

Responsibility for the forest

– Forest research and higher education at Eberswalde since 1892¹

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Before acknowledging the major milestones of higher education and research at Eberswalde it is worth taking a brief look at the situation of German forestry in the 19th century. The first half of the century was a major period of forest restoration in Germany and Central Europe. As head of the Prussian state forest administration from 1811 on, Hartig launched a whole new era of forestry in Northern Germany, introducing silvicultural systems such as the large-scale shelterwood cutting method. Concurrently in 1811, the Forest Academy of Tharandt (state of Saxony) was founded, and Cotta paved the way for a long success story of education and research in forestry there. Tharandt was also the place where a very influential school of forest management was established, promoting and spreading the soil rental theory. At the end of the century the first forest scientists and practitioners were realizing that pure and even-aged forests are susceptible to disturbances, and should be converted into mixed stands. Thus, the fundamentals of Close-to-nature forest management were established, leading to the development of a significant section of German silviculture.

In 1830 a higher education institution for forestry was founded at Eberswalde by Wilhelm Pfeil. In 1868 the institution was named the Forest Academy. A major step forward in implementing sustainable forest management was the establishment of forest research institutions and their long-term observation plots. Thus in 1871 the 'Hauptstation für das Forstliche Versuchswesen in Preußen', the Forest Research Institute, was established with 5 divisions, and soon integrated into the Forest Academy. Head of the Academy and the Institute was Bernhard Danckelmann.

¹ Extended version of a speech at the 125th anniversary of IUFRO at Eberswalde on Sept. 15, 2017.

The link between this research institute and the higher education institute (Forest Academy) reflects the enormous progress of natural science at that time. Already a prominent feature of forestry education in Eberswalde was the emphasis on practical application and learning. The head of the Academy was also head of 4 associated forest districts (Lehroberförstereien) at the same time.

During the 'International Agriculture and Forestry Congress' in Vienna (1890) and Badenweiler, Germany (1891), a committee of international scientists in forestry research was established. Together they developed statutes to harmonize the implementation and evaluation of forestry experiments. On September 19, 1892, a committee of the German forest research institutes that contained international contributors decided to adopt these statutes and thus establish the International Union of Forest Experiment Stations. In the document it is quoted:

'Unanimously it is resolved: The Union of German Forest Experiment Stations, as well as the Austrian and Swiss Experiment Stations, will form the International Union of Forest Experiment Stations according to the statutes agreed upon on 18 September 1891 at Badenweiler and approved by their governments.'

Hence Germany (the German Union of FRIs founded in 1872), Austria and Switzerland joined to take part from the very beginning, in this initially central European network that would become IUFRO. The idea behind the foundation of an international association was to establish common standards in measurements and monitoring in all participating countries, in order to facilitate the comparison of research and publications. The years between 1945 and 1992 can be seen as years of worldwide expansion with an emphasis on reorganization into divisions, subject and object groups, new statutes and growth. The focus of IUFRO increasingly encompassed tropical issues and developing countries. The 1971 XV IUFRO World Congress in Gainesville, USA, was the first to be held outside of Europe.

Some well-known personalities shaped the decades after 1900 in the Forest Academy and the research institution at Eberswalde. One of the most prominent was Schwappach, a forest growth and yield scientist who advanced the establishment of permanent observation plots, such as those at the pine provenance trial in Chorin (1908), and worked on volume tables for the major tree species. In fact, Schwappach was the founder of modern forest monitoring.

Another influential figure was Alfred Möller who headed the Forest Academy from 1906 to 1921. Under his leadership the study programme was extended from 2 to 3 years and new staff were hired, primarily to cover the rapid progress in natural sciences at the time. Möller was a mycologist, studying the complexity of tropical and subtropical forests in southern Brazil in the 1880s. When he returned to northeast Germany, he found the vulnerable, mostly pure and even-aged forests of Scots pine; and contrasted this with his concept of permanent forest. Currently the internationally used term to describe the silvicultural approach Möller consequently developed is 'Continuous-Cover-Forestry, CCF'. Continuous Cover Forestry and its variants are increasingly appealing as methods of sustainable forest management in many countries. In Germany we can see CCF as a specific type of Close-to-Nature Forest Management, with special emphasis on avoiding clear-cuts in the regeneration period. However, before having the time to disseminate his forest model, Möller passed away. In 1921, when Möller was voted out as Director, the Forest Academy became a university with the right to award doctoral degrees. At the time both Eberswalde and Hanoverisch Münden were kept as forest universities in the state of Prussia.

