

**Higher education in forestry in Tharandt –
before and after implementation of the Bologna Principles**

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HIGHER EDUCATION IN FORESTRY IN THARANDT - BEFORE AND AFTER IMPLEMENTATION OF THE BOLOGNA PRINCIPLES

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Abstract

Amongst well established sites of education in forest sciences, Tharandt, Germany, belongs to those with the longest tradition. Graduates from this site influenced forestry education and practice in quite a number of countries worldwide. During more than 200 years, there have been many changes as a result of adaptation to changing framework conditions. After adoption of the Bologna Principles in 1999, the lecturers of the Tharandt Department of Forest Sciences decided to harness the underlying philosophy for fundamentally improving teaching and learning in programmes of forest sciences. Although some shortcomings are visible, overall feedback from graduates and stakeholders is positive, mainly due to the higher flexibility in comparison with the Diploma system. Future challenges are arising both from higher education policy and implementation questions. Besides permanent adaptation to the needs of the job market, keeping the ‘forest focus’ will be one of the fateful questions for the future.

Keywords: Forest sciences, forest history, Tharandt, study programmes, syllabi, graduate survey, public image

The early stages of forestry education in Tharandt

With regard to forestry education, Tharandt is one of the most traditional sites in the world. Although at the end of the 18th century there were previous deliberations to establish a Saxonian forest academy in Freiberg (Schuster, 2013), it was in 1811 when Heinrich Cotta opened his forest academy in the village of Tharandt, close to a large forest area and not too far away from Dresden. In the year 1816, the private institution was transformed into a Saxonian Royal Academy. Finally, the academy became part of Technische Universität Dresden in 1929.

- From the beginning on, there was a continuous discussion if the study programmes should be adapted to the needs of the state forest service only or if they should be open to a broader group of students. Consequently, the requirements for admission to the academy were modified several times (Lorenz, 2012):
- 1816: Minimum age 16 years, lower level of education, morality; open for all applicants, not only those interested in a career at the state forest service.
- 1832: One year of practical placement before enrolment necessary for aspirants of state forest service.
- 1846: Minimum age 17 years; one year of practical placement for all; knowledge level of Gymnasium or secondary school necessary for aspirants of the forest rangers career; final secondary-school examinations from Saxony for forest district officers education.
- 1852: One year of practical placement for aspirants of state forest service; examination report from a secondary school for all fulltime students.
- 1862: Final secondary school certifications obligatory for aspirants of state forest service.

During more than 200 years, the curricula have been permanently adapted to the respective framework conditions. While some disciplines disappeared from the timetables or have at least a modified title today, others kept their name until now. Taking the curriculum of the Royal Forest Academy for the winter term 1828/29 as an example, the then offered disciplines ‘forest management planning’ and ‘forest protection’ are still an integral part of the curriculum today while ‘arithmetic exercises’, ‘drawing of plans’, ‘French language’, ‘Latin language’ cannot be found in the study plans anymore and have been replaced. This is even more the case for lectures in ‘Encyclopedia of forest science’ or ‘patriotic history’. Agricultural science was offered during nearly 40 years (1830-1869) when the Academy consisted of both an agricultural and a forestry department. Table 1 gives an example of teaching contents of the Royal Forest Academy at the end of the 1920s. All lessons listed were taught by the lecturers during summer term and during winter term, respectively. So Table 1 covers more than one batch.

In the 19th century, students had to pay study fees and also for reserving a seat in the lecture hall. It was possible to study as a remote student or guest student. There were consecutive study programmes and complex excursions combining different disciplines. These excursions, conducted per pedes at that time, lasted up to 10 days and gave students even the opportunity to visit remote forests bordering Bohemia (Weber, 2011).

Education in forestry at the Academy in Tharandt was always open to foreign students, although in the 19th century the categorization “foreign” also applied to people from neighbouring countries outside Saxony, i.e. Thuringia or Bavaria. Due to that fact the numbers of “real” international students are a little bit lower. In total, 1503 students from 48 countries were classified as foreign from 1811 to 1945. Additionally, during the period when Tharandt offered academic education both in forestry and agriculture, 177 students were inscribed in agriculture. Some of the students became famous representatives of the forestry profession in Russia, Finland, Japan, China and other countries.. Amongst others, Alexander E. Teplouchoff, Maxwell Jacobs, Seiroku Honda and Risto Sarvas have to be

Table 1: Example for early teaching contents in forest sciences: Curriculum of the Royal Forest Academy in Tharandt, summer term 1928 and winter term 1828/29. Source: Cotta, 1828, translated by the authors.

