

# DEVELOPMENT OF FOREST SCIENCES CURRICULA IN EUROPE

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Participants SILVA-Network meeting 2009 in Thessaloniki. Photo Reiner Mühlisegl.

## PREFACE

After the 2006 SILVA Network conference in Valencia, we were looking forward to a new conference in a Mediterranean environment, for the first time in Thessaloniki, Greece, which was a very exciting perspective indeed. The programme comprised two days of indoor conference and two field trips of one day each including cultural aspects – in Greek lifestyle.

On the first day it was our great honour and pleasure to welcome the participants, colleagues from many European universities, at the Aristotle University of Thessaloniki, in the presence of the Honoured Rector, the Dean of the Faculty of Forestry and Natural Environment, and many dear Greek hosts.

It was great to do this in Thessaloniki, in this great university in this city with its long history, time-honoured, but full of life. It was my dream to hold an annual conference of SILVA Network here, and – as president of the SILVA Network and first author of this preface – I even had the chance of a visit for preparation earlier, hosted and guided by my dear colleague Prof. Dr. Pavlos Efthymiou – alumnus of my own Institute for Forest Utilization and Work Science of the University of Freiburg.

“Development of Forest Science Curricula in Europe”, may look like a very unspecific and timeless title for the conference, and indeed we had similar conference titles and contents of annual conferences of SILVA Network over the ten years before. The dominant reason for that is the Bologna process, if we like it or not, if we name it or rather talk implicitly about it by dealing with the consequences in our universities.

The ongoing transformation of curricula was not welcome in many universities; it was coming top-down from some level above the universities. It is a rather bureaucratic transformation, mainly of curricula structures and of degrees. Considerations of didactics, of learner-orientation of curricula and courses seem to be second priority or even less or totally forgotten. But this was certainly not the intention of the Bologna process, which becomes quite clear when reading the more basic ones of many documents on the websites related to the Bologna process – with this keyword you find millions of documents in the world-wide-web.

Therefore we should not forget about the chances connected with the transformations connected with the realization of the Bologna process. Even the tight stipulations leave much room for didactical innovation. One of the remarkable changes is the chance for students: they may modify their line of learning by changing their subject when moving on to their Master studies, which will result in completely new and diverse competences, which could result in special chances on

the labour market. Think for instance of a BSc of Forestry with a Master of Environmental Law, or of a Master of Forestry with a BSc in sociology.

Starting from these considerations we had a fruitful conference. We heard from the developments in a number of universities and shared experiences and learned from each other, teachers as well as students, how best to deal with our challenges.

This was made possible by Prof. Dr. Pavlos Efthymiou as local host, and his team, as well as to the contributors and reviewers of the papers. To all of them go our sincere thanks.

Thanks also to the authors who submitted their papers and improved them after reviewing and editing by the editors. Without these authors, no proceedings would exist.

Siegfried Lewark, Pieter Schmidt, Filippos Aravanopoulos  
Editors

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## **SUMMARY**

### **PIETER SCHMIDT**

#### **Development of forest sciences curricula in Europe**

Since the SILVA-Network conference in Wageningen (1997) the dynamics of the curriculum development has increased. Siegfried Lewark stated this in his introduction to the SILVA Network Conference in 2009, here in Thessaloniki. Not only the content, but also the preliminaries (selection and enrolment of students) and the afterwards (quality and competencies of alumni, desiderata of the labour market) changed. The Bologna Declaration of 1999 caused major changes, also in the greater concept of university education. Many of these aspects, according to Lewark, have been discussed during preceding SILVA Network meetings and will be discussed during the conference days, or in the following pages.

On the labour market for university graduates in forest sciences, a demand exists for both specialists and generalists. Pavlos Efthymiou requests in his key note that universities respond adequately. Based on the different requirements for both specialist and generalist and on the factors influencing the possibilities of educational systems, Efthymiou formulates a proposal for a programme structure allowing both the education of a generalist and a specialist. Both should have a BSc part of four years followed by a MSc part of one year. Efthymiou formulates a generalist curriculum for a small number of students, during which all aspects of forestry are taught and five specialist curricula, focussing on Forest sciences, Forest products, Forest engineering, Wildlife and Urban forestry respectively. In his concluding remarks Efthymiou stressed the need for flexibility within the curricula as well as of curricula.