In 1923 the research institute was re-organized as the Prussian Forest Research Institute (,Preußische Forstliche Versuchsanstalt'). From 1927 Prof. Eilhard Wiedemann was the head, a growth and yield scientist who was particularly well-known for his work on yield tables. There was considerable development of the institute throughout his time, including the construction of the Wood Research Institute in 1930 and the Forest Protection Institute

in 1934 (see photo with the then new building from 1938). The development of forestry and silviculture became turbulent in the years before World War II. Initially, there was a serious attempt to introduce CCF in Germany's forests, but this came to a halt with the preparation and finally the outbreak of the war.

125 years of IUFRO also means 125 years of forest experiments. Currently, the forestry competence centre at Eberswalde, the LFE, possesses some very old permanent observation plots which are still monitored. For example, the under-planting trial of E. beech under Scots pine from 1874, where the objective was and is to study the yield/increment of under-planted beech. Such long-term forest experiments can still be very valuable today, although their initial goal was a different one. Some milestones in research on permanent observation trials at the Eberswalde site are:

1. Long-term observation plots and demonstration trials of introduced (alien or exotic) tree species which have been monitored for over one hundred years. The analyses of these trials allow for estimating both the performance and the adaptability of these species under the site-specific conditions of Brandenburg or northeast Germany. At least five exotic tree species have shown their suitability including Douglas fir, red oak, grand fir, Japanese larch and Western red cedar; taking into account growth performance, tree health, timber and regenerative capacity.
2. Long-term observation plots are the basis of classical work on yield tables. E.g. yield tables for Scots pine by Wiedemann in the 1940s or by Lembcke, Dittmar & Knapp during the GDR times; and more recently by Lockow, for several less frequent tree species. Moreover, the growth of sessile oak, Douglas fir or Sitka spruce has been modelled using modern growth models.
3. Even old provenance trials can have still a great value today. The provenance trial on Scots pine laid out by Schwappach in 1908 has been used to analyse the secondary metabolism of the tree's needles. It could be shown that southwest European provenances, e.g. from central France, show a high amount of defence-relevant substances but poor

growth forms; whereas the Brandenburg and the Baltic provenances invest more into growth, thus showing a much better growth performance. Nevertheless, these results have not been used to adapt the seed transfer rules in Germany. Still today, foreign provenances of native species cannot be used for afforestation or seeding activities.

4. Researchers (and their respective teams), such as Prof. Hofmann or Prof. Anders, have extended the classic yield studies to more complex ecosystem research.

5. Furthermore, much effort in Eberswalde over the last 20 years was in developing the scientific basis for forest conversion from pure even-aged, mostly pine stands to mixed and structured forests.

(A huge work was done in Eberswalde in the last 20 years to develop the scientific base of forest conversion, from pure even-aged, mostly pine stands to mixed and structured forests.)

6. Finally, various studies have been dedicated to the question of forest adaptation to climate change; such as species-specific growth and drought resistance, the potential of mixed stands in adaptation to climate change, or silvicultural measures and their impact. Can the forests be adapted by slight, incremental measures; or is there a need for short-term intensive adaptation measures?

