.T. Kalashnikov, as a substitute solution for the planned, but due to the COVID epidemic not realized, summer school at the M.S. Kirov University of Forestry in St. Petersburg.

Department of Applied Zoology and Game Management

- **LIFE16 NAT/SI/000634** Preventing the extinction of Dinario-SE Alpine lynx population through reinforcement and long-term conservation - **Dr. h. c., prof. R. Kropil, 2017-2024**

  Annotation of 2020 results:
  Within the LIFE LYNX project, another opportunistic year-round monitoring of the lynx lynx (*Lynx lynx*) was carried out in the areas of Veporské vrchy, Vtáčnik, and Volovské vrchy. Deterministic (systematic) monitoring of lynx with phototape and census with the method of spatial estimation of population size (SCR) in the Veporské vrchy Mountains was continued. Additional equipment for lynx trapping was prepared. On the basis of the granted exemption from the law, trapping of lynx specimens was carried out with the aim of their restitution in the Dinaric Mountains.

- **VEGA 1/0797/19** Spatio-temporal requirements, habitat preferences and management of selected groups of forest vertebrates - **Dr. h. c., prof. R. Kropil, 2019-2021**

  Annotation of 2020 results:

The influence of other habitat variables on the diversity and abundance of birds in different types of Carpathian forests in Slovakia and Poland was analysed. The main difference in habitat structure was a several times higher volume of dead wood in reserves. The overall diversity of birds in management forests and reserves was similar and depended mainly on geographical location, forest complexity and management intensity. In the field of large carnivore ecology, the distribution and abundance of lynx was evaluated in other selected geomorphological units, following sites from central and eastern Slovakia, as well as in collaboration with partner organisations in the Czech Republic. In the field of wildlife ecology, further research on the foraging preferences of red deer was carried out. Analysis of the influence of soil nutrients and deer density on antler size in Carpathian red deer was also carried out. Analyses of the impact of fire and predators on the partial migratory deer population in Canada were also finalized.

- **Project of business activity:** analysis of impacts/modification of forest management induced by strengthening of recreational functions on LC Lesy SR Bratislava - doc. Ing. R.Sedmák, PhD.

  Annotation of 2020 results:
  In 2020, the analytical part of the expert project continued to be elaborated according to the requirements of the client - DG ŠL Banská Bystrica. It was mainly the recalculation of compensation needs of several variants of modified management agreed between the city representatives and the ŠL staff directly in the field. The recalculations included not only substantial refinements of the expected timber sales revenues based on more detailed information on the actual monetization of various assortments in the period 2016-2020, but also refinements of the impacts of the cessation of timber harvesting in 2019-2020. The refined calculations of expected timber yields then served to determine more objectively the compensation requirements of the SL for a number of compensation suboptions resulting from the fact that part of the stands managed by the SL are managed on a lease basis. The project is implemented in cooperation of three departments of the Faculty of Forestry - the Department of Forest Resource Planning and Informatics, the Department of Forest Economics and Management and the Department of Applied Zoology and Game Management.

Department of Silviculture

- **APVV-18-0195** Economic optimization of models of the target state of forests close to nature - **prof. M. Saniga (Principal Investigator NLC Zvolen), 2019-2022**

  Annotation of 2020 results:
  The analysis of the thickness structure of the Dobročský forest obtained by analysing the temporal datasets in the individual years of measurement confirmed the dominance of beech in the lower layer. Significant decline over the period under study was recorded for fir and spruce species. The thickness structure of the forest over the whole period under study has a consistently decreasing pattern of thickness abundance. This thickness structure is stable due to the beech tree. From the analysis of the structure, a model of a selection forest was derived for the studied tree species composition The thickness structure of the Badínský prforest shows elements of stability with a gradual decrease in the abundance of fir. Its tree

species composition with a dominant representation of beech creates preconditions for the creation of a model of beech selection forest, or a model of mosaic structure for managed forests of similar tree species composition. The transformation of forest thickness structures was used as a framework model in the reconstruction of selected stand

types of the University Forest Enterprise of the Technical University of Zvolen. The model objects of the conversion to beech selection forest are the TVP series in volume 513. In the rest of the area of the volume 513 and in the stand 514 the conversion to mosaic structure has been carried out since 2000. Over the period under review, individual or patch selection was carried out on this part of the stand. The intention was to promote the quality of the beech, to remove spruce as a non-native tree species and to retain winter oak and fir into the second generation of the stand. The stand thickness structure observed in 2020 shows a gradual transition to a mosaic forest model (Weibull function). The results of the conversion of stands to mosaic structure confirmed the correctness of using the research findings of selected forest structure parameters for calibration of the forest model of thickness classes.

- **VEGA 1/0021/18** Dynamics of structure change and disturbance processes in selected forests of Slovakia under changing ecological conditions - **prof. M. Saniga, 2018-2020**

  Annotation of 2020 results:
  The analysis of the tree species structure of the Dobročský and Badín forests obtained by analysing the data sets /four decades/ in the individual years of measurement confirmed the dominance of beech. The results of the research on the structure of gaps in the Dobroch and Badin forests according to size categories confirmed their small-area character. In the studied forests more than 70% of the total number of stand gaps was concentrated in size classes from 50 to 300 m^2 . Gaps with an area of 50 - 100 m have the highest proportion^2 . The same proportion was found in the 5 - 50 m size classes^2 and 100 - 150 m^2 . Tree mortality was gradual, gaps were mostly elliptical or irregularly circular in shape and were covered by successional generation of forest, mainly beech trees. This natural regime of gaps with small surface areas creates the preconditions for the continuous onset of natural regeneration of virtually all tree species. For the fir tree species, the greatest risk to its conservation is deer. The forests have a small-area gap structure, as almost 80% of their number is in the area range of up to 5 acres. Research has confirmed that the dominant proportion of gaps has been created by the death of 1-2 trees of the upper forest layer. In terms of their age structure, the gaps were found to be formed continuously and evenly over time.
  Long-term research of the spruce natural forest of NPR Kotlov žľab has confirmed the influence of large-scale disturbance in the past, resulting in a state of poorly heightdifferentiated forest structure with stagnant natural regeneration. Disturbance processes, the intensity of which began to show significant onset in 1993-1994, had a different impact on the permanent research plots studied. The part of the natural forest in TVP 3 (advanced stage of decay), which has the lowest density and was located at the lowest altitude, was the best adapted to the effects of long-term disturbance. This pre-disturbance structure created the best conditions for the development of natural regeneration of tree species, compared to the other TVPs. The studied natural spruce forest is practically in its entire area undergoing a developmental stage of decay, which is significantly accelerated by the spruce budworm. This stage has been going on in the forest for 25 years with varying intensity. The result is a successional forest generation represented by a mosaic of natural regeneration patches of varying age and size, made up of spruce and mountain ash. On the basis of the results from the experimental plots and by inspecting the whole forest, the state of its developmental dynamics cannot be assessed as a transition through ontogenetic development, i.e. large development cycle of the forest.

- **VEGA 1/0564/19** Structural Diversity, Growth Potential and Predictors of Woody Plants Distribution in Forest-Steppe Communities under Changing Ecological Conditions - **doc. I. Lukáčik, 2019-2021**

Annotation of 2020 results:

In 2020, the project activities were focused on the analysis of growth processes, development and reproduction of monitored tree species in relation to differentiated environmental conditions, on the assessment of their health status, damage and forecasting of changes in the species structure of forest-steppe communities through dendrochronological analyses.

A network of 60 relascopic research plots for *Quercus pubescens* and *Quercus cerris* species was established at three sites of the Krupinská planina orographic unit (Drieňovo, Medovarce, Plášťovce), followed by 9 circular permanent research plots of 500 m each^2 . where moisture, air and soil temperature measuring devices were installed. Within the plots the following were assessed: defoliation, mortality, circular basal area, stock, abundance, top height, species composition and recruitment abundance. For dendrochronological analyses, cuttings were taken from selected individuals of *Q. pubescens* and *Q. cerris* and vegetative and generative reproductive plant material was collected endangered and rare xerothermophilic species. From the assessed stand indices (Shannon diversity index, aggregation index, homogeneity index, thickness differentiation index), the influence of natural and climatic conditions on stand structure and consequently on natural regeneration was assessed. Preliminary results show that the individual sites differ significantly from each other in stand structure and in the abundance, composition and damage to natural regeneration.

- **VEGA 1/0385/20/8** Developmental, disturbance and regeneration dynamics of mixed natural and near-natural forests under conditions of climate change - **doc. P. Jaloviar, 2020-2023**

Annotation of 2020 results:

In the first year of the scientific project, we focused on the identification and the beginning of repeated measurements on a permanent research area of 200×250 m in the Badínský prales NPR. The plot was established by the staff of the Department of Silviculture in 2010 with the aim to record the positional distribution of all trees with a thickness of more than 8 cm, natural regeneration groups and the occurrence and structure of stand gaps. The aim of repeated measurements after 10 years is to determine the dynamics of stand gaps in natural forests, Identify changes in the size of original gaps (closure or expansion) and their relationship to the size and position of the original stand gap. Determine the number and size structure of newly created gaps. Identify the predominant cause of both gap formation and closure and draw up a diagram of the likely evolution of gaps in relation to their size and location. Due to the limitations of the missions, i.e. field measurements, we have only carried out measurements in part of the area indicated. As part of the research on changes in forest structure, we focused on processing and publishing the results of the assessment of natural tree mortality. The results of the assessment of long-term demography, or more

narrowly defined mortality, show a different pattern to that predicted by the equilibrium model of natural forests, probably due to the occurrence of sporadic but strong disturbances. It is found that

mortality rates (*m*) are often around 1.5 per cent instead of the expected one per cent. It turns out that the existing mortality models rather underestimate the mortality rate, especially for level trees, precisely because of the short observation period and only repeated measurements covering several decades allow to capture the impact of less frequent strong disturbances.

Department of Natural Environment

- **H2020** MSCA-ITN-EID-2019-RISE-WELL, No. 860173: Critical solutions for elderly well-being RISE-WELL - **prof. V. Pichler (Principal Investigator FEE - Ing. M. Pichlerová), 2020-2024**

  Annotation of 2020 results:
  Research on the impact of COVID-19 on forest visitation was conducted on a representative sample of the population. The findings correlated with the results of a survey on the expectations of the population for forests, which showed the desired recreational and health function of forests as the most important. The selection process continued with the selection of candidates for 2 junior researcher positions that will address the health and recreational function of the forest in relation to the elderly population starting in 2021.

- **COST Action CA15226** - Climate-smart Forestry in Mountain Regions (CLIMO) **- doc. K. Střelcová, 2017-2021**

  Annotation of 2020 results:
  Climate Smart Agriculture (CSA) integrates the three dimensions of sustainable development (economic, social and environmental), as well as the goals of sustainably increasing agricultural productivity and profit, while adapting to climate change and reducing greenhouse gas emissions. The CLIMO project seeks to use this concept for climate
  "smart" forestry (CSF). Three main pillars of the project were identified: to improve the livelihoods of people in mountain regions by improving forest ecosystem services, by increasing the adaptation and resilience of mountain forests to climate change, focusing on the most effective mitigation measures. The main objective of the project is to define CSF in a European context, which requires the identification of key growing characteristics and the harmonisation of CFS in mountain areas in order to create a common platform at European level. Joint publications in the Canadian Jounal of Forest Research and a monograph in the Springer publishing house have been submitted to the editors and are currently under review.

- **COST Action CA18237** -European Soil-Biology Data Warehouse for Soil Protection (EUdaphobase) **- doc. E. Gömöryová, 2019-2023**

  Annotation of 2020 results:
  European authorities and stakeholders urgently need reliable tools to monitor and assess the state of the environment in the context of several EU directives. The project aims to develop a database on soil biodiversity to better understand, protect and sustainably manage soils,

their biodiversity and functions. To achieve this, the project summarises and evaluates the results of research and monitoring, representing a large dataset on the structure and spatial distribution of

soil organisms across Europe. These data have been collected in the context of studies assessing changes in the community of soil organisms in relation to soil health and quality, changes in land use, the impact of pollutants or different environmental gradients. Due to the pandemic situation, the activity under this COST Action in 2020 was limited to email communication only.

- **APVV-15-0176** Plants, soil microorganisms and carbon sequestration in forest soils: linkages and interactions **- doc. E. Gömöryová, 2016-2020**

Annotation of 2020 results:

The progress of work on the project in its final, fifth year continued in accordance with the proposed work schedule. In the final stage, the main activity was the summarisation of the measured data and their subsequent evaluation. At the same time, the analyses of soil samples collected in 2019 were continued. The analysis of the values of organic carbon and total nitrogen concentration, as well as C/N ratio in beech and spruce natural forests, showed a high variability of values not only within all monitored areas in Slovakia, but also within individual sites at stand level. We found that in spruce natural stands, the soil organic carbon and total nitrogen content significantly reflect the influence of elevation and slope gradient, with the influence of elevation increasing with soil depth and the influence of slope decreasing. The concentration of these elements is also significantly influenced by the number of trees on the plot. In general, we can state that in terms of thickness structure, the highest concentration of soil organic C was observed in plots dominated by trees of 28-56 cm thickness, then with a range of thicknesses up to 28 cm and 56-84 cm, and the lowest concentration was found in trees with a thickness greater than 84 cm.

- **APVV-15-0497** Sensitivity of flood runoff generation to intense rainfall and land use in headwater catchments - **prof. J. Škvarenina, (prof. J. Szolgay, STU Bratislava), 20162020**

Annotation of 2020 results:

In 2020, we were mainly concerned with the proposal of new scientifically based measures to reduce extreme flood runoff and erosion processes on forest soil stock in selected forest vegetation stages in Slovakia, also from the aspect of model assessment of effectiveness for flood and erosion protection in the conditions of our forested watersheds. The interaction of precipitation, especially storm downpours and longer duration landscape rainfall with large runoff events on runoff from mountainous (forested areas in uplands were not addressed as a priority), small, forested catchments is still assessed only according to general knowledge and experience without in-depth analyses of measured data from which measures for necessary flood and erosion protection would emerge. Local knowledge from forestry and hydrological research and partial research on the subject allow, albeit only to a limited extent, to give principles for forestry and hydrological policy. The adoption of concrete measures in the last decade has been complicated by the massive and

widespread forest damage and dieback due to warming, drought, wind and insect calamities.

- **APVV-16-0325** Extreme manifestations of climate change and their impacts on the growth and production of forest stands **- doc. K. Střelcová, (Ing. Zuzana Sitková, LVÚ NLC Zvolen), 2017-2021**

  Annotation of 2020 results:
  The aim of the project is to create a long-term sustainable web application for on-line biometeorological monitoring. The application is to be used for operational assessment of a range of climate-related risks in forest ecosystems (drought, fire occurrence, changes in population dynamics of insect pests, etc.) for the needs of forestry practice, state administration, the general public and for use in the educational process. The intention is to develop frameworks for using biometeorological monitoring of forest ecosystems for early identification of adverse climate impacts on forests and thus contribute to the development of adaptation measures. Integration of two currently independent biometeorological monitoring systems managed by the applicant and a co-investigator. The development of a web-based operational biometeorological monitoring application and the establishment of frameworks for its use in practice. Assessment of the impact of recent climate variability on the growth and production of different tree species in a national network of permanent monitoring plots. Assessment of the impact of climate stress factors on the ecophysiological processes of selected tree species. In 2020, an integrated online forestry meteorological monitoring website with the domain www.forestweather.sk was completed, which links the meteorological monitoring of the two research organisations on one common platform. A popularisation article on this application was published in the professional journal Forest - Lesokruhy. In 2020, two scientific articles registered in CC by the team of researchers from LF TU were also published with acknowledgement of the project.

- **APVV-17-0676** Gradients of vegetation and soil carbon stocks at the tree line in the polar region of Siberia **- prof. V. Pichler, 2018-2021**

  Annotation of 2020 results:
  At the Institute of Forest of the Russian Academy of Sciences, under a cooperation agreement, soil carbon and tree trunk borehole analyses were carried out on tree trunks taken on the territory of the Putoran Plateau on the Taimyr Peninsula. After checking, the results were delivered to the research team and then the data were formatted for further processing by statistical methods.

- **APVV-18-0347** Climate change and natural hazards: vulnerability and adaptive capacity of forest ecosystems of the Western Carpathians **- prof. J. Škvarenina, 2019-2022**

  Annotation of 2020 results:
  In 2020, the first phase of the project was completed, concerning the creation of a data base for the purposes of the project (creation of meteorological, hydrological, phenological, climatic and dendrochronological databases; establishment of research plots, procurement of instrumentation and software). The second phase of the project, dedicated to

experimental field and laboratory research on primary and secondary natural hazards, as well as the third phase, aimed at analysing and assessing the impacts of natural hazards on forest ecosystems, have been launched. In particular, we focused on the regionalisation of the ecological drought hazard in the first and second forest vegetation stages, respectively, which was interpreted from a soil-management point of view. We focused in detail on

the elevational differentiation of drought hazard in the landscape, the tendency of drought intensification in the face of ongoing climate change. The assessment was carried out through the SPEI (Standardized Precipitation Evapotranspiration Index). Within the framework of the solution, small forest catchments in the Western Tatras region were selected, where several small as well as larger calamities have occurred in the last twenty years. Their origin was primarily an abiotic factor, i.e. wind. To assess the impacts of wind calamities on selected forest catchments, digital mapping data were analysed using GIS tools, where changes in land use before and after the occurrence of these natural calamities were demonstrated. The runoff regime was assessed based on selected hydrometeorological data. Time series of flow, precipitation and air temperature were investigated. Their dispersion within months was analysed and their long-term monthly averages for the whole period under study and the period after the most significant calamity were compared.

- **APVV-18-0390** Growth and production of ecosystems under conditions of climate aridization **- doc. K. Střelcová, 2019-2023**

  Annotation of 2020 results:
  Climate aridification and changes in the precipitation regime in Central Europe as one of the main factors influence the growth and production of ecosystems, the transport of substances and energy in the soil-plant-atmosphere (PRAT) system through physiological, growth and production processes. Expected climate change is likely to trigger a range of changes and disturbances not only in these processes but also in the functions, health and evolution of temperate terrestrial ecosystems. In this year of the project, we have focused on field experimental research, database development and the establishment and replenishment of research plots for f i e l d and laboratory research, in particular on: - water flow processes in terrestrial ecosystems, water balance, precipitation regime, transpiration and evaporation and their quantification with respect to the importance of water in CO2 sequestration and release by plants and soil in the processes of photosynthesis and respiration as part of ecosystem energy fluxes, - the impact of drought as a stress factor acting on physiological processes, growth and production and health status through water uptake, management and expenditure, photosynthesis, respiration of ecosystems. These processes are addressed in the context of climate change, in particular the increase in mean temperature, changes in the amount and distribution of precipitation with consequent changes in the water balance and changes in the frequency and intensity of extreme events (extreme warm or cold periods). ecosystems. In 2020, the results of the project were published in 6 scientific papers registered in the CC and in one on-line paper at the EGU conference in Vienna.

- **APVV-19-0142** Soil microbiota in natural forest ecosystems: its response to changing biotic and abiotic habitat factors - **doc. E. Gömöryová, 2020-2024**

  Annotation of 2020 results:
  Soil microbiota (including soil nematodes) play a key role in nutrient and energy cycling, regulating the availability of nutrients from the soil to plants and thus providing essential ecosystem services to forests. The aim of the proposed project is to analyse and elucidate how the response of soil microbiota, including nematodes, to changes in abiotic and biotic factors of their habitat in natural forest ecosystems varies at the local level (stand level) and

to determine whether the "pattern" of this response differs at regional and global scales. The research will be carried out at sites with different tree species in natural forest

ecosystems. The innovative elements of the project are: i) a comprehensive assessment of the relationships in the vegetation-soil-soil microbiota system, ii) the study of the relationships between two groups of microbiota - soil microorganisms and nematodes, iii) the synthesis of data on soil microorganisms from different locations in Slovakia and abroad, which will allow a certain degree of generalization of knowledge. Understanding how the soil microbiota responds to variability in biotic and abiotic factors is a prerequisite for making recommendations for soil conservation and biodiversity conservation in the context of climate change. The project started on 1.7.2020, with a first year of 6 months only, during which sampling was carried out in beech forests along the Italian coast and in pine plantations in the Zagorje region, followed by analysis of the samples under laboratory conditions

- **APVV-19-0340** Connectivity and dynamics of flood runoff generation in headwater catchments of Slovakia (CONTROL) - **prof. J. Škvarenina, (STU Bratislava), 20202024**

Annotation of 2020 results:

In 2020, initial work on WP1 was initiated to evaluate the performance of a measurement network aimed at detecting hydrological connectivity in pilot mountain micro-watersheds, obtaining data on snow cover and soil water regime in mountain forest ecosystems as well as in mountain agriculturally used watersheds. Towards the onset of the 2020/2021 winter season, we installed four digital cameras with online transmission for continuous daily monitoring of snow cover height in the study area of calamitous spruce forests in the Western Tatras at an altitude of 1420 m a.s.l., using ablation processes for modelling the hydrophysical properties of snow.

- **VEGA 1/0710/17** Spatial differentiation of soil properties in forest landscape - **doc. E. Gömöryová, 2017-2020**

Annotation of 2020 results:

The project aims to analyse and clarify the spatial variability of soil properties. Disturbances in the natural environment lead to disturbances in ecosystem and community structure, altering nutrient sources and availability as well as the physical environment. Field rodents, as a result of their burrowing activity, are one of the major disturbance agents. The accumulation of excavated soil on the soil surface leads to a modification of the micro-relief, creating a mosaic of soils differing in their properties. By analysing samples taken from fresh gopher tortoise excavations, older excavations as well as from control sites, we found that there were no changes in some soil characteristics (e.g. Ca concentration^{2+} , diversity of microorganisms). Although some characteristics (e.g. pH) differed in the excavations from the control plots, no differences were observed between fresh and older excavations. For another group of characteristics, changes could also be observed between fresh and older cuttings, but while soil bulk density, C and N concentrations gradually returned to their original values, some characteristics increased in older cuttings compared to the control plots. This is the case, for example, for P and K content. The results suggest that grass hay, by disturbing the soil environment, contributes to increased heterogeneity of such sites, thus affecting both soil functions and soil processes (soil aeration, decomposition, nutrient cycling).

- **VEGA 1/0836/18** Adaptation of forest landscapes as a source of ecosystem services to uncertainties of future development by tools of ecological rationality -prof**. V. Pichler, 2018-2020**

  Annotation of 2020 results:

  Predictive relationships between soil carbon concentration and stock were extracted from data obtained by analysing soil samples in forest ecosystems of Central, E, SE and S Europe to a depth of ca 1 m. A ranking of binding mechanisms based on soil carbon concentration was determined for phyllosilicates, pedogenic iron oxides, short-range minerals, carbonates and selected primary minerals, e.g. muscovite. From this ranking, the sensitivity of soil carbon to losses due to mineralization and respiration was derived.

- **VEGA 1/0370/18** Evaluation Vulnerabilities of selected natural and disturbed ecosystems to hydrometeorological extremes - **doc. J. Vido, 2018-2021**

  Annotation of 2020 results:

  In 2020, the research activities of the project continued according to the work schedule. During the year we achieved the following new results. Chemical analyses of soil samples from the Čierna Hora research area were carried out, where very high concentrations of heavy metals and other toxic substances were detected in the immission area of the site above the Kovohuty Krompachy company. Comparative samples from the Margecany site area, which was expected not to be affected by the immission fallout from the above mentioned metallurgical combine, were also very high. This was a rather surprising result. There is no obvious difference between the two sites. Colleagues from the partner organisation (SAV Institute of Zoology) processed the biological material collected in 2020 (beetles from the earth traps) and carried out ecological analyses.

  In the Vtáčnik research area, automatic soil water potential measuring devices were installed in 2020 in order to determine the differences in soil water potential between the sites Račkov Laz (undermined area) and Hrádok (unmined area). From the incomplete data series in 2020, it was found that there is a significant difference between these sites. Which assumes that the impact of undermining has an impact on the percolation of soil water into the geological bedrock.

  From the Tatras research area, data on soil water potential between the reference forest site (Smrekovec) and the extracted site with ongoing secondary succession (Daniel's House) were further collected and analysed in 2020. However, these data are affected by frequent failures of the measuring equipment, due to animal damage.

- **VEGA 1/0500/19** Climate change, ecosystem vulnerability and natural hazards - **prof. J. Škvarenina, 2019-2022**

  Annotation of 2020 results:

  In 2020, the first phase of the project was completed, focusing on the processing of databases of climate elements, climate change scenarios, natural risks, in particular: identification of natural risks in the context of climate change from the perspective of forest

ecosystems. Research work has started on the second stage of the project, which is oriented towards experimental monitoring and field research on natural risks. The main focus was on the occurrence of episodes of summer heat waves, meteorological and soil drought, and modelling of fire weather factors. Forest and landscape fires are already a serious natural risk even in the temperate climate of Slovakia. Landscape fires also disrupt the carbon balance and CO_2 sequestration, so we used the FCCS model to balance the amounts of potential greenhouse gas emissions from the largest forest fires in the Slovak Paradise National Park area. We observe a significant increase in spring forest and landscape fires, which are also related to the decreasing water supply in the snowpack, as well as the persistent spring burning of dry grass. The main risk factor for forest fire occurrence is low - critical forest litter moisture, which is significantly correlated with air humidity and surface temperature.

At Solution completed projects can be see annotation of the following most significant results :

- **H2020** Altenative models and robust decision-making for future forest management ALTERFOR - **prof. J. Tuček, 2016-2020**

Annotation of the most significant results:
The Alterfor project was aimed at finding innovative management models at the forest stand and woodland level. The research was initially carried out at national level (12 countries) in order to be generalised at a later stage to the European level. The new management models should robustly deliver (under different scenarios of economic, environmental and social development) the full range of key ecosystem services (timber and biomass production, carbon sequestration, recreation, landscape water flow services, biodiversity) at the level required by a representative sample of stakeholders in the management outcomes of the selected area over a time horizon of 100 years. The Slovak area of interest was the Podpoľanie region (approx. 30000 ha of forest). From the Slovak point of view, the main contributions of the project are the compilation of two alternative management models at the forest stand level - a model of more flexible management in age-class forests and a model of mixed management concepts suitable for uneven stand structures. The two alternative models were used to develop an alternative management concept at the level of the forest landscape or area of interest (more flexible in respecting the views and needs of forest owners), which was compared with classical conventional management (based on habitat and ecological management predisposition). The two management concepts were compared in terms of meeting the desired range of ecosystem services and management objectives set by a representative sample of stakeholders under different socio-environmental-economic scenarios. The main result of the analyses carried out was the finding that climatic factors will influence the delivery of ecosystem services more than management approaches when management approaches are formulated in an expert manner. For this reason, management and any economic concepts need to
in a defined set of stands to be optimized using modern multicriteria optimization methods (e.g. evolutionary multicriteria optimization methods seem to be very promising).

- **EFI Network Fund** Perception of the role of the forestry sector in the bioeconomy (PerForm) - **prof.**

J. Šálka, 2018 - 2020

Annotation of the most significant results:
The aim of the PerForm project was to better understand regional differences in national bioeconomy policies and perceptions of the forest-based bioeconomy. Methodologically, qualitative document analysis, stakeholder interviews and innovative communication tools such as e-learning will be used.
The main outputs of the project are an online information platform and a freely available e-learning course that aims to inform forest stakeholders, policy makers, students and the general public about the bioeconomy in different regions of Europe and Russia. Other outputs of the project include so-called society briefs on the main project outputs (Bioeconomy Strategies, Student Perceptions and Urban Population); Policy maps for each of the researcher countries, which contain bioeconomy strategies, including policy objectives, issues as well as the economic and environmental values promoted; Special issue in Ambio magazine. TUZVO staff are co-authors on three articles.
For more information, visit the project website https://perform-bioeconomy.info.

- **EFI Network Fund No. 01/2018 FORMASAM -** Forest Management Scenarios For Adaptation And Mitigation–**Dr. nat. techn. K. Megranicova, 2018-2020**

Annotation of the most significant results:
FORMASAM is an international project supported by the EFI call "EFI Network Fund". The project focused on Adaptation of forests to climate change and its mitigation through the application of different types of forest management. In 2020, the final conference of the project "Managing forests in the 21st century" was held in Potsdam from 02.03.2020 - 06.03.2020, where not only the results achieved within the project but also the broader context of managing forest ecosystems in the context of climate change were presented. Within the framework of this conference, Katarína Merganičová, as a representative of the Faculty of Forestry, gave a lecture on "Searching for an optimal harvest-regeneration system using multi-criteria analysis", in which she presented the results of multi-criteria optimization of harvest-regeneration procedures using the Sibyla simulator. In addition, the simulation of forest development by different models under different management and climate scenarios and the processing of the results were continued at stand and European level.

- **APVV-15-0270** Anthropogenic eutrophication of the environment and its impacts on the species diversity of temperate deciduous forests - **prof. K. Ujházy, 2016-2020**

Annotation of the most significant results:
The last six months of the solution were extended to 11 months due to the pandemic. Initially, we planned to publish and present the results for the whole period of the solution at scientific conferences in Slovakia and abroad. Since no foreign ones were realized, evaluation of changes in phytocenoses on experimental plots of the VšLP was presented only at the conference of the Botanical Garden of the UPJŠ in Košice.
The project was extended by 5 months, which we used for field data collection. In the fall, we completed data collection on the experiment and implemented annual management

interventions. We also restored several dozen TRPs in collaboration with the NLC collective. At the same time, data editing and replenishment of the database, which currently contains more than 14,300 plots (including replicates), continued. The database is continuously archived on the Forest Typology website. This year, due to technical problems on the NLC server, we moved the site to the server of TU in Zvolen, where the domain https://lestypo.tuzvo.sk/ was created, where higher data security is ensured thanks to regular backup of the site.

Thanks to very effective international cooperation, phytocenological and environmental data from Slovakia have been included in pan-European and global analyses, the results of which have been published in top scientific journals - *Science*, *Nature Ecology and Evolution and Journal of Ecology*, several of which have been publicized at both Slovak and European level.

- **APVV-15-0265** Modelling of tree growth in forest ecosystems of the Carpathian Mountains under variant climate change scenarios - **Ing. M. Bošeľa, 2016-2020**

Annotation of the most significant results:

The aim of the project was to investigate the long-term and short-term growth and productivity of spruce, fir and beech in the Carpathian Mountains and to try to predict the possible development of the increments of these species in the future. In the course of the project, we managed to expand international cooperation, thanks to which we have built a database of dendrochronological data containing more than 6000 samples not only from the Carpathian Arc, but also from other parts of Europe. The results generally indicated an improvement in the growth of fir and beech in the Carpathians as well as in Europe. However, they point to an unfavourable trend in spruce growth and productivity over the last century, especially in recent decades. Fir in the Carpathian Arc has significantly increased its productivity after a period of suppressed growth due to high concentrations of emissions in the 1950s-1980s. However, the fir tree's response to climate as well as its long-term growth is related to its postglacial origin and the type of management in the past. Of the three tree species studied, fir is the least sensitive to weather extremes and has so far responded positively to warming. Beech has seen an increase in productivity over the last century, but the results indicated a decline in beech productivity since 2000. In addition, dendroecological models suggest that beech at high elevations can improve its growth even under RCP scenario 8.5, but there is likely to be a decline in productivity at lower elevations (below 500 m). The spruce population in the Carpathians is threatened. The results showed us a significant decline in productivity after 2000 due to several extremely dry years, which probably triggered long-term negative processes. In terms of mitigating the impacts of climate change on the studied tree species and the forest ecosystems composed of these tree species, we recommend increasing the proportion of mixed forests. The greater the species diversity, the higher the production (higher amount of carbon stored in the forest) and especially the stability of the ecosystem against various disturbances. We also recommend age and spatial diversification of forests and the use of nature-friendly management practices.

- **APVV-15-0176** Plants, soil microorganisms and carbon sequestration in forest soils: linkages and interactions - **doc. E. Gömöryová, 2016-2020**

Annotation of the most significant results:

The main objective of the project was to analyse the interactions between the plant community, soil microorganisms, nematodes and soil in natural forest ecosystems and ecosystems affected by human activities and natural disturbances. The results show that: in the same habitat, the species composition of herbaceous community, nematodes and soil microorganism activity differed between stands of different tree species as well as between managed and natural forests. However, in contrast to unmanaged forests, the diversity of undergrowth in managed forests is highly variable over their life cycle. Soil microbiota, but not soil nematodes, follow this trend. The depth to which the influence of vegetation and different soil management is manifested, as well as the trend of change along the soil profile, varies with soil type and microbial characteristics themselves. We found high variability in soil C content (SOC) values not only within the study plots in Slovakia, but also within individual sites at the stand level. Its amount is strongly influenced by the parent substrate from which the soil was formed, and this influence is more significant than the influence of climatic factors. In natural spruce stands, the influence of altitude and slope was also a significant factor in SOC content, with the influence of altitude increasing with soil depth and the influence of slope decreasing with soil depth. We found a different response of soil nematode and microorganism communities to wind disturbance in beech stands compared to our previous studies in coniferous stands (in the Tatra Mountains).

- **APVV-15-0497** Sensitivity of flood runoff generation to intense rainfall and land use in headwater catchments - **prof. J. Škvarenina, (prof. J. Szolgay, STU Bratislava), 20162020**

Annotation of the most significant results:

The extreme flash and mudflow floods that have occurred recently in Europe and in our country have triggered the need to improve the hydrological methods used to evaluate the effectiveness of nature-based flood control measures and proposals for soil erosion protection. A basic prerequisite for successful risk management of these extreme events in small, agricultural and forestry catchments is also to address the extent to which land use and management practices and the impact of global change contribute to their occurrence and extremity. The aim of the research was therefore to build and validate a modelling apparatus suitable for the purpose in our conditions on the basis of experimental research. In the modelling approach, we also tried to take into account the possibility of transferability of the results to different time scales (hourly and daily time step) and spatial scales (research area scale and catchment scale) in the specific conditions of small river basins of the Slovak Republic. The project focused on experimental research and mathematical modelling to assess the sensitivity of small agricultural and forested headwater catchments in Slovakia to the occurrence of extreme flood runoff and water erosion under different agricultural and forest land use and management. In addition to studying the extremity of initiating hydrometeorological phenomena and their scalability, the solution developed process-oriented procedures for modelling the occurrence of extreme flood runoff and soil water erosion on hillslopes in relation to land use, based on well-established concepts. To parameterize these models under conditions of small headwater catchments in the Slovak Republic, original experimental measurements of surface runoff generation on slopes, infiltration processes in

soils and the interception capacity of vegetation on agricultural land and in forest stands. The output of the project is the proposal of new scientifically based methods and measures to reduce the extremity of flood runoff and erosion processes in small river basins in Slovakia and model assessment of their effectiveness for flood and erosion protection in the conditions of our river basins.

In total, the project published:

- 44 articles in international peer-reviewed journals or in WoS or SCOPUS,
- 1 national college textbook,
- 2 scientific monographs published abroad,
- 28 scientific papers in peer-reviewed scientific journals in Slovakia or abroad,
- 63 articles, posters and abstracts in proceedings of international or national conferences,
- 1 software product,
- there are more than 200 citations in SCI for publications resulting from the project so far.
- Some of the methodological procedures and scientific knowledge obtained during the project were also applied directly in practice in the design of flood protection and prevention of soil erosion in areas of natural importance: a case study of the municipality of Vrbovce in the framework of the Interreg SK-CZ 2014-2020 project.

- **VEGA 1/0639/17** Global environmental changes and their impacts on species composition and diversity of temperate deciduous forests - **prof. K. Ujházy, 2017-2020**

Annotation of the most significant results:

In the last year of the solution we planned to publish and present the results for the whole period of the solution at scientific conferences in Slovakia and abroad. Unfortunately, due to anti-pandemic restrictions, the conferences were not realized. The results of analyses of changes in oak forests of the Slovak Central Highlands as well as an article evaluating changes in the species composition of forests in Slovakia according to typological units were published in the journal *Acta Facultatis Forestalis*. However, the most important output was an article in the *Journal of Vegetation Science*, in which we addressed the consequences of changes in management and tree species composition on understory diversity in the foothill forests of the Slovak Karst.

In the summer season we continued the restoration of typological plots in the field. Firstly, we completed about 20 plots in the oak woodlands of the *Fageto-Quercetum* stratum in the Slovak Central Mountains and secondly, we focused on repeating the records in the beech forests of the Kysuce bearded zone. This was the second repetition, now after about 15 years, carried out by the same authors on precisely restored plots. These accurately restored plots should reveal more reliably the course of change over the last decades. The pauperization process was tentatively confirmed here, as we observed a marked decrease in cover in most plots.

- **VEGA 2/0040/17** Dynamics of anthropically influenced biotopes of non-forest vegetation in the process of ecological restoration - **prof. K. Ujházy (Mgr. I. Škodová, BÚ SAV), 2017-2020**

Annotation of the most significant results:

In this last year of the project, we focused our fieldwork on repeated records at the Príslopy site, where we are monitoring the restoration of the grassland after the clearing of

successional stands of spruce. After annual monitoring within the project, we can now accurately reconstruct the course of grassland establishment, changes in species composition and diversity. It turns out that the first years are crucial for the development of the community after a strong disturbance, in which the

The area is established by species from the seed bank and species able to exploit the available niches. Animal grazing is important, allowing grassland species to spread into the area and, in turn, suppressing the vernal spread of ruderal species.
We concluded our long-term research on the impact of the grassland gopher on plant communities by summarizing the results in our master thesis and subsequently submitted an article to the journal *Nature Conservation*.
P. Širka was mainly involved in the inventory of bryoflora from the Poľana region from published and unpublished data, and more than 200 species were found that were not yet recorded on previous inventory lists from this mountain range.