Lessons in Summer Term	Hours per week	Lessons in Winter Term	Hours per week
Silviculture	6	Forest management planning	4
State forestry	1	Forest protection	3
Arithmetic	6	Theoretical geometrics	6
Theoretical forest botany	4	Practical geometrics	3
Practical forest botany	4	Encyclopedia of forest science	2
Orography	4	Basics of physics and chemistry	6
Soil science	4	Application of chemical principles	2
Physical geography	2	German language style	3
Natural history	4	Zoology for hunting	2
German language	3	Morale	1
Morale	1	Hunting	3
Hunting & hunting ground management	4	Arithmetic exercises	6
Target practice	3	Drawing of plans	4
Geometric exercises	4		
Measurement exercises	4		
Taxation exercises	6		
Drawing of plans			

In addition, there was a private, voluntary offer by lecturers Krutzsch and Tappe in the fields of agricultural science, patriotic history, French language and Latin language

mentioned here (Lochmann and Lochmann, 2011). Alexander E. Teplouchoff (1811-1895) studied forestry in Tharandt from 1834 to 1838 with excellent performance. After returning to Russia, he was responsible for the management of a forest area of about 500.000 ha on behalf of the countess Stroganova and established a forest botanical garden in Iljinsk. He married the daughter of a Professor of the Tharandt Forest Academy (Prof. Krutzsch), and their sons studied in Tharandt as well. Maxwell Jacobs (1905-1979) came from Australia, both for studying and accomplishing a PhD. As one of the leading forest scientists in Australia, he published a worldwide used

book on Eucalypt trees and, received many honours in his home country. From Japan, Seiroku Honda (1866-1952) visited Tharandt in the summer term 1890. Later he was employed as a Professor for Forest Sciences at the Emperor's University Tokyo, and also received high honours as head of professional organizations and societies. Taizan Shiga, studying in Tharandt between 1885 and 1888, is a second prominent person from Japan that should be mentioned here. Risto Sarvas (1908-1974) came from Finland. Acting as professor of silviculture at the Finnish Institute for Forest Research for a long time, he gained recognition as one of the most productive researchers in forestry at that time. He was author of a monography about the conifers of the world, and many of his articles on blossoms and seeds still are cited today (Lochmann and Lochmann, 2011). Further remarkable professional traces of graduates from Tharandt can be found e.g. in France and Spain.

Actual questions of teaching and learning on the Campus of Tharandt¹

As in many other universities in Europe, a fundamental change of study programmes in forest sciences occurred during recent decades. Many - but not all - of them are a consequence of switching from traditional higher education (in Germany Diploma programmes, still offered in some other disciplines) to the two-tiered system of Bachelor and Master degrees. In Tharandt, this opportunity was not only seized for formal adaptations. Rather, the underlying 'Bologna philosophy' was implemented on a large scale. A modularization took place where completely new and multi-disciplinary modules were developed. With regard to the contents or topics of teaching, in addition to knowledge, more emphasis was laid on competences and skills. Forms of teaching and learning were stronger oriented towards the needs of the job market, especially for the Bachelor programme. Finally, the Department of Forest Sciences took part in the development of an integrated Master programme on Spatial Development and Natural Resources at the level of the Faculty of Environmental Sciences.

While the introduction of the Bachelor and Master System has been commented critically for many study programmes in Germany, a lot of positive experiences have been gained with implementation of the new type of education in forest sciences Tharandt;

¹ Special topics of forest education in Tharandt have been addressed in several previous issues of SILVA Proceedings (Böhnke and Weber, 2013; Weber and Bonn, 2014; Weber and Stefke, 2015). The current paper is focused on the change from traditional to "modern" education in forest sciences against the background of the Bologna Principles.

it offers a higher flexibility in comparison to Diploma system. Graduates with a Bachelor degree can decide to continue with a 'classic' forest master or in another direction either at TU Dresden (e.g. wood economy and wood technology) or somewhere else.

- students are able to complete a study programme after six semesters, an opportunity for those who would not be able to continue successfully or are no longer interested in studying.
- the marks students achieved in a previous BSc programme is an indicator for the formal admission to studying a Master programme. Besides, within the application procedure for the Master programme, the aptitude of applicants can be evaluated again, partly even for special tracks of the Master.
- in contrast to other study programmes, for Bachelor students in forest sciences there is a clearly defined job profile available.
- the system encourages mutual exchange of graduates between universities and universities of applied sciences after the BSc grade.
- as was mentioned above already, a reconfiguration of the study programmes in forestry took place by interdisciplinary organization of modules and integration of soft skills, both within the modules and as separate offers.
- lifelong learning is encouraged by part-time options of study that have been fixed in the Bachelor programme of forest sciences recently and should also be introduced for the Master programme.