The curricula of two forest sciences education institutions are described in detail. Filippos Aravanopoulos and A. Christodoulou present the history and the actual situation of the forest sciences education at the Aristotle University of Thessaloniki in Greece. It is an old institution educating also students from the region. The actual programme, based on the European tradition and somewhat influenced by the forest sciences education in North America, is in urgent need of revision. Authors express the expectation that similar discussions on other European universities can act as an inspiration.

Werner Grosse, Sven Wagner and Stephan Bonn present the structure of the new forest sciences curricula (BSc and MSc format, 3 + 2 years) at the Technische Universität Dresden and the first experiences. The modules involved, each valued at five ECTS credits, contain both instruction and examinations. Interdisciplinary modules promote collaboration between professors and have synergistic effects.

## 2 Summary

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The problem of the labour positions for BSc students has been solved by participation in the curriculum development of the German state chief forest officers and indeed positions for BSc graduates are offered now. Shortcomings still to be solved are that at the moment not enough elective courses can be offered, due to lack of funding and that it is not possible for students forced to work next to their study to fund it, to follow these curricula according to schedule.

In Estonia, forest sciences can only be studied at the Estonian University of Life Sciences (EULS). Notwithstanding a programme reform based on the Bologna declaration and an accreditation based on an evaluation by an international expert committee, Hardi Tullus expects that in future less study programmes in forest sciences will be offered at EULS, due to a radical reform of the State Forest Service resulting in a decreased number of jobs. University education in forest sciences remains necessary at all three levels (BSc, MSc and PhD) and will probably receive support from state and society.

The Saint-Petersburg State Forest Technical Academy houses the Tempus FORPEC project. According to Olga Shaytarova, this project designs a new MSc curriculum in forest policy and economic development in accordance with Bologna principles and is developed by specialists in teaching forestry and forest policy and economics from four European countries (Russia, Sweden, Estonia and Germany). The programme introduces a modular structure of studies and innovative teaching methods, integrates policy and economic sciences, and advances the internationalization of higher forestry education. The content of the programme is concentrated around three themes: Russian and international forest policy; management planning for sustainable forestry in Russia; and modern economics for forestry in transition.

Siegfried Lewark explores developments on the subject of E-learning in forest sciences. It was discussed intensively during the SILVA Network conferences in Warsaw and Beauvais in 2003 and 2004. The developments and the present situation are difficult to trace, due to the fact that not all courses are clearly indicated on universities' websites. The most E-learning courses are used on campus only, with as result that not all possibilities (long distance learning) of E-learning are used. Probably, a too heavy workload in traditional teaching for many teachers forms a bottleneck for the development of new courses.

Two contributions focus on the relation between the curricula and the labour market. In their contribution, Javier Arevelo and Sari Pitkänen describe a survey to explore the possible gap between higher forestry education and labour market in Europe, which was carried out during autumn 2009. Concretely, the survey examined the current status and importance of various labour-market relevant competencies as seen by programme coordinators and employers of forestry graduates in Europe, focussing at the MSc level. Both universities and employers would like future curricula to focus more on environmental sciences and

communication and less on ecology, tree biology and soil sciences. Employers would like more attention on economics, marketing and governance.

Eduardo Rojas-Briales and his colleagues report on their survey conducted in autumn 2009 under more than 80% of the graduates of the first six years of the Forestry MSc programmes at the Polytechnic University of Valencia in Spain. Despite the rapid increase of forest graduates in the labour market a strong employability is observed. Progressive signs of a maturing job market for forestry graduates are identified as well. Both the study success and the employability are enhanced when students enrolled in the MSc programmes after a previous study of forestry. Moreover, employability is higher after a study abroad and for students with higher marks.

The last two contributions report on other institutions than the SILVA Network relevant for university forest sciences education. Simon Heath presents ICA and Fernando Garcia Robredo ConDDEFFS. The latter describes the new organisation Conference of Deans and Directors of European Forestry Faculties and Schools. Its objectives - summarized - are to foster cooperation among the participant institutions to strengthen forestry education in Europe. In its mission statement, references are included to competences included in forestry education, mobility, networking and funding, all three regarding both forestry research and forestry education. As the primary objective of SILVA Network is “to stimulate and facilitate educational co-operation in the field of forestry in Europe”, Garcia Robredo describes some points of possible cooperation.