- **VEGA 2/0077/17** Evolutionary ecology of umbrella and flagship vertebrate species in Slovakia - **Ing. P. Klinga (Mgr. P. Kaňuch, ÚEL SAV Zvolen), 2017-2020**

Annotation of the most significant results:
In populations of selected vertebrate species whose conservation is important for the overall biodiversity of Slovakia or the Western Carpathians, we attempted to identify evolutionary and ecological factors that contribute to the reproductive success, phenotypic variability, fitness and survival of these populations. We studied these questions using molecular, phenotypic and behavioural data in conditions where significant environmental changes are currently occurring (deforestation, change in vegetation structure, drying landscapes, climate change). The project was carried out in cooperation between the Institute of Environmental Research of the Slovak Academy of Sciences, TUZVO and UPJŠ in Košice. The principal investigator of the project was UEL SAV and the coprincipal investigator for the Department of Education was TUZVO. Primarily, we studied four selected species: the mountain deer, the lynx, the rusty bat and the bog turtle. At TUZVO we dealt with the mountain deer and the lynx.
In the case of the red-cockaded woodpecker, we mainly studied evolutionary (population genetic) factors related to long-term reproduction and population stability, which is also important for assessing the success of species restitution in the peripheral parts of the range. Using landscape/environmental modelling in combination with distributional and genetic data, we identified biological corridors and assessed the importance of habitat patches for gene flow in fragmented landscapes. Multivariate analyses confirmed the importance of larger patches of suitable habitat for gene flow and detected isolation of populations by habitat; distance from human settlements was one of the significant negative factors causing low connectivity between populations. We also compared the spatial genetic variation in relict Carpathian populations of red-cockaded woodpeckers in two different demographic periods. We found that current habitat connectivity has significantly declined compared to 50 years ago, as altered climatic and environmental factors significantly affect the population structure of this species. The results confirm that a narrow ecological niche is critical for the long-term survival of the species in the Carpathians.
In lynx, we compared the relationship between phenotypic variation, heritability, and environmental factors acting on fitness and survival of populations. Using photographic traps, we estimated the population density of lynx in Slovakia and found that in some peripheral areas this density is below the long-term survival of the species. Based on the results, it can be assumed that this unfavourable situation is mainly caused by human activities. We found that colouration and mottling of the lynx coat is a highly heritable phenotypic trait, but the expression of this trait has varied over the last 60 years in the

Carpathian population in Slovakia. The Western Carpathians were originally characterized by a spotted phenotype but nowadays its proportion is decreasing and the rosette phenotype is beginning to predominate. Rapid change

The dominant phenotype, especially in the peripheral parts of the range, is very likely due to disturbances in the genetic fitness of the populations, their small effective size and limited gene flow. We consider high traffic growth and human-caused lynx mortality as the primary factors responsible for the fragmentation of local populations. Thus, from an evolutionary perspective, our results demonstrate a close relationship between phenotypic expression and genetic characteristics of populations.
The objectives of the project were set in accordance with the planned staffing and funding of the research. All planned objectives were met and the results obtained were published. However, given the time involved in both field collection and laboratory analyses, it would have been preferable if the results of the project could have included results that will be published at some time after its official completion. The main results of the project have been published in Conservation Genetics, Landscape Ecology (Eurasian Hornbill), European Journal of Wildlife Research, Oryx (Lynx).

- **VEGA 1/0031/18** Optimization of technological and operational steps and risk assessment in forest biomass production for energy purposes - **doc. M. Gejdoš, 20182020**

Annotation of the most significant results:
The first results were available in February 2019. In October, samples were collected in selected heating plants in the Banská Bystrica municipality and analysed for biological harmful agents in an accredited laboratory. Within the second stage of the solution, two experimental piles were dismantled on two dates, 6 February 2019 and 12 August 2019, and samples of wood chips were taken from them for microbial analysis in the accredited laboratory of the Regional Health Inspectorate Poprad (RÚVZ Poprad). In the last year of the project, the last two experimental piles at the measurement site were dismantled again on 5 February 2020 and 5 August 2020 and the samples were sent for microbial analysis. The results confirmed the production of phytopathogens and moulds hazardous to human health throughout the experiment. At the same time, the energetic properties of the stored wood chips deteriorated significantly. Samples were continuously taken from urban-type heating plants, where high concentrations of phytopathogens were also confirmed, although the supply and consumption of biomass is continuous in these plants. In total, during the project period, the following were published: 9 papers in the CCC database, 1 university textbook, 2 scientific monographs, 2 scientific papers in foreign journals registered in the WOS and SCOPUS databases, 2 scientific papers in domestic journals registered in the WOS and SCOPUS databases, 4 scientific papers in domestic peerreviewed scientific journals, 3 published invited papers at domestic scientific conferences; 4 published papers at foreign scientific conferences.

- **VEGA 1/0021/18** Dynamics of structure change and disturbance processes in selected forests of Slovakia under changing ecological conditions - **prof. M. Saniga, 2018-2020**

Annotation of the most significant results:
The research of the tree species composition of the Dobročský Forest confirmed that the Norway spruce as a risk tree species is declining under the current influence of deer, climate change and the spruce budworm. The thickness structure of the forest over the whole period under study has a decreasing pattern of thickness abundance. Analysis of the structure of gaps by size categories in this forest confirmed that 90.2% of the total number of stand gaps

are concentrated in the first 5 size classes i.e. from 50 to 300 m^2 . The thickness structure of the Badín forest, with a gradual decrease in the representation of fir, shows elements of

stability and its tree species composition creates preconditions for creating a model of a selection forest or a mosaic structure for managed forests of similar tree species composition. The forest has a small-area structure of gaps, as almost 80% of their number is in the area range of up to 5 acres. Research has confirmed that up to 51% of the gaps have been created by the death of 1-2 trees of the upper forest layer. The spruce forest of Kotl's Trough on all TVPs, but virtually its entire area, is undergoing a developmental stage of decay that is significantly accelerated by the spruce budworm and altered climatic conditions.

- **VEGA 1/0710/17** Spatial differentiation of soil properties in forest landscape - **doc. E. Gömöryová, 2017-2020**

  Annotation of the most significant results:
  The aim of the project was to analyse and clarify the spatial variability of soil properties, especially in relation to vegetation. The analysis of samples from economic spruce, beech and fir-beech natural stands confirmed the influence of tree species composition on soil properties. Most changes were observed in the cover humus, less in the upper 0-10 cm, deeper changes due to the influence of woody species were no longer significant. The effect of spruce stand on soil properties was significantly different from that of the other stand types, while the effect of beech stand and stand in the NPR on soil properties was very similar. Based on the results, it can also be concluded that soil type has a more pronounced effect on biomass, activity and microbial community structure than differences in land use. However, the depth at which the effect of different soil management can still be observed, as well as the trend of changes along the soil profile, varies depending on the microbial characteristic itself, and no general trend ("pattern") was observed. Although the most pronounced differences due to different land uses can be observed in the uppermost horizons, deeper horizons should also be taken into account, e.g. when studying nutrient cycling and carbon sequestration. However, soil type should be taken into account, as it strongly influences the magnitude of changes associated with different land uses. Based on the results of a study of beech stands in the Havešová area, it can be concluded that the use of non-invasive methods (e.g. electrical resistivity tomography) to detect physical and hydrophysical properties of soils helps in the precise identification of changes in soil properties in both the horizontal and vertical directions and can be a useful tool in e.g. identifying and delineating areas prone to wind disturbance.

- **VEGA 1/0836/18** Adaptation of forest landscapes as a source of ecosystem services to uncertainties of future development by tools of ecological rationality -prof**. V. Pichler, 2018-2020**

  Annotation of the most significant results::
  The project resulted in the development of a new methodology for predicting the static stability of forest stands based on electrical resistivity tomography of the geological subsoil and soil substrate. Eruptions in forest stands are correlated with low electrical resistivity values. The possibility of non-destructive measurements of this parameter at the scale of whole forest stands (10^2 ha) has been verified. On their basis, it is possible to optimise the tree species composition in the production of PLS. A part of the survey on preferences

towards wood-based biomaterials (e.g. textiles, packaging materials) was also evaluated, which showed the potential for their use, provided that users are more familiar with their

The success of sensitisation towards biomatreals is very likely to be conditioned by the careful use of forests and the creation of quiet zones for nature conservation and recreation. In the framework of the third work package of the project, an increase in the number of visits to the forest by the inhabitants was demonstrated, among other things, in vulnerable segments of the population. The results show the need to ensure sufficient availability of forests with primary recreational and health functions close to settlements, especially in regions with relatively lower forest cover

- **KEGA 013TU Z-4/2018** Innovative methods in teaching financial management - **prof. I. Hajdúchová, 2018-2020**

  Annotation of the most significant results:
  The teaching of financial management in technical colleges is considered justified, if not necessary, especially after the recent financial crisis, the scandals in the non-banking sector and the constant failure of financial flows between business entities, which induce primary and secondary indebtedness. The aforementioned stimuli have led us to seek to develop an ICT-supported textbook that would incorporate the necessary knowledge for understanding corporate financial management for graduates of technical universities and the general lay public as well.

- **KEGA 006TU Z-4/2018** 3D functional models of flood protection as new methods and forms of university teaching - **prof. M. Jakubis, 2018-2020**

  Annotation of the most significant results:
  The objectives of the project have been met for the entire project period. In the years 2018-2020, an educational object was built on the premises of the Arboretum Borová hora TU in Zvolen, the purpose of which is to use new methods and forms of teaching to familiarize students of the Faculty of Physical Education TU in Zvolen, as well as other faculties within the Slovak Republic, with some of the possibilities of active flood protection solutions on functional model objects and to introduce the method of their flood protection in the landscape. It is possible to analyse the course of flows in different model types of channels (flow profiles) on the objects. In the selected site we used a permanent natural water source, which was deepened to a depth of about 1.4 m, thus ensuring the availability of the water source for flow modelling. The water source was adapted into a small reservoir model and can serve as an illustration of one of the important water retention options in the landscape. Three types of model flow profiles at 1:10 scale with different hydraulic characteristics were created as part of the building of the facility. Tests were carried out on these models to measure the profile velocities. In addition to the model channels and the small water model, a 1:10 scale model of a stone dam, a 1:10 scale model of a transverse earthen dam and a small dry reservoir (polder) were constructed. As part of the project solution, a model area for observing the formation of sheet runoff over an undisturbed soil surface with a humus layer in a forest ecosystem and a model area for observing the formation of sheet runoff over a disturbed soil surface without a humus layer were constructed. One of the possible uses of these model objects is to analyse the suitability of using different methods for calculating the average profile velocity in watercourses in terms of optimal sizing

the capacity of the flow profiles. An important result of the project is a scientific monograph on Flash Floods and Flood Protection in Small Catchments, published in 2020.

II. Organisational, personnel, material-technical and financial support of science and technology at the Faculty of Forestry

1. Organisational, personnel and financial security

The structure of research and teaching staff (Table 1) has changed slightly from the previous year, with a total of 113, a slight increase in the total number of staff from the previous year's 111. The management of the Faculty of Forestry pays due attention to the qualification growth of LF staff, also in terms of providing supervisors and co-guarantors of accredited study programmes.

Table 1. Structure of the Faculty of Forestry staff according to individual departments (as of 31 December 2020)

Workplace	valification							Total	of the total	
	pedagogical workers			scientific research work.			Other			
	prof.	doc.	rep.as.	scientific (PhD.)	Department of Higher Education	Answer. SŠ	tech.		DrSc.	CSc. PhD., Dr.
KERLH	3	1	6	4			2	16		14
KF	2	1	4	5			4	16	1	10
KPLZI	3	4	5	2	1	2	1	18		15
KIOLK	1	3	4	3			2	13		11
KLŤLM	2	4	2	4		1	1	14		12
KAZMZ	2	1	3	5		1		12		11
KPL	1	5	1	2		1	1	11	1	8
KPP	2	3		3		1	4	13		10
S p o l u	**16**	**22**	**25**	**28**	**1**	**6**	**15**	**113**	**2**	**91**

Table 2 shows the staffing levels for each department by full-time equivalent in 2020. We will use the numbers of graduate staff by full-time equivalent to calculate the CC outputs per creative staff member, as they are the most faithful representation of reality.

Table 2. Structure of the Faculty of Forestry staff according to individual departments (working time)

Workplace	C valification							Total	of the total	
	pedagogical workers			scientific research work.			Other			
	prof.	doc.	rep.as.	scientific (PhD.)	Department of Higher Education	Answer. SŠ	tech.		DrSc.	CSc. PhD.,Dr.
KERLH	3	1	5,8	1,8			2	13,6		11,6
KF	2	1	4	5			4	16	1	10
KPLZI	3	4	5	2	1	2	1	18		15
KIOLK	1	3	3,98	2			2	11,98		9,98
KLŤLM	2	4	1,99	3,38		1	1	13,37		11,37
KAZMZ	2	1	2	4,21		1		10,21		9,21
KPL	1	5	1	2		1	1	11	1	8
KPP	2	3		2,98		1	4	12,98		9,98
S p o l u	**16**	**22**	**23,77**	**23,37**	**1**	**6**	**15**	**107,14**	**2**	**85,14**

As in previous years, the research capacity is concentrated on solving grant tasks from the Ministry of Education and Science of the Slovak Republic, both by teaching and research staff (Table 3). The capacity table also includes the capacity of PhD students and secondary school staff. Grant projects account for over 94.23% of the capacity and other projects, including international projects, account for 5.77% of the total capacity. The average capacity per teaching staff member is 1367.5 hours and per researcher is 1282 hours.

Table 3. Research capacity of LF departments for scientific research projects in 2020

Department	Research capacity in hours Research projects				S p o l u		
	Grant projects		Other projects		Educator. Staff	Scientific research workers / doc.	Pedag. + Researchers + PhD.
	Educator. Staff	Scientific research workers / doc.	Educator. Staff	Scientific research workers / doc.			

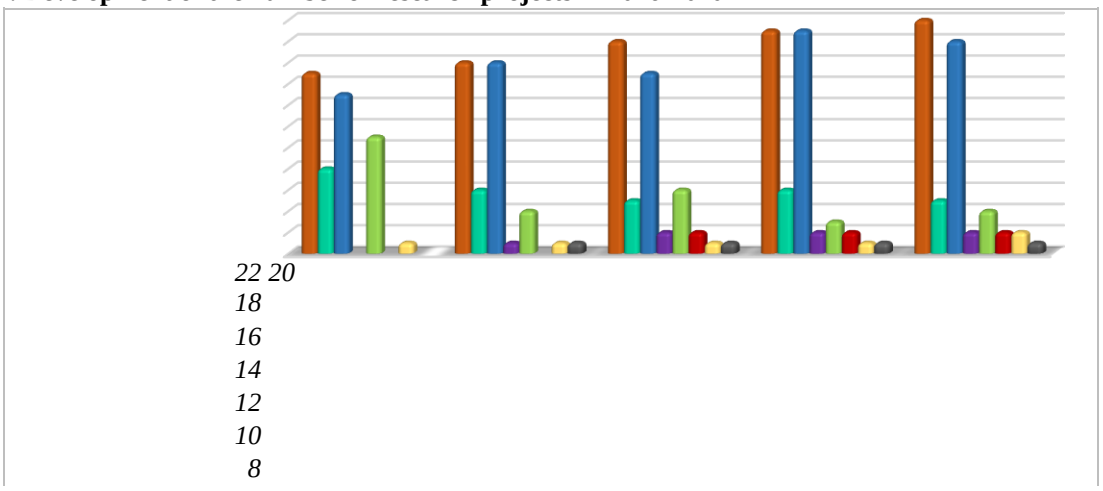
KERLH	14800	3450/13300	1100	400/500	15900	3850/13800	33550
KF	10200	7000/0	300	840/0	10500	7840/0	18340
KPLZI	12250	2634/1550	1750	2000/0	14000	4634/1550	20184
KIOLK	11400	2300/3350	0	0/0	11400	2300/3350	17050
KLŤLM	9750	5000/300	0	0/0	9750	5000/300	15050
KAZMZ	6350	7500/0	100	2045/0	6450	9545/0	15995
KPL	7400	3050/450	0	0/0	7400	3050/450	10900
KPP	10750	8650/6250	0	0/0	10750	8650/6250	25650
LF total	**82900**	**39584/25200**	**3250**	**5285/500**	**86150**	**44869/25700**	**156719**
	147684		**9035**		**156719**		

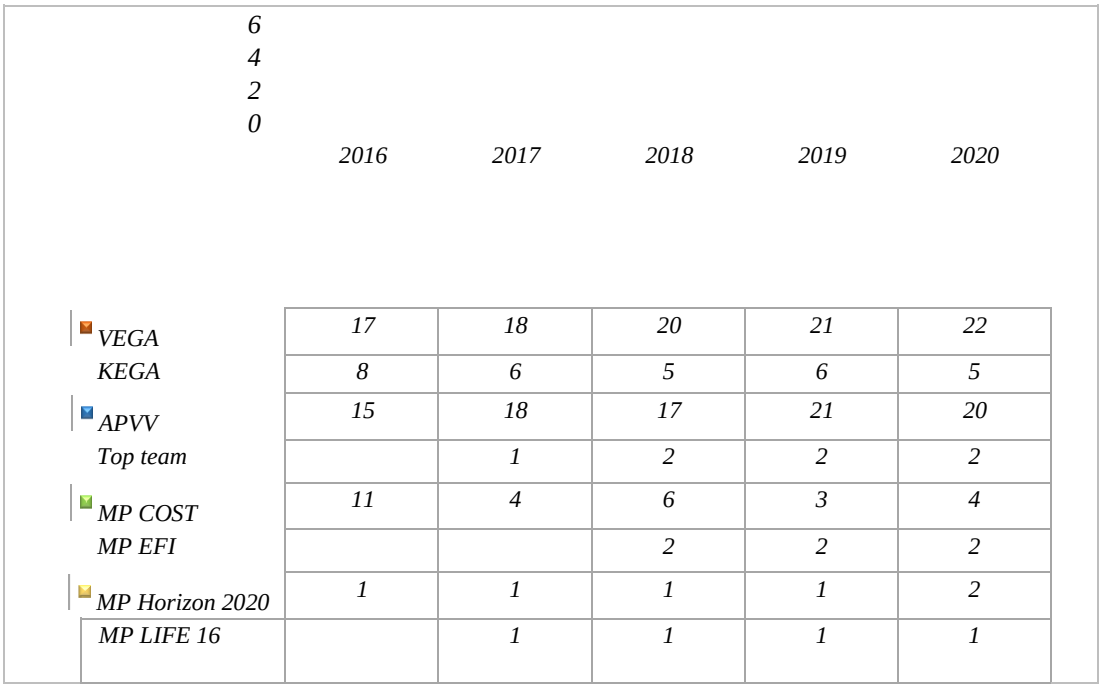
Financial support for R&D at the Faculty of Science is mainly provided through projects of the Agency for Research and Development Support (APVV), projects of the Scientific Grant Agency

and applied research of the Ministry of Education and Science of the Slovak Academy of Sciences (VEGA) and the Ministry of Education and Science of the Slovak Academy of Sciences in connection with pedagogical activities through the projects of the Cultural and Educational Grant Agency (KEGA) and development projects of the Ministry of Education and Science of the Slovak Academy of Sciences (MŠVŠŠ). It should be stressed that the Faculty of Arts has representatives on the committees and boards of these agencies. Scientific research activities through international programmes of the European Commission, especially Horizon 2020 and COST programme, are also an important contribution. Figure 1 shows the evolution of the number of scientific research projects for the years 2016-2020. In 2020, a total of 58 different projects were addressed at the Faculty of Arts, and in 2019 it was 57. A higher number compared to the previous year was recorded for VEGA, COST and Horizon 2020 projects. The development of the allocated funds in absolute terms, which is shown in Figure 2, documents a decrease in the volume of funds in 2020 compared to 2019, by EUR 65 000 (EUR 982 000 compared to EUR 1 047 000). In particular, the most significant decrease was in the case of AAL projects, with a decrease of EUR 138 000 compared to 2019. In percentage terms, the largest share is still accounted for by the funds allocated to AAL projects. In absolute and percentage terms, this amounts to EUR 642,000 and this amount represents approximately 65.4% of all project funds allocated to the Faculty (Figure 3).

However, it should be critically noted that we are still not succeeding at an adequate level to apply the transfer of knowledge from the faculty environment to the level of practical industrial use. This should be primarily the commercial or industrial exploitation of patent solutions through a university spin-off company. The potential for utilisation of patents and utility models is also found in the field of project activities in connection with active involvement in EU Community programmes aimed at development and innovation, EU Structural Funds and other projects. In the field of research and development, patent solutions are of relevance in establishing cooperation with leading commercial domestic and foreign scientific research institutions. Software solutions and products that cannot be patented under the European Union's legal provisions also have innovation potential. They are governed by the principles of copyright law and intellectual property. Examples include the forestryoriented point cloud processing products DENDROCLOUD and the SIBYLA growth simulator. Both products have been included as tools within the proposed IT cluster under the competence of the Banská Bystrica Self-Governing Region. The SIBYLA growth simulator will also be introduced into the forest user's information system in cooperation with the external sub-enterprise ITERSOFT.

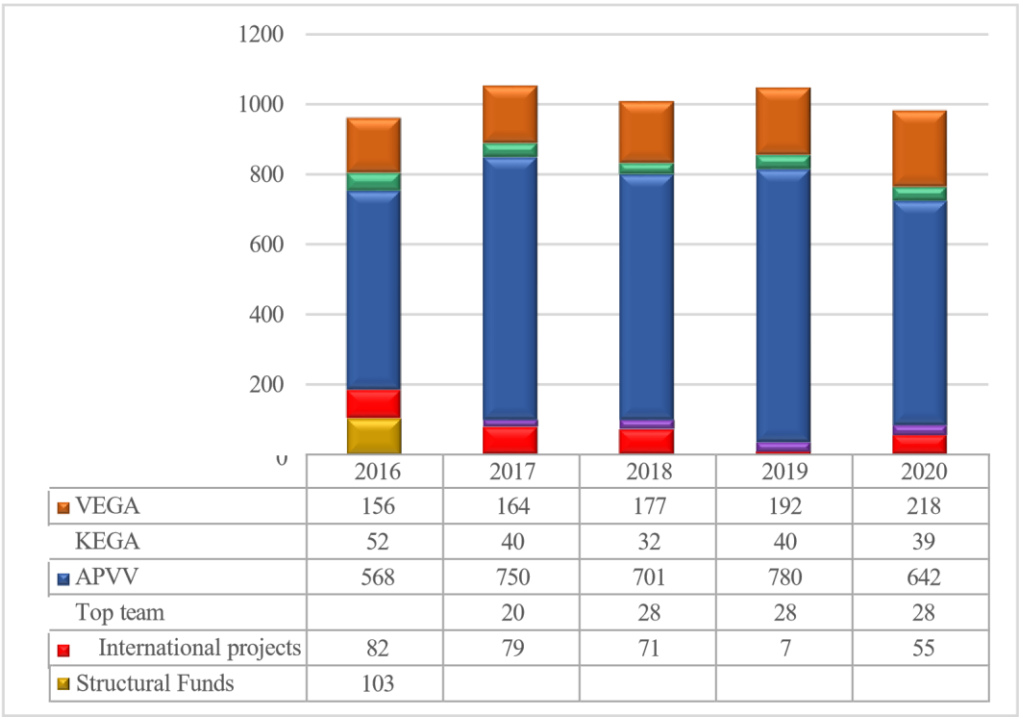
Fig. 1. Development of the number of research projects in 2016-2020





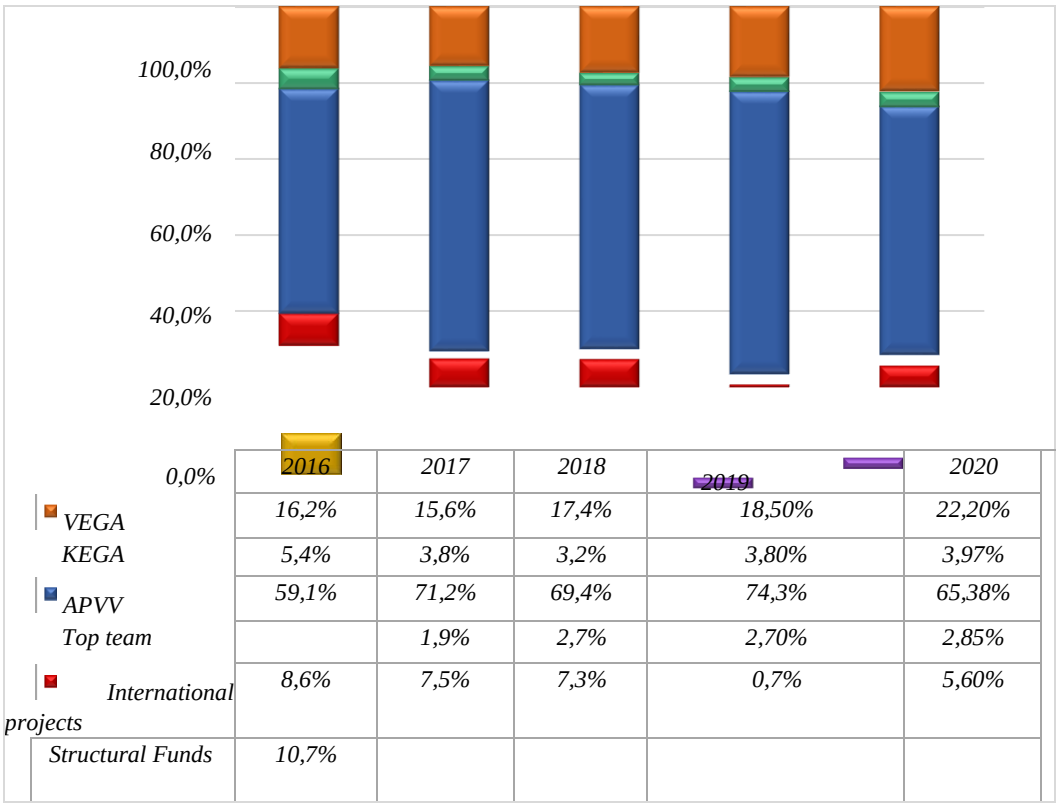
	2016	2017	2018	2019	2020
VEGA	17	18	20	21	22
KEGA	8	6	5	6	5
APVV	15	18	17	21	20
Top team		1	2	2	2
MP COST	11	4	6	3	4
MP EFI			2	2	2
MP Horizon 2020	1	1	1	1	2
MP LIFE 16		1	1	1	1

Fig. 2. Development of funding for scientific research projects in 2016-2020 in thous. EUR



	2016	2017	2018	2019	2020
VEGA	156	164	177	192	218
KEGA	52	40	32	40	39
APVV	568	750	701	780	642
Top team		20	28	28	28
International projects	82	79	71	7	55
Structural Funds	103				

Fig. 3. Development of funding for research projects in 2016-2020 in percentage

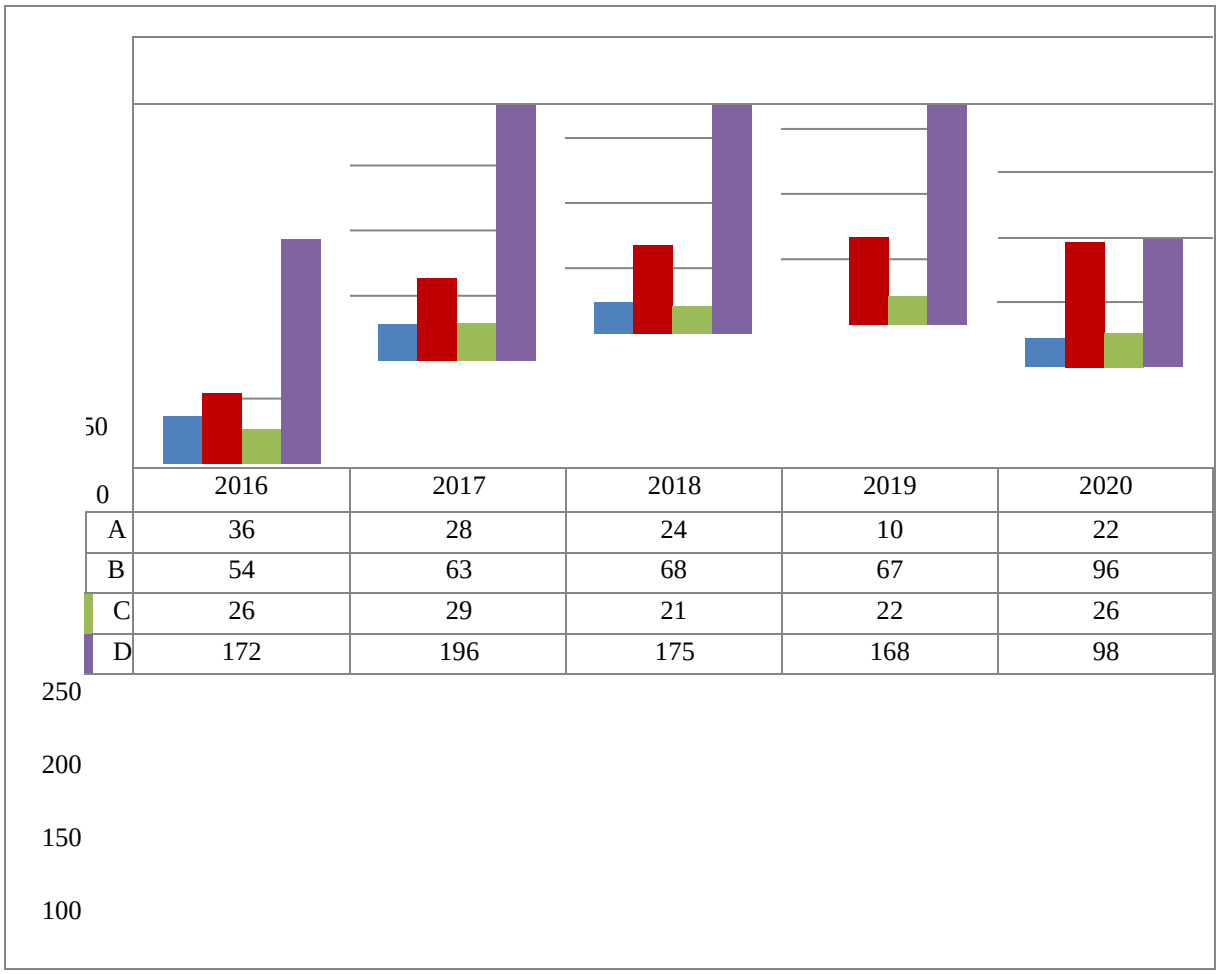


	2016	2017	2018	2019	2020
VEGA	16,2%	15,6%	17,4%	18,50%	22,20%
KEGA	5,4%	3,8%	3,2%	3,80%	3,97%
APVV	59,1%	71,2%	69,4%	74,3%	65,38%
Top team		1,9%	2,7%	2,70%	2,85%
International projects	8,6%	7,5%	7,3%	0,7%	5,60%
Structural Funds	10,7%				

2. Publication activity

The results of the publication activity of the Faculty of Forestry in 2020 compared to previous periods are shown in Figure 4. The individual categories of publication activity A-D were established by the Ministry of Education and Science of the Slovak Republic and were valid also in 2020 (their change occurs only from 1.1.2021). This division is important from the point of view of allocation of funds for the HERE and the Faculty of Arts, while from the point of view of the long-term development of the faculty, the most important category is B, namely publications in carentered scientific journals (with the code designation ADC and ADD). In addition, from 2018 onwards, the quartiles of journals within the respective research fields in which the articles have been published are also taken into account in university funding. Through the incentive-based remuneration system, the LF management aims to motivate creative faculty members to publish more strongly, especially in category B, and thus to change the overall structure of publication activity in order to partially reduce the predominant share of publications in category D (i.e. other publications not registered in Current Contents, Web of Science and Scopus databases), which the faculty has actually achieved satisfactorily for the first time in 2020.

Fig. 4: Evaluation of the development of publishing activity at the Faculty of Forestry, TU in 2016-2020 from the library's data



	2016	2017	2018	2019	2020
A	36	28	24	10	22
B	54	63	68	67	96
C	26	29	21	22	26
D	172	196	175	168	98

From the point of view of the Faculty of Forestry (but without taking into account the coauthorship of the members of individual departments on the publication output), 93 papers were published in 2020 in peer-reviewed journals (plus 1 paper from 2019, which was registered only in 2020), of which 88 papers were published in foreign peer-reviewed journals and 6 papers in domestic peer-reviewed journals. It is particularly pleasing to note that the largest proportion of published CC papers was in the first quartile according to Journal Citation Reports (JCR) rankings (up from 46 papers in Q1, 26 papers in Q2, 11 papers in Q3 and 11 papers in Q4). Figure 5 presents the evolution of faculty publication of peer-reviewed papers over the period 2016-2020, with a very pleasing status in 2020. The figure also provides a comparison of the development of publication of peer-reviewed articles with scientific monographs (codenamed AAB). From the perspective of individual departments, the distribution of publication of papers in peer-reviewed journals in 2020, taking into account the co-authorship of members of individual departments in the publication output, is as follows: KPLZI - 24, KF - 29, KIOLK - 18, KERLH - 12, KPP - 15, KPL - 5, KLŤLM - 12
(plus 2 patent applications), KAZMZ - 3 (plus 1 more paper from 2019, which was registered only in 2020) (Fig. 6). In view of the long-term trend erasing year-to-year fluctuations in the publication of peer-reviewed articles by international publishers, it is both more promising and more correct to assess the publication in CC journals on a multi-year basis. Therefore, Figure 6 provides comparisons of the publication performance of individual departments in the category

of peerreviewed articles for the period 2018-2020, where the effect of year-to-year fluctuation is quite evident for more or less all departments, not only the most publicationally active ones

Fig. 5: Overview of the development of publication of scientific monographs and peerreviewed articles at the Faculty of Forestry, TU in 2016-2020

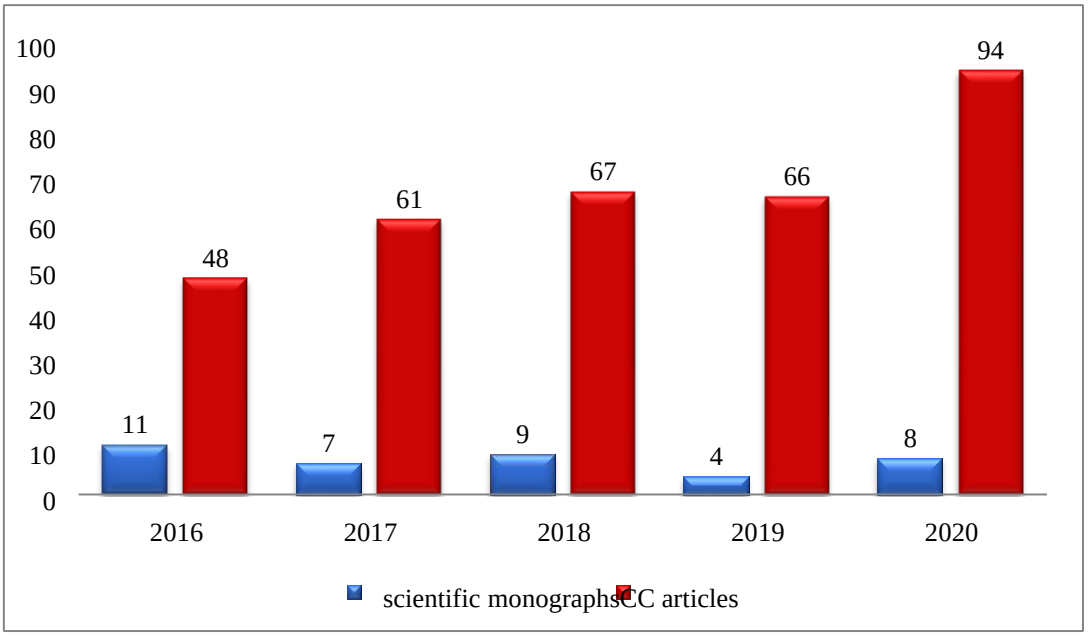
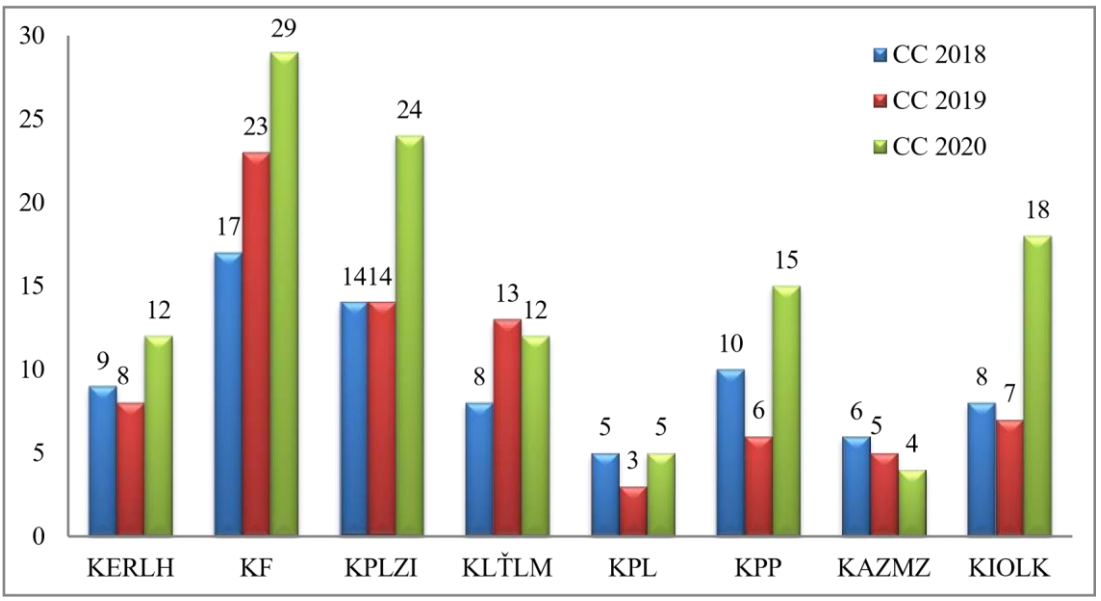


Fig. 6: Number of scientific papers in peer-reviewed journals by department for 20182020



The proportion of articles published per creative worker per department but calculated on the basis of the full-time equivalent of the departmental staff in 2020 is shown in Figure 7. More than an average of 1 carentenated article per creative worker in the department was achieved by 5 departments in 2020 (KF, KIOLK, KPP, KPLZI and KERLH), while in 2019 it was only 3 departments (KF, KLŤLM and KPLZI). The evolution of publication activity in terms of

publication categories A to D by each department over the period 2016-2020 is shown in Figures 8 to 15. A summary overview of the publication activity of all departments for 2020 is given in Figure 16.