The immediate post-war period in Germany in 1945, is often referred to with the term 'Zero Hour'. The town of Eberswalde and the Faculty facilities had faced severe destruction. Many professors did not return to Eberswalde (such as Prof. Hilf, Prof. Kollmann, or Prof. Schwerdtfeger). Only Johannes Liese (rector since 1942; father of the 1977-81 IUFRO President Walter Liese) and Johannes Schubert (over 80 years old) were present and started teaching courses in 1946, after general permission of the Soviet military administration. The Forest University was merged with Humboldt University of Berlin, and the Prussian Forest Research Institute was dissolved. It was under the leadership of Prof. Göhre as dean, who also served as mayor of Eberswalde after the war, that the faculty could be stabilized until 1955-58, whereby a well performing and productive faculty existed again. All

vacancies could be filled, 50 (-70) students per year were enrolled in the period 1946-57; and in 1959 the new study programme for wood engineering began.

With respect to research at Eberswalde, one key milestone was the foundation of the Institute of Forestry, IFE, in 1952. The long-term head of IFE from 1957-1970 was Prof. Albert Richter, an innovative researcher in forest planning and forest economics. IFE developed into one of the largest forest research centres in Central Europe, comprising 650 employees through 25 departments in the 1970s. Within the IFE, applied forest research in the GDR was concentrated at the Eberswalde site, especially after closure of the faculty in 1963; whilst higher education was concentrated at Tharandt (today Technical University of Dresden). IFE was a member of IUFRO, who played an indispensable role as a facilitator of exchange, meetings and cooperation during the Cold war.

The research establishment at Eberswalde proved a marked contribution to forest science through its recognition that specific forest site features must be considered in all forestry activities. The term 'Eberswalde School' emerged to highlight this fundamental role that site conditions play in forest operations. This may be seen through the adaptive capacity of tree species to site conditions; or the necessity for quantitative site descriptions and mapping to ensure long-term forestry success. Wilhelm Pfeil, one of forestry's prominent personalities of the 19th century and founder of the Forest Academy at Eberswalde in 1830, with his 'Iron law of the site', can be seen as the godfather of site-adapted forestry in Germany. In the 1920s a dispute between Möller and his advocates, with the many opponents to the Continuous Cover Forestry system, led to the recognition of the site as the basis for forest management and the related disciplines. A landmark publication in this respect was given by Wagenknecht et al. 1956: 'Wege zu standortgerechter Forstwirtschaft: Eberswalde 1953' (Pathways towards site-adapted forestry: Eberswalde 1953). After 1950, several researchers at Eberswalde and their teams worked on site-related research questions. The following achievements are particularly worth mentioning:

- Richter and his team developed an innovative forest planning method, using modern methods in standing volume inventory;
- Wagenknecht and Erteld worked on silvicultural recommendations with respect to the site; thus developing a predecessor of the so-called Forest Development Types (FDTs);
- Scamoni, Kopp, and Schwanecke developed the site mapping fundamentals;
- Sacmoni and Hofmann did extensive research on plant sociology, forest types and site-related biomass.

Finally, with these achievements, the expression 'Eberswalde School' evolved from an insult during the dispute with the CCF advocates; to a 'trademark'!

In the mid-1950s, contact with the 'West' was still possible and frequently occurred for Eberswalde scientists. But as the political situation changed, scientists increasingly found themselves confronted with two main accusations:

- Overly intensive contact with people in West Germany meant that they were not politically reliable or trustworthy;
- Students were not educated (enough) according to the principles of socialism.

Several teachers came under political pressure and were denounced. Two cases highlight the remarkable breaks in the biography of so many:

Werner Erteld (1907 – 1992), Professor of Forest Growth and Yield and Dean at the time; was suspended from all his positions at Eberswalde in the early 1960s and forced to accept a job as a forester. Gerd Hildebrandt (born 1923), who worked as the assistant of Prof. Richter, fled to West Germany in 1957 and became an internationally recognized scientist in the field of Remote Sensing at the University of Freiburg.

Retelling the achievements of the Eberswalde School allows for highlighting some basic aspects of forestry and forest management of the former GDR. History often unfolds in cy-

cles and we can find 5 clear cycles to illustrate the main features of forestry and forest management in the GDR:

I.

The situation immediately after the war was characterized by overexploited forests, reparation cuts, forest fires and bark beetle calamities; resulting in 10% of the area clear cut in 1949/50. Agroforestry practises were still frequent at that time and a huge poplar program was developed.