The former, Simon Heath, discusses the Association for European Life Science Universities (abbreviation ICA), which is an open network of more than 60 European Universities. These universities focus on the life sciences relating to agriculture, forestry, the food and non-food chains, natural resources, rural development and the environment. ICA’s vision is to enhance members’ success in the international market place, in Europe and globally, by providing a supportive environment to share experience, to cooperate in new ventures, and to benefit from the resulting synergy. ICA promotes conferences in collaboration with its partners and members, and also leads and participates in projects. ICA links seven ICA Standing Committees, among which the SILVA Network. For instance, one project supported the development of the SILVA Network and the subsequent initiative of the ERASMUS Mundus MSc in European Forestry.

In his concluding remarks, Pieter Schmidt stresses that due to continuous societal changes the development of forest sciences curricula was and will be a continuous process, involving, teachers, university deans, employers, and students.

# INTRODUCTION

## SIEGFRIED LEWARK

### Development of forest sciences curricula in Europe

Curriculum development at European forestry faculties over the years is mirrored in the topics and contents of the SILVA Network annual conferences since SILVA's beginnings. At the 1997 conference in Wageningen there was a special focus on the state of curricula, which is documented in the proceedings of the conference with more than 20 curriculum descriptions (Schmidt et al., 1998).

Since 1997 the dynamics of curriculum development have even been increasing, so that most of the curricula described then do not look the same any more today. This dynamic development was discussed during all of the subsequent annual conferences, if under different topics and perspectives. Recently, the Bologna Declaration caused fundamental changes, forcing many universities to move from one-cycle five-year programmes to three-cycle curricula (BSc, MSc, PhD).

All changes in curricula have great impact at the start and the end of the programmes (selection and self selection of students, output orientation of assessments) as well as during the learning and teaching process itself. At the same time we observe a diversification of curricula: very often you find more than one Bachelor programme and a variety of Master programmes, where only few years earlier just one study programme was offered.

Motivations of students have changed as well as their career perspectives. Studying abroad, experiencing cultural, political and educational as well as climatic or ecological differences, in managing forests - as forestry would be their profession - was a special issue in forestry education. Today, however, student exchange seems to be more difficult than it used to be. And that in a time, when globalisation and the European Higher Education Area and the European labour market emphasise the growing importance of international experiences during education.

But still there are special profiles of faculties of forestry in Europe, partly continued or even cultivated as strategy of survival. At the end of the SILVA conference in Wageningen 2005 we even formulated expectations of a growing competition between universities due to local specialization (Lewark et al., 2006). On the other hand, universities should take advantage of international cooperation. An important condition for mutual benefits is to take advantage of each others' niche expertise.

Developments in forest science education will continue. Students and teachers involved in learning, teaching and curriculum development can profit enormously by discussing the above topics, their backgrounds, connections and future developments. The contributions in these proceedings may serve this purpose, beyond the conference presentations and discussions.

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## **GENERALIST OR SPECIALIST?**

**PAVLOS N. EFTHYMIU**

### **Abstract**

Particularly in the fields of forestry, there is a demand for specialists and, at the same time, for generalists. Higher education in forestry has to respond adequately. A survey of major topics of forestry curricula is presented. A proposal is worked out for structuring the university curricula according to the professional demands. Reflecting international trends, a subdivision of university studies is suggested which is currently practised at the Aristotle University of Thessaloniki, Greece.

Keywords: Educational system, forest science, curricula, structure, networking, specialist, generalist

### **Introduction**

Forest sciences include a strongly diversified set of scientific disciplines and specializations, characterized by a large collectivity, borrowing knowledge from an extended number of basic sciences, like mathematics, physics, chemistry, biology, engineering, economics, law, sociology, medicine plus some derived from other sciences.

Central and Northern Europe have the longest tradition in the development of forest sciences, already providing for 250-300 years an undergraduate education at its universities leading to diplomas of generalists of forest science, forest economy or on processing and technology of wood products in some partially specialized curricula. In the last decades, the European universities and the faculties of forest sciences turn and focus their interests to various directions of environmental studies, mainly on analysis and management of terrestrial and natural ecosystems, where the forest ecosystems play a dominating role. But in this context, there is a very strong competition from other educational and professional groups on various levels, mainly due to scientific-professional – occupational or employment needs.