Fig. 7: Number of CC outputs per creative worker by individual departments calculated on the basis of full-time employees of the departments for 2020 (*after taking into account the reduced full-time employees of KAZMZ)

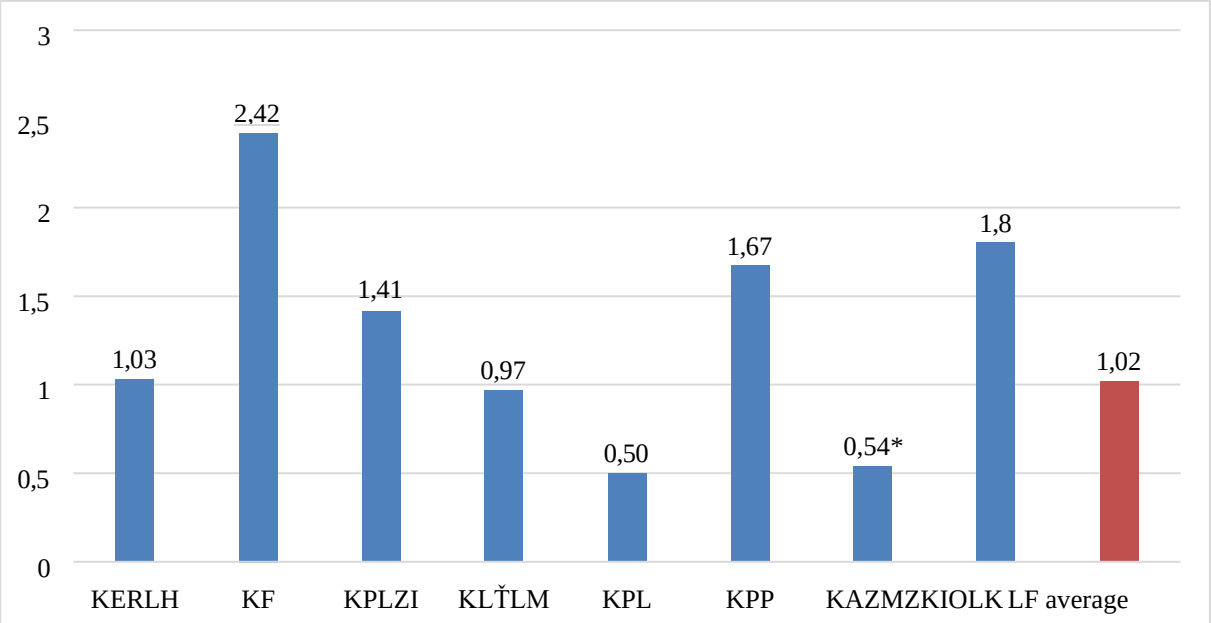
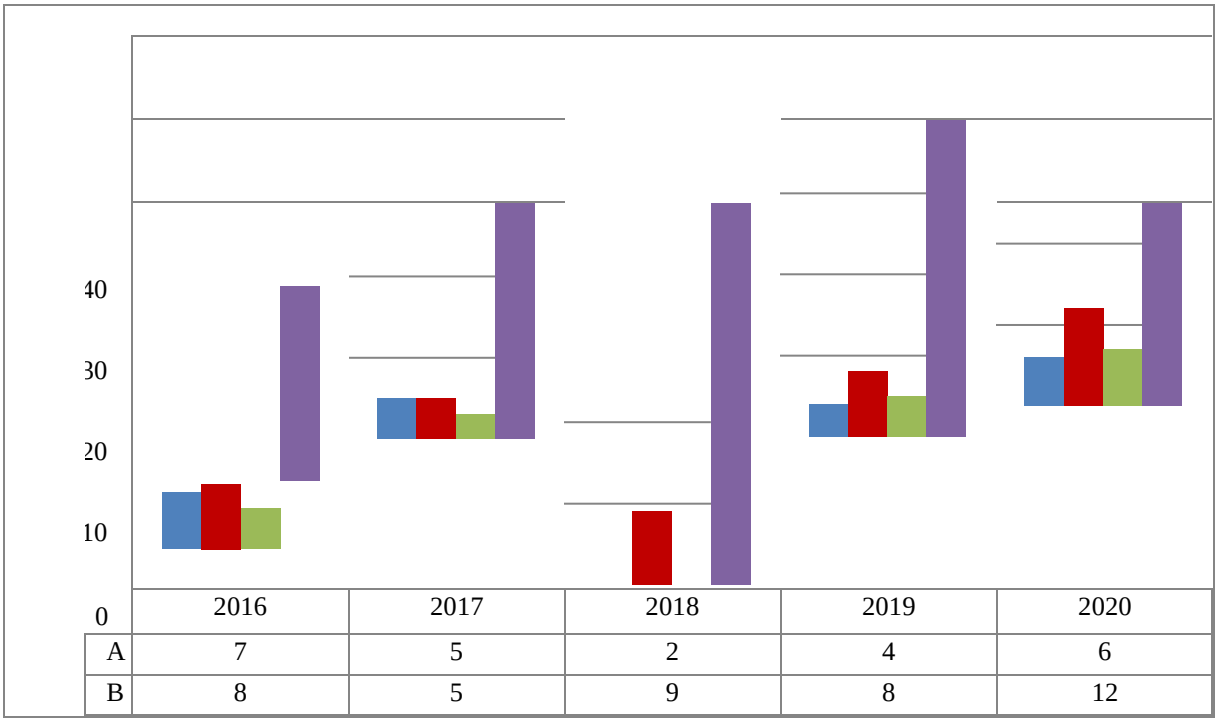


Fig. 8: Evaluation of the development of publishing activity at KERLH in 2016-2020 from library data



	2016	2017	2018	2019	2020
A	7	5	2	4	6
B	8	5	9	8	12

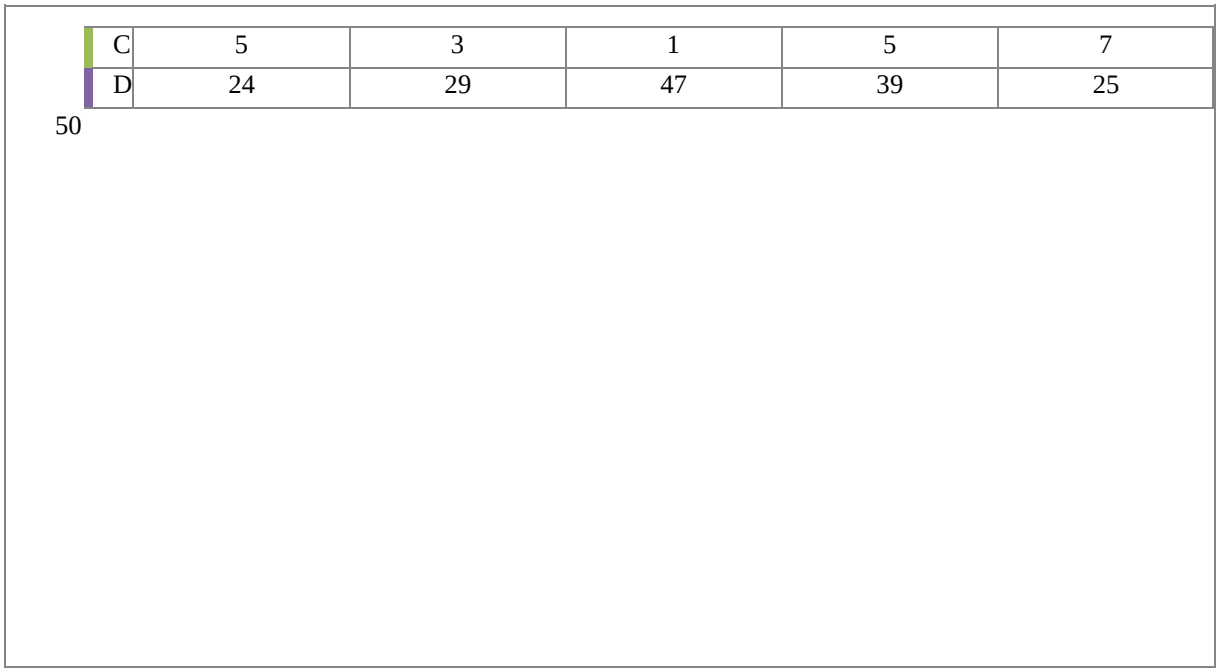


Fig. 9: Evaluation of the development of publication activity at the KF in 2016-2020 from the library's data

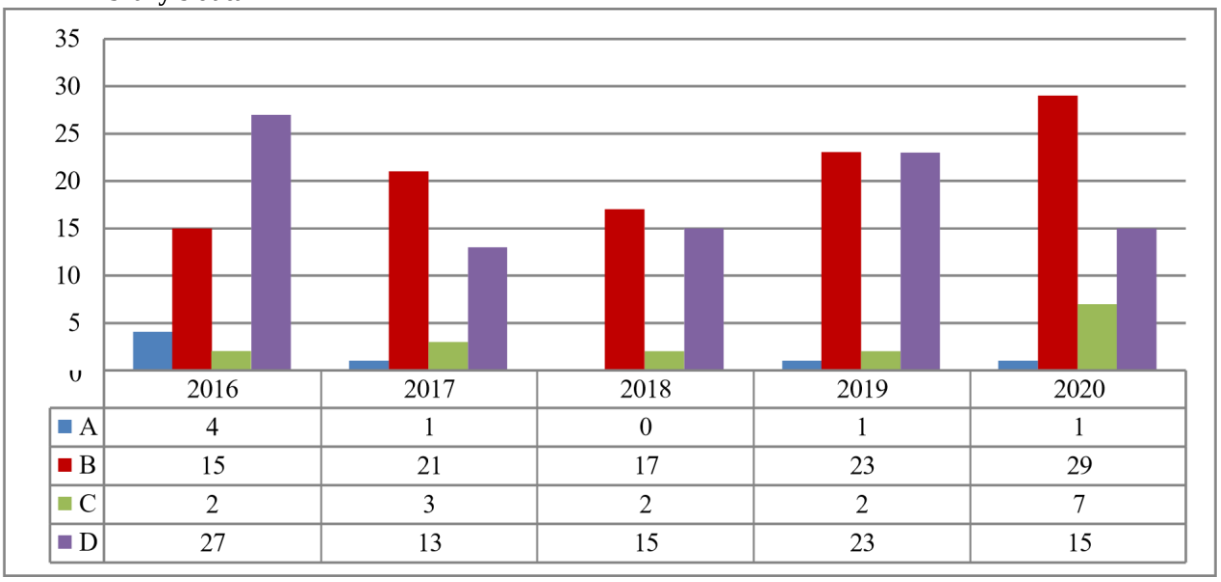
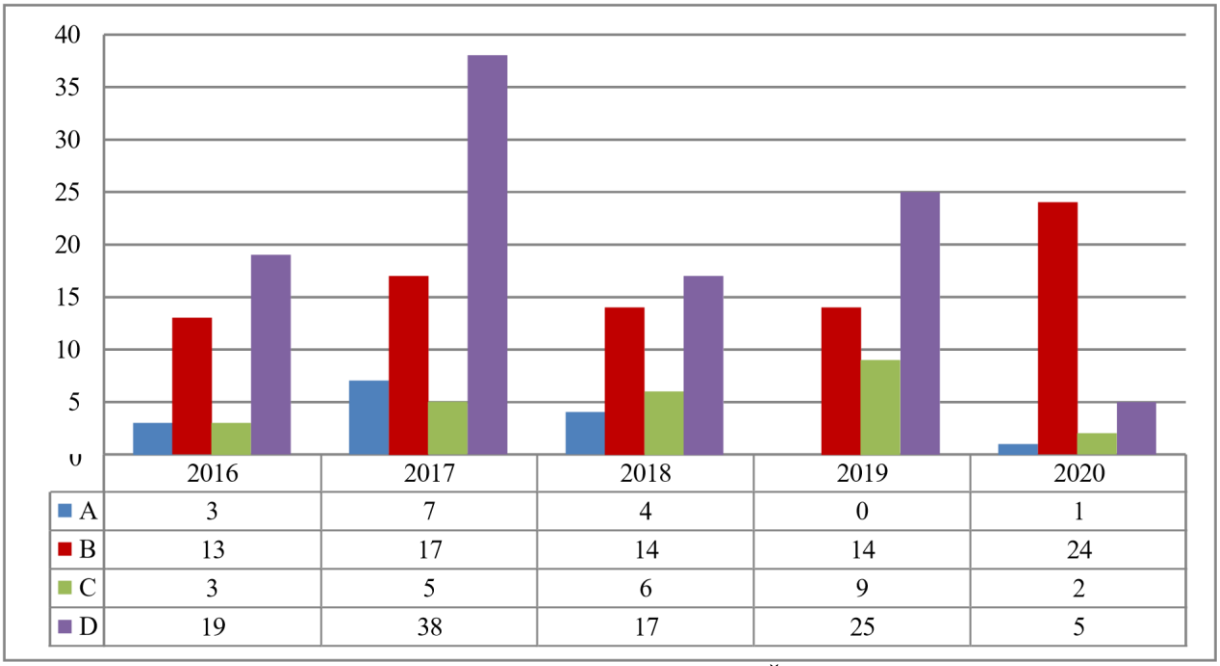
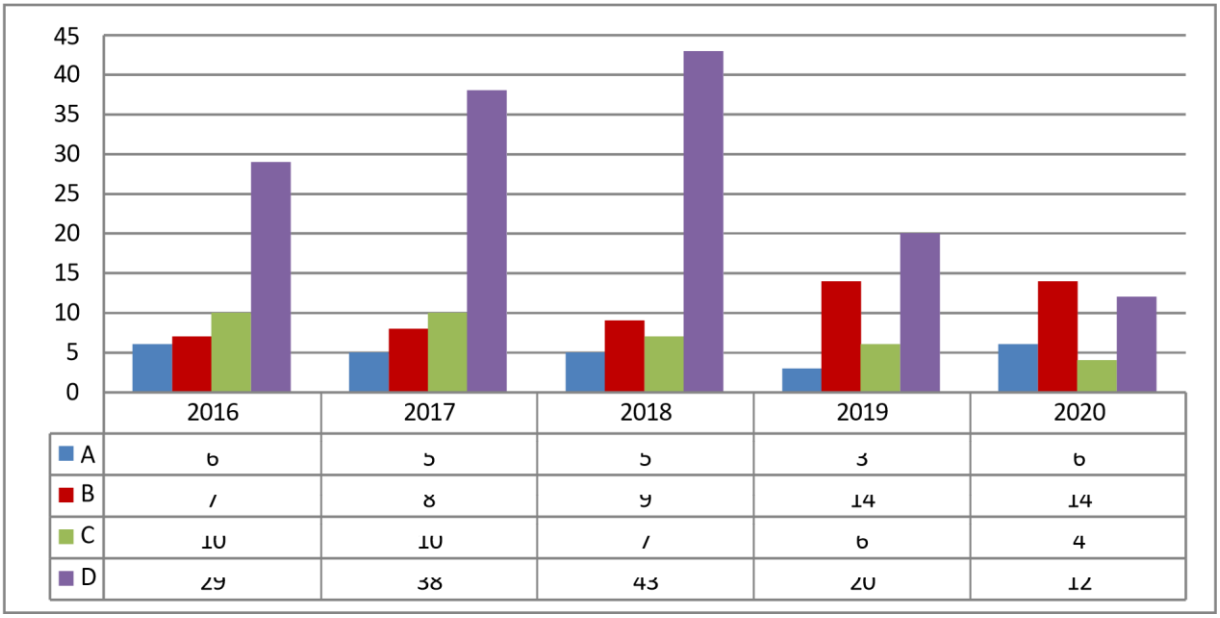


Fig. 10: Evaluation of the development of publishing activity at KPLZI in the years 2016-2020 from library data



	2016	2017	2018	2019	2020
A	3	7	4	0	1
B	13	17	14	14	24
C	3	5	6	9	2
D	19	38	17	25	5

Fig. 11: Evaluation of the development of publishing activity at KLŤLM in 2016-2020 from library data



	2016	2017	2018	2019	2020
A	٦	٥	٥	٣	٦
B	٧	٨	٩	١٤	١٤
C	١٠	١٠	٧	٦	٤
D	٢٩	٣٨	٤٣	٢٠	١٢

Fig. 12: Evaluation of the development of publishing activity at KPL in 2016-2020 from library data

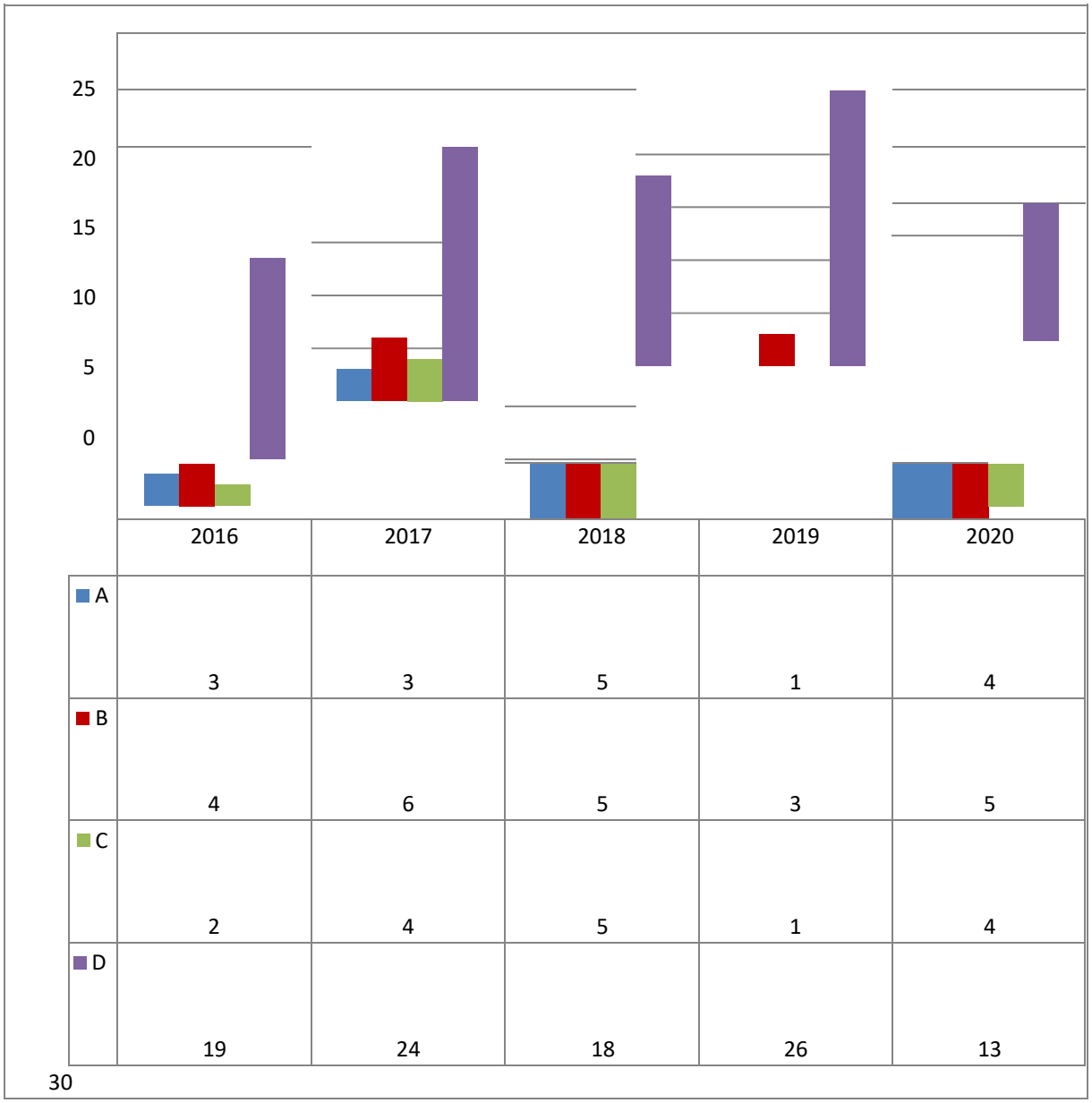
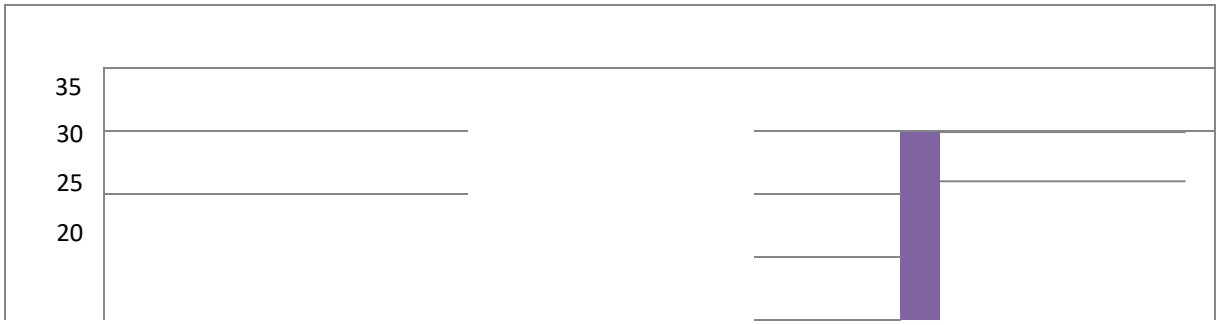
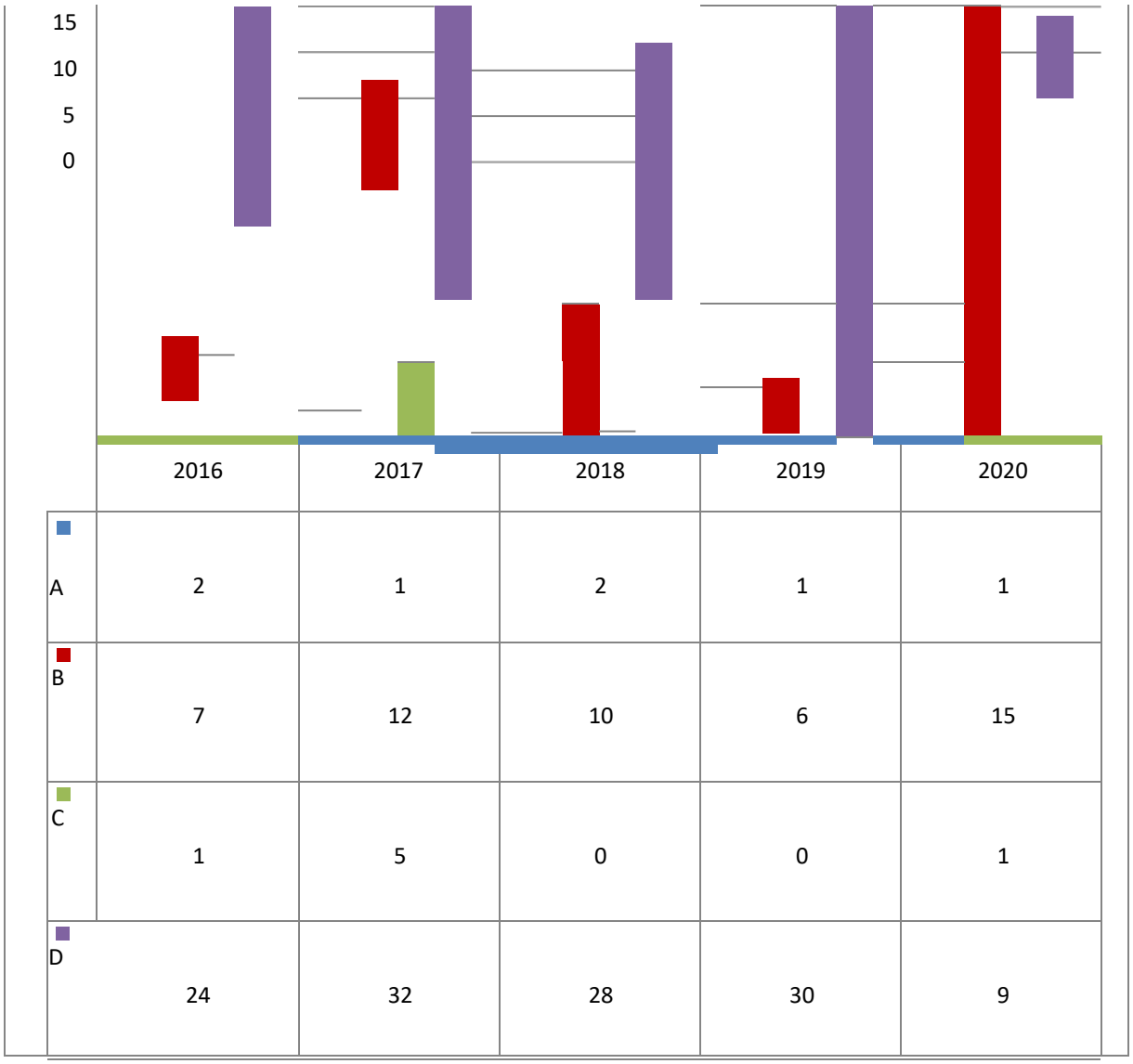


Fig. 13: Evaluation of the development of publishing activity at the KPP in 2016-2020 from the library's data





	2016	2017	2018	2019	2020
A	2	1	2	1	1
B	7	12	10	6	15
C	1	5	0	0	1
D	24	32	28	30	9

Fig. 14: Evaluation of the development of publishing activity at KAZMZ in 2016-2020 from the library's data

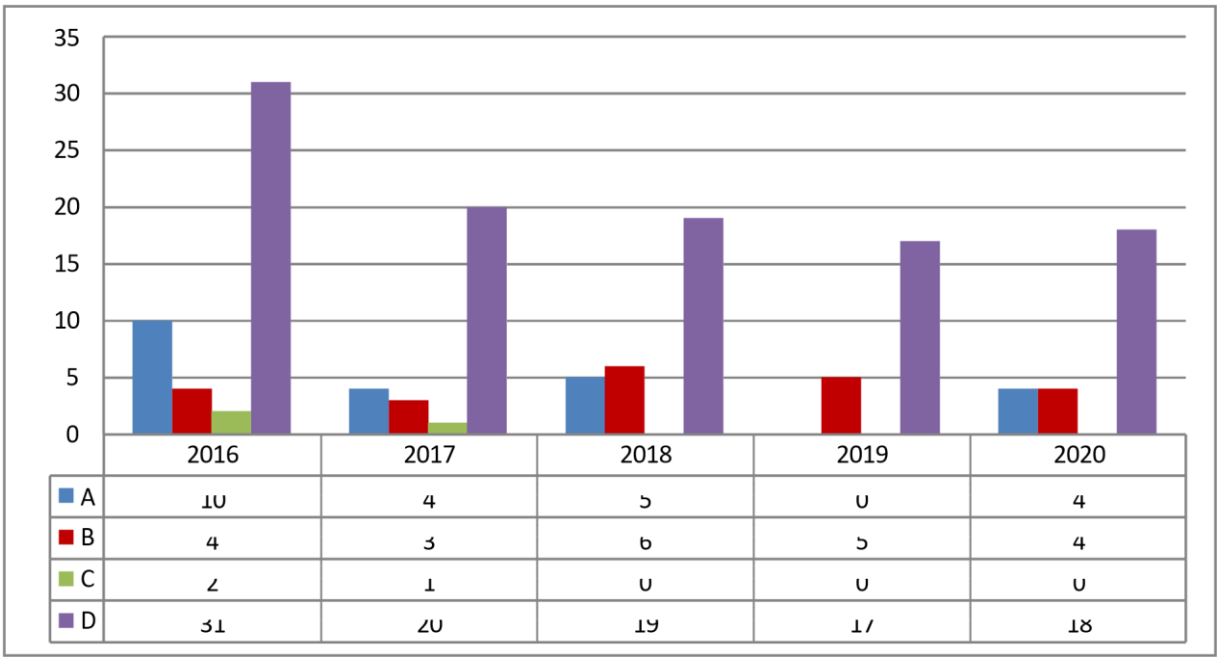
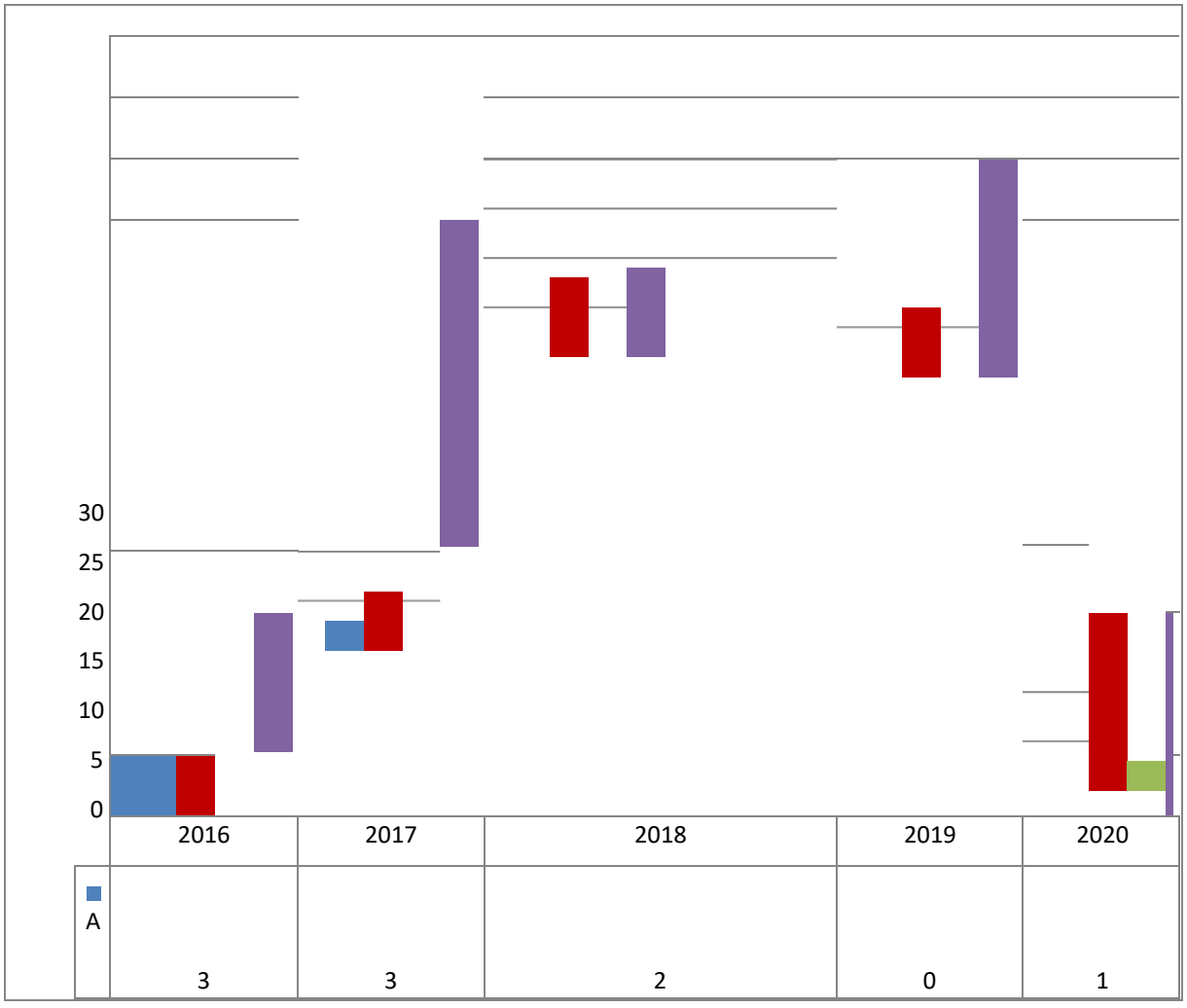


Fig. 15: Evaluation of the development of publishing activity at KIOLK in 2016-2020 from library data