Some of the changes, e.g. reduction of disciplinary contents and stronger orientation along obligatory timetables, were initially perceived as shortcomings by some of the lecturers. However, in the meantime the new structure gained high acceptance.

Teaching at the Department of Forest Sciences in Tharandt today is characterized by several features:

- a site-specific, traditionally high commitment for aspects of teaching,
- scientifically based study programmes focused on topics around forests and forestry,
- obligatory defence of Bachelor and Master theses,
- a strong international orientation in teaching and collaboration.

Examples for the latter are the Master Programme in Tropical Forestry, some obligatory modules in English language, an increasing share of international topics in the lectures and the involvement of staff in international teaching projects like the UNEP/UNESCO/BMUB-CIPSEM course. Additionally, the modern and renovated buildings on the Campus, a well-equipped library, easy access to the neighbouring

Teaching Forest and an outstanding Arboretum offer favourable conditions for teaching and learning. Last but not least, there is a strong connection to the city of Tharandt, the so-called Forststadt (forest city).

However, as everywhere there is room for improvement. That is why at the occasion of the 200-year anniversary in 2011, a Diploma thesis was assigned to find out more about the “external view” (Staudtmeister, 2011). This study offered interesting insights. From the view of the 73 respondents of the survey (graduates from forestry study programmes, practical forestry, forest industries and wood trade, nature conservation, specialists from other universities), Tharandt was regarded as a discrete site of university education, especially due to the long tradition. The local and regional meaning of the site was highly appreciated. However, the small size of the campus was seen as ambivalent. On the one hand, there is a familiar atmosphere and the campus received high values for attractiveness and sympathy, especially from graduates. On the other hand, some felt disadvantages in the infrastructural field as the campus is situated about 14 kilometers outside the main campus of TU Dresden and many of the students have to commute daily between Tharandt and their accommodation in Dresden. Practice-orientation of teaching, based on a well-established cooperation with external partners, was seen as strength. Yet, for some of the lecturers, the strong focus on teaching might have resulted, at least partly, while neglecting research.

In 2015, for the four German university faculties offering forest sciences programmes (Freiburg, Göttingen, München/Freising, Dresden/Tharandt) a survey was conducted with the aim to get insights into the professional career of graduates, both of Bachelor and Master programmes (Liebal and Weber, 2016). In comparison to the other three universities, graduates from Tharandt had a very idealistic motivation for the study programmes, they expressed the highest satisfaction with the programmes and showed high values with regard to self-assessment of imparted capabilities and skills. However, in comparison to graduates of the other German forestry faculties, they complained about more problems in the phase of job application and less satisfaction about the job due to lower incomes. It has to be mentioned here that the job market in Saxony or other parts of Eastern Germany has been more problematic than in the rest of the country. Apart from that, many students want to stay in the surroundings of Dresden what causes an excess supply of labour and lower wages (Liebal and Weber, 2015).

Actual challenges of teaching at TU Dresden in Tharandt, with about 800 students and 19 lecturers, are resulting both from general questions of higher education policy and

technical questions. Higher education policy urges universities to conduct permanent evaluation of academic performance. While this causes a lot of additional work, evaluation criteria still are primarily oriented towards third-party funding and peer-reviewed publications. It has to be mentioned here that TU Dresden has been conformed as one of 11 universities of excellence in Germany in 2019. Besides, at the Tharandt site a unique teaching profile has to be developed that is different from the profiles of other universities. This is not also necessary because of the formal convergence of BSc and MSc degrees of universities and universities of applied sciences (UAS) but also because of the new Master programmes in forestry and related disciplines that have been established by the UAS. Continuous education and lifelong learning are a further point to consider. While the BSc / MSc system encourages an intermitted academic education (Bachelor – professional practice – Master), in fact only a few students choose that option. That is why the option of part-time studies is offered now as well.

Staff involved in teaching builds an important resource. The involved challenges in Tharandt comprise a slight reduction in the number of professorships, the educational profiles of newly appointed professors (forestry and non-forestry profiles), a low number of senior lecturers and only limited capacities of teaching by third-party funded staff. Finally, there is a kind of supplement of sectoral study programmes (forestry) by integrated programmes (e.g. Master in Spatial Development and Natural Resources Management) and “Single Issue-Masters”, e.g. Ecosystem Services, on faculty level.