II.

To cope with this, from 1950 on, Close-to-nature forestry was then the preferred management and silvicultural approach. The intention was to turn away from pure stand management using clear cuts (age-class forestry) and to develop mixed, uneven-aged forests. Comparable attempts were made in West Germany at that time.

III.

The 1960s were characterized by fully implementing site-adapted forestry (see 'Eberswalde School'). In an enormous effort, site mapping was implemented – here Dietrich Kopp was the scientific head for decades in the north-eastern German lowlands. This was also the period when major work on establishing yield tables began.

IV.

Due to changing socioeconomic conditions, a period of so-called industrial wood production started in the 1970s, lasting until the end of the 1980s. This period featured an increase in productivity, focusing on pure stand management with occasional large clear cuts, and large technical operations.

V.

As a response to forest decline and other major global developments (e.g. the Rio Conference in 1992 and the emergence of the environmental movement) ecological silviculture prevailed after 'die Wende' of 1989 (referring to the 'turn' or 'change' resulting from the fall of the Wall and the reunification of Germany). One important consequence of this change in

the silvicultural paradigm was the creation of large forest conversion programmes in the state forests.

The fall of the iron curtain and German reunification had significant repercussions throughout all of Germany; hence Eberswalde was not left unaffected. It shaped the developments at the site through the 90s, whereby the IFE was dissolved and after much conversation and upon recommendations from politicians and the German Science Council, three institutions were finally established:

1. a federal research institute,
2. a state forest institute,
3. and a university of applied sciences.

The federal research institute was formed by taking over the 'ecology' research area from IFE. From 1992 until 2007 the institute was named BFH – 'Federal Research Institute for Forestry and Wood Science'; its headquarters were located in Hamburg and the Eberswalde branch was known as the 'Institute for Forest Ecology and Inventory'. In 2008 several institutes in the fields of agriculture, forestry and fisheries were merged to form Thuenen; the Eberswalde institute was then renamed the 'Thuenen Institute of Forest Ecosystems'.

In current times the Eberswalde branch of the Thuenen Institute advises the German Federal Ministry in various fields such as forest health, timber resources and carbon reporting. Research is primarily conducted on forest ecology and wildlife management. Thuenen has a strong focus on forest hydrology and forest adaptation to climate change, with valuable experimental facilities (e.g. Drylab and Lysimeter station). Moreover, Thuenen coordinates the national monitoring in forest inventory (Bundeswaldinventur), soil condition, forest health and intensive monitoring of plots (Level II and I). Finally, Thuenen is also the coordinating centre of ICP Forests.

With respect to the state forest institute, a joint research centre for all the new eastern German federal states was recommended. However this failed, primarily due to German Federalism. The predecessors of the forest research institute are the former Prussian forest research institute and IFE. Currently the institute, called LFE – ‘Eberswalde Forestry Competence Centre’ of the federal state of Brandenburg, is part of the state forest enterprise and comprises 3 divisions:

1. Forest resources management,
2. Forest ecology and monitoring, and
3. Forest protection and wildlife ecology and management.

The LFE produces very valuable work for forestry practitioners. Major tasks include applied research in the above fields, environmental monitoring in Brandenburg on the Level I and II plots (41 Level I, 7 Level II), forest health and soil condition inventories, and analyses of climate and phenological records; among others. They also produce monthly reports on forest protection and maintain a network that allows for economic comparisons of forest enterprises.

In 1992 the centennial celebrations of IUFRO took place in Eberswalde and Berlin, with many excursions, historic exhibitions about IUFRO and a variety of scientific talks on the premises of the Technical University of Berlin. In his keynote speech at the centennial celebrations of IUFRO in Chorin 1992, Prof. Walther Liese (IUFRO President from 1977 to 1981), recounted this history and emphasized the development of IUFRO from a small central European research group to the leading network of forest research organizations in the world, with membership spreading across more than 111 countries in 1992.