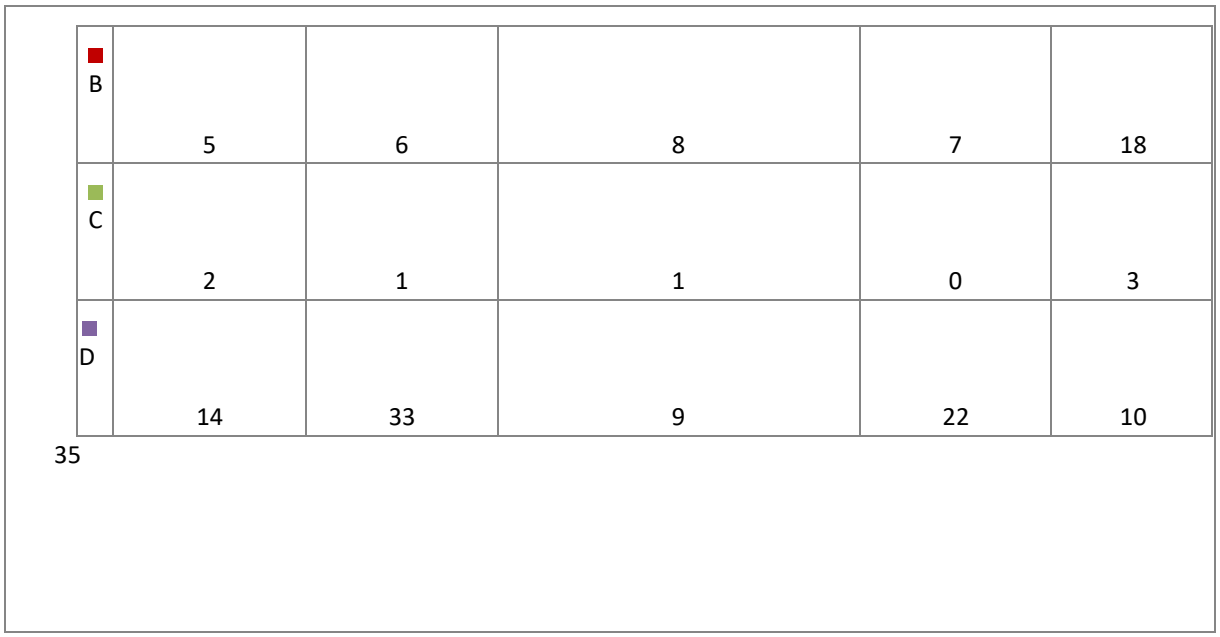
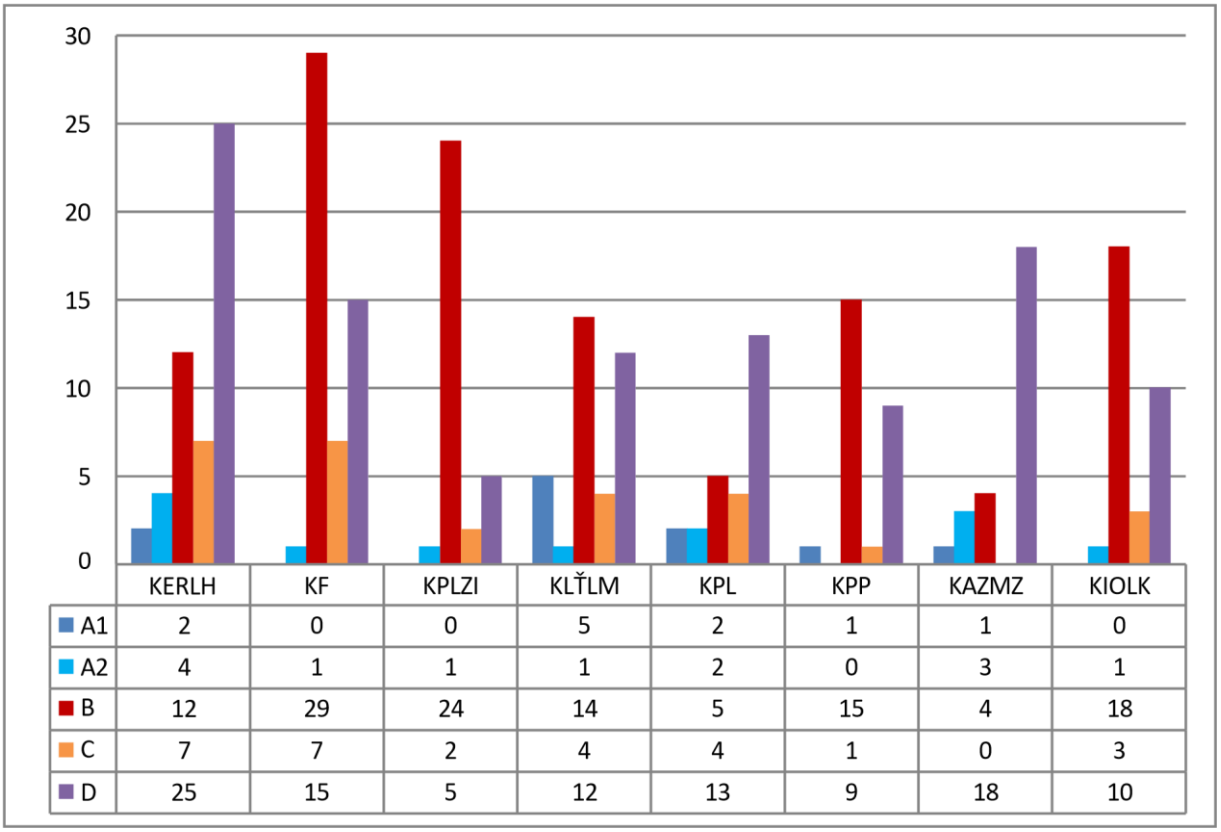
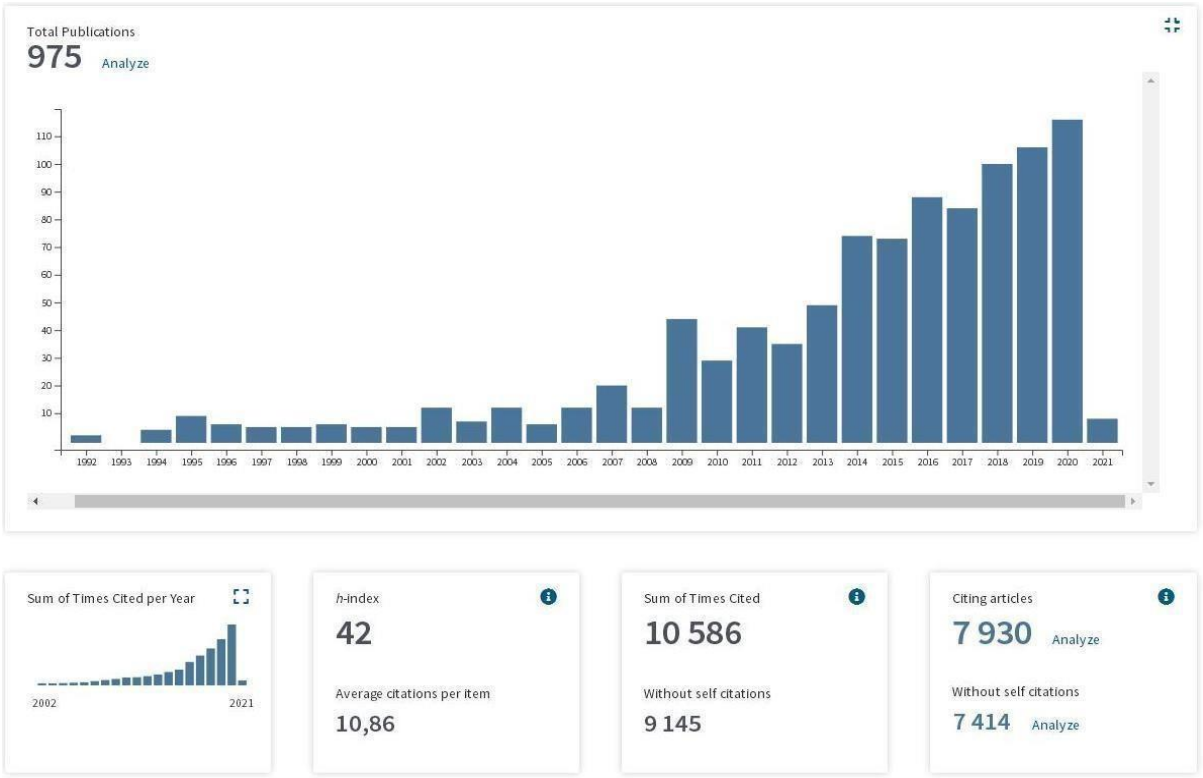


Fig. 16: Comparison of publication activity of individual LF departments in 2020



	KERLH	KF	KPLZI	KLŤLM	KPL	KPP	KAZMZ	KIOLK
A1	2	0	0	5	2	1	1	0
A2	4	1	1	1	2	0	3	1
B	12	29	24	14	5	15	4	18
C	7	7	2	4	4	1	0	3
D	25	15	5	12	13	9	18	10

Fig. 17: Dynamics of the development of publication outputs and citations of LF staff registered in the Web of Science Core Collection database as of 04.02.2021



As can be seen in Figure 17, we can state a rather very favourable situation in the registration of high quality publication outputs of our staff in the Web of Science Core Collection database. There has been a significant increase in the number of outputs compared to previous years, while it should be noted that the database also registers publication outputs with a considerable delay. Thus, it is still possible to expect the registration of delayed outputs for the year 2020, which have not yet all appeared in the database on the date of creation of the graphical output (i.e. 04.02.2021). At the same time, a further increase in the number of SCI citations in the database compared to previous years is pleasing. The Hirsch index for the Faculty of Forestry has also increased and reaches a value of 42, whereas in the previous two years it was 34 and 37 respectively.

Table 4 gives an overview of the publication activity of creative staff of individual departments for 2019 and 2020 in 4 selected categories, which, in addition to citation response, are among the most important in terms of scientometric potential of our faculty staff to acquire scientific projects. These are the number of articles that have been peer-reviewed (codenamed ADC and ADD), the number of patent applications, utility model applications and design applications (codenamed AGJ), the number of scientific papers in journals registered in t h e Web of Science or Scopus databases (codenamed ADM and ADN) and the number of scientific monographs (codenamed AAA, AAB, ABA, ABB, ABC and ABD). In addition to the potential for obtaining scientific projects, the reporting of adequate publication activity in these categories is also directly related to the potential for guaranteeing and coguaranteeing study programmes at doctoral level, or for granting the right to carry out habilitations and inaugurations in the relevant fields of study, which is particularly important for the development of the Faculty. In addition to the number of theses, Table 4 also shows the cumulative percentage of the author's contribution to the theses in question. The results in these 4 selected key categories show quite significant disparities in the publication activity of creative workers within and between departments.

Table 4: Overview of publication activity of LF staff in 2019 and 2020 in selected categories

Department	Number of CC papers[1] and % author share 2020	Number of CC papers[1] and % author share 2019	Number of patents and designs[2] and % author's share 2020	Number of patents and designs[2] and % author share 2019	Number of WOS and SCOPUS works[3] and % author share 2020	Number of WOS and SCOPUS works[3] and % author share 2019	Number of scientific monographs[4] and % author's share 2020	Number of scientific monographs[4] and % author share 2019
KERLH								
Šálka Jaroslav prof. Dr. Ing.	4 (0,35)	2 (0,25)			1 (0,07)	1 (0,10)	1 (0,25)	
Šulek Rastislav doc. Ing. Mgr. PhD.								
Balážová Emília Ing. PhD.								
Brodrechtová Yvonne Dr. Ing.	1 (0,04)	1 (0,30)			1 (0,10)	1 (0,40)		
Giertliová Blanka Ing. PhD.	2 (0,19)	1 (0,20)			1 (0,30)	1 (0,30)		
Halaj Daniel doc. Ing. PhD.		1 (0,50)				1 (1,00)		
Trenčiansky Marek Ing. PhD.	1 (0,30)	1 (0,30)						
Hajdúchová Iveta prof. Ing. PhD.	1 (0,15)				2 (0,40)	1 (0,40)		
Holécy Ján prof. Ing. CSc.					1 (0,10)			
Dobšinská Zuzana JUDr. PhD.	4 (0,73)	3 (0,30)				2 (0,30)		
Štěrbová Martina Ing. PhD.	2 (0,55)	1 (0,40)			1 (0,33)	1 (0,10)	1 (0,25)	
Výbošťok Jozef Ing. PhD.	4 (0,56)				2 (0,55)			
KF								
Ďurkovič Jaroslav prof. Dr. Mgr.	3 (0,61)	2 (0,20)				1 (0,28)		
Ujházy Karol prof. Ing. PhD.	3 (0,26)	3 (0,35)						
Gömöry Dušan prof. Ing. DrSc.	7 (1,61)	6 (1,17)			3 (0,95)	1 (0,01)		
Klinga Peter Ing. PhD.	2 (0,75)	1 (0,60)						
Krajmerová Diana Ing. PhD.		3 (0,56)			2 (0,30)			
Máliš František Ing. PhD.	11 (0,42)	6 (0,25)			1 (0,03)			

Kochjarová Judita RNDr. CSc.	2 (0,09)	3 (0,40)						
Kardošová Monika Ing. PhD.	2 (0,30)							
Hrivnák Matúš Ing. PhD.	1 (0,40)	2 (0,39)			4 (0,45)			

Širka Pavel Mgr. PhD.	2 (0,32)	1 (0,60)			1 (0,10)			
Wiezik Maroš Ing. PhD.	2 (0,75)							

Department	**Number of CC works[1] and % share of the author 2020**	**Number of CC papers[1] and % author share 2019**	**Number of patents and designs[2] and % author's share 2020**	**Number of patents and designs[2] and % author share 2019**	**Number of WOS and SCOPUS works[3] and % author's share 2020**	**Number of WOS and SCOPUS works[3] and % author's share 2019**	**Number of scientific monographs[4] and % author's share 2020**	**Number of scientific monographs[4] and % author share 2019**
KPLZI								
Fabrika Marek prof. Ing. PhD.	1 (0,02)	1 (0,30)				2 (0,65)		
Chudý František doc. Ing. CSc.	1 (0,10)	1 (0,20)			1 (0,20)	1 (0,20)		
Kardoš Miroslav doc. Ing. Bc. PhD.		2 (0,35)						
Bahýľ Ján Ing. PhD.	2 (0,04)							
Bošeľa Michal Ing. PhD.	7 (0,76)	5 (0,91)			1 (0,10)	1 (0,10)		
Root Milan Mgr. PhD.	3 (0,70)	1 (0,05)				1 (0,10)		
Sedmák Róbert doc. Ing. PhD.	7 (1,54)	3 (0,77)				1 (0,15)		
Sitko Roman Ing. PhD.	2 (0,06)					1 (0,70)		
Tomaštík Julián Ing. PhD.	2 (0,12)	4 (0,95)				1 (0,20)		
Scheer Ľubomír prof. Ing. CSc.		1 (0,30)				2 (0,50)		
Tuček Ján prof. Ing. CSc.	3 (0,11)	1 (0,20)				1 (0,05)		
Merganičová Katarína Ing.Dr.nat.techn.	4 (1,02)	1 (0,03)				3 (0,53)		

Valent Peter Ing. PhD.	1 (0,03)					1 (0,35)		
Čerňava Juraj Ing. PhD.					1 (0,45)			
Korená Hillayová Michaela Ing. PhD.	2 (0,15)				1 (0,50)			

Department	Number of CC papers[1] and % author share 2020	Number of CC papers[1] and % author share 2019	Number of patents and designs[2] and % author's share 2020	Number of patents and designs[2] and % author share 2019	Number of WOS and SCOPUS works[3] and % author share 2020	Number of WOS and SCOPUS works[3] and % author share 2019	Number of scientific monographs[4] and % author's share 2020	Number of scientific monographs[4] and % author share 2019
KLŤLM								
Štollmann Vladimír doc. Ing. CSc. PhD.			2 (1,25)		1 (0,25)			
Ferenčík Michal Ing. PhD.		3 (0,42)						
Gejdoš Miloš doc. Ing. PhD.	3 (0,94)	4 (1,20)				4 (1,38)	1 (0,60)	
Juško Vladimír Ing. PhD.	1 (0,03)							
Lieskovský Martin doc. Ing. PhD.	1 (0,08)	2 (0,50)					3 (0,95)	1 (0,35)
Jakubis Matúš prof. Ing. PhD.		1 (0,05)			1 (0,80)	2 (1,20)	2 (0,90)	
Messingerová Valéria prof. Ing. CSc.	1 (0,10)	1 (0,02)		1 (0,15)	1 (0,40)			1 (0,02)
Merganič Ján doc. Ing. PhD.	5 (0,72)	3 (0,13)			1 (0,05)			
Allman Michal Ing. PhD.	1 (0,35)	6 (1,90)						1 (0,85)
Dudáková Zuzana Ing. PhD.	1 (0,50)	6 (1,41)						1 (0,10)
Vlčková Mária Ing. PhD.		4 (0,80)				1 (0,40)		
Mokroš Martin Ing. PhD.	2 (0,12)	3 (0,65)			1 (0,40)	1 (020)		
KIOLK								
Fleischer Peter doc. Ing. PhD.	6 (0,95)	1 (0,20)			1 (0,05)			
Kodrík Milan doc. Ing. CSc.								
Hlaváč Pavol Ing. PhD.								

Pavlík Martin Ing. PhD.	2 (0,80)	2 (0,60)						
Kmet'a Jaroslav prof. Ing. PhD.	2 (0,13)	2 (0,10)			1 (0,05)			
Kurjak Daniel doc. Ing. PhD.	8 (0,98)	3 (0,48)			1 (0,05)			
Fleischer Peter Ing. PhD.	7 (1,30)	2 (0,30)			1 (0,15)			
Kubov Martin Ing. et Ing. PhD.	2 (0,50)	1 (0,51)						
Konôpková Alena Mgr. PhD.	5 (0,90)	3 (0,65)			3 (0,60)			
Dzurenko Marek Ing. PhD.	3 (0,45)							

Mezei Pavel Ing. PhD.	1 (0,25)							

Department	Number of CC works[1] and % share of the author 2020	Number of CC works[1] and % share author 2019	Number of patents and designs[2] and % author's share 2020	Number of patents and designs[2] and % author share 2019	Number of WOS and SCOPUS works[3] and % author's share 2020	Number of WOS and SCOPUS works[3] and % author's share 2019	Number of scientific monographs[4] and % author's share 2020	Number of scientific monographs[4] and % author share 2019
KAZMZ								
Kropil Rudolf Dr. h. c.. prof. Ing. PhD.	1 (0,10)	1 (0,10)						
Rajský Dušan doc. MVDr. PhD.		2 (0,20)						
Bútora Ľubomír Ing. PhD.								
Lešo Peter doc. Ing. PhD.		1 (0,45)					1 (0,10)	
Stanovský Miroslav Ing. CSc.								
Garaj Peter prof. Ing. CSc.								
Korňan Martin RNDr. PhD.	1 (1,00)	1 (0,65)						
Kubala Jakub Mgr. PhD.	2 (0,45)							
Pataky Tibor Ing. CSc.	1 (0,07)							
Smolko Peter Ing. PhD.	2 (0,25)	1 (0,10)						
Veselovská Alexandra Ing. PhD.								
KPL								
Jaloviar Peter doc. Ing. PhD.	2 (0,32)	1 (0,05)			2 (0,40)			1 (0,10)
Kucbel Stanislav doc. Ing. PhD.	2 (0,33)	1 (0,10)			2 (0,40)			1 (0,10)
Lukáčik Ivan doc. Ing. CSc.		1 (0,10)					1 (0,10)	
Repáč Ivan doc. Ing. PhD.					2 (1,00)	1 (1,00)		

Vencurik Jaroslav doc. Ing. PhD.	2 (0,35)	1 (0,23)			2 (0,20)		1 (0,15)	1 (0,10)
Saniga Milan prof. Ing. DrSc.	3 (0,36)	1 (0,10)			1 (0,25)		1 (0,50)	1 (0,30)
Parobeková Zuzana Ing. PhD.	1 (0,05)	1 (0,03)			1 (0,10)			
Pittner Ján Ing. PhD.	4 (0,25)	1 (0,03)			2 (0,35)		1 (0,35)	1 (0,20)
Sedmáková Denisa Ing. PhD.	4 (0,98)	2 (0,60)			2 (0,40)			1 (0,10)

Departm ent	**Number of CC works[1] and % share of the author 2020**	**Number of CC papers[1] and % author share 2019**	**Number of patents and designs[1] and % author's share 2020**	**Number of patents and designs[2] and % author share 2019**	**Number of WOS and SCOPUS works[2] and % author's share 2020**	**Number of WOS and SCOPUS works[3] and % author's share 2019**	**Number of scientific monographs[3] and % author's share 2020**	**Number of scientific monographs[4] and % author share 2019**
KPP								
Gömöryová Erika doc. Ing. CSc.	4 (1,15)	2 (0,60)			1 (0,09)			1 (0,10)
Střelcová Katarína doc. Ing. PhD.	3 (0,25)							
Vido Jaroslav doc. Ing. PhD.	3 (1,00)	1 (0,40)					1 (0,45)	
Pichler Viliam prof. h. c. prof. Dr. Ing.	2 (0,35)							
Škvarenina Jaroslav prof. Ing. CSc.	6 (0,80)	3 (0,45)						
Homolák Marián Ing. PhD.	1 (0,50)							
Leštianska Adriana Ing. PhD.	2 (0,60)							
Nalevanková Paulína Ing. PhD.	2 (1,10)	1 (0,30)						

[1] Copyright certificates, patents, utility models, discoveries (codename AGJ)
[2] Scientific papers that are not peer-reviewed but are registered in WoS or Scopus databases (code ADM, ADN)
[3] Book publications in the character of a scientific monograph (code designation AAA, AAB, ABA, ABB, ABC, ABD

1

Scientific papers in peer-reviewed scientific journals (code ADC, ADD)

From the side of the Research Agency of the Ministry of Education and Science of the Czech Republic, we have noticed a new requirement to indicate the Hirsch index of all researchers in some submitted research and development plans for EU Structural Funds projects in the Operational Programme Research and Innovation. As of 26.01.2021, the h-index values of the creative staff of the Faculty of Science were updated as they were listed in the Web of Science Core Collection database. The results of the h-index values (Table 5) show the existing significant disproportions not only between departments but also within departments. While it is pleasing to see an increase in the h-index value with a significant number of creative faculty members compared to previous years, increasing it by way of international acclaim (rather than intra-university acclaim) remains one of the key tasks of the LF Long-Term Plan 20172023. As well as differences in the h-index, differences in the number of SCI citations recorded in the Web of Science Core Collection database for 2020 reflect differences not only between staff within departments, but also between departments (Table 5).

Tab. 5: Comparison of the Hirsch index of LF staff in the Web of Science Core Collection database (as of 26.01.2021) and the number of SCI citations for 2019 and 2020

Department	H-index 2020 (WOS Core Collection)	H-index 2019 (WOS Core Collection)	Number of SCI citations 2020	Number of SCI citations 2019
KERLH				
Šálka Jaroslav prof. Dr. Ing.	9	7	43	28
Šulek Rastislav doc. Ing. Mgr. PhD.	3	3	15	16
Balážová Emília Ing. PhD.	0	0	3	2
Brodrechtová Yvonne Dr. Ing.	4	4	16	12
Giertliová Blanka Ing. PhD.	3	2	9	6
Halaj Daniel doc. Ing. PhD.	3	2	8	7
Trenčiansky Marek Ing. PhD.	2	2	5	1
Hajdúchová Iveta prof. Ing. PhD.	5	5	13	9
Holécy Ján prof. Ing. CSc.	2	2	9	9
Dobšinská Zuzana JUDr. PhD.	10	8	51	42
Štěrbová Martina, Ing. PhD.	3	3	14	8
Výbošťok Jozef Ing. PhD.	2	2	18	9
KF				
Ďurkovič Jaroslav prof. Dr. Mgr.	11	10	48	52
Ujházy Karol prof. Ing. PhD.	12	10	50	49
Gömöry Dušan prof. Ing. DrSc.	23	20	217	206
Kardošová Monika, Ing. PhD.	3	3	3	1
Klinga Peter Ing. PhD.	3	2	4	3
Krajmerová Diana Ing. PhD.	8	6	46	33
Máliš František Ing. PhD.	13	9	120	57
Kochjarová Judita RNDr. CSc.	9	8	22	31

Hrivnák Matúš Ing. PhD.	4	3	17	7
Širka Pavel Mgr. PhD.	2	0	2	0
Kováč Ján Mgr. PhD.	3		20	
Wiezik Maroš Ing. PhD.	2		1	

KPLZI				
Fabrika Marek prof. Ing. PhD.	9	8	275	143
Chudý František doc. Ing. CSc.	6	5	39	31
Kardoš Miroslav doc. Ing. Bc. PhD.	4	4	18	17
Bahýľ Ján Ing. PhD.	2	2	4	1
Bošeľa Michal Ing. PhD.	13	11	87	72
Root Milan doc. Mgr. PhD.	7	5	43	22
Sedmák Róbert doc. Ing. PhD.	10	8	63	38
Sitko Roman Ing. PhD.	5	4	10	2
Tomaštík Julián Ing. PhD.	7	5	86	34
Scheer Ľubomír prof. Ing. CSc.	4	4	5	5
Tuček Ján prof. Ing. CSc.	6	5	41	19
Valent Peter Ing. PhD.	4	4	38	16
Merganičová Katarína Ing.Dr.nat.techn.	9	7	56	52
Čerňava Juraj Ing. PhD.	3		25	
Korená Hillayová Michaela Ing. PhD.	1		1	
KLŤLM				
Štollmann Vladimír doc. Ing. CSc. PhD.	2	2	2	5
Ferenčík Michal Ing. PhD.	5	4	17	11
Gejdoš Miloš doc. Ing. PhD.	7	5	57	45
Juško Vladimír Ing. PhD.	0	0	0	0
Lieskovský Martin doc. Ing. PhD.	4	3	21	11
Jakubis Matúš prof. Ing. PhD.	3	3	0	11
Messingerová Valéria prof. Ing. CSc.	4	3	18	10
Merganič Ján doc. Ing. PhD.	11	7	108	92
Allman Michal Ing. PhD.	4	2	13	5
Dudáková Zuzana Ing. PhD.	3	2	11	2
Vlčková Mária Ing. PhD.	3	2	6	2
Mokroš Martin Ing. PhD.	9	7	120	62
KIOLK				
Fleischer Peter doc. Ing. PhD.	8	7	77	52
Kodrík Milan doc. Ing. CSc.	4	4	5	0
Hlaváč Pavol Ing. PhD.	3	2	11	9
Pavlík Martin Ing. PhD.	1	1	4	7
Kmet'a Jaroslav prof. Ing. PhD.	6	6	20	21
Kurjak Daniel doc. Ing. PhD.	8	7	37	34
Fleischer Peter Ing. PhD.	4	2	15	10

Kubov Martin Ing. et Ing. PhD.	1	1	3	3
Konôpková Alena Mgr. PhD.	3	2	6	2
Dzurenko Marek Ing. PhD.	2	1	4	3
Mezei Pavel Ing. PhD.	5		23	
KAZMZ				
Kropil Rudolf Dr. h. c. prof. Ing. PhD.	8	7	28	20
Rajský Dušan doc. MVDr. PhD.	9	7	27	23

Bútora Ľubomír Ing. PhD.	0	0	0	0
Lešo Peter doc. Ing. PhD.	2	2	3	6
Garaj Peter prof. Ing. CSc.	3	2	9	10
Korňan Martin RNDr. PhD.	7	6	14	11
Kubala Jakub Mgr. PhD.	2	2	96	97
Pataky Tibor Ing. CSc.	1	1	2	0
Smolko Peter Ing. PhD.	4		16	
Veselovská Alexandra Ing. PhD.	2		5	

Department	**H-index 2020 (WOS All Databases)**	**H-index 2019 (WOS Core Collection)**	**Number of SCI citations 2020**	**Number of SCI citations 2019**
KPL				
Jaloviar Peter doc. Ing. PhD.	8	7	42	34
Kucbel Stanislav doc. Ing. PhD.	9	9	60	51
Lukáčik Ivan doc. Ing. CSc.	4	3	10	4
Repáč Ivan doc. Ing. PhD.	4	3	9	7
Vencurik Jaroslav doc. Ing. PhD.	5	4	26	23
Saniga Milan prof. Ing. DrSc.	10	10	67	54
Parobeková Zuzana Ing. PhD.	2	2	7	6
Pittner Ján Ing. PhD.	5	4	14	14
Sedmáková Denisa Ing. PhD.	5	4	17	14
KPP				
Gömöryová Erika doc. Ing. CSc.	10	10	45	38
Střelcová Katarína doc. Ing. PhD.	13	11	51	62
Vido Jaroslav doc. Ing. PhD.	7	6	42	15
Pichler Viliam prof. h. c. prof. Dr. Ing.	11	11	42	45
Škvarenina Jaroslav prof. Ing. CSc.	15	13	103	76
Homolák Marián Ing. PhD.	6	6	23	24
Leštianska Adriana Ing. PhD.	3	3	5	6
Nalevanková Paulína Ing. PhD.	4	4	14	7

3. Editorial activity

Tables 6 and 7 show the evaluation of editorial activities at the Faculty of Arts for 2020. The process of developing an editorial plan is very often not in line with the Editorial Guidelines. The implementation of the plan is 30.77 %. The editorial activity is carried out on the basis of the Organisational Directive No 3/2015 for the Editorial Activity Principles with effect from 1 July 2015. In connection with the publication of the periodical Acta Facultatis Forestalis, it is necessary to mention the problems with filling the two obligatory issues with articles and thus with its periodicity. Of course, this is also related to the evaluation of the category of these outputs on the basis of the endowment (ADF category). As a result of the situation, we have come to a solution where the special issue of Acta Facultatis Forestalis with selected papers from the SVOČ becomes a regular issue supplemented by several contributions from the creative staff of the faculty.

Table 6: Evaluation of editorial activities at the Faculty of Arts in 2020

Type of publication	Planned number	Number submitted	Implementation (%)
Textbooks	6	1	16,67%
Scripts	11	2	18,18%
Handbooks			
Scientific monographs	2	2	100%
Professional book publications	1		
Proceedings of the approved GTC	3		
Proceedings of scientific papers	2	2	100%
Other special-purpose publications	1	1	100%
Total	**26**	**8**	**30,77%**

Table 7: Evaluation of editorial activities by departments at the Faculty of Forestry in 2020

Department	Status	Textbooks	Scripts	Handbooks	Monographs	Dept. of Books publ.	Proceedings, special publications.	Total
KERLH	planned	2	2				2	6
	uploaded by	0	0				2	2
	implementation (%)	0	0				100	33,33
KF	planned		3					3
	uploaded by		1					1
	implementation (%)		33,33					33,33
KPLZI	planned	2	4					6
	uploaded by	0	1					1
	implementation (%)	0	25					16,67
KLŤLM	planned				1	1		2
	uploaded by				1	0		1
	implementation (%)				100	0		50

KIOLK	planned	1						1
	uploaded by	1						1
	implementation (%)	100						100
KAZMZ	planned						1	1
	uploaded by						0	0
	implementation (%)						0	0
KPL	planned	1			1			2
	uploaded by	0			1			1
	implementation (%)	0			100			50
KPP	planned		2					
	uploaded by		0					
	implementation (%)		0					
LF	planned						3	3
	uploaded by						1	1
	implementation (%)						33,33	33,33

4. Organisation of scientific and professional events

Conferences, symposia, seminars and workshops are among the most important forms of publication and confrontation of scientific knowledge. Unfortunately, in the past year, 2020, the vast majority of scheduled events were cancelled due to the coronavirus pandemic. Only 2 events (one with 20 international participants) were held online, with the LF acting as organiser (Table 8). However, given the current unflattering epidemiological situation, it cannot be expected that 2021 will be any more favourable for the organisation of scientific and professional events.

Table 8: Scientific and professional events organised in 2020

Name of the event	Venue	Date of the event	Type of event	Number of participants home/abroad	Event sponsor
Adaptability and growth vigour of woody plants in changed environmental conditions	Zvolen	18.06.2020	online home scientific conference	31/0	doc. Ing. Ivan Lukáčik, CSc.
Funding 2020 Forests - Wood	Zvolen	26.11.2020	online conference with internatio nal participat ion	114/20	prof. Ing. I. Hajdúchová, PhD.

5. Doctoral studies

Doctoral studies, student scientific professional activity

Doctoral studies (PhD) at the Faculty of Forestry, TU in Zvolen are carried out in full-time form for 3 years and in external form for 4 years. It is organized in accordance with the Act on Higher Education No. 131/2002 Coll., as amended, internal guidelines and study regulations in 7 doctoral study programmes accredited in 2015. At the end of 2017, a new study programme Forest Ecology was accredited in the field of study Forest Protection.

The admission procedure for doctoral studies was held well in advance. The study programmes, conditions and admission procedure were published. The admission procedure consisted of an assessment of the applicant's level of knowledge of foreign languages and a verbal interview with the applicant, at which the applicant's theoretical and methodological knowledge related to the topic was examined. The proposal and the conditions for the admission procedure were approved by the Academic Senate of the Faculty of Forestry. Of the 14 applicants, 8 students were admitted to the full-time form of study, no applicant was admitted to the part-time form of study.

In 2020, the following students successfully completed their doctoral studies in the field of forestry (Table 9):

Ing. Martin Belko
defended his dissertation thesis in the study programme Forest Cultivation and Protection on the topic Optimization of technologies of establishment of forest cultures of spruce and beech under conditions of climate change, supervisor doc. Repáč

Ing. Tomáš Trgala
defended his dissertation thesis in the study programme Forest Cultivation and Protection on the topic: optimization of forest tree planting material production procedures, supervisor doc. Repáč

Ing. Alžbeta Grznárová defended her doctoral thesis in the study programme forest management on the topic: derivation of selected tree variables using a remotely piloted aerial system, supervisor prof. Fabrika

Ing. Milan Hunčaga defended his dissertation thesis in the study programme forest management on the topic: inference of longitudinal trunk shape from cloud points obtained by terrestrial measurements, supervisor doc. Root

Ing. Lukáš Orlovský defended his dissertation thesis in the study programme of forestry technologies on the topic: analysis of time consumption standards for selected wood concentration technologies, supervisor prof. Messingerová

JUDr. Martina Kašubová
defended her dissertation thesis in the study programme Ecosystem Services of Forests on the topic Legal Conditions of Public Use of Forests in Selected EU Countries, supervisor doc. Šulek

Ing. Michaela Korená Hillayová
defended her doctoral thesis in the study programme Ecosystem Services of Forests on the topic Measurement of the change in the capital value of forest land in the presence of fire risk and emerging climate change, supervisor prof. Holécy **Ing. Klára Báliková**
defended her dissertation thesis in the study programme Ecosystem Services of Forests on the topic Implementation and evaluation analyses of economic instruments for the provision of ecosystem services of forests, supervisor prof. Šálka

Table 9 gives an overview of the number of PhD students by study programme and year. The number of doctoral students who have completed their studies without submitting their dissertation has fallen significantly because the exclusion from studies is consistently applied on the basis of the relevant legislation and proposals from supervisors.

Tab. 9: Overview of students in doctoral studies according to individual study programmes and forms of study at the Faculty of Forestry in 2020 (as of 31.12.2020)

Study programme	Total	of which daily	Number of students					Exceeding the standard length of study DF/EF
			1. r.	2. r.	3. r.	4. r.	5. r.	
forest cultivation and protection	2	2		1	1			
forest management	6	6	2	2	2			
forestry phytology	6	6	3	1	2			
applied zoology and hunting	0							0/0
forestry technology	2	1	1			1		
forest ecosystem services	7	6	2	3	2			
forest ecology	4	4		2	2			
Total	**27**	**25**	**8**	**9**	**9**	**1**		**0/0**

Table 10: Doctoral graduates by field of study as of 2016 (as of 31.12.2020)

Doctoral study programme	Number of graduates				
	2016	2017	2018	2019	2020
	ES/HS	ES/HS	ES/HS	ES/HS	ES/HS
forest cultivation and protection		1/1	1/1	1/0	2/0
forest management	3/0		4/0	2/0	2/0
forestry phytology	1/0	5/0	1/1	3/0	
applied zoology and hunting		1/0			

forestry technology	2/0			1/1	1/0
forest ecosystem services				2/0	3/0
S p o l u	**6/0**	**7/1**	**6/2**	**9/1**	**8/0**

Table 10 documents the number of students between 2016 and 2020 who successfully completed their doctoral studies by defending their dissertation. Figure 18 highlights an important indicator in terms of accreditation, namely the number of completed PhD students per post

associate professor and professor. This indicator has been unflattering for many years and no extreme increase in value can be expected in the future. Figure 19 shows the trend in the number of doctoral graduates between 2016 and 2020. Table 10 documents this situation in terms of fields of study.

Fig. 18: Number of completed PhD students per associate professor and professor position (2016-2020)

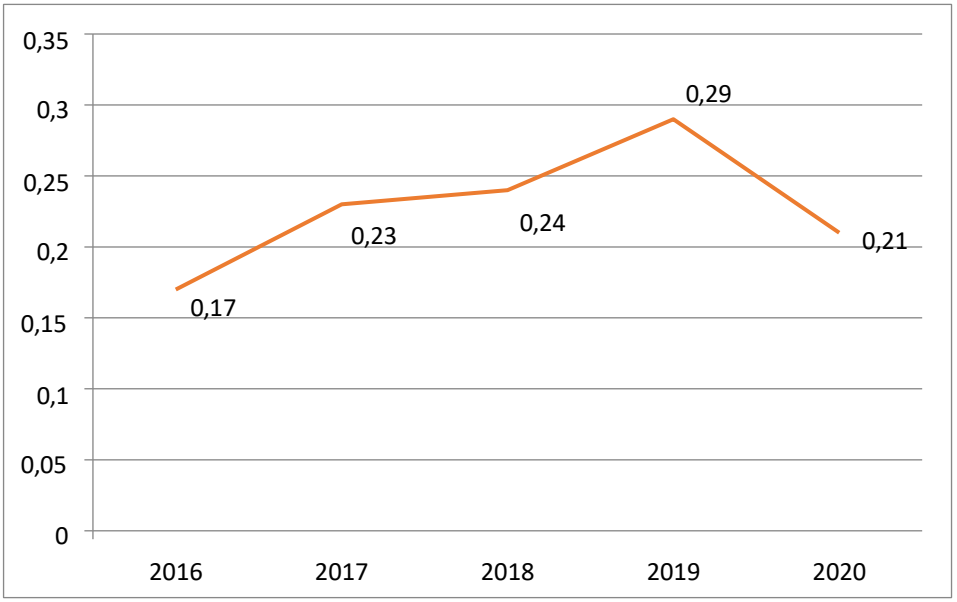


Fig. 19: Number of completed PhD students (2016-2020)

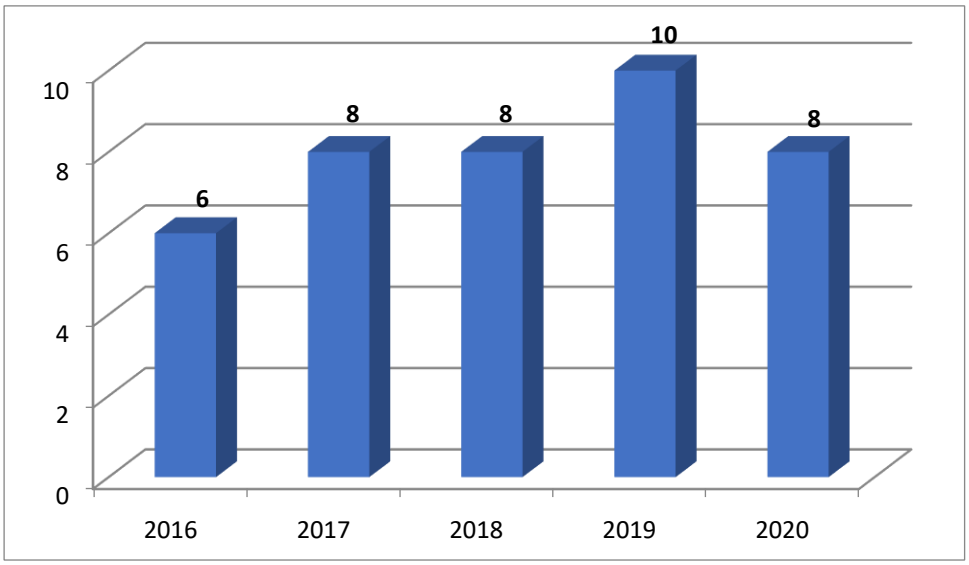


Table 11: Number of successfully completed PhD students in 2016-2020

Doctoral field of study	Number of PhD students	Name of supervisor and number of PhD students

forest cultivation and protection	7	doc. Jaloviar - 1 doc. Kodrík - 1 doc. Kucbel - 1 doc. Repáč - 3 prof. Saniga -1
forest management	11	prof. Fabrika - 1 prof. Hajdúchová - 1 doc. Chudý - 1 doc. Kardoš - 1 doc. Root - 2 doc. Merganič - 1 prof. Scheer - 1 prof. Tuček - 3
forestry phytology	11	prof. Ďurkovič - 2 prof. Gömöry - 2 doc. Gömöryová - 1 Ing. Hrivnák, PhD. - 1 prof. Kmet - 1 doc. Střelcová - 1 prof. Škvarenina - 1 prof. Ujházy - 2
applied zoology and hunting	1	prof. Kropil - 1
forestry technologies	5	prof. Jakubis - 1 prof. Messingerová - 2 prof. Šálka - 1 doc. Stollmann - 1
forest ecosystem services	5	prof. Holécy - 1 prof. Šálka - 1 prof. Škvarenina - 1 doc. Šulek - 1 prof. Tucek - 1

Between 2016 and 2020, 40 PhD students (Tables 10 and 11) successfully completed their studies, mostly in the full-time form of study. In recent years, the faculty has been more rigorous in assessing the publication activity of doctoral students. Between 2016 and 2020, 10 PhD students were expelled or terminated early (Table 12), with a predominance of external PhD students. Their number has increased in recent years due to a more rigorous application of one of the criteria for comprehensive accreditation. These are outputs of doctoral students mainly in category A (i.e. scientific papers registered in WOS, CC and SCOPUS databases with adequate impact factor). The number of PhD students recruited is also significantly affected by the change in the Ministry's funding of PhD studies (this is funding from the salary chapter). In view of these facts, the management of the Faculty of Forestry has decided that only those supervisors who are researchers of current scientific projects and who have recently published in impacted journals together with doctoral students are allowed to write topics for doctoral studies.