In addition to higher education policy, further framework conditions are influencing higher education in forest sciences at Tharandt:

- The Quality Management System (TU Dresden opted for system accreditation in 2012 and implemented it subsequently) causes comprehensive reporting obligations for all study programmes and leads to a permanent adaptation of examination regulations and other study documents.
- Within this broader framework, the quality aim of internationalization encourages the development of study programmes, or at least modules, in English language.
- For covering all aspects of student lifecycle management, new and comprehensive software applications are introduced at the university.
- Depending on the situation on the job market, the expected competences of graduates are changing. For instance, there is an informal „Catalogue of Requirements“ in which state forest enterprises and authorities in Germany have enumerated the indispensable knowledge fields for being hired in the state service.

For addressing these and other questions, an advisory board (Programmbeirat), consisting of students, faculty staff and representatives of professional fields in which graduates are employed, convenes once a year in Tharandt. This institution has proven as a valuable forum for continuous development of the study programmes that are offered by the Department of Forest Sciences.

Future challenges for higher forestry education – in Tharandt and elsewhere

On a worldwide scale, forests are providing a multitude of products and services for the wellbeing of billions of people, including climate change mitigation and protection of biodiversity. For the proper management and protection of these “green factories”, well-educated specialists are needed. These should be able to analyse the complex and dynamic societal demands with regard to feedstock, energy, biodiversity, climate, soil and water. They should be able to develop solutions to fulfil these demands without endangering the capacity of the forest ecosystem. Consequently, education of students in forest sciences needs to be balanced along several cleavages. Basic or traditional knowledge has to be amended (and partly also replaced) by current (but not just “fashionable”) topics that might be traditional in a few years from now. A balance is also necessary between disciplinary specialisation, with regard to theories and methods, and multi- or interdisciplinary approaches. While a narrow-minded teaching focus, oriented towards classical topics of forestry only, is not reflecting complex realities, thematic arbitrariness along ‘catchwords’ has to be avoided as well. With regard to relations between university and practice, scientific depth has to be accompanied by transdisciplinarity and political relevance. This is the only way to prevent researchers and lecturers being blamed for living in the “ivory tower” of science. Finally, a balance has to be found between traditional, proven and tested forms of teaching and innovative forms of teaching and learning, especially those supported by digitalization.

Besides the introduction of Bachelor and Master Programmes, some further challenges have to be taken into consideration. These relate to the changing entrance qualification of students and the design of the introductory phase of the programmes; the delineation between tasks of universities and universities of applied sciences; the permanent evaluation and accreditation of study programmes and the connection to practical professional qualifications (especially the European Qualifications Framework, EQF; European Commission 2018). But also changing societal attitudes towards forests and forestry are playing an important role. Last but not least, the dramatic challenges for practical forestry (extreme weather events, forest fires, adaptation to climate change, combating the loss of biodiversity, searching for the

adequate role in bioeconomy) necessitate a permanent adaptation of teaching and learning, contents and methods.

Conclusions and outlook

Within more than 200 years of its existence, higher forestry education in Tharandt underwent many institutional, organizational and conceptual changes. Amongst others, there has been a permanent differentiation of admission requirements, dynamics in the teaching contents of the disciplines (cf. Weber, 2007), refinement of teaching methods and an increasing interest in internationalization. Much stronger than other external factors, the Bologna Principles had a decisive influence. Implementation of the principles did not only result in new formal structures of study programmes, i.e. change of the headlines from Diploma to BSc and MSc. Rather it encouraged the responsible actors to modify modes of decision making, including stronger involvement of stakeholders like students and employers. Even more important, it introduced a shift in attention from teaching to learning. Apart from that, the situation for graduates in forest sciences in Germany generally has improved considerably in recent years, and representatives of forest enterprises and administrations are actively approaching universities for recruiting purposes. At least for the nearer future, for graduates of forest sciences from TU Dresden there will be attractive job offers in forest administrations on national, sub-national and communal level, in research institutes, in the private sector and in many forest-related fields. The most important challenge for the future is to find a balance between competing interests on different levels of higher education policy (local, regional, national, European). While further professionalization in research and teaching, oriented at complex questions (e.g. land use, resilience etc.) is inevitable, centrifugal forces uncoupling forest sciences and education from their core focus, i.e. forest and forest landscapes, have to be controlled. Against that background, higher forestry education in Tharandt will still be competitive in the future.

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