Subsequently higher education in forestry was re-launched in Eberswalde through the establishment of a university of applied sciences, initially containing just one faculty: Forestry! After that, 3 more faculties were founded: Landscape Management and Nature Conservation, Wood Engineering, and Sustainable Business. A lively university with a clear ‘green’

profile arose, with 17 successful study programmes, 2200 students, 56 professors, two campuses, but a casual communication culture between students and teachers and one student representative acting as one of 3 vice presidents. Around 30% of the university's budget is third-party funded (more than 100.000 € per professor per year), with further education and transfer as increasingly important fields of activity, besides teaching and research. Since 1830, when first founded in Eberswalde, the guiding principle of the academy/university has been sustainability, as is reflected in the current mission statement: 'Research and Teaching with Nature for People'. The university was renamed in 2011 to 'Eberswalde University for Sustainable Development', HNEE. In 2009 HNEE was awarded the prize 'Greenest University in Germany', and in 2010 and 2017 it won the European EMAS Award for its environmental management system. The Faculty of forest and environment has 19 professors, among them 2 professors dedicated to research and 5 honorary professors; 4 study programmes, among them 3 international ones. Attached to the faculty is the Centre for Economics and Ecosystem Management, with worldwide activities in adaptive conservation management. A variety of research activities are conducted, mostly inter- and trans-disciplinary; and amongst larger, international research alliances. Some of the topics are:

- Adaptive conservation management (e.g. trans-boundary biosphere reserves)
- New innovative inventory approaches (smart forestry, forestry 4.0)
- Forest adaptation to climate change
- Research in wildlife management
- Regionalisation of forest site conditions

The faculty's impact and visibility is steadily growing. Amongst other reasons this is due to being published in internationally highly ranked journals. For example, a new global map of road-less areas, published in Science by Pierre Ibisch and his team, shows that the earth's surface is divided by roads into more than 600.000 fragments. More than half of them are smaller than 1 km². Of the remaining roadless areas only 7% are larger than 100 km². The

largest tracts are to be found in the tundra and the boreal forests of North America and Eurasia, as well as some tropical areas of Africa, South America and Southeast Asia. There was a tremendous media echo to this study, from 'Spiegel online' to 'The Washington Post'.

A field of study that complements the university's green profile and its dedication to sustainability is internationalization. Internationalization is primarily important as it can:

- 1) Improve job opportunities for our graduates and
- 2) Enrich the curricula and the cultural life of students at campus.

In 1998 the first international Bachelor study programme (IFEM) was launched at the faculty. In 2005 an additional 2 international study programmes were established - Forest Information Technology, a double degree Master's program with Warsaw University of Life Sciences, and Global Change Management. The number of incoming full-time students has increased from 20 in 2007 to more than 90 in 2016. Between 40-50% of students have a stay abroad, mostly in a practical internship.

Concerning IUFRO and Eberswalde today, two activities can be highlighted. In 2011 a Conference on 'Population dynamics, biological control, and integrated management of forest insects' was organized in Eberswalde, bringing together 91 participants from 27 countries. Recently the IUFRO Task Force 31 'Forest restoration' met in Eberswalde to prepare their contributions dedicated to the IUFRO 125 anniversary meeting in Freiburg, Germany.

The forestry research and higher education site Eberswalde is a dynamically growing centre of excellence with some unique competitive advantages:

- Research on relevant topics, focusing on applicability
- Modern study programmes with increasing international focus
- Transfer into practice

This creates benefits for the region and its forest owners or enterprises, and for other research organisations. Moreover, on an international scale the forest institutions at Eberswalde site can contribute to finding solutions to better cope with the global environmental threats.

Photos:



Stone in the forest of Chorin



Forest Academy in the 19th century



Prof. Walther Liese during his speech at the Danckelmann memorial, Eberswalde (September 15, 2017)



Thuenen Institute for Forest Ecosystems



Abb. 3.2/1 Hauptgebäude des Instituts für Forstwissenschaften Eberswalde Alfred-Möller-Straße (erbaut 1953-1956). Foto W. Römpler

State forest Competence Centre Eberswalde



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