Table 12: Number of doctoral students who were excluded from doctoral studies or dropped out at the proposal of their supervisor by the Faculty of Forestry in 2016-2020

Doctoral field of study	Number of PhD students	Name of supervisor and number of PhD students
Before taking the dissertation examination		
forest management	1	Prof. Fabrika - 1

forestry phytology	3	doc. Gömöryová - 1 prof. Škvarenina - 1 prof. Ujházy - 1
applied zoology and hunting	2	prof. Garaj - 1 prof. Šálka - 1
forest ecosystem services	2	doc. Fleischer - 1 prof. Škvarenina - 1
After passing the dissertation examination		
forestry phytology	1	prof. Škvarenina - 1
applied zoology and hunting	1	prof. Šálka - 1

In the past, the Achilles heel of doctoral studies at the Faculty of Forestry has been the quality of our doctoral students' outputs for the purposes of doctoral accreditation. After incorporating the requirement of acceptance of scientific publications for print in scientific journals of the CC or WOS or SCOPUS database with an adequate impact factor, or an accepted industrial property right application, into Article 31 of the Study Regulations for Doctoral Studies at the Faculty of Forestry, the situation has changed for the better. In the AR 2019/2020, 8 PhD students defended their dissertations, five of whom have at least one category A output as of 01.02.2021 in terms of the criteria from the last accreditation (CC database, with the lowest achieved IF being 2,221). However, two doctoral students in the external form of study, after having already passed the dissertation examination, have completed their studies without defending their dissertation and therefore their evaluation falls into category D. By department, the distribution of completed PhD students with A category results is as follows: KPLZI - 2, KERLH - 2, KPL - 1. In terms of evaluation according to the rules from the last comprehensive accreditation, the result from AR 2019/2020 would correspond to a final grade of B (Table 13), which is the same qualitative evaluation result that was achieved in the last AR 2018/2019.

In the case of the evaluation of the 9 PhD students who are currently post-dissertation (i.e. not yet graduates), 5 of them have at least one accepted category A output in peer-reviewed journals as of 01.02.2021 (Table 14). The preliminary assessment of the doctoral students' outputs after the dissertation examination corresponds to a grade of A-, which is qualitatively a significantly better result than in the previous AR 2018/2019 (C+). In terms of the quality of outputs, we consider it a priority to have continuous communication between doctoral students and their supervisors or faculty management so that at the time of the dissertation defense, an article accepted by the editorial board for publication in a journal registered in the CC or WOS or SCOPUS database with an adequate IF is available, as required by the approved change in the study regulations for doctoral studies at the TUZVO.

Table 13: Publication activity of PhD graduates in 2015-2020 by research area

Year	OV	A	B	C	D	Result	Mark
2019/2020	OV 19	5	2	1	2	3,00	B
2018/2019	OV 19	5	3	1	1	3,20	B
2017/2018	OV 19	6	0	0	2	3,25	A-
2016/2017	OV 19	7	0	1	0	3,75	A-

2015/2016	OV 19	7	2	0	0	3,78	A
2014/2015	OV 5	0	1	1	2	1,75	C
2014/2015	OV 14	0	0	1	0	2,00	C
2014/2015	OV 19	1	0	4	0	2,40	C+

students aft
in 2020

Year	OV	A	B	C	D	Result	Mark
2020	OV 19	5	3	1	0	3,44	A-

2. Student Scientific and Professional Activity (SSPA)

Student Scientific and Professional Activity (SSA) is one of the oldest possibilities of presenting the results of the work of students of the Faculty of Forestry at the Technical University. This opportunity to use and shape their professional interest, develop their talent and creative thinking was also used by students this year and they actively participated in the 60th year of the ŠVOČ. The event offered an opportunity for all students who want to be one step ahead, to show their uniqueness, exceptional skills, talent and diligence. ŠVOČ allows to make use of the acquired knowledge and experience in further studies, writing and defending a bachelor's thesis, diploma thesis, or for some it is also the first start in scientific work in the form of later doctoral studies.

The 60th year of the School of Forestry at the Faculty of Forestry of the Technical University of Zvolen was opened with a solemn speech on 8 April 2020 by the Vice-Dean of the Faculty of Forestry for scientific and research activities prof. Dr. Mgr. Jaroslav Ďurkovič online via MS Teams. The students submitted their work in the form of scientific papers also via MS Teams and the expert committees evaluated them afterwards. In this year's edition of the SVOČ competition, 3 expert sections were created. In addition to the PhD section, two more student sections were created, namely the Biology section and the Technology section. Following the positive experience from the previous years of the SVOČ, larger sections were thus created, bringing together work from several departments.

Table 15: Numbers of submitted and presented papers in individual sections, expert committees at the 60th Forestry Conference

SECTION Expert Commission	number of entries
TECHNOLOGY SECTION *Ing. Michal Ferenčík, PhD., (chairman), Ing. Michal Bošeľa, PhD., Ing. Paulína Nalevanková, PhD.*	7
SECTION BIOLOGICAL *doc. Ing. Peter Lešo, PhD., (chairman), Mgr. Alena Konôpková, PhD., Mgr. Pavel Širka, PhD.*	6

DOCTORAL SECTION *prof. Ing. Dušan Gömöry, DrSc. (chairman), doc. Ing. Róbert Sedmák, PhD., Ing. Blanka Giertliová, PhD., Ing. Zuzana Parobeková, PhD.*	12

Table 16: Awarded students in individual committees at the 60th Forestry Conference of the Slovak Forestry Council

Section	winners (1st to 3rd place) student prize
TECHNOLOGY SECTION	1. Bc. Daniel Tomčík 2. Bc. Andrej Tesár 3. Bc. Milan Kašiar
SECTION BIOLOGICS	1. Bc. Linda Csölleová 2. Bc. Marek Kotrík 3. Bc. Jerguš Rybár
DOCTORAL SECTION	1. Mag. biol. Anja Petek 2. Ing. Peter Petrík 3. Ing. Jozef Rozkošný

A total of 25 works were submitted to the 60th year of the competition of theses at the Faculty of Forestry, of which 12 works were sent to the doctoral section. On the basis of the entries received, the committees evaluated the difficulty of the chosen topic, the theoretical and practical contribution of the thesis, as well as the formal level of the thesis. The evaluation ceremony through MS Teams was held on 27 April 2020 under the patronage of the Dean of the Faculty of Forestry prof. Ing. Marek Fabrika, PhD, who highlighted the level of the conference and the positive approach of both students and teachers who participated in the student scientific and professional activities. Despite the difficult circumstances and the reduced number of participants due to the first wave of the coronavirus pandemic, the 60th Forestry Conference can be evaluated as quite successful, mainly due to the approach of the students, their teachers, but also the cooperation of the faculty management, heads of departments and members of the Forestry Conference Council. However, this edition was also specific in that the papers were not presented online and thus there was no interactive discussion between the student and the committee. In the future, if it is not possible to carry out the presentational form of the SVOČ, the possibility of online presentation of students' work via MS Teams will be already planned.

CONCLUSION

The submitted report on the scientific research activities of the Faculty of Forestry of the TU was prepared according to the requirements of the management of the TU in Zvolen and the Ministry of Education and Science of the Czech Republic. It presents basic information on scientific research and publishing activities, personnel and financial support of research,

doctoral studies and student scientific and professional activities. The information was compiled on the basis of records from the level of the LF Dean's Office, SLDK as well as from individual departments.

Based on the participation and results, it can be stated that the involvement of the departments and staff in research projects of various nature was high. The outputs of scientific results are numerous but with significant differences both between departments and between individual staff members. There are currently 27 students in the PhD programme, of whom 25 are full-time students. Participation and quality in Student Scientific and Professional Activities can be considered acceptable.

V. IMPLEMENTATION OF THE 2020 TARGETS AND ACTIONS FOR 2021

Implementation of tasks and measures from the College of the Dean of the Faculty of Forestry on 13. 02. 2020

1. Prepare an evaluation of research activities and doctoral studies for 2020
T : February 2021 From : Vice-Dean for VVČ

2. Prepare a draft science and research plan for 2021.
T : February 2021 From : Vice-Dean for VVČ ***3.*** Prepare a proposal of scientific events for the Faculty of Forestry for the year 2021. T : February 2021
From : Vice-Dean for VVČ

4. To continue to improve the efficiency of the evaluation of scientific and publishing activities at the level of TU Zvolen through the SLDK and the need to compare the results of all departments.

T : permanent task
From : Vice-Dean for VVČ

5. Encourage involvement in all forms of scientific research, whether basic or applied research, both nationally and internationally, to increase the proportion of funding received from international programmes in a number of departments. Cooperate with other faculties in the preparation of Structural Fund projects.
T : permanent task Z : LF management

6. Seek financial incentives for staff with excellent results in engaging in major scientific projects and for staff with outstanding results

in the field of publishing. Increase the share of WOS and CC publications based on successfully solved scientific research projects (reduction of outputs in category C). T : permanent task Z : LF management

7. Evaluate the success rate of completion of doctoral studies, the extent of publication activity of doctoral students, especially in publications included in WOS, or SCOPUS, and take the analysis into account in the admission continuation of doctoral students.

T : permanent task From : Vice-Dean for VVČ ***8.*** Ensure the holding of the faculty round of ŠVOČ in 2020.

T : April 2020

From : Vice-Dean for VVČ

The tasks were carried out as follows:

1. The evaluation of scientific research activities and doctoral studies for the year 2020 was prepared and approved.
2. A Science and Research Plan for 2021 has been developed and approved.
3. A proposal of scientific and professional events for the Faculty of Forestry for the year 2021 was elaborated and approved.
4. The evaluation of the VVČ is carried out through the departments, with the heads of the departments being responsible for fulfillment and compliance. The evaluation of publishing activities was also carried out through the SLDK, which sends documents to the Ministry of Education and Science of the Slovak Republic. Accordingly, the guidelines for the departments have been modified. However, the non-compliance with the deadline for submitting the documents to the Faculty of Forestry persists and, in particular, the incorrectly prepared documents for the departments, which complicates their processing.
5. In the past year, LF has been involved in all forms of scientific research, whether basic or applied, national or international.
6. The first and partly also the second part of the task has been fulfilled, motivation for involvement in major international scientific projects will have to be carried out.
7. The evaluation has been carried out, the task will continue.
8. The faculty round of ŠVOČ was secured, the abstract book was published and the best papers were subsequently published in the periodical Acta Facultatis Forestalis Zvolen 2020.

Tasks and actions for 2021

1. Prepare an evaluation of research activities and doctoral studies for the year 2021

T : February 2022 From : Vice-Dean for VVČ

2. Prepare a draft science and research plan for 2022.

T : February 2022 From : Vice-Dean for VVČ

3. Prepare a proposal of scientific events for the Faculty of Forestry of the TU for 2022.

T : February 2022

From : Vice-Dean for VVČ

4. To continue to improve the efficiency of the evaluation of scientific and publishing activities at the level of TU Zvolen through the SLDK and the need to compare the results of all departments.

T : permanent task
From : Vice-Dean for VVČ

5. Encourage involvement in all forms of scientific research, whether basic or applied research, both nationally and internationally, to increase the proportion of funding received from international programmes in a number of departments. Cooperate with other faculties in the preparation of Structural Fund projects.

T : permanent task Z : LF management

6. Seek financial incentives for staff with excellent results in terms of involvement in major scientific projects and for staff with outstanding results in terms of publications. Increase the proportion of WOS and CC publications based on successful scientific research projects (reduction of C outputs).

T : permanent task Z : LF management

7. Evaluate the success rate of completion of doctoral studies, the extent of publication activity of doctoral students, especially in publications included in WOS, or SCOPUS, and take the analysis into account in the admission continuation of doctoral students.

T : permanent task
From : Vice-Dean for VVČ

8. Ensure the holding of the faculty round of ŠVOČ in 2021.

T : April 2021
From : Vice-Dean for VVČ

ANNEX 1 LIST OF PUBLICATION ACTIVITIES OF THE FACULTY OF FORESTRY FOR THE YEAR 2020

6. External relations

Within the framework of the approved Long-term plan of the Technical University of Zvolen for 2017 - 2023 in the area 3 "Public Relations, National and International Cooperation", the Faculty of Forestry implemented steps in 2020 with the aim of building a positive image of the faculty, strengthening national and international cooperation and thus creating a "goodwill" of this educational and scientific research institution.

The individual tasks focused on:

- popularization of the results of scientific research, pedagogical and other activities of the faculty towards the general professional and lay public,

- communication with the media and the public, and promotion of the faculty through press and scientific conferences, television programmes, special editions of newspapers and professional journals,
- cooperation with economic and social practice, the region and the city of Zvolen,
- promotion of forest ecosystem services and sustainable forest management in Slovakia,
- support for student and faculty staff mobility,
- cooperation with universities close to the V4 countries, the EU and international organisations.

These are activities that have a long-term character. However, the Faculty of Forestry (FF) approaches their implementation purposefully and responsibly. The Faculty of Forestry has continued to popularise its scientific research activities through its own updated websites: www.lesnickyvyskum.sk and www.lesnickekruzky.sk, as well as through social networking channels. The Faculty continued to amplify its outreach through increased participation in television and print media. It promoted nature-based forest management and ecosystem services through participation in major international research outputs. Constantly communicated with the economic and social practice with regard to the application of our graduates in the labour market, mainly in the forestry sector.
The faculty also places equal emphasis on the mobility of its students in order to support their personal progression. This has gradually manifested itself in the increasing interest of its students in foreign internships, as well as foreign students in completing part of their studies at the Faculty of Forestry within the framework of various programmes and mobilities. However, due to the global pandemic of COVID-19, measures to prevent the spread of the virus have been gradually introduced in the EU, which has had a significant impact on the reduction in participation in Erasmus+ academic mobility for both students and teachers. In the area of communication strategy, the activities within the "Social Media Strategy of the Faculty of Forestry, TU Zvolen" continued in 2020 despite the pandemics. In the evaluation year 2020, the process again shifted in the area of relations in the external environment towards the professional and lay public, the effect of which is in the creation of a positive image and goodwill of the Faculty of Forestry. Thus, the Faculty has continuously successfully implemented the so-called branding strategy, i.e. brand building under the philosophy of the slogan: *"Together for a sustainable future"*. The implementation of this strategy since the second half of 2016 has been consistently very successful.

IMPLEMENTATION OF THE TASKS APPROVED BY THE SCIENTIFIC COUNCIL OF THE LF FOR EXTERNAL RELATIONS IN 2020

Task 1

Personal growth of students and scientific-teaching staff

Continue to promote and motivate the personal growth of LF students in order to increase their employability on the labour market by the following applied marketing tools:

- practice in individual functional departments of the VŠLP for engineering degree students,
- personal communication with potential employers in the forestry sector,
- meeting students on various occasions,

- motivating environment in the interior and exterior of the LF,
- Active networking for ring, project activities, mobility and social marketing.

In the same way, motivational lectures, active networking for mobility and social marketing will be used for the scientific and pedagogical staff of the Faculty of Science in order to achieve quality in teaching and research activities.

Rating:

Students' personal growth continued to be supported by posts on the faculty's social networks and by the already existing faculty websites: www.lesnickyvyskum.sk; www.lesnickekruzky.sk, as well as by extending them with additional online lectures in collaboration with creative scientific and pedagogical staff: www.lesnickeprednasky.sk. Due to the onset and duration of the pandemic throughout 2020, the ring activities of the faculty as well as the international mobility of students and scientific-teaching staff have been severely limited. Student support and promotion of any activities has largely moved to an electronic environment.

Task 2

Support for interdepartmental as well as interfaculty research teams

Based on the strong support of the new category of the LF SVOČ focused on theses containing elements of innovation, students will be guided for teamwork under the responsibility of their supervisors between departments or faculties and then selected for the formation of spin-off project teams. In the same way, these students will be able to participate in other projects, e.g. with the city of Zvolen in the framework of building green infrastructure in the city's intramural area, as well as in international projects of the faculty. Similarly, the aim is to develop this activity among the scientific and teaching staff towards achieving a higher competitiveness of the submitted research projects.

Rating:

Due to the anti-pandemic measures and the transition to distance learning, most of the project scientific meetings, guidance of students in bachelor and diploma theses were carried out in an electronic environment (MS Teams). Similarly, the 60th edition of the LF SHS was conducted only in the form of submission of theses and their offline evaluation. Due to the given situation regarding COVID-19, the support of interdepartmental research teams was significantly limited.

Task 3

Building faculty goodwill and international relations

Promotion of the faculty at the international level in two basic areas: scientific activities (electronic and personal promotion of scientific teams at professional forums) and study opportunities, faculty environment (modern and creative interior of TUZVO, on-line brochures, fairs, international student activities, Erasmus+, CEEPUS) in conjunction with the city of Zvolen (green infrastructure and biotechnological innovations). Cooperation with secondary

schools and involvement of their students in the faculty's SVOČ and research projects (www.lesnickyvyskum.sk). Efforts to establish individual top scientists of the faculty and their teams within the international structures of institutions such as EFI and IUFRO.

Rating:

The Faculty of Forestry was promoted internationally through an on-line brochure, personal contacts of individual faculty teachers, participation in international seminars, meetings of Erasmus project coordinators, as well as a website focused on scientific cooperation (http://en.lesnickyvyskum.sk/), as well as through the success of approved research projects and participation in prestigious articles. To increase the promotion of studies at the Faculty of Arts, both the personal presentation of the faculty at secondary schools and the continuous online promotion of the activities of the faculty and successful scientific and pedagogical staff of the faculty in the form of their own videos on social networks and through RTVS programmes (RTVS News, Halali) and print media Quark, Pravda and Sme newspapers have played an important role.

FOREIGN COOPERATION AGREEMENTS

Cooperation between the Faculty of Arts and foreign partners is implemented on the basis of bilateral and multilateral treaties, agreements, memoranda and programmes. On the basis of these agreements, various types of academic mobility of the Faculty's staff and students take place. Table 1 gives an overview of the bilateral agreements of the ERASMUS+ programme, which is an ongoing project to implement various types of mobility in the European Higher Education Area.

Tab.1 Bilateral ERASMUS+ contracts

See	Institution	State	Area of cooperation
1.	Lesotechnitcheski Universitet University of Forestry Sofia	Bulgaria	Forestry, Environmental science, Engineering, Materials - wood
2.	Mendel University in Brno Mendel University in Brno	Czech Republic	Forestry, Environment, Materials - wood
3.	Jan Evangelista Purkyně University in Ústí nad Labem	Czech Republic	Environmental sciences, Ecology,
4.	Czech University of Life Science Prague Czech University of Life Science Praha	Czech Republic	Forestry, Environment, Forestry Business and Administration, Engineering
5.	Masaryk University Brno	Czech Republic	Earth Sciences
6.	University of Ostrava - University of Ostrava	Czech Republic	Earth Sciences
7.	University of Zagreb - Faculty of Forestry	Croatia	Forestry, Materials - wood
8.	Karelia University of Applied Sciences	Finland	Forestry, Engineering
9.	University of Helsinki	Finland	Forestry
10.	University of Eastern Finland	Finland	Forestry, Environmental sciences
11.	Seinajoki University of Applied Sciences	Finland	Forestry
12.	Agroparistech - Institut des sciences et industries du vivant et de l´environnemen	France	Forestry
13.	Université de Lorraine ENSTIB	France	Forestry
14.	Aristotle University of Thessaloniki	Greece	Forestry

15.	Latvia University of Life Sciences and Technologies	Latvia	Forestry, Environmental sciences, Natural environments and wildlife
16.	University of West Hungary	Hungary	Forestry, Earth Science
17.	Eötvös Loránd University	Hungary	Earth Science
18.	Szent István University	Hungary	Environment
19.	Georg-August-Universität Göttingen	Germany	Forestry
20.	Technische Universität Dresden	Germany	Forestry, Materials (Wood)
21.	Technical University of Műnchen	Germany	Forestry
22.	Hochschule Ostwestralen-Lippe	Germany	Materials - wood
23.	Inland Norway University of Applied Sciences	Norway	Forestry, Environment
24.	Norwegian University of Science and Technology	Norway	Environmental Sciences, Engineering, Technology
25.	Poznan University of Life Sciences	Poland	Forestry, Environmental sciences, Engineering
26.	University of Agriculture in Krakow	Poland	Forestry, Environment
27.	Universidade de Lisboa	Portugal	Forestry, Agriculture, fisheries
28.	Universidade de Évora	Portugal	Forestry, Geodesy, Cartography, Remote sensing
29.	Instituto Politécnico de Portalegre	Portugal	Forestry
30.	BOKU-Universität fur Bodenkultur Wien	Austria	Forestry, Environmental science
31.	Universitatea Transylvania Transilvania University of Brasov	Romania	Forestry, Materials (Wood)
32.	University of Ljubljana	Slovenia	Forestry, Material Science (Wood)
33.	Universidad Politécnica de Madrid	Spain	Forestry, Earth Science
34.	Universitat Politècnica De València	Spain	Forestry
35.	Universita Degli Studi Di Sassari	Italy	Biology and Genetics, Environmental Sciences, Ecology
36.	Kastamonu University	Turkey	Forestry
37.	Karadeniz Technical University	Turkey	Forestry

Table 2 lists other international agreements that have been concluded mainly for scientific and technical cooperation, but their focus also allows for student and staff mobility. Most of these agreements are of a framework nature; specific activities are subsequently provided for in the form of separate projects and amendments to these agreements.

Traditionally, our cooperation with partner forestry faculties in the Czech Republic - Faculty of Forestry and Wood Technology MU in Brno, Faculty of Forestry and Wood Technology ČZU in Prague - is already rich. It is necessary to mention the mutual memberships and visits to the Council of Faculties, defences, etc. These activities are covered by institutional funds as well as faculty projects, which is an expression of support and willingness for mutual cooperation.

It should be noted that there are foreign activities that may not be merely contractual. Many faculty members meet and collaborate with foreign counterparts at the departmental level, based on personal contacts and friendships.

Table 2 Other international treaties and cooperation agreements

See	Institution	State	Area of interest
1.	University of Forestry Sofia	Bulgaria	Academic cooperation agreement
2.	Czech University of Agriculture Prague	Czech Republic	Agreement on scientific-pedagogical cooperation

3.	Mendel University of Agriculture and Forestry in Brno	Czech Republic	Cooperation agreement
4.	Global Change Research Centre of the CAS	Czech Republic	Cooperation agreement
4.	Faculty of Forestry, University of Zagreb	Croatia	Cooperation agreement
5.	Sallahadin University, Kurdistan Region of Iraq	Iraq	Scientific cooperation in the field of forestry, natural resources, nature and landscape conservation, exchange students and teachers
6.	University of West Hungary, Sopron	Hungary	Cooperation Agreement on Education and research
7.	Georg-August University of Göttingen	Germany	Framework agreement on scientific cooperation
8.	Technical University of Dresden	Germany	Cooperation agreement
9.	Agricultural University of Cracow	Poland	Framework cooperation agreement
10.	Universitat für Bodenkultur Vienna	Austria	Cooperation agreement
11.	Izhevsk State Technical University of M. T. Kalashnikov, Izhevsk	Russian Federation	Cooperation agreement
12.	North-Eastern Federal University M. K. Ammosova, Yakutsk	Russian Federation	Cooperation agreement

The Faculty of Forestry has signed several memoranda of cooperation with major international institutions and universities, which focus on academic mobility, mutual exchange of knowledge and scientific publications, work on scientific projects focused on bilateral and multilateral grants.

At the level of the Technical University in Zvolen, an important Memorandum of Cooperation was signed between the TUZVO and the JRS in Ispra (Joint Research Centre of the EC), in which the LF has a leading position both in terms of content and focus. The cooperation between the institutions was divided into the following areas:

- Forest ecosystem services and biodiversity
- Forestry and climate change
- Sustainable use of forests under uncertainties
- Bio-economy in forestry
- Timber as ecosystem service for buildings and bio-energy
- Applied geoinformatics and Decision support systems in Forestry

Table 3 Memoranda of Cooperation

See	**Institution**	**State**
1.	University of Agriculture in Kraków, Faculty of Forestry	Poland
2.	Institute of Biosciences and BioResources, Firenze	Italy
3.	Aurora Research Institute of the Aurora College, Inuvik	Canada
4.	Mendel University in Brno	Czech Republic
5.	Institute of International Forestry and Forest Products, Dresden	Germany
6.	ARO Volcani Center, Bet Dagan	Israel
7.	Forest National Corporation, Ministry of Agriculture and Forestry	Sudan
8.	University of Khartoum, Faculty of Forestry, Khartoum	Sudan
9.	College of Forestry and Range Science, Sudan University of Science and Technology, Khartoum	Sudan

MEMBERSHIP OF INTERNATIONAL ORGANISATIONS AND GOVERNING BODIES OF INTERNATIONAL SCIENTIFIC PROGRAMMES

The Faculty of Forestry and its staff are members of several international organisations, scientific programmes, scientific and professional societies. An overview of the most important positions is given in Table 4-6. These positions do not change significantly from year to year, although an increase can be observed in the longer term.

Table 4 International NGOs

Name of organisation	Name	Position
European PRO SILVA Committee	prof. Ing. Milan Saniga, DrSc.	Member
IUFRO	doc.Mgr.Ing.Rastislav Šulek,PhD.	coordinator of research group Forest law and environmental legislation, member of International Council
	prof. Dr. Ing. Jaroslav Šálka	Deputy Coordinator of the Forest Policies Group in the Baltic States and Central and Eastern Europe
	Ing. František Máliš, PhD.	member unit 1.03.01- Traditional coppice, ecology, silviculture and socioeconomic aspects
	prof.h.c. prof. Dr. Ing. Viliam Pichler	Member
International Council for Game and Wildlife Conservation (CIC)	prof. Ing. Peter Garaj, CSc.	expert
	Ing. Tibor Lebocký, PhD.	Head of the Slovak delegation, international expert for trophy evaluation
Research Policy Working Group EUA	Dr h.c. prof. Ing. Rudolf Kropil, PhD.	committee member
ForestReplot - a database of forest herb layer resurvey plots	Ing. František Máliš, PhD.	National Platform Coordinator

Tab. 5 Scientific programmes

Programme name	Name	Position
H2020 Alternative models and robust decision making for future forest management ALTERFOR	prof. Ing. Ján Tuček, CSc	sponsor
H2020 Critical solutions for elderly wellbeing RISE-WELL	prof.h.c. prof. Dr. Ing. Viliam Pichler	Co-investigator
LTER Long-term Ecological Research Europe	doc. Ing. Peter Fleischer, PhD.	member of a national body
EFI Network Fund PERFORM - Perception of the role of the forestry sector in the bioeconomy	prof. Dr. Ing. Jaroslav Šálka	Member of the working group
EFI Network Fund FORMASAM - Forest Management Scenarios For Adaptation and Mitigation	Dr. Nat. Ing. Katarína Merganičová	LF representative
LIFE16 NAT/SI/000634 Preventing the extinction of Dinario-SE Alpine lynx population through reinforcement and long-term conservation	Dr. h. c. prof Ing. Rudolf Kropil, PhD. Mgr. Jakub Kubala, PhD.	project manager coordinator of professional activities
COST Action CA15206 Payments for Ecosystem Services - Forests for Water (PESFOR-W)	prof. Dr. Ing. Jaroslav Šálka	Member of the working group
COST Action CA 19128 Pan-European Network for Climate Adaptive Forest Restoration and Reforestation (PEN-CAFoRR)	prof. Ing. Dušan Gömöry, DrSc.	member of the management committee

COST Action CA15226 Climate smart forestry in mountain regions (CLIMO)	doc. Ing. Peter Fleischer, PhD. doc. Ing. Katarína Střelcová, PhD. Ing. Michal Bošeľa, PhD.	Member of the working group
COST Action CA16208 Knowledge conversion for enhancing management of European riparian ecosystems and services (CONVERGES)	Ing. František Máliš, PhD.	member of the management committee in the position of substitute member
COST Action CA16219 Harmonization of UAS techniques for agricultural and natural ecosystems monitoring	Ing. Martin Mokroš, PhD.	member of the management committee
COST Action CA19139 Process-based models for clmate impact attribution across sectors (PROCLIAS)	doc. Ing. Miloš Gejdoš, PhD. doc. Ing. Ján Merganič, PhD.	management committee representative
COST Action CA18237 European Soil-Biology Data Warehouse for Soil Protection (EUdaphobase)	doc. Ing. Erika Gömöryová, CSc.	Member of the working group
EUFORGEN European forest genetic resources programme	prof. Ing. Dušan Gömöry, DrSc.	Member of the working group

Table 6 Scientific and professional societies

Name of organisation	Name	Position
British Ornithologist Union	RNDr. Martin Korňaň, PhD.	Member
Carpathian Convention Working Group on Biodiversity	Mgr. Jakub Kubala, PhD.	Member
Czech Academy of Agricultural Sciences, Economic Commission	prof. Ing. Iveta Hajdúchová, PhD.	Member
	prof. Ing. Ján Holécy, CSc.	Member
	prof. Dr. Ing. Jaroslav Šálka	Member
Czech Bioclimatological Society	prof. Ing. Jaroslav Škvarenina, CSc.	Member
	doc. Ing. Jaroslav Vido, PhD.	Member
Czech Botanical Society	RNDr. Judita Kochjarová, CSc.	Member
European Economic and Social Committee Brussels	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	Member of the Bureau
NAT Economic and Social Committee	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	Member
ECO Economic and Social Committee	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	Member
REX Economic and Social Committee	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	Member
SOC Economic and Social Committee	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	Member
European Ornithologist Union	RNDr. Martin Korňaň, PhD.	Member
European Forest Institute	prof. Dr. Ing. Jaroslav Šálka	Representative of the Slovak Republic in reg. Office
European Universities Association	Dr h.c.prof. Ing. Rudolf Kropil, PhD.	committee member
European Vegetation Survey	doc. Ing. Karol Ujházy, PhD.	Member of the working group
German Ornithologist Union	RNDr. Martin Korňaň, PhD.	Member
FACE European Federation for Hunting and Conservation	Ing. Tibor Lebocký, PhD.	Head of Delegation of the Slovak Republic
FESPB Federation of European Societes of Plant Biology	prof. Ing. Jaroslav Kmet'j, PhD	Member
IAVS European Vegetation Survey	prof. Ing. Karol Ujházy, PhD.	Member of the working group
IAVS Historical Vegetation Science	prof. Ing. Karol Ujházy, PhD.	Member of the working group
International Association for Economics and Management in Wood Processing and Furniture Manufacturing - WoodEMA	doc. Ing. Miloš Gejdoš, PhD.	Member

International Association for the Study of the Commons	doc. Mgr. Ing. Rastislav Šulek, PhD.	Member
ICP Forests	Ing. František Máliš, PhD.	Member of the expert panel on biodiversity and ground vegetation
	Ing. Martin Pavlík, PhD.	Member
International Humic Substances Society	doc. Ing. Erika Gömöryová, CSc.	Member
International Society for Mushroom Science	Ing. Martin Pavlík, PhD.	Member
International Society for Medicinal Mushrooms	Ing. Martin Pavlík, PhD.	Member
International Union of Soil Science	doc. Ing. Erika Gömöryová, CSc.	Member
	Ing. Marián Homolák, PhD.	Member
The Maple Society	prof. Dr. Mgr. Jaroslav Ďurkovič	Member
The European acoustics association EAA	doc. Ing. Miloš Gejdoš, PhD.	Member
Mitteleuropäischen Gesellschaft für Jagdwissenschaft	doc. MVDr. Dušan Rajský, CSc.	Member of the Board of Directors and Vice President
Mitteleuropäischen Instituts für Wildtierökologie	doc. MVDr. Dušan Rajský, CSc.	Member of the Board of Directors and Vice President
OEE Hungarian National Forestry Association	Ing. Tibor Lebocký, PhD.	Member
SINIF Simposio Nacional Sobre Incendios Forestales, Comité Scientifico-profesional,Alicante	prof. Ing. Ján Holécy, CSc.	Member of the Scientific and Expert Council
Central European Institute of Wildlife Ecology	doc. MVDr. Dušan Rajský, CSc.	Member of the Board of Directors
World Society for Mushroom Biology and Mushroom Products	Ing. Martin Pavlík, PhD.	Member

MEMBERSHIP OF NATIONAL AND INTERNATIONAL EDITORIAL BOARDS AND ASSESSMENT ACTIVITIES

Faculty of Forestry staff are members of several national and international journal editorial boards, an overview of which is given in Tables 7-9. In addition to the listed

positions are also invited as reviewers to assess manuscripts of articles, projects and various documents.

Tab. 7 Domestic periodicals

Name of periodical	Name	Position
Acta Facultatis Forestalis	prof. Dr. Mgr. Jaroslav Ďurkovič	scientific editor
	prof. h.c. prof.Dr. Ing. Viliam Pichler	Chairman of the Editorial Board
	prof. Ing. Marek Fabrika, PhD.	member of the editorial board
	prof. Ing. Peter Garaj, CSc.	
	prof. Ing. Iveta Hajdúchová, PhD.	
	prof. Ing. Matúš Jakubis, PhD.	
	prof. Ing. Valéria Messingerová, CSc.	
	prof. Ing. Jaroslav Kmeťa, PhD.	
	prof. Ing. Milan Saniga, DrSc.	
	prof. Ing. Jaroslav Škvarenina, CSc.	
	Ing. Martin Lieskovský, PhD.	Executive Editor
Economy and society	prof. Ing. Iveta Hajdúchová, PhD.	member of the editorial board
Folia Oecologica	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial board
	doc. Ing. Róbert Sedmák, PhD.	member of the editorial board
Meteorological journal	prof. Ing. Jaroslav Škvarenina, CSc.	editorial board member

Tab. 8 Foreign and international periodicals

Name of periodical	Name	Position
Austrian Journal of Forest Science	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial board
Biological and Chemical Research (USA)	Ing. Martin Pavlík, PhD.	member of the editorial board
Central European Forestry Journal	Ing. Michal Bošeľa, PhD.	member of the editorial board, secretary and thematic editor
	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial board
	doc. Ing. Erika Gömöryová, CSc.	member of the editorial board
Cogent Biology	prof. Ing. Karol Ujházy, PhD.	member of the editorial board
Folia Venatoria	prof. Ing. Peter Garaj, CSc.	member of the editorial board
Forests	doc. Mgr. Ing. Rastislav Šulek, PhD.	topic editor
	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial board
	Ing. Michal Bošeľa, PhD.	theme editor
	doc. Ing. Miloš Gejdoš, PhD.	member of topics board
Frontiers in Remote Sensing	Ing. Martin Mokroš, PhD.	member of the editorial board
Newsletter for Sumatran experiments	prof. Ing. Milan Saniga, DrSc.	member of the editorial board
Journal of Central European Agriculture	Dr. h. c. prof. Ing. Rudolf Kropil, PhD.	member of the editorial board

Journal of Forest Science	prof. Ing. Marek Fabrika, PhD.	member of the editorial board
Journal of Hydrology and Hydromechanics	prof. Ing. Jaroslav Škvarenina, CSc.	associate editor
Plos One	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial board
	Ing. Michal Bošeľa, PhD.	member of the editorial board and academic editor
Remote Sensing Journal	Ing. Martin Mokroš, PhD.	guest editor
Research in Agriculture, Scholink	prof. Dr. Ing. Jaroslav Šálka	member of the editorial board
Summarizing	prof. Ing. Dušan Gömöry, DrSc.	member of the editorial
		board
The Sumatran Journal	prof. Ing. Milan Saniga, DrSc.	member of the editorial board
Forestry Research Reports	prof. Ing. Milan Saniga, DrSc.	member of the editorial board

Tab. 9 Professional periodicals

Name of periodical	**Name**	**Position**
Biology	RNDr. Judita Kochjarová, CSc.	member of the editorial board
Magazine Mobility-machinery-technology-ecology	prof. Ing. Iveta Hajdúchová, PhD.	member of the editorial board
Hunting and fishing	doc. MVDr. Dušan Rajský, CSc.	Chairman of the Editorial Board
Slovak Raptor Journal	Dr h. c. prof. Ing. Rudolf Kropil, PhD.	Vice-President
Tatras	doc. Ing. Peter Fleischer, PhD.	member of the editorial board
Tichodroma	Ing. Peter Lešo, PhD.	member of the editorial board
	RNDr. Martin Korňan, PhD.	member of the editorial board

Among other significant activities of the faculty members in this part it is necessary to mention:

- chairman of the editorial board and editor of the Proceedings - Žitnoostrovské poľovnícke listy I. - doc. MVDr. Dušan Rajský, PhD.
- membership in the editorial board of the Bulletin of the Slovak Botanical Society - RNDr. Judita Kochjarová, CSc.
- membership of the scientific board of the journal Manažment podnikov - Management of Companies - doc. Ing. Vladimír Štollmann, CSc., PhD.
- Editor of the special issue Qualitative Features of Wood as a Determinant for Wood Quality Assessment (https://www.mdpi.com/journal/forests/special_issues/wood_assessment), journal Forests - doc. Ing. Miloš Gejdoš, PhD.
- Guest editor Special Issue of Water magazine "Impact of Natural Hazards on Forest Ecosystems and Their Surrounding Landscape under Climate Change", section "Hydrology and Hydrogeology" - doc. Ing. Jaroslav Vido, PhD., Ing. Paulína Nalevanková, PhD.

- **Trade union memberships Doctoral studies, scientific councils, habilitation and inauguration committees:**
  - MU Brno, Department of Economics and Management of Renewable Natural Resources - prof. Ing. Iveta Hajdúchová, PhD.
  - ČZU Praha, Department of Business Management and Economics - prof. Ing. Iveta Hajdúchová, PhD., prof. Ing. Ján Holécy, CSc., prof. Dr. Ing. Jaroslav Šálka
  - Mendel University Brno - chairman of the habilitation committee for habilitation proceedings Ing. Tomáš Mikita - prof. Ing. Ján Tuček, CSc.
  - Czech University of Life Sciences Prague - member of the habilitation committee for the habilitation procedure of Dr. Ing. Privat. Doz. Petr Surový - prof. Ing. Ľubomír Scheer, CSc.
  - MU Brno, Department of Hunting - prof. Ing. Peter Garaj, CSc.
  - MU Brno - prof. Ing. Milan Saniga, DrSc.
  - SPU Nitra - member of the scientific council - doc. Ing. Ivan Lukáčik, CSc.
  - ÚEL SAV Zvolen - member of the scientific board - doc. Ing. Ivan Lukáčik, CSc.
  - SPU Nitra - member of habilitation committees - Faculty of Agrobiology and Food Resources, Faculty of Horticulture and Landscape Engineering - doc. Ing. Ivan Lukáčik, PhD.

- **Other memberships:**
  - ČZU Praha - expert board of the project 63976/2018-MZE-16222 Fragmentation of forest ownership and its impacts on forestry policy - member - JUDr. Mgr. Zuzana Dobšinská, PhD.
  - Database administrator within the SoilTemp initiative - Ing. František Máliš, PhD.
  - Economic and Social Committee of the Slovak Republic - Chairman - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - Slovak Government Council for Science, Technology and Innovation - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - Government Council for Agenda 2030 - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - Monitoring Committee for OP VI - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - Scientific Council of ČZU Praha, Mendel University Brno, TU Košice, UVLF Košice, SPU Nitra, UKF Nitra, UVR AU Banská Bystrica, UMB Banská Bystrica, NLC Zvolen, CPPV Nitra - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - National Platform for Biodiversity - Dr. h. c. prof. Ing. Rudolf Kropil, PhD.
  - APVV Council for MVTS - doc. Mgr. Ing. Rastislav Šulek, PhD.
  - expert council of the Ministry of Health of the Czech Republic - prof. Ing. Milan Saniga, DrSc.

- Croatian Academy of Sciences - Honorary Membership - prof. Ing. Milan Saniga, DrSc.
- Section DVFFA Ertragskunde - member of the working group - prof. Ing. Marek Fabrika, PhD.
- Centre of Plant Biology and Biodiversity of the Slovak Academy of Sciences - member of the Scientific Council - prof. Ing. Dušan Gömöry, DrSc.
- SAV commission for assessment of scientific qualification of employees - member - prof. Ing. Dušan Gömöry, DrSc.
- State Nature Conservation of the Slovak Republic - member of the scientific board - prof. Ing. Karol Ujházy, PhD.

- Ministry of Agriculture of the Czech Republic - member of the expert board for the research project
  NAZV QJ1920433
  "Effect of defensive measures on populations of lycopods in relation to population densities" - Ing. Pavol Hlaváč, PhD.
- NLF 2022-2030 "Forests and modern technologies - coordinator of the thematic committee team - Assoc. Ing. Ján Merganič, PhD.
- Slovak Acoustical Society at the Slovak Academy of Sciences - member - doc. Ing. Miloš Gejdoš, PhD.
- Working on the development of the National Forestry Programme for 2022-2030 - member of the committee: Climate change, forests and forest wildlife - prof. Ing. Prof. Milan Saniga, DrSc.
- OÚ Banská Štiavnica, Department of Environmental Care - member of the review committee (CHA Banská Štiavnica Botanical Garden) - doc. Ing. Ivan Lukáčik, CSc.
- Slovak Botanical Society - chairman of the dendrological section - Ing. Ivana Sarvašová, PhD.
- Czech Academy of Sciences - member of the assessment team within the 1st phase of the Czech Academy of Sciences quality evaluation - Research Evaluation 2020 - doc. Ing. Jaroslav Vido, PhD.
- Slovak Bioclimatological Society - membership in the committee - doc. Ing. Katarína Střelcová, PhD.
- Slovak Meteorological Society - membership - doc. Ing. Katarína Střelcová, PhD.
- Slovak Academy of Agricultural Sciences - member of the Department of Forestry - doc. Ing. Katarína Střelcová, PhD.

Table 10 Assessment of scientific publications for foreign periodicals

Name of foreign periodical	Name of the assessor
Acta Universitatis Agriculturae et Silviculturae Mendelianae Bruensis	doc. Ing. Miloš Gejdoš, PhD.
Agriculture	doc. Ing. Miloš Gejdoš, PhD.
	prof. Ing. Jaroslav Škvarenina, CSc.
	Ing. Marián Homolák, PhD.
Agronomy	doc. Ing. Erika Gömöryová, CSc.
	prof. Ing. Jaroslav Škvarenina, CSc.
Annals of Silvicultural Research	JUDr. Mgr. Zuzana Dobšinská, PhD.
Annals of Forest Science	doc. Ing. Róbert Sedmák, PhD.
Applied Sciences	prof. Ing. Dušan Gömöry, DrSc.
Applied Vegetation Science	Ing. František Máliš, PhD.
Atmosphere	prof. Ing. Jaroslav Škvarenina, CSc.
Baltic Forestry	prof. Ing. Dušan Gömöry, DrSc.
	prof. Ing. Ján Tuček, CSc.
Birds	RNDr. Martin Korňan, PhD.
Canadian Journal of Forest Research	doc. Ing. Miloš Gejdoš, PhD.
	Ing. Martin Mokroš, PhD.
Central European Forestry Journal	doc. Ing. Peter Fleischer, PhD.
	doc. Ing. Peter Jaloviar, PhD.
	prof. Ing. Jaroslav Škvarenina, CSc.

Dendrobiology	prof. Ing. Dušan Gömöry, DrSc.
Dedrochronology	Ing. Michal Bošeľa, PhD.
	Ing. Denisa Sedmáková, PhD.
Diversity	prof. Ing. Dušan Gömöry, DrSc.
	RNDr. Martin Korňan, PhD.
Ecography	RNDr. Martin Korňan, PhD.
Ecosystems	prof. Ing. Jaroslav Škvarenina, CSc.
Energies	doc. Ing. Miloš Gejdoš, PhD.
Environments	doc. Ing. Miloš Gejdoš, PhD.
European Journal of Forest Research	prof. Ing. Dušan Gömöry, DrSc.

Folia Horticulturae 2020	Ing. Martin Pavlík, PhD.
Forest Ecology and Management	prof. Ing. Dušan Gömöry, DrSc.
	prof. Ing. Karol Ujházy, PhD.
	Ing. Michal Bošeľa, PhD.
	doc. Ing. Stanislav Kucbel, PhD.
	doc. Ing. Erika Gömöryová, CSc.
Forest Policy and Economics	JUDr. Mgr. Zuzana Dobšinská, PhD.
Forestry	JUDr. Mgr. Zuzana Dobšinská, PhD.
Forests	JUDr. Mgr. Zuzana Dobšinská, PhD.
	doc. Mgr. Ing. Rastislav Šulek, PhD.
	prof. Ing. Dušan Gömöry, DrSc.
	prof. Ing. Ľubomír Scheer, CSc.
	doc. Ing. Róbert Sedmák, PhD.
	doc. Ing. Miloš Gejdoš, PhD.
	Ing. Martin Mokroš, PhD.
	doc. Ing. Stanislav Kucbel, PhD.
	doc. Ing. Peter Jaloviar, PhD.
	Ing. Zuzana Parobeková, PhD.
	Ing. Denisa Sedmáková, PhD.
	doc. Ing. Jaroslav Vencurik, PhD.
	doc. Ing. Erika Gömöryová, CSc.
Frontiers in Plant Science	prof. Ing. Dušan Gömöry, DrSc.
Futures (MDPI)	prof. Dr. Ing. Jaroslav Šálka
iForest	Ing. Martin Mokroš, PhD.
	prof. Ing. Karol Ujházy, PhD.
International Journal of Forest Research	JUDr. Mgr. Zuzana Dobšinská, PhD.
International of Digital Earth	Ing. Martin Mokroš, PhD.
Journal of Applied Remote Sensing	Ing. Martin Mokroš, PhD.
Journal of Cleaner Production	JUDr. Mgr. Zuzana Dobšinská, PhD.
	doc. Ing. Róbert Sedmák, PhD.
Journal of Environmental Management	prof. Ing. Iveta Hajdúchová, PhD.
	prof. Ing. Karol Ujházy, PhD.
	prof. Ing. Ľubomír Scheer, CSc.
	doc. Ing. Erika Gömöryová, CSc.
	Ing. Martina Pavlík, PhD.

Journal of Forest Science	doc. Ing. Peter Fleischer, PhD.
	prof. Ing. Jaroslav Kmet'a, PhD.
	doc. Ing. Stanislav Kucbel, PhD.
	doc. Ing. Ivan Repáč, PhD.
	Ing. Denisa Sedmáková, PhD.
Journal of Hydrology and Hydromechanics	prof. Ing. Jaroslav Škvarenina, CSc.
Journal of Mountain Science	doc. Ing. Erika Gömöryová, CSc.
Journal of Vegetation Science	prof. Ing. Karol Ujházy, PhD.
Land	Ing. Marián Homolák, PhD.
Land Degratation and Develpment	Ing. Marián Homolák, PhD.
Mountain Research and Development	doc. Ing. Ivan Repáč, PhD.
New Zealand Journal of Forestry Science	prof. Ing. Dušan Gömöry, DrSc.
PeerJ	doc. Ing. Stanislav Kucbel, PhD.
Plant Ecology	doc. Ing. Jaroslav Vencurik, PhD.
Plant Ecology & Diversity	doc. Ing. Ivan Repáč, PhD.
PLOS One	Ing. Peter Smolko, PhD.
Remote Sensing	prof. Ing. Ján Tuček, CSc.
	Ing. Martin Mokroš, PhD.
Resources	doc. Mgr. Ing. Rastislav Šulek, PhD.
Science of the Total Environment	Ing. Michal Bošeľa, PhD.
	Ing. Marián Homolák, PhD.
Scientific Reports	doc. Ing. Erika Gömöryová, CSc.
SEEFOR	JUDr. Mgr. Zuzana Dobšinská, PhD.
Slovak Journal of Political Sciences	JUDr. Mgr. Zuzana Dobšinská, PhD.
Small Scale Forestry	prof. Dr. Ing. Jaroslav Šálka
Soil Science Annual	prof. Ing. Jaroslav Škvarenina, CSc.
Soil and Water Research	doc. Ing. Erika Gömöryová, CSc.
South-east European Forestry	Ing. Peter Smolko, PhD.
Sustainability	JUDr. Mgr. Zuzana Dobšinská, PhD.
	prof. Ing. Iveta Hajdúchová, PhD.
	doc. Ing. Erika Gömöryová, CSc.
	doc. Mgr. Ing. Rastislav Šulek, PhD.
	Ing. Marián Homolák, PhD.
IEEE Transaction on Geoscience and Remote Sensing	Ing. Martin Mokroš, PhD.
Urban Forestry and Urban Greening	JUDr. Mgr. Zuzana Dobšinská, PhD.
Water	prof. Ing. Jaroslav Škvarenina, CSc.
Forestry Research Reports	doc. Ing. Stanislav Kucbel, PhD.
	doc. Ing. Ivan Repáč, PhD.
	Ing. Denisa Sedmáková, PhD.

- judging the publication KUPČÁK, V. - ŠIŠÁK, L. - POLSTER, P. Czech Academy of Agricultural Sciences and the Quarter Century of the Commission of Forest Economics - prof. Ing. Iveta Hajdúchová, PhD.

- Assessing a college textbook M. Pavlík et al. 2020: Practical Mycology. TU in Zvolen - prof. Ing. Jaroslav Kmet, PhD.
- Mendel University Brno - PVP: Loss of agroforestry: Symbolic annihilation of mixed cultures in 19th century agricultural science. European Countryside - prof. Ing. Jaroslav Kmet'j, PhD.

Work on joint publications:

- Collaboration with ForestREplot and SoilTemp partners on several publications, e.g. Staude et al. 2020 (Nature Ecology and Evolution), Zellweger et al. 2020 (Science), Lembrechts et al. 2020 (Global Change Biology) - Ing. František Máliš, PhD.
- Cooperation with the University of Belgrade, experimental work with micro-computed tomography of ash wood, publication: KARADŽIĆ, D., STANIVUKOVIĆ, Z., MILANOVIĆ, S., SIKORA, K., RADULOVIĆ, Z., RAČKO, V., KARDOŠOVÁ, M., ĎURKOVIČ, J., MILENKOVIĆ, I. 2020:
  Development of *Neonectria punicea* pathogenic symptoms in juvenile *Fraxinus excelsior* trees. Frontiers in Plant Science 11: article number 592260
- Project **oForest "How to balance forestry and biodiversity conservation - a view across Europe"** - cooperation on the creation of a book with the same title in the segment of model objects of multifunctional forests of Europe (University Forest Enterprise TU Zvolen), Consortium BAFU Federal Office of the Environment Switzerland, WSL Birmensdorf, BMEL Federal Ministry of Food and Agriculture Germany, EFI Bonn Germany, processing of the model object VŠLP TUZVO, project on Forets, costs covered by the Swiss side, guarantor for the processing of the book: dr. Frank Krumm, WSL Birmensdorf, Switzerland - prof. Ing. Milan Saniga, DrSc., doc. Ing. Peter Jaloviar, PhD., doc. Ing. Stanislav Kucbel, PhD.
- Museum of National History and Department of Zoology Palacký University in Olomouc - article for the magazine Živa - RNDr. Martin Korňan, PhD.
- Bureau for Forest Management and Geodesy, Poland - collaboration on the preparation of the original scientific thesis - RNDr. Martin Korňan, PhD.
- Institute for Economic Modification of Forests, Czech Republic - collaboration on the preparation of the original scientific thesis - RNDr. Martin Korňan, PhD.

- **Reviews of works:**
  - Legal, economic and technological aspects of the use ofalternative raw materialsas a means of-dissertation thesis (ČZU Praha)- prof. Dr. Ing. Jaroslav Šálka
  - Interception and selected hydric functions in a climax spruce forest after a bark beetle calamity - dissertation - doc. Ing. Peter Fleischer, PhD.
  - Cultivation of low and medium forest - habilitation thesis - doc. Ing. Peter Jaloviar, PhD.
  - Application of white birch (*Betula pendula* Roth) in forest restoration and creation after calamities - habilitation thesis - doc. Ing. Jaroslav Vencurik, PhD.

- **Assessments of project proposals and projects under development:**
  - NAZV No.QK1820358 "Potential of structural changes in forestry and timber processing" opponent's opinion on the final report of the research project - prof. Ing. Iveta Hajdúchová, PhD.
  - Project for Croatian Science Foundation - prof. Ing. Dušan Gömöry, DrSc.
  - Academy of Sciences of the Czech Republic - evaluation of research and professional activities - Ing. Michal Bošeľa, PhD.
  - VEGA: Long-term changes in air pollution and their impact on ecosystems - opinion on the project proposal - doc. Ing. Peter Fleischer, PhD.
  - Research and development to support the competitiveness of Slovak forestry - report on the project - doc. Ing. Peter Fleischer, PhD.
  - Ministry of Agriculture of the Czech Republic - member of the expert board for the research project
    NAZV QJ1920433
    "Effect of defensive measures on populations of lycopods in relation to population densities" - Ing. Pavol Hlaváč, PhD.
  - Mendel University Brno - project "Analysis of harvester use in educational logging in the context of changing tree species composition due to climate change" - doc. Ing. Miloš Gejdoš, PhD.

- **Other cooperation:**
  - cooperation with partners from ICP Forest on the preparation of the H2020 project Integrated tool for the Best Practices identification in Restoration of Forest Ecosystem Services - Ing. Fantišek Máliš, PhD.
  - National Research and Development Institute in Forestry "Marin Dracea" ICAS, Research Station for Norway spruce silviculture (Dr. Ionel Popa) - cooperation within the project APVV-15-0265 - Ing. Michal Bošeľa, PhD.
  - School of Agriculture, Policy and Development, University of Reading UK (prof. Martin Lukac) - cooperation within the project APVV-15-0265 - Ing. Michal Bošeľa, PhD.
  - Faculty of Forestry, University of Agriculture Krakow - informal professional cooperation in the field of forestry phytopathology and forest protection, work on the preparation of a joint project on the protection of mountain spruce forests - Ing. Pavol Hlaváč, PhD., prof. Ing. Jaroslav Kmet'j, PhD.
  - HNEE Eberwalde, Landesbetrieb Forst Brandenburg, Germany:
    Professional cooperation within the project KEGA 006TUZ-4/2020 "Use of innovative approaches to increase the quality of education in the fields of Forestry and Hunting through e-learning explanatory dictionary of Slovak and German terminology used in hunting". For KIOLK: Ing. Pavol Hlaváč, PhD. (project leader: Mgr. Zuzana Vyhnáliková, PhD.)
    Organisational and professional cooperation in the preparation of the planned professional excursion of German students in Slovakia, during which they will also visit the KIOLK LF TU in Zvolen. For KIOLK: Ing. Pavol Hlaváč,PhD.

Development and pilot testing of FireRisk-SK software for forest fire risk assessment in calamity areas. For KIOLK: Ing. Pavol Hlaváč, PhD.
Informal professional cooperation in the field of forest protection, forest phytopathology and arboriculture - exchange of current knowledge and literature. For KIOLK: Ing. Pavol Hlaváč, PhD.

- MycoMedica d.o.o. Slovenia - cooperation on the basis of the Cooperation Agreement - partly funded by APVV 17-0644- Ing. Martin Pavlík, PhD.
- Cooperation within the framework of the Cooperation Agreement between TUZVO and SAAS; cooperation on research on Ganoderma lucidum species, publication of a joint article in CC journal; financed partly from APVV 17-0644; guarantor : doc.Ing.Martin Pavlík,PhD.
- Czech University of Agriculture Prague - professional cooperation in the field of forest fires. Work on a forthcoming joint article on forest fires in calamity areas - Ing. Pavol Hlaváč, PhD., informal professional cooperation in the field of forest fire protection (working consultations on a joint project on the subject - Ing. Pavol Hlaváč, PhD. and prof. Ing. Jaroslav Kmet'a, PhD.
- Institute of Forest Protection and Hunting, Faculty of Forestry and Wood Technology, Mendel University in Brno - Professional cooperation in the field of forest phytopathology and forest protection - consultations, sample determination, laboratory work, assessments, project preparation (INTERREG SK-CZ project)
  "Identification of damage to forest vegetation using unmanned aerial vehicles" - Ing. Pavol Hlaváč, PhD., prof. Ing. Jaroslav Kmet'j, PhD.
- Belarusian State Technological University Minsk - cooperation on the basis of the Cooperation Agreement - doc. Ing. Vladimír Štollmann, CSc., PhD.
- Saint-Petersburg State Forestry University S. M. Kirov Saint Petersburg - cooperation on the basis of the Cooperation Agreement - Assoc. Ing. Vladimír Štollmann, CSc., PhD.
- Arctic State Agrotechnological University of Yakutsk - cooperation on the basis of Cooperation Agreement - Assoc. Ing. Vladimir Stollmann, CSc., PhD.
- North-Eastern Federal University M. K. Ammosova - - cooperation on the basis of the Cooperation Agreement - doc. Ing. Vladimír Štollmann, CSc., PhD.
- Izhevsk State Technical University M. T. Kalashnikov - cooperation on the basis of the Cooperation Agreement - doc. Ing. Vladimír Štollmann, CSc., PhD.
- Institute of Systematics and Evolution of Animals, Polish Academy of Sciences Krakow - research on the impact of ivy (*Hedera helix*) on bird diversity in the Western Carpathians - Ing. Peter Lešo, PhD.

PARTICIPATION OF CREATIVE STAFF OF THE FACULTY OF SCIENCE IN SCIENTIFIC AND PROFESSIONAL EVENTS ABROAD

Fig. 1 shows the evolution of the number of faculty members posted abroad. The number of faculty traveling abroad has increased each year during the 2016-2019 reporting period, with the exception of 2020, which was significantly impacted by the global pandemic (down 76% from 2019). These numbers are clearly related to the activities of our staff abroad. These are mostly participation in scientific conferences, seminars, exhibitions, working meetings and coordination activities within international projects, skills development events, study and research stays, etc.

The structure of these destinations is also more stable in the long term, in most cases they are EU countries or other European countries, with occasional destinations outside the European continent.

Table 11 gives an overview of the mobility of LF staff within the Erasmus+ programme and Table 12 is only a statement, where mainly due to the pandemic no mobility within the National Scholarship Programme took place.

In 2020, participation of faculty members in events and research assignments abroad decreased significantly due to the global pandemic situation with COVID-

19. Foreign activities lasted only until the beginning of March 2020, since when the countries of Europe entered the
"lockdown." Most of the events took place online.

Table 11 Erasmus+ staff mobility for the academic year 2019/2020

Surname and first name	Foreign institution	Landscape	From	to
Teaching				
doc. Ing. Gejdoš Miloš, PhD.	Mendel University	Czech Republic	09.09.2019	12.09.2019
doc. Ing. Lieskovský Martin, PhD.	Mendel University	Czech Republic	09.09.2019	12.09.2019
Ing. Marek Trenčiansky, PhD.	Maria Curie-Sklodowska University	Poland	14.10.2019	18.10.2019
Training				
Ing. Váľková Miriam, PhD.	Cenil Centro de Línguas LDA/ISAL	Portugal	24.02.2020	28.02.2020

Tab. 12 LF staff mobility for the academic year 2019/2020

Surname and first name	Foreign institution	Landscape	From	to
no mobility				

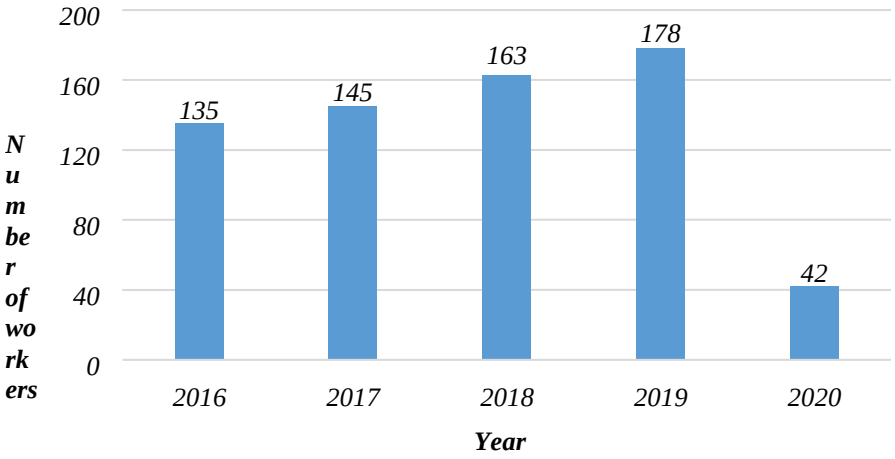


Fig.1 Development of the number of expatriate LF employees in the period 2016-2020

RECRUITMENT OF FOREIGN WORKERS

The development of the number of foreign staff recruited at the Faculty of Forestry is shown in Fig. 2. Similarly as in the previous case, this number is predominantly determined by scientific and professional events at the level of departments, faculties, joint meetings and cooperation of various kinds with foreign partners.

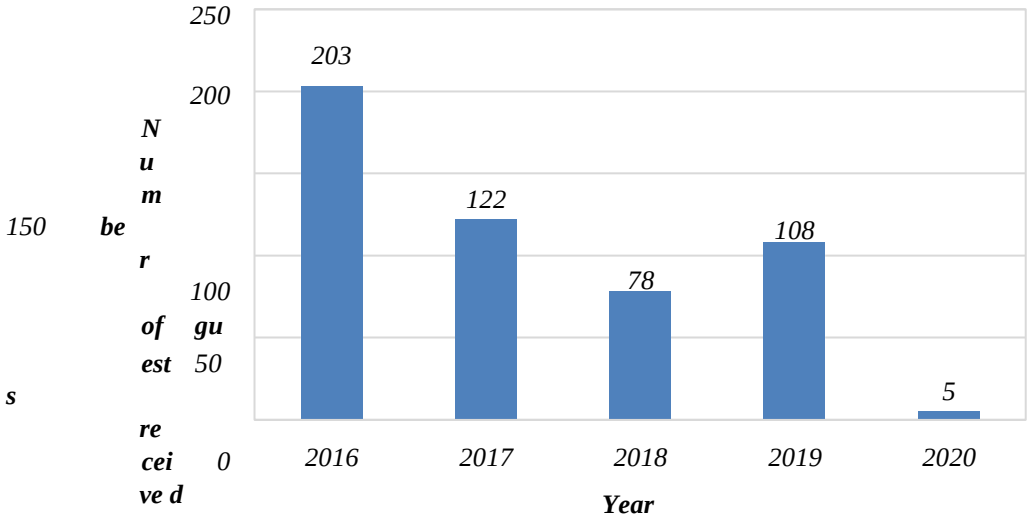


Fig.2 Development of the number of admitted guests in the period 2016-2020

Within the share of foreign workers, visitors from European countries predominated. However, the Faculty of Forestry was also visited by guests from non-European countries. However, their number was significantly reduced due to the global pandemic (Fig. 2, a decrease of 95% compared to 2019).

Tab. 13 Erasmus+ mobility of foreign teaching staff for the academic year 2019/2020

Surname and first name	Foreign university	Landscape	From	to
Aris Jansons	Institute of Systematics and Evolution of Animals	Latvia	13.01.2020	17.01.2020

Among other activities of the LF departments in 2020, which are examples of bilateral foreign mobility of creative workers, it is necessary to mention :

- doc. Ing. V. Štollmann, CSc. PhD. participated online at 84. IGC dedicated to the 90th anniversary of BGTU and the Day of Belarusian Science, section Forest Engineering, Materials Science and Design, Minsk, 03-14.02.2020
- doc. Ing. V. Štollmann, CSc. PhD., Ing. Mária Vlčková, PhD., Ing. Lukáš Orlovský participated in the online IGC Forest Production: problems and solutions dedicated to the 90th anniversary of the Belarusian State Technological University, 13-15.05.2020, Minsk
- Online working meeting between TUZVO and the Arctic State Agrotechnological University of Yakutsk, meeting participants: T.K. Nifontov, M.N. Khaldeyeva, M.V. Sleptsova, G.E. Kokieva, I.A. Dranaeva, M.I. Novgorodova. A. Portiaginova, Assoc. Ing. B. Olah, PhD., doc. Ing. Bc. M. Kardoš, PhD., Ing. P. Gejdoš, doc. Ing. V. Štollmann, CSc. PhD., on 06.08.2020
- International online scientific conference "Financing Forests-Tree 2020", 26.11.2020, KERLH, 20 foreign participants
- online course RJ organized within the KEGA project in cooperation with Izhevsk State Technical University M. T. Kalashnikov. Course participants: students of LF, 01.10.2020 - 30.12.2020

- Nature-friendly forest management - a prerequisite for sustainable management -

Forestry Day on 13th July 2020 took place at OZ Prievidza, LS Duchonka. The coorganizer of the event was the Ministry of Forests of the Slovak Republic, Forestry and Wood Processing Section, whose employees formed a substantial part of the 80 participants, which included, in addition to the representatives of the guest OZ, employees of the Directorate General of Forests of the Slovak Republic, non-state forest owners, state administration of forestry and nature protection as well as non-state conservation organizations. The most important participant was the Minister of Agriculture Ing. Ján Mičovský, CSc. The expert guarantor of the event was Prof. Ing. Milan Saniga, DrSc. The expert guide of the forestry day, the head of LS Duchonka Ing. Dušan Mikuš

- The forestry day held on 23 September 2020 was realized by OZ Levice with the theme of nature-friendly management of oak forests on LS Plášťovce, LO Čelovce. The guides of the event were the head of the LS Plášťovce Ing. Dušan Krajniak and the head of LO Čelovce Mr. Tibor Berecki, the interpretation and commentary was complemented by prof. Ing. Milan Saniga, DrSc., as a leading representative of the Pro Silva movement for nature-friendly management in Slovakia. The event was attended by representatives from the Slovak Forest Enterprise (LESOV SR, š. p.), which consisted of DG staff headed by the former Director General Ing. Matej Vigoda, employees from selected 7 branch plants. Employees of NLC Zvolen, MPRV SR, non-state forest managers and PSL preparers, 81 participants in total
- Czech-Slovak internet conference "Dynamics of spring frosts and possibilities of protection", number of participants 19, 14.12.2020 - prof. Ing. Jaroslav Škvarenina, CSc.

ACADEMIC MOBILITY OF STUDENTS

Fig. 3 shows the development of the number of students admitted from abroad and the number of LF students sent to foreign universities and faculties for the period 2016-2020. These mobilities took place mainly within the Erasmus+ programme (LF as a partner) and COST STSM[1] , CEEPUS, respectively within the National Scholarship Programme, also participation in international conferences (PhD students, post-doctoral students). Their posting abroad mainly serves the purpose of acquiring professional knowledge, establishing contacts and friendships, which in many cases can be the basis for successful international cooperation in the future. Some students have also represented the Faculty of Physics at international scientific conferences and conferences of the School of Science and Technology with their theses. Again, it should be noted that a global pandemic is behind the significant drop in the number of students admitted (down 75%) and sent (down 64%) in 2020. Tables 14 and 15 give an overview of Erasmus+ student mobility.

[1] STSM short term scientific mission

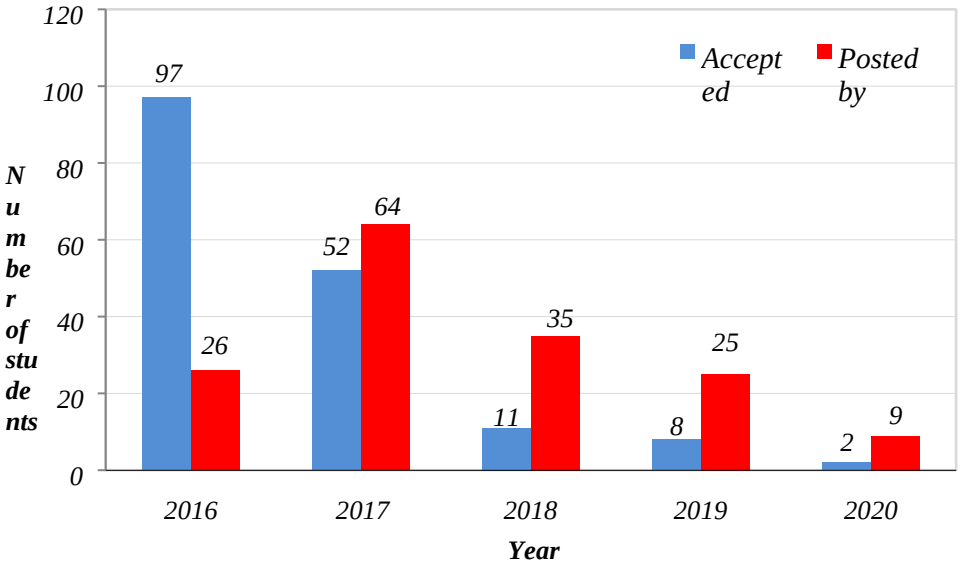


Fig. 3 Development of the number of admitted and seconded students from/to LF abroad in the period 2016-2020

Tab. 14 Erasmus+ Mobility of LF students in the academic year 2019/2020

Last and first name of the student	Foreign university	Landscape	From	to
Study				
Juraj Cipa	Universitatea Transilvania din Brasov	Romania	30.09.2019	16.02.2020
Internship				
Mag.biol Petek Anja	Kobenhavns Universitet	Denmark	01.12.2019	29.02.2020
Ing. Petrík Peter	Kobenhavns Universitet	Denmark	01.12.2019	29.02.2020

Tab. 15 Erasmus+ mobility of foreign students admitted to the Faculty of Arts in the academic year 2019/2020

Last and first name of the student	Foreign university	Landscape	From	to
Study				
Stjepan Stopic	College near Karlovac	Croatia	30.09.2019	30.12.2019
Alžběta Šídlová	Mendel Brno	Czech Republic	02.03.2020	03.07.2020
Timur Kulyntayev	Forest Technical University, Saint Petersburg	Russia	18.02.2020	17.07.2020
Internship				
no mobility				

Thanks are due to all the departments that provided teaching and professional programme for the foreign students and also to the institutions that contributed to the successful completion of their stays.

LF PARTICIPATION IN INTERNATIONAL PROGRAMMES AND PROJECTS TO SUPPORT TEACHING, SCIENCE AND RESEARCH

Projects of this type have the potential to support mobility, the preparation and submission of major international projects, as well as publication in international scientific journals.

Projects to support teaching

There were no projects with this theme in 2020.

Projects to support science and research

COST, H2020 and LIFE Lynx - annotations are given in the Evaluation of Scientific Research Activities and Doctoral Studies for 2020.

On 15/12/2020 it was announced that Horizon 2020 Framework Programme; Project: 101000289 - **HoliSoils "Holistic management practices, modelling and monitoring for European forest soils**" has been approved
The principal investigator is: prof. Prof. Raisa Mäkipää from Natural Resources Institute Finland (LUKE). There are 17 participating countries in the project. For the Faculty of Forestry of TU the project preparation was carried out by: Dr. Michal Bošeľa (head of the HERE section); prof. Škvarenina, doc. Gomoryová; doc. Prof. Fleischer, Dr. Homolák.

Mixed projects

DAAD "Ostpartnerschaften" solved in cooperation with Georg August Universität Göttingen and TU in Zvolen guarantor: prof. Ľ. Scheer, prof. Dr., W. Kurth

Annotation of 2020 results:
Long-term topics of mutual cooperation are applied informatics, spatial information systems, geoinformatics, forest modelling and growth simulators. Within this cooperation, Prof. Fabrika was the opponent of the student Marius Heidenreich's thesis "Design and Implementation of a Structural Poplar Model" within the Master Study using the SIBYLA growth simulator. This was a refinement (downscaling) of growth simulations at the level of poplar tree morphology. The planned mobility for 2020 was postponed to 2021 due to the unfavourable pandemic situation.

COOPERATION WITH DOMESTIC PARTNERS

Cooperation with domestic partners is an important part of the educational and scientific research activities of the LF at the national level. In 2020, a number of meetings were held between representatives of the Faculty of Forestry and representatives of organisations of the Ministries of the Ministry of Agriculture and Rural Development of the Slovak Republic and the Ministry of the Environment of the Slovak Republic, as well as with representatives of the State Enterprise Forests of the Slovak Republic at the level of the DG and the management of the plants, as well as with representatives of organisations of forest owners and users. In view of the pandemic situation of COVID-19, the meetings were held online. The institutions with which the Faculty of Forestry has long-term cooperation are listed in Table 16.

Table 16 List of long-term cooperation institutions

Institution	NameType of cooperation	
Ministry of Environment of the Slovak Republic	prof. Ing. Dušan Gömöry, DrSc. member of theCommission for Biosafety KAZMZ	cooperation
Ministry of Agriculture and Rural Development	KAZMZ KERLH prof. Ing. Milan Saniga, DrSc.	collaboration cooperation in solving APVV projects elaboration of comments to the Decree amending Decree No. 453/2006 Coll. No. 15/2015 Coll. on forest management as amended by Decree No. 15/2015 Coll.
Bratislava selfgoverning region	Ing. Vladimír Juško, PhD.	elaboration of theAction Plan for forest conservation
City of Zvolen	Ing. Pavol Hlaváč, PhD.	professional cooperation in the field of arboriculture inassessing the health status of trees growing in the park Ľ. Štúr
City of Zarnovica	Ing. Pavol Hlaváč, PhD.	professionalcooperation in the field of arboriculture, elaboration of professional expertise of health condition and static stability of spruces growing in the city
Municipal Office Horná Mičiná	Ing. Pavol Hlaváč, PhD. prof. Ing. Jaroslav Kmet'a, PhD.	professional cooperation in the field of arboriculture in the assessment of tree health
Babina Municipal Office	Ing. Pavol Hlaváč, PhD. prof. Ing. Jaroslav Kmet'a, PhD.	professional cooperation in the field of arboriculture in the assessment of tree health
Municipal Office Turčianske Teplice	Ing. Pavol Hlaváč, PhD. prof. Ing. Jaroslav Kmet'a, PhD.	professional cooperation in the field of arboriculture in the assessment of tree health
Forests SR, š.p. Banská Bystrica	Ing. Blanka Giertliová, PhD.	organizing a professional colloquium for students in forest economics
	doc.Ing.Vladimír Štollmann,CSc.PhD. doc. Ing. Ján Merganič, PhD. Ing. Vladimír Juško, PhD. Ing. Michal Ferenčík, PhD.	collaboration working in a working group on the controversial application of the PBHL principles
	KAZMZ	collaboration
Forests of SR, š.p. OZ Semenoles	doc. Ing. Ivan Repáč, PhD.	experiments in nursery centres, Jochy and Orava dam, technical and material support for scientific research activities, exchange of acquired knowledge
ML Banská Bystrica	KERLCollaboration in solving APVV projects	
ML Kremnica	prof. Ing. Iveta Hajdúchová, PhD.	consulting in the field of financial management
TANAP State Forests	Ing. František Máliš, PhD. Ing. Peter Klinga, PhD. **treetops Bachledka**	collaboration

	LOS Banská Štiavnica	
Podtatranské Museum Poprad		
Bachledka Ski & Sun Trail through the		
Ing. Pavol H		HČ from the subject Integrated forest protection
	doc. Ing. Peter Fleischer, lPhD.	Implementation of the APVV evaluation project carbon balance by the eddy covariance method
	KERLCollaboration áin the solution of APVV projects	
	Ing. František Máliš, čPhD.	cooperation
	Ing. Pavol Hlaváč, PhD.	cooperation in the protection of forest stands growing in the vicinity of theBachledka treetop trailfrom the aspect of their protection against bark
	Ing. Pavol Hlaváč, PhD.	beetles cooperation in the field of forest protection and phytopathology, providing HC, reviewing the proceedings of the international conference
SOP SR Banská Bystrica	Ing. Peter Klinga, PhD.	spolipráca

	prof. Ing. Karol Ujházy, PhD.	preparation of theCatalogue of Biotopes of the Slovak Republic KAZMZ cooperation
SHMÚ regional centre B.Bystrica	prof. Ing. Jaroslav Škvarenina, CSc.	cooperation
	prof. Ing. Dušan Gömöry, DrSc. Ing. Peter Klinga, PhD. Ing. Daniel Kurjak, PhD.	cooperation on research projects (APVV, VEGA)

Institute of Forest Ecology SAV Zvolen	Ing. Peter Fleischer, PhD.	evaluation oftree growth changes using automatic dendrometers, measurement of photosynthesis rate and air permeability in spruces on a high altitude transect in the Tatras; implementation of the joint project
Botanical Institute of the Slovak Academy of Sciences	prof. Ing. Karol Ujházy, PhD.	APVV-16-0306 work on monograph
	RNDr. Judita Kochjarová, CSc.	3 scientific-publication projects of national importance, VEGA project
	Ing. František Máliš, PhD.	cooperation
PÚ SAV Košice	doc. Ing. Erika Gömöryová, CSc.	cooperation on the project APVV-15-0176, preparation of joint publications
Research Institute Animal Production Nitra	prof. Ing. Peter Garaj, CSc.	Opinions, memberships in departmental committees, reviewing publications, solving APVV projects
	doc. MVDr. Dušan Rajský, PhD.	cooperation
National Forestry Centre Zvolen	prof. Dr. Ing. Jaroslav Šálka doc. Mgr. Ing. Rastislav Šulek, PhD. JUDr. Mgr. Zuzana Dobšinská, PhD. Ing. Jozef Výbošťok, PhD.	solving research tasks
	Ing. František Máliš, PhD. prof. Ing. Karol Ujházy, PhD.	cooperationon the APVV project
	Ing. Michal Bošeľa, PhD.	cooperation
	KAZMZ	collaboration
	doc. Ing. Erika Gömöryová, CSc.	cooperation on the project APVV-19-0142
	Ing. Martin Pavlík, PhD. Ing. Peter Fleischer, PhD.	collaboration on research on *Ganoderma lucidum* fungi, joint publications including CC article assessment of the dynamics of the leaf area index in the Bienska dolina research site
Administration of the Slovak Republic	prof. Dr. Ing. Jaroslav Šálkaprofessional lectures in the field of forestry	
VÚPOP Prešov	doc. Ing. Erika Gömöryová, CSc.	cooperation
PLATAN	Ing. Pavol Hlaváč, PhD. prof. Ing. Jaroslav Kmeťa, PhD.	professional cooperation in the field of arboriculture
Remedies Department District Office B. Bystrica	prof. Dr. Ing. Jaroslav Šálkaprofessional lectures in the field of forestry Legislatio n	
State Veterinary and Food	KAZMZ	collaboration
Slovak Hunting n		Legislatio
	KAZMZ	collaboration
Institute of Parasitology of the Slovak Academy of Sciences Košice	KAZMZ	collaboration
Central European Institute of Beast Ecology Nitra	KAZMZ	collaboration
National Zoo Bojnica	KAZMZ	collaboration
Chamber		

	Ing. Pavol Hlaváč, PhD.	cooperationin the field of
University of Veterinary Medicine and Pharmacy in Košice	Ing. Martin Pavlík, PhD.	multi-year cooperation with the Department of Chemistry, Biochemistry and Biophysics, Institute of pharmaceutical chemistry on the scientific research of fungi of the genus Cordyceps and common Publication outputs including article in CC KAZMZoponentations , membership in committees,
Slovak University of Agriculture Nitra	doc. Ing. Erika Gömöryová, CSc. publicationsKAZMZoponts committees,	assessment of publications Preparation of joint , memberships in departmental assessment of publications, APVV solution
LKT Trstena	doc.Ing.Vladimír Štollmann,CSc.PhD.	cooperation
SL Slovakia, a. s. Slovenská Ľupča	doc.Ing.Vladimír Štollmann,CSc.PhD.	cooperation
HS Hrinova	doc.Ing.Vladimír Štollmann,CSc.PhD.	Cooperation
HIRECO Fluid Bytča	doc.Ing.Vladimír Štollmann,CSc.PhD.	Cooperation
OIL Slovakia, s.r.o. Nitra	doc.Ing.Vladimír Štollmann,CSc.PhD.	cooperation
UMB Banská Bystrica Faculty of Natural Sciences	Wood-destroying fungi 2020	phytopathology and mycology, preparation of symposium prof. Ing.Karol Ujházy, PhD.
UK Bratislava Faculty of Science, Charles University Bratislava Department of Ecology	cooperation project VEGA 2/0040/17 Ďurkovičcooperation of	doc. Dr. Mgr. Jaroslav KAZMZ cooperatio

	n	
UK Bratislava Botanical Garden Blatnica	Ing. František Máliš, PhD. prof. Ing. Karol Ujházy, PhD.	cooperation work on the monograph Vegetable Communities of Slovakia 6 - forests and shrubs
STU Bratislava, Faculty of Civil Engineering	Ing. Pavol Hlaváč, PhD. KPPcollaboration	cooperation in the development of software forforest fire risk assessment FireRisk:EN on project solutions

LF MARKETING COMMUNICATION

As part of its communication strategy, the LF applied the following marketing communication tools in 2020:

a. *public relations*, *which* prevailed among the various means. We include: professional seminars, press conferences, lectures, publications for professional and lay public, articles in newspapers and magazines, matriculation, ring activities for professional and lay public, creation of faculty image through social networks, giving interviews for professional, TV talk shows, forest pedagogy, faculty events, etc.).
b. *personal promotion of the* possibility of studying at LF in the framework of trips to high schools
and fairs,
c. *Paid advertising* on social networks aimed at promoting studies at the Faculty of Arts,
d. *direct marketing*, where the faculty reaches out directly to its existing students for various educational and extra-curricular activities via SMS gateway; and
e. *corporate identity*, which included the production of promotional items in accordance with the LF TUZVO design manual (T-shirts, bracelets, pens, notebooks, gift items, etc.)

Marketing activities of LF

At the outset of this section of the report, it should be noted that the impact of the global COVID-19 pandemic has had a significant negative impact on the use of faculty marketing activities in the 2020 analysis year. The transition to distance learning, the ban on meetings, the restriction to online form of contact only, have contributed to a very weakened form of use of marketing tools, as this segment is naturally dominated by "public relations" and face-toface communication. For this reason, most marketing activities have been carried out only in the electronic environment or in the television and print media. ***Nevertheless, the faculty managed to increase the number of students enrolled in 2019 by 22% compared to the previous year, from 159 to 194 students (Figure 4).***

As part of the promotion of the Faculty of Forestry and its study programmes as well as scientific research activities, the brochures "Guide to studying at the Faculty of Forestry" in Slovak and English and the brochure "Rings at the Faculty of Forestry" as well as the Faculty of Forestry websites www.lesnickekruzky.sk and www.lesnickyvyskum.sk were updated for 2020. All of these brochures are also available online in a browsable form on the forestry website of the main portal https://lf.tuzvo.sk/sk.

Most of the Faculty's activities were presented in short text-image information and videos on the Faculty's website (https://lf.tuzvo.sk/), many of them are shared on Facebook, Instagram as well as on the Faculty's YouTube channel.

We have also paid adequate attention to the promotion of the Faculty of Arts and communication with the public on social networks (FB and Twitter, LinkedIn, YouTube channel, Instagram), where many information for students and other target groups (prospective students, professional and professional organizations, alumni community, supporters of the Faculty of Arts, job offers for graduates, etc.) are disseminated and shared. The most relevant information was also promoted through paid advertising. We produced several creative videos and recordings of distance education, online dissertation and habilitation thesis defenses, inaugural lectures, and scientific and popular science lectures. The main marketing activities in 2020, which the faculty organised mainly under its own responsibility, are listed in chronological order within the calendar year 2020 in Table 17.

Table 17 Overview of LF marketing activities for 2020

Date	Marketing activity
7 January	Video from the life of the students of the Faculty of Forestry in 2019 presented on the YouTube channel.
14 January	Lecture by Dr. Āris Jansons from Jelgava, University of Latvia, Faculty of Forestry, on Risks of hemiboreal forest management related to the Global climate change - (a)biotic Erasmus+ Mobility factors
14 January	doc. Peter Fleischer from the Department of Integrated Forest and Landscape Conservation, Faculty of Forestry informed about the research activity of CO_2 capture in TANAPE via Youtube channel of Halali RTVS.
17 January	In the New Year 2020, the Faculty of Forestry again continued to promote studies at the faculty. This time at the Gymnasium J. Chalupka in Brezno.
24 January	The first visit of prof. Ing. Róbert Marušák, PhD., the new Dean of the Faculty of Forestry and woodworking ČZU in Prague, together with Mr. Vice Dean Radek Rinn led to our Faculty

	of Forestry.
28 January	Open Day at LF 2020
30 January	Representation of the Faculty of Arts at the fair of educational offer at universities in Žilina.
30 January	Recognition of the work of FB PBOL by the Pro Silva Slovakia Committee with promotion on the Pro Silva website and social networks.
7 February	Promotion of the visit of LF management and experts to Prince Charles in Highgrove, England in the print media, Saturday's Pravda: "Prince Charles' forest is decorated with Slovak elms. For 20 years"
26 February	The Faculty of Forestry was part of the filming of the TUZVO video spot for www.refresher.sk.
11 March	As part of the "Where to go to college" video series, Refresher.sk took a look at the Technical University of Zvolen. Promotion of studies at the Faculty of Arts within Youtube.
26 March	Promotion of the quality of distance learning at the Faculty of Arts in social networks in the form of video shot. Online learning opportunities at the Faculty of Forestry along with photodocumentation of e-learning by faculty lecturers during the COVID-19 pandemic.
28 March	Online promotion of the 60th Faculty Round of Student Scientific and Professional Activities at the Faculty of Forestry.
17 April	The newly elected Dean of the Faculty of Forestry prof. Marek Fabrika promotes distance learning within Lesmedium.sk.
22 April	Promotion of international scientific outputs of the Faculty of Science on the popular server startitup.sk: "Slovak scientist helped figure out how to stop the decline of plants and animals"
May 3	Promotion of May Day by young graduates and several students of the Faculty of Arts despite the Corona virus in front of the main building of TUZVO.
21 May	Video promotion of a study published in the journal Science, which is the result of the work of an international team of scientists, including Dr. František Máliš from the Faculty of Forestry TUZVO.
12 - 14 June	Promotion of the possibility of using drones in studies at the Faculty of Forestry in Zvolen through the Halali RTVS show.
30 June	Popularising science at LF through Quark magazine: 'Will they survive without us?'
9 July	Video promotion of the state examinations at the Faculty of Arts TUZVO in social networks and the website of the Faculty of Arts TUZVO.
26 July	Top science at the Faculty of Forestry in Zvolen. Promotion of the interview with its other representative Dr. Máliš in the weekend edition of the daily Pravda.
26 August	Promotion of the new professor doc. Dr. Mgr. Jaroslav Ďurkovič in the field of forestry phytology.
16 September	Video promotion of new world-class scientific results published in the journal Science of the Total Environment by an international team of scientists led by Dr. Michal Bošeľa from the Faculty of Science of the University of Life Sciences of the University of Life Sciences of the University of Life Sciences of the University of Life Sciences of the Czech Republic in social networks and on the website of the Faculty of Life Sciences of the Czech University of Life Sciences of the Czech Republic.
26 September	Video promotion of the realization of dissertation and habilitation thesis defenses, as well as scientific council meetings in a combined online and face-to-face environment due to pandemic measures within social networks and the website.

27 September	The management of the Faculty of Forestry met with a representative of the business sector from the company IterSoft, which develops and offers information systems for forest managers. The aim of the meeting was to modernise the teaching of forest management and other subjects towards computerisation. An agreement was also reached on the transfer of technology and innovation to forest operations.
30 September	Appointment meeting of the LF management with freshmen of the Bachelor's degree. Office 365 options were highlighted, compliance measures were noted and studying was encouraged.
02 October	Meeting of the LF management with student representatives in the AS LF and TUZVO in both face-to-face and online form (Microsoft Teams) regarding the improvement of teaching and learning environment during a pandemic.
03 October	The results of the leading forestry science of our faculty in the main news of the Slovak Television (RTVS) in the section "Focused by our world".
08 October	Visit of the Director General of the Forestry Section of the Ministry of Agriculture Ing. Michal Tomčík. The management of the Faculty of Forestry together with prof. Viliam Pichler discussed with the Director General the possibilities of transferring the final software solutions of the faculty (growth simulator SIBYLA) directly to the forestry practice.
08 October	Boris Jedlička, a second year engineering student at the Faculty of Forestry, took part in the Summer Universiade of the Slovak Republic in Žilina and placed second in the non-standard category - bare bow.
12 October	The management of the Faculty of Forestry together with prof. Viliam Pichler met with the new management of ŠL TANAP, Director Ing. Ján Marhefko and the head of the research station Ing. Zuzana Homolová, PhD. The topic of the meeting was mutual cooperation, e.g. in the field of management and the implementation of final works in ŠL TANAP, the joint implementation of scientific and research focuses and ecological restoration of TANAP stands after the wind calamity of 2004.
17 October	LF promotes the purchase of a recording studio (green screen, studio microphone, vlogging camera, more powerful computer and necessary software)
19 October	Due to the difficulty in organizing the main exercises at the LF due to COVID 19, the faculty offers the possibility to partially compensate for this situation by providing 360 degree panoramic images of the locations of the main exercises and placing them on the web.
23 October	Dean of the Faculty of Forestry, prof. Marek Fabrika, received at the Faculty the Minister of PaRV Ján Mičovský. During the meeting at the Dean's Office, they jointly discussed priority areas of cooperation in the short and medium term.
19 November	The President of the Slovak Republic, Zuzana Čaputová, appointed Assoc. Ing. Karol Ujházy, PhD., from the Faculty of Forestry, TUZVO, in the field of Forest Phytology.
26 November	Online conference Financing Forests-Tree 2020 with the participation of the Minister of the Ministry of Forests and Forestry of the Slovak Republic Mr. Jan Michovský, organized by the Department of Forest Economics and Management.
18 December	Video Christmas greeting of the dean's office and the LF management created in the new LF recording studio shared via social networks and the LF TUZVO website.

LF Student Portfolio

Within the 2016-2020 period, the portfolio of first-year students at the LF is clearly dominated by three main groups (clusters) of students (Figure 4), namely: *forestry secondary schools (*average share of 50% of the total number of students), *grammar schools (*25%) and technical secondary schools (here we include electrical, civil, industrial, mechanical and vocational - about 14%). In the 2019-2020 study period, we can observe a trend of a gradual increase in the share of students from forestry secondary schools (18%), gymnasiums (26%) and technical secondary schools (50%) in the total student portfolio, as well as an increase in the total number of students enrolled in the first year compared to the previous year in 2019, with a growth index of 1.22.

Figure 5 documents the distribution of the number of the largest group of students from forestry SHSs. For the period 2019-2020, we can state that on average, students from Banská Štiavnica (about 44% of the total number of students from forestry secondary schools), Liptovský Hrádok (about 33%) and Prešov (23%) have the largest representation, while students from the forestry secondary school in Tvrdošín are a minority.

In contrast, the representation of grammar school students as the second largest group of students at the LF with 25% (Figure 6) shows the following over the period under study:

a. *high variability in the representation of individual cities between years,*
b. *a low number of students per grammar school in the range of 1-3 students and*
c. *the overwhelming concentration of grammar schools from the Central Slovak region (Banskobystrický and Žilinský).*

The cities that had the highest representation of grammar school students during the entire period under study include Brezno, Zvolen, Banská Bystrica, Bardejov, Rožňava, Krupina and Košice.

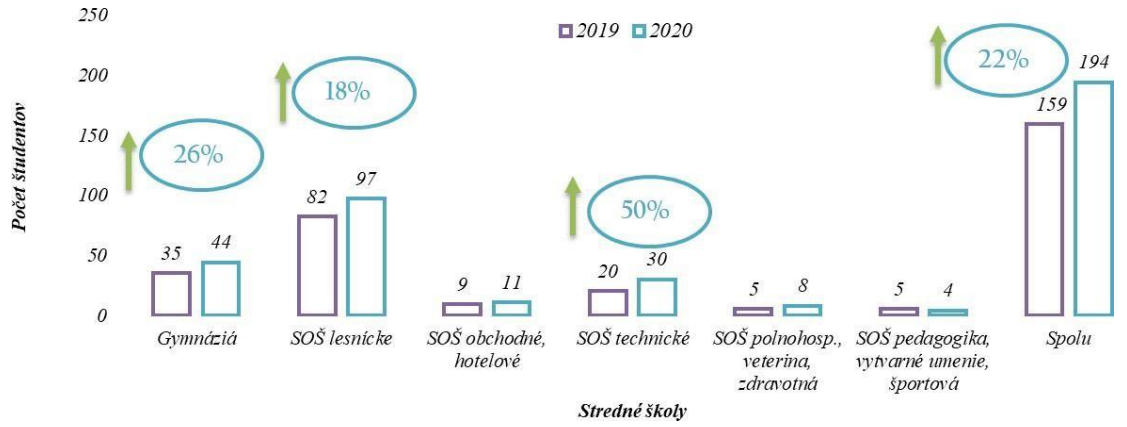


Fig. 4 Trend in the number of secondary school students enrolled in the first year 2019-2020

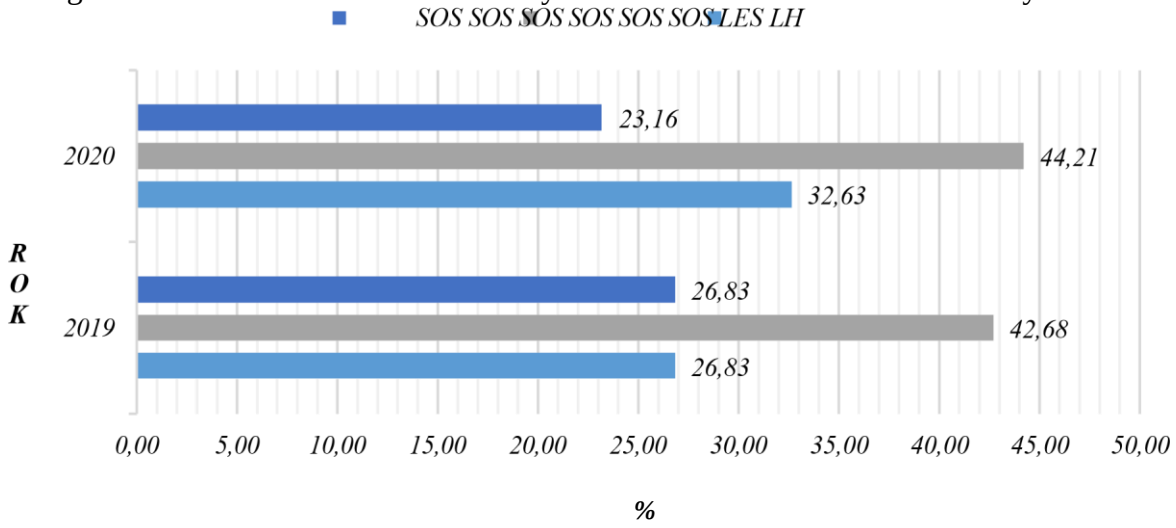


Fig. 5 Evolution of the percentage of students in the total number of students from forestry secondary schools in 2019-2020

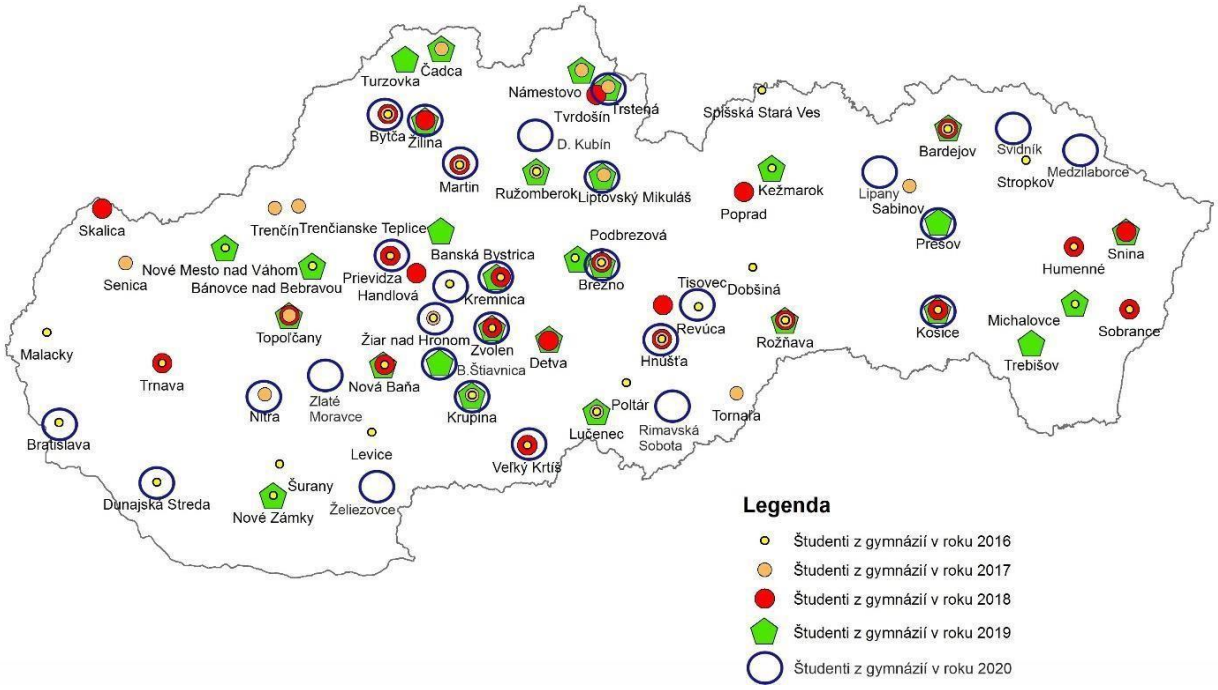


Fig. 6 Development of the representation of grammar school students in the first year of LF in the cities of Slovakia in 2016-2020

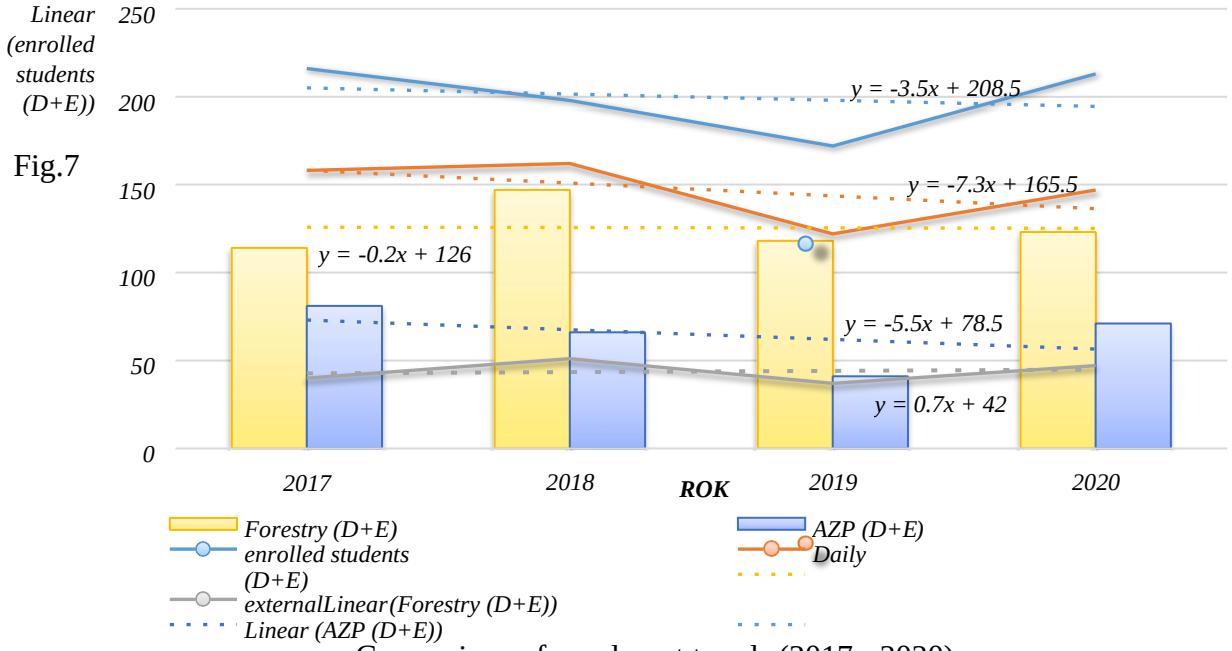
Comparing the trends for the years 2017-2020, we can conclude the following (Figure 7):

- The total number of students enrolled (full-time and part-time) in the first year of the Bachelor's degree has declined only very slightly with a tendency to increase again in the last year 2020 (22% increase),
- the decrease is only visible for full-time students, while for external students it is a trend with a slight increase,
- from the comparison of the two main study programmes we register a greater decrease of students in the AZP programme with a tendency to increase again in the last year 2020 (69% increase), when the situation in the forestry study programme is almost balanced.

N

U M B E R O F ST U D E N TS

Fig.7



Comparison of enrolment trends (2017 - 2020)

From the marketing approach of targeting a specific type of high school (student segment) to increase student success during their undergraduate studies at the college, we also evaluated the effect of high school type on state exam success at the end of the bachelor's degree. However, we did not find statistical support for the effect of high school type on state exam success (R= -0.1111). In terms of frequency analysis, we can evaluate the situation for the year 2020, where out of 28 unsuccessful students, 18 were from secondary schools and 10 were from high schools.

A PROPOSAL FOR EXTERNAL RELATIONS TASKS FOR 2021

In 2021, the strategy of promoting and motivating the personal growth of students in order to increase their employability on the labour market, as well as the scientific and pedagogical staff of the Faculty in order to achieve quality in their teaching and research activities will continue. *In view of the unfavourable prospects of the situation with regard to the pandemic disease COVID-19, constantly adapt marketing activities towards secondary school students, students of the Faculty of Arts, their potential employers, as well as the scientific and pedagogical staff of the Faculty.* Efforts will be made to encourage, motivate students in their distance education, promote the quality of the offered online/commented lectures and tutorials, promote scientific and other important outputs of prominent students and scientists of the faculty in TV and print media as well as on social networks in the form of paid advertising, promote interdepartmental as well as interfaculty scientific teams with a tendency to form project teams (also on online platform) on a spin-off basis.

Task 1

Promoting the quality of online education and motivating students in distance learning

Continue to promote and motivate the personal growth of LF students in order to increase their employability in the labour market with tailored marketing tools in the light of the global pandemic:

- telephone or online communication with potential employers in the LH sector,
- meeting with students in the form of online meetings,
- Implementation and promotion of quality online education,
- Motivating lectures for mastering distance learning in the form of online couching,
- Active online networking for clubs, project activities, mobility and social marketing.

Similarly, for the scientific and pedagogical staff of the Faculty of Arts, online couching, active online networking for online mobility and social marketing will be used for the purpose of achieving quality in teaching and research activities.

Task 2

Promotion of interdepartmental as well as interfaculty scientific teams and their outputs
Based on the strong support of the new category of the LF SVOČ focused on theses containing elements of innovation, students will be guided for teamwork under the responsibility of their supervisors between departments or faculties and then selected for the formation of spin-off project teams. The implementation will be adapted for an electronic environment within available software solutions with promotion of the outputs through multiple faculty communication channels (print and TV media). In the same way, these students will be able to participate in other projects, e.g. with the city of Zvolen within the framework of building green infrastructure in the city's intramural area, as well as in international projects of the faculty. Similarly, the aim is to develop this activity among the scientific and teaching staff towards achieving a higher competitiveness of the submitted research projects.

Task 3

Building relationships with secondary schools and international educational and research institutions, with an emphasis on the electronic environment
Promotion of the faculty at the international level in two main areas: scientific activities (electronic and personal promotion of scientific teams at professional forums) and study opportunities, faculty environment (modern and creative interior of TUZVO, online brochures, online fairs, international student activities, Erasmus+, CEEPUS) in conjunction with the city of Zvolen (green infrastructure and biotechnological innovations). Cooperation with secondary schools and involvement of their students in the faculty's SVOČ and research projects with emphasis on the online environment (www.lesnickyvyskum.sk). Efforts to establish individual top faculty researchers and their teams within the international structures of institutions such as EFI and IUFRO.

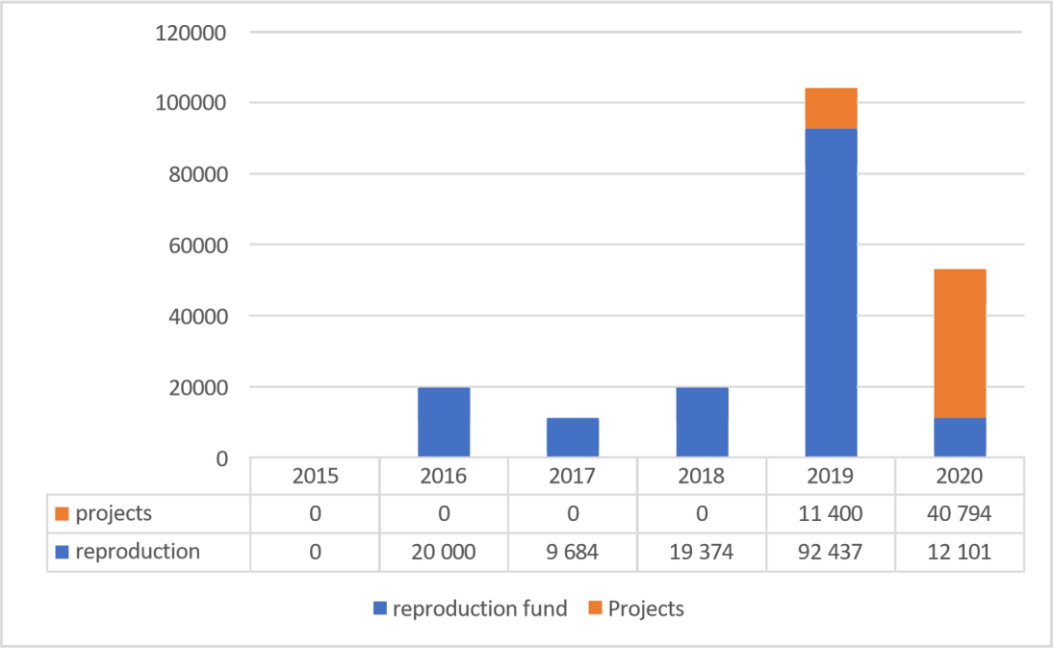
7. Management of the Faculty

The draft methodology for the distribution of the subsidy of TU in Zvolen for 2020 and the procedure of budgeting was discussed at the meeting of the Rector's College of TU in Zvolen on 16 March 2020. Subsequently, the Academic Senate of the Technical University of Zvolen at its meeting on 6 April 2020 approved the proposal for the distribution of the subsidy of TU Zvolen and the budgeting process for 2020.

1. Funds for capital expenditure - subsidy

Funds for capital expenditures from the endowment have not been allocated to the faculty in 2020. In the long term, the faculty provides capital development only from facultydriven projects and the faculty reproduction fund. An overview of investments through capital expenditures since 2015 is shown in the chart below (Figure 1).

Fig. 1: Evolution of LF capital expenditure in Euros per year in 2015 - 2020 by funding source



	2015	2016	2017	2018	2019	2020
projects	0	0	0	0	11 400	40 794
reproduction	0	20 000	9 684	19 374	92 437	12 101

2. **Funds for current expenditure - goods and other services - subsidy**

a) Education and operation of the faculty - programme 0771100

The faculty was allocated current expenditure of **€4,570** (same as the previous year) on goods and other services for the provision of education and operations. The 2019 saving of €2,429 was carried forward as a balance to the following year. A breakdown by department is shown in the table below (Table 1).

Table 1: Utilization of current endowment expenditures in individual departments in 2020

Department	Subsidy r.2020	Balance from 2019	Expenditure in 2020	Balance of 2020
KPP	454,00 €	450 €	486,00 €	418 €
KPL	404,00 €	245,84 €	24,91 €	624,93 €
KERLH	492,00 €	357,64 €	835,55 €	14,09 €

KF	383,00 €	92,47 €	28,46 €	447,01 €
KLŤLM	396,00 €	0,00 €	92,64 €	303,36 €
KAZMZ	343,00 €	122,65 €	443,05 €	22,60 €
KIOLK	375,00 €	35,51 €	69,00 €	341,51 €
KPLZI	552,00 €	96,95 €	137,52 €	511,43 €
DLF	1 171,00 €	1 028,36 €	1 692,08 €	507,28 €
Total	**4 570,00 €**	**2 429,42 €**	**3 809,21 €**	**3 190,21 €**

b) Research and development activities - subsidy for the operation and development of infrastructure for research and development - programme 0771201

The faculty has been allocated **€ 26 550** for research and development activities for 2020 (by 2 610

The 2019 saving of € 10 520,30 was carried forward as a balance to the following year. An overview by department is given in the table below (Table 2).

Table 2: Expenditure on research and development activities (science and technology chapter) by department in 2020

Department	Subsidy r.2020	Balance from 2019	Expenditure in 2020	Balance of 2020
KPP	2 490,00 €	1 159,05 €	2 979,02 €	670,03 €
KPL	2 208,00 €	394,66 €	760,93 €	1 841,73 €
KPLZI	3 238,00 €	1 975,45 €	3 463,82 €	1 749,63 €
KERLH	2 178,00 €	1 270,79 €	2 465,94 €	982,85 €
KF	2 202,00 €	1 581,49 €	1 113,68 €	2 669,81 €
KLŤLM	2 539,00 €	1 536,14 €	2 131,13 €	1 944,01 €
KAZMZ	1 887,00 €	1 945,97 €	3 754,11 €	78,86 €
KIOLK	1 807,00 €	201,28 €	866,22 €	1 142,06 €
DLF	8 001,00 €	455,47 €	2 659,90 €	5 796,57 €
Total	**26 550,00 €**	**10 520,30 €**	**20 194,75 €**	**16 875,55 €**

c) Structural changes

For the structural changes of the faculty, a subsidy of **€93 750** has been allocated to the faculty for 2019. Balances from 2019 in the amount of € **84 622,79** were carried over as a

balance to 2020. The funds were invested in the modernization of teaching (purchase of tablets and licenses

information system of the VŠLP for exercises and main exercises - PSL, LHE and maps) and invested in the development of infrastructure within the upcoming virtual science park of TUZVO (laboratory equipment - furniture and fume cupboards). The amount of investment is shown in Table 3.

Table 3: Allocations and uptake of structural change funding in 2020

SPP element	Subsidy r.2020	Balance of the subsidy. from 2019	Drawdown r.2020	Balance of 2020
077116105	0,00 €	84 622,79 €	55 255,05 €	29 367,74 €

3. Funds allocated to scientific projects

a) KEGA projects

In 2020, the KEGA grant agency has allocated current funds totalling **€ 38,725** for research and development tasks for the development of education in the specified areas. A list by project and responsible investigator is given in Table 4.

Table 4: Allocations and spending in KEGA projects in 2020

SPP element	Principal investigator	Subsidy r.2020	to be added in 2019	Drawdown r.2020	Balance of 2020
K-18-001-00	prof. Hajdúchová	12 349,00 €	2 788,81 €	15 137,81 €	0,00 €
K-18-002-00	prof. Jakubis	5 949,00 €	1 465,13 €	5 325,18 €	2 088,95 €
K-19-001-00	Prof. Fabrika	6 271,00 €	2 054,68 €	8 325,68 €	0,00 €
K-19-002-00	prof. Šálka	7 150,00 €	692,00 €	1 991,78 €	5 850,22 €
K-19-003-00	doc. Stollmann	7 006,00 €	583,43 €	8 211,87 €	-622,44 €
Total		**38 725 €**	**7 584 €**	**38 992 €**	**7 317 €**

b) VEGA projects

In 2020, the VEGA grant agency allocated funds for current expenses in the amount of 218 340 to individual project leaders for basic research
€. The list by project and responsible researchers is given in Table 5.

Table 5: Allocations and spending in VEGA projects in 2020

SPP element	Principal Investigator	Subsidy r.2020	Balance of 2019	Drawdown r.2020	Balance of 2020
V-17-001-00	doc. Gömöryová	14 508,00 €	10 312,48 €	23 026,41 €	1 794,07 €
V-17-005-00	Ing. Klinga	2 012,00 €	1 208,16 €	3 182,16 €	38,00 €
V-17-006-00	prof. Ujházy	13 608,00 €	4 452,50 €	16 301,89 €	1 758,61 €
V-18-001-00	prof. Pichler	6 769,00 €	51,93 €	4 491,29 €	2 329,64 €
V-18-002-00	doc. Vido	10 994,00 €	5 296,37 €	10 879,11 €	5 411,26 €
V-18-003-00	doc. Chudý	11 063,00 €	3 804,98 €	8 014,56 €	6 853,42 €
V-18-004-00	prof. Saniga	5 968,00 €	1 457,46 €	6 987,34 €	438,12 €
V-18-005-00	doc. Kurjak	11 966,00 €	3 226,36 €	15 192,36 €	0,00 €
V-18-006-00	doc. Gejdos	5 233,00 €	878,34 €	6 111,34 €	0,00 €
V-19-001-00	prof. Škvarenina	20 475,00 €	1 052,97 €	14 821,24 €	6 706,73 €
V-19-002-00	doc. Lukáčik	6 016,00 €	1 031,67 €	3 747,42 €	3 300,25 €
V-19-003-00	prof. Ďurkovič	14 570,00 €	2 140,96 €	13 809,34 €	2 901,62 €
V-19-004-00	prof. Kropil	5 852,00 €	1 510,94 €	877,80 €	6 485,14 €
V-20-001-00	doc. Jaloviar	7 522,00 €	0,00 €	2 090,26 €	5 431,74 €
V-20-002-00	doc. Šulek	6 958,00 €	0,00 €	2 473,02 €	4 484,98 €
V-20-003-00	Ing. Giertliová	6 299,00 €	0,00 €	2 706,34 €	3 592,66 €
V-20-004-00	Ing. Šterbová	6 055,00 €	0,00 €	3 010,81 €	3 044,19 €
V-20-005-00	prof. Gömöry	18 659,00 €	0,00 €	10 724,83 €	7 934,17 €
V-20-006-00	doc. Merganič	15 361,00 €	0,00 €	12 159,50 €	3 201,50 €
V-20-007-00	Ing. Mokros	13 432,00 €	0,00 €	12 880,63 €	551,37 €
V-20-008-00	doc. Kurjak	12 820,00 €	0,00 €	8 184,57 €	4 635,43 €
O-11-110/0003-00	prof. Ujházy	2 200,00 €	58,15 €	2 258,15 €	0,00 €
Total		**218 340 €**	**36 483 €**	**183 930 €**	**70 892,90 €**

c) **APVV projects**: the Agency has allocated a total of **€ 642 584** in current funding for APVV projects in 2020. A list by project and responsible investigator is given in Table 6. *Note: The balance column also includes salary expenses for the month of December 2020 paid in January 2021. These expenses are counted in the 2020 budget according to the Agency's APVV rules. However, they are booked in 2021 in the accounts of the TUHVO. Therefore, these are not funds to be returned to the Agency.*

Table 6: Allocations and uptake of funding under the APVV projects in 2020

SPP element	Principal Investigator	Subsidy r.2020	of which Coinvestigator	Balance of 2019	Returned in year 2019	Drawdown r.2020	Balance of 2020
06K1157	**Mgr. JUDr. Dobšinská**	0,00 €	0,00 €	3 156,25 €	2 798,27 €	357,98 €	**0 €**
06K1158	**doc. Gömöryová**	13 172,00 €	6 142,58 €	833,53	827,35	6 327,18 €	**708,42 €**
06K1160	**Ing. Bošeľa**	18 613,95 €	0	2 761,35 €	2 069,26 €	19 306,04 €	**0 €**
06K1161	**prof. Ujházy**	20 364,00 €	8 428,00 €	0,00 €	0,00 €	11 936,00 €	**0 €**
06K1170	**prof. Pichler**	2 360,00 €	0,00 €	5 835,28 €	5 835,28 €	2 360,00 €	**0 €**
06K1172	**doc. Fleischer**	47 379,00 €	4 827,00 €	0,00 €	0,00 €	42 500,28 €	**51,72 €**
06K1177	**doc. Merganič**	82 404,00 €	0,00 €	1 464,27 €	0,00 €	81 075,02 €	**2 793,25 €**
06K1178	**prof. Škvarenina**	83 826,00 €	36 883,00 €	1 052,23 €	0,00 €	46 572,59 €	**1 422,64 €**
06K1180	**doc. Střelcová**	40 116,00 €	11 398,00 €	512,78 €	0,00 €	29 230,78 €	**0 €**
06K1181	**prof. Hajdúchová**	46 068,00 €	0,00 €	9 235,92 €	26,68 €	42 847,99 €	**12 429,25 €**
06K1185	**doc. Gömöryová**	6 754,00 €	3 162,00 €	0,00 €	0,00 €	3 592,00 €	**0 €**
06K1186	**prof. Holécy**	29 603,00 €	0,00 €	0,00 €	0,00 €	27 277,94 €	**2 325,06 €**
06K1187	**Ing. Máliš**	32 885,00 €	0,00 €	0,00 €	0,00 €	30 327,25 €	**2 557,75 €**
06K1188	**Ing. Bošeľa**	73 206,00 €	0,00 €	0,00 €	0,00 €	69 986,19 €	**3 219,81 €**
06K1189	**Prof. Fabrika**	20 865,00 €	0,00 €	0,00 €	0,00 €	17 737,42 €	**3 127,58 €**
O-16-110/0001-00	**prof. Škvarenina**	5 680,00 €	0,00 €	786,98 €	289,50 €	6 177,48 €	**0 €**
O-17-110/0001-00	**doc. Střelcová**	20 062,00 €	0,00 €	395,65 €	0,00 €	20 457,65 €	**0 €**

O-17-110/0002-00	**prof. Gömöry**	30 844,00 €	0,00 €	0,00 €	0,00 €	30 149,05 €	**694,95 €**
O-18-110/0002-00	**prof. Šálka**	35 350,00 €	0,00 €	1 507,00 €	76,38 €	36 668,19 €	**112,43 €**
S-19-110/0001-00	**prof. Saniga**	22 182,00 €	0,00 €	95,07 €	95,07 €	20 154,80 €	**2 027,20 €**
S-20-110/0001-00	**prof. Škvarenina**	10 850,00 €	0,00 €	0,00 €	0,00 €	10 850,00 €	**0 €**
Total		**642 584 €**	**70 841 €**	**27 636,31 €**	**12 017,79 €**	**555 891,83 €**	**31 470,06 €**

d) **Top teams**

The top team has also been allocated funding from the 2020 endowment in the amount of **€ 20 000,** as shown in Table 7.

Table 7: Allocations and spending in 2020 for the Top Team

SPP element	Name	Subsidy r.2020	Balance r.2019	Expenditure in 2020	Balance of 2020
I-16-110-00	Sylvibio	20 000,00 €	184,74 €	19 983,77 €	16,23 €

e) **Foreign projects**

The Faculty of Forestry received funding in 2020 under five international projects. An overview of the allocated funds and their use by individual projects and their responsible researchers is given in Table 8.

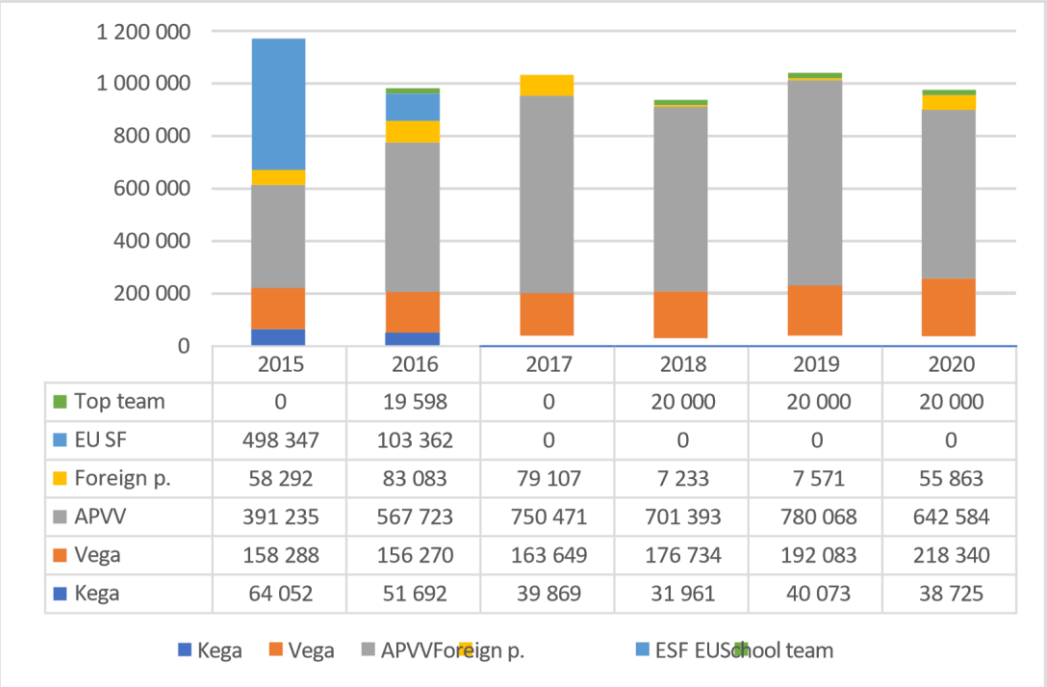
Table 8: Allocations and uptake in 2020 for international projects

SPP element	Project	Subsidy r.2020	Balance from 2019	Expenditure in 2020	Balance of 2020
Z-16-110/0001-00	Alterfor prof. Tucek	0,00 €	0,00 €	14 979,99 €	-14 979,99 €
Z-17-110/0001-00	COST Merganic	0,00 €	134,47 €	134,47 €	0,00 €
Z-17-110/0002-00	LIFE Lynx prof. Kropil	52 737,80 €	1 157,03 €	-33 655,21 €	87 550,04 €
Z-18-110/0001-00	Perform-EFI	2 177,47 €	1 566,42 €	3 743,89 €	0,00 €
Z-18-110/0002-00	Formasan-EFI	948,00 €	341,82 €	1 289,82 €	0,00 €
Total		**55 863,27 €**	**3 199,74 €**	**-13 507,04 €**	**72 570,05 €**

f) **Overview of projects for the previous period**

Figure 2 shows the overall overview and evolution of funding received for research projects by individual grant agencies since 2015.

Fig. 2: Evolution of funding for research projects 2015-2020



	2015	2016	2017	2018	2019	2020
Top team	0	19 598	0	20 000	20 000	20 000
EU SF	498 347	103 362	0	0	0	0
Foreign p.	58 292	83 083	79 107	7 233	7 571	55 863
APVV	391 235	567 723	750 471	701 393	780 068	642 584
Vega	158 288	156 270	163 649	176 734	192 083	218 340
Kega	64 052	51 692	39 869	31 961	40 073	38 725

g) **Project contributions to energy**

Table 9 shows the contribution of the project investigators to the University's energy. For the VEGA and KEGA projects this was set at 15 % of goods and services and for the APVV projects the energy contributions were transferred according to agency rules and planned budgets.

Table 9: Contributions of faculty research projects to university utility expenditures

Contribution to energy	Sum
APVV	19 929,02 €
VEGA	32 722,65 €
KEGA	5 808,75 €
Total	**58 460,42 €**

Table 10 provides a breakdown of the energy and depreciation allowances of the individual faculty departments by project and responsible investigator.

Table 10: Project contributions to energy and depreciation by project and responsible investigator in 2020

SPP element	Principal Investigator	Write-offs	Energy
06K1158	doc. Gömöryová		160 €
06K1160	Ing. Bošeľa	1 575,45 €	1 387 €
06K1161	prof. Ujházy	216 €	358,05 €
06K1172	doc. Fleischer	6 381 €	46,49 €
06K1177	doc. Merganič	5 500 €	6 378,61 €
06K1178	prof. Škvarenina	600 €	
06K1180	doc. Střelcová	563,47 €	862 €
06K1181	prof. Hajdúchová		2 714 €
06K1185	doc. Gömöryová		107 €
06K1186	prof. Holécy		890 €
06K1187	Ing. Máliš	2 060 €	986,55 €
06K1188	Ing. Bošeľa	2 625 €	1 701 €
06K1189	Prof. Fabrika	3 000 €	635,62 €
O-17-110/0001-00	doc. Střelcová	1 094,95 €	602 €
O-17-110/0002-00	prof. Gömöry	2 452 €	1 850,7 €
O-18-110/0002-00	prof. Šálka	1 000 €	1 000 €
S-19-110/0001-00	prof. Saniga	600 €	250 €
		27 667,87 €	**19 29,02 €**

4. LF Reproduction Fund

Table 11 shows the status of the faculty reproduction fund for 2020.

Table 11: Status of the faculty reproduction fund in 2020

SPP element	Balance from previous years	Acquired in 2020	Drawdown r.2020	Balance of 2020
O-07-110/0027-00	138 481,11 €	27 736,37 €	12 101,00 €	154 116,48 €

A computer-aided data collection kit was purchased from the reproduction fund in 2020 for a total of €12 101.

Table 12 shows the 2020 depreciation prescription and the 2020 depreciation allowance by faculty department.

Table 12: Faculty depreciation provision and depreciation allowances in 2020 by department

Workplace	Depreciation 2020 (prescription)	Reclassification to depreciation 2020 (contributions)	The Difference
KPP	-5 860 €	2 258 €	-3 602 €
KPL	-908 €	600 €	-308 €
KAZMZ	-1 082 €	0 €	-1 082 €
KIOLK	-8 509 €	6 381 €	-2 128 €
KPLZI	-7 600 €	7 200 €	-400 €
KERLH	0 €	1 000 €	1 000 €
KF	-5 750 €	4 728 €	-1 022 €
KLŤLM	-5 342 €	5 500 €	158 €
DLF	-469 €	0 €	-469 €
Total	**-35 520 €**	**27 667 €**	**-7 853 €**

Departmental depreciation was covered by 78% of project funds.

Figure 3 below shows the evolution of the total depreciation regulations for each department as well as the departments' contributions to depreciation since 2015.

Fig. 3: Depreciation recovery in 2015-2020

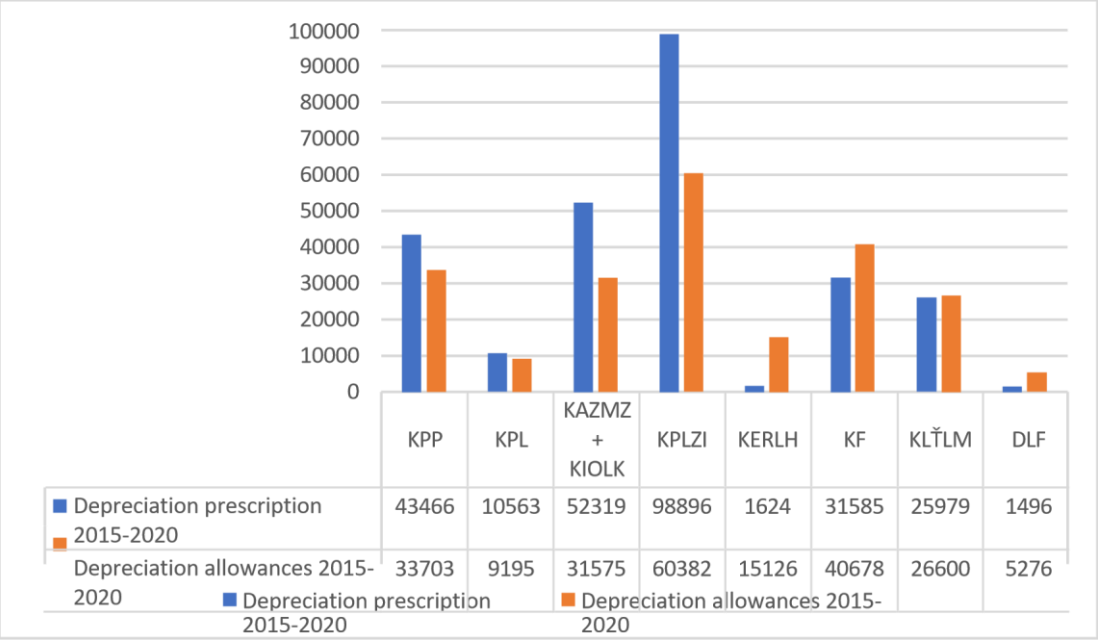
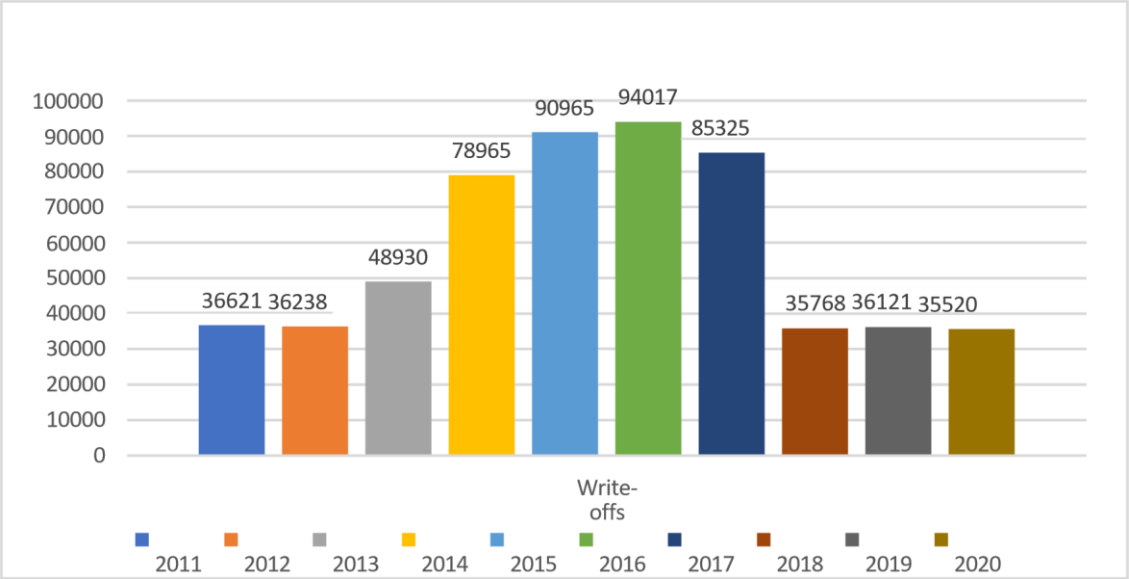


Figure 4 then shows the development of the depreciation rate of the Faculty of Forestry between 2011 and 2020.

Fig. 4: Development of the LF depreciation rate in the years 2011 - 2020



5. Wage appropriations

The faculty has been allocated **€1,961,701** for salaries and €690,519 for wages in 2020, which is an increase of €128,755 in salaries compared to 2019. The actual use of salary appropriations for 2020 was €2 040 519 (€154 022 more than in 2019), including personal allowances and bonuses. During the year, the wage bill was replenished with the balance from the previous year, funds from the current account and refunds from business activities.

Personal allowances and bonuses for 2020 were paid in the total amount of **€ 483 439** (20 259 more than in 2019) on the basis of the "Criteria for granting personal allowances for teaching and research staff of the Faculty of Arts" discussed in the AS LF.

Figure 5 shows the evolution of staff salaries since 2015, divided into the eligible component (tariff salaries and functional allowances) and the incentive component (personal allowances and special bonuses). Figure 6 then shows the evolution of salaries calculated on average per employee.

Fig. 5: Evolution of salaries (eligible and incentive component) of the Faculty of Forestry in 2015 - 2020

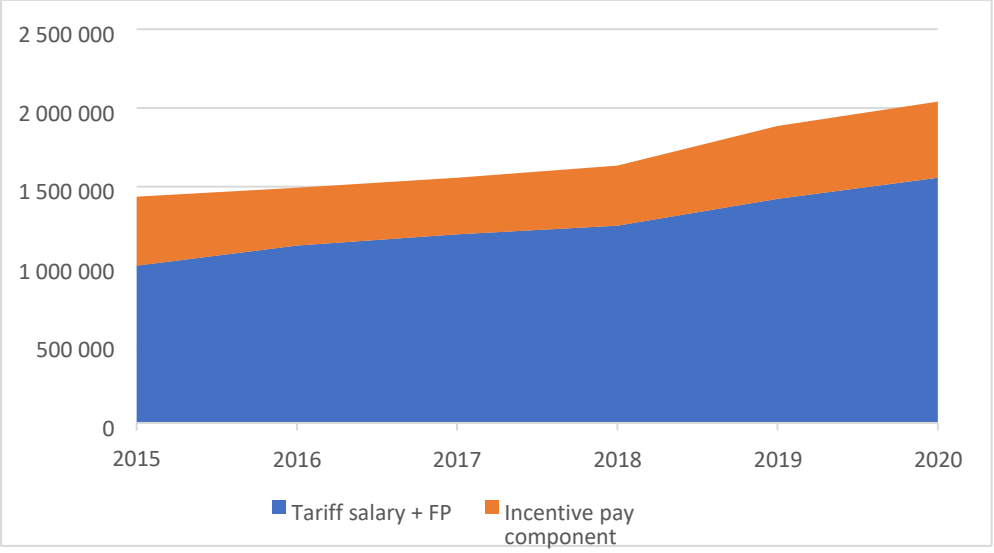


Fig. 6: Evolution of salaries (eligible and incentive pay) of the LF on average per employee in 2015 - 2020

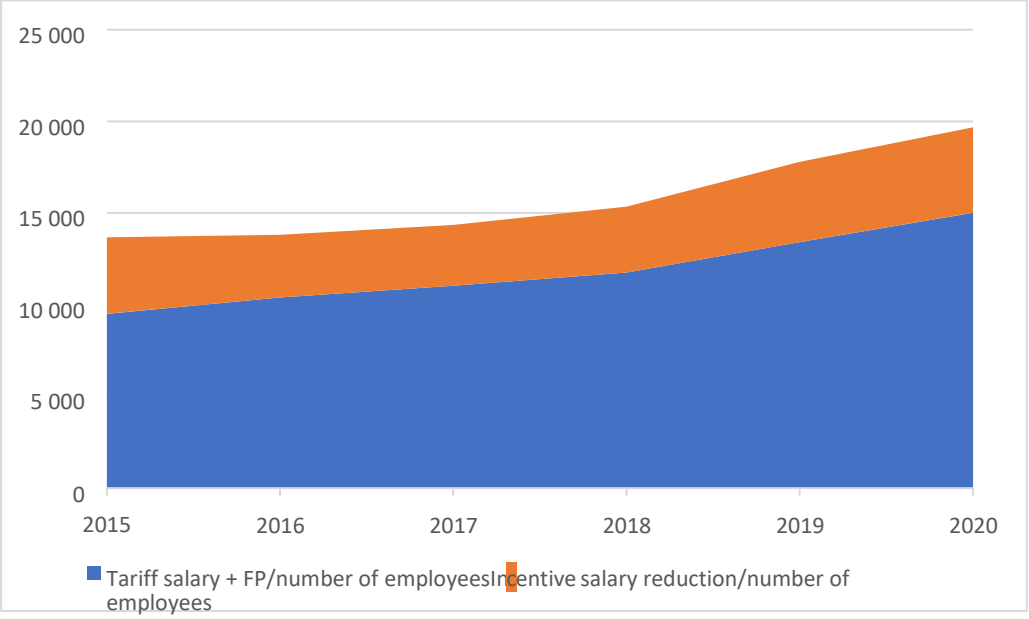


Table 13 shows the total use of LF salary resources in 2020 based on the report received from the HR department of the TUZVO.

Table 13: Use of LF salary funds in 2020

Workplace	2020 budget (excluding levies)	budget for levies for 2020	Retrieved from 1-12/2020	Reimbursement PN	Para.
	1	2	3	4	5

L F	1 961 701	690 519	**2 040 519**	3 707	

off.	annive rsaries	Legal	MP reimbursed from other sources	Salary procedu res	drawing on the departme nt's budget	drawing levies from the departme nt's budget
6	7	8	9	10	11	12
5 050			80 411	5 109	1 963 756	704 851

Retrieved from 1-12/2020	+ saving/ - overshootin g MP 2020	+ savings/ - overrun of MP for 2019, including euro projects)	Balance of 2020 (with deductions)
13	14	15	16
2 668 607	-16 388	79 439	**63 051**

6. Business activity

a) Overview of the Faculty's business activities in 2020

Table 14 shows the revenues and expenses in 2020 from faculty business activities by department.

Table 14: Revenues and costs in 2020 from the Faculty's business activities

Workplace	SPP element	Revenue 2020	Cost 2020	Prof it
KERLH	**P-110-0006/08**	200,00 €	200,00 €	**0,00 €**
KPLZI	**P-110-0001/17**	4 165,63 €	4 165,63 €	**0,00 €**
KF	**P-110-0002/16**	11 283,71 €	11 166,80 €	**116,91 €**
KERLH	**P-110-0001/20**	24 000,00 €	5 559,05 €	**18 440,95 €**
KIOLK	**P-110-0002/20**	1 875,00 €	1 875,00 €	**0,00 €**
KPLZI	**P-110-0003/20**	1 847,40 €	387,95 €	**1 459,45 €**
Total		**43 371,74 €**	**23 354,43 €**	**20 017,31 €**

b) **Overview of profitable accounts of departments and faculty**

Table 15 shows the 2020 drawdown of funds from the for-profit accounts by department and for the faculty.

Table 15: Disbursement of funds from the profit accounts in 2020

Department	SPP element	Balance from previous years	Obtained in 2020	Drawdown	Balance 2020
KPP	R-07-110/0001-00	391,18 €	0,00 €	0,00 €	391,18 €
KPL	R-07-110/0002-00	70,96 €	0,00 €	0,00 €	70,96 €
KAZMZ	R-07-110/0003-00	51 532,20 €	0,00 €	0,00 €	51 532,20 €
KPLZI	R-07-110/0006-00	873,12 €	32,38 €	80,00 €	825,50 €
KERLH	R-07-110/0007-00	761,11 €	19,10 €	0,00 €	780,21 €
KLŤLM	R-13-110/0001-00	1 823,92 €	79,00 €	0,00 €	1 902,92 €
KF	R-09-110/0001-00	14 629,89 €	693,48 €	282,83 €	15 040,54 €
LF	R-07-110/0008-00	823,15 €	16 933,81 €	2 454,40 €	15 302,56 €
Total		**70 905,53 €**	**17 757,77 €**	**2 817,23 €**	**85 846,07 €**

7. Faculty management result 2020 - non-subsidy activity

The economic result generated by the LF for 2020 is **€ 45 405,91** (€ 15 809 more than in the previous year). The economic result from non-subsidy activities amounts to **€ 25 388,60** (€ 2 834 less than in the previous year). The higher use of the funds received was not possible due to the fact that, in accordance with the methodology for the distribution of the subsidy and the budgeting of TU Zvolen for 2020, it is necessary to generate a positive economic result of at least 20% of the income from the main non-endowment activity (i.e. a minimum of € 22,793). 40% of the economic result will be used for the creation of a reserve fund. The remaining percentages are the profit of the departments and faculty.

Table 16 shows the economic result of the Faculty in 2020

Table 16: Faculty economic result in 2020 in €

	Main activity - non-subsidising	EU projects	

Organisational components	Revenue (V)	Cost (N)	Income tax	VH=V-N	Revenue (V)	Cost (N)	VH=V-N	VH main activity nonsubsidy total
LF	136 081,35	110 043		26 038,35		649,75	-649,75	25 388,60

Business activity					Total VH	Revenue-HC Faculty	VH within the meaning of Method. of creating a schedule.
Revenue (V)	Cost (N)	VH=V-N Before by taxation	Income tax	VH after Taxation			
43371,74	18033,37	25 338,37	5 321,31	20 017,31	**45 405,91**	113 965	22 793

Table 17 provides a detailed breakdown of the faculty's non-endowment revenues in 2020. Compared to 2019, there has been a decrease of €9,400 in tuition fee revenue for overstayed studies and also a decrease of €12,450 in tuition fee revenue for external studies, which is related to the decrease in the number of students**.**

Table 17: Revenues from non-endowment activities of the faculty year 2020

Sales scripts	5 670 €
Tuition fees for overstayed DS	25 200 €
Fees for the admission procedure	10 715 €
Fee for issuing documents	445 €
Tuition fees for external study	78 050 €
Creation of the SF	4 640 €
Other income	3 108 €
Proceeds from the use of the SFs	8 253 €
Total	**136 081 €**

The overall evolution of the level of revenues from non-subsidy activities since 2011 is shown in the following figure (Figure 6) and the costs from non-subsidy activities in 2020 are shown in Table 18 below.

Fig. 6: Evolution of the amount of revenue from non-subsidy activities from tuition fees and extra study duration from 2011 to 2020

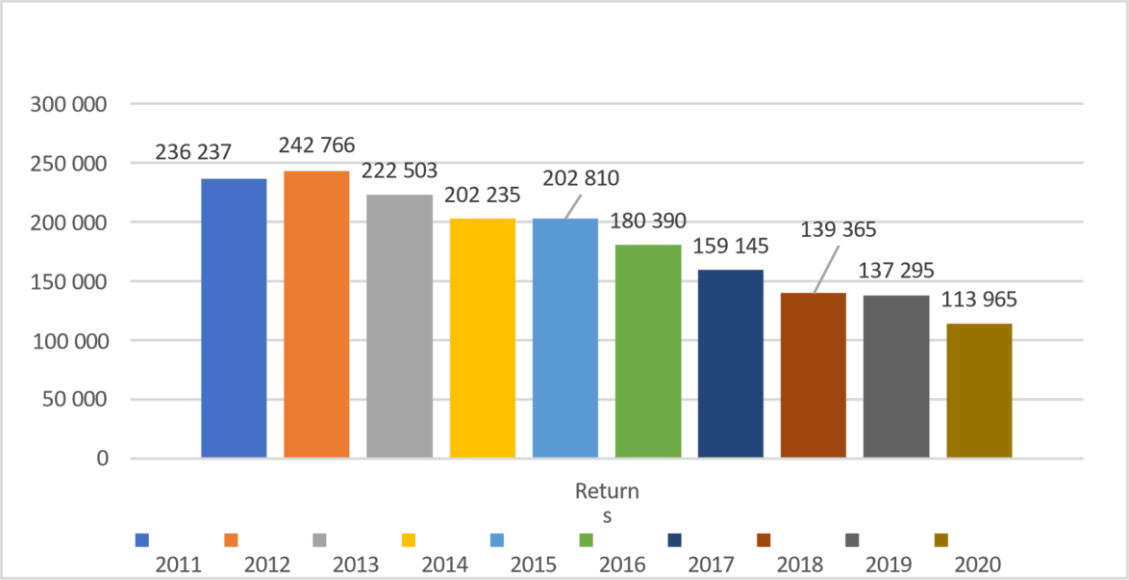


Table 18: Costs from non-subsidy activities year 2020

Office supplies	819 €
Computing	10 847 €
Furniture, classroom equipment	1 621 €
Promotional material, drapes	3 773 €
Repairs	51 €
Travel	-445 €
Advertisement	1 455 €
Telephones, postage	2 656 €
Royalties	2 011 €
Printing of VTU, brochures	5 583 €
Gratuities (recharges from the salary account)	22 000 €
DOVP	7 574 €
Deductions	9 392 €
Other services	2 029 €
Scholarships - payment	8 253 €
Levy - incentive components*	9 950 €
Deduction - computerisation**	5 341 €
Deduction - creation of SF***	4 640 €
LF depreciation	35 520 €
Departmental Transcripts	-27 668 €

Creation of SF from tuition fees	4 640 €
Total	**110 043 €**

*Note: * 10% of the tuition fee income paid for external studies and for exceeding the standard length of study was diverted to the creative staff incentive,*
*** 7% of the revenue from external tuition fees has been used to create resources for informatisation,*
****of the income paid from tuition fees for exceeding the standard length of studies (§ 92 (18) of the Higher Education Act) 20% was used to create a scholarship fund*

8. Implementation of the measures adopted for 2020

a) Individual departments are covering depreciation and replenishing the reproduction fund, with the 2020 rate at 78%. This trend is positive and allows faculty to invest in fixed assets.

b) The performance in scientific activities continues to grow, which manages to compensate for the reduced income of money to the faculty budget under the influence of the decreasing number of students. However, the performance of some of our creative staff is already at the edge of possibility and further ways of optimisation as well as prevention of burnout will have to be sought.

c) In 2020, the resources of the university as well as the faculty were invested in the construction of three laboratories, one recording studio, hardware and software equipment for the pedagogical process (tablets and software) as well as the hardware and software environment of science

and research (computer-assisted data collection), as well as in equipping selected rooms with technology for tele-conferencing and distance learning. This creates the conditions for improving the teaching and scientific environment, and thus for maintaining or increasing the performance of creative staff.

d) In 2020, cooperation in the form of memoranda and preliminary agreements was established with external organizations (NLC, State Forests of TANAPU, private company ITERSOFT) to increase the potential for innovation and transfer of knowledge and technology into practice. We have also applied for international projects from EU structural funds and if successful, additional financial resources will be generated.

9. Draft measures for 2021

a) There is no expectation that student numbers will increase given the demographic curve, the competitive environment in higher education in Slovakia and the outflow of students abroad. Therefore, it will continue to be necessary to create optimal conditions for maintaining or growing performance in science and research. We propose the following measures:

- maintain the incentive component of the wage,
- creating the conditions for scientific work by investing in scientific infrastructure. This involves building laboratories, instrumentation and technical support within the framework of the upcoming virtual science park of TUZVO. Priority will be given to departments and teams that have a high scientific performance and therefore represent the best guarantees for the effectiveness of the funds spent. For example, the H-indexes of departments and teams will be taken into account, as well as their innovation potential,
- to create conditions for optimising teaching and thus reducing the teaching load of executive staff. This involves the use of modern and promising forms of teaching, which were already deployed in 2020 during the pandemic, transformation of teaching to problem-oriented exercises and seminars, block-oriented teaching, recruitment of quality PhD students and their greater involvement in the pedagogical process,
- create conditions to reduce the risk of burnout, especially among over-exposed creative workers. One option is to introduce

"sabbatical of the semester". However, the legislative environment of the faculty will also need to be adjusted for this.,

b) Given the poor financial situation of higher education in Slovakia, which is related to the gradual proclaimed reduction of funding from the Ministry of Education, Science, Research and Sport, it will be necessary to continue to optimize the staffing of the faculty. This is in response to two indicators in which the faculty shows less than optimal figures, namely the number of students per one creative employee and the number of other staff per one creative employee. In view of this situation, it will be necessary to optimise the number of staff drawing salaries from budget allocations and subsidies, for example by gradually shifting research staff to full funding from research projects.

c) With regard to the applicability of scientific research knowledge and its transfer into practice, it will also be necessary to emphasize innovation in the form of new technologies,

software and methodological procedures, as well as direct cooperation with the practice environment to create the conditions for future funding of science and research from the public and private business environment.

d) A high level of effort will continue to be required to secure projects from grant agencies. However, given the uncertain future of some domestic grant agencies (KEGA and VEGA), attention will also need to be paid to foreign grant agencies.

e) In making investments based on the use of the resources generated in the reproduction fund, consideration will be given not only to the performance of the applicant department, but also to the department's past performance in meeting its obligations in replenishing the reproduction fund to ensure value for money.