All these developments indicate the necessity to become more capable and competitive in order to stay, resist and win in the employment battle a substantial part of jobs, projects and opportunities for the young graduates who finish our forestry studies. The perspectives show that we will have an increasingly heavy competition in the free-market economy, especially with biologists, hydrologists and environmental engineers.

In North America and in the Russian Federation, higher education in the fields of forestry has followed a very different philosophy in structuring the undergraduate

studies and the respective curricula. They started very early with structuring the forest sciences curricula in many specializations, three to fifteen fields of study leading to a specific individual – autonomous diploma after four or five years of study. Naturally, the knowledge provided in such specialized curricula is more detailed, more insightful on concentrated relevant fields of knowledge, without prolongation or extension to indifferent or marginal topics, far or outside the core focus of professional and scientific interest of studies. The material of the various lectures supports the clarification of the crucial aspects and options around the central objectives of the prescribed professional requirements for detailed modern knowledge, solving problems. This specialist has much more specialized knowledge for a smaller subject area of forestry science, deeper, more insightful with more details on the specific behaviour of the system elements. The specialist can not have a detailed overview or a global consideration of all peripheral systems. It depends upon his personality and his duties to ask assistance from or to collaborate with other scientists for solving marginal problems not belonging to his core focus of specialized knowledge.

The generalist has a broader framework of disciplines, which he can partially understand or which he can explain after a long engagement and experience. As a general remark or observation it can be stated that the generalist has a better overview, but his knowledge on the most subsystems is more shallow, less insightful and less operational for solving problems. Especially if he is not taking care for replacing his old and obsolete knowledge with new, valid, improved and dynamic knowledge, derived from recent research and innovation activities. Good and reliable experience has a very high value.

### **Factors affecting the developments of educational systems**

Thinking about the development, structure and continuous optimization of a successful educational system, we should first of all find out what are the contents, the attributes, or the characteristics of the job description for the profession, we prepare or cultivate our future scientists for. Every profession has its own claims and requirements, which have to become the fundamental context of reference and orientation in structuring a field of general or specialized studies.

Nobody is permitted to make improvisations and egoistic plans without a sound basis and the needed realistic components for the new foresters or forest scientists. Mostly, they want to study with clear and well-targeted objectives in order to be successful in their future employment and respectively for the support of their whole life.

The analysis of professional requirements should not only be limited to the spectrum of the needed courses but also to the range, the possibilities and the extent of knowledge a young scientist can manage to be competitive and successful. In this direction, a major decision point represents the background of the student, the need

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to be cultivated as an integrated personality and the availability of time for various social activities for a normal life avoiding exaggerations, as a golden rule.

In addition to the above factors there are many external impacts which influence to varying degrees the constellation of forestry curricula. These kinds of factors could roughly be categorized as follows:

- Scientific developments and new research findings;
- New information technology (hardware and software);
- Automatic devices and robotics (CIM, CAD, NC, etc.);
- Trends of operational systems in the forest industry;
- Technology transfer and innovation needs;
- Production systems (engineering and management);
- Privatization and deregulation of the state sector;
- Reduction of the state sector (example of Austria);
- Domination of market powers;
- Increasing demand for social and environmental sensitivity;
- Participatory decision-making processes and non-governmental organizations;
- New dimensions of sustainability and multiple use;
- Culture, tradition and mentality evolution;
- Needs and reforms of wood-working industries;
- Demands of the public and its attitude to forestry;
- Priorities of the national forestry policy;
- Professional developments and competition of forestry – and environmental jobs/groups;
- Flexibility and collaboration of graduates;
- Forestry and labour legislation;
- Urbanization, recreation and landscaping needs;
- Certification, eco-labelling, forestry restrictions;
- Political developments and social influences;
- Financing of forestry activities;
- Financing for strengthening academic institutions;
- Motivation for economic and scientific progress.

These factors do not need to be explained in detail because their meaning is well known. It can be understood easily, how crucial their impacts are in the new millennium we entered some years ago. The combination of some factors may have very positive or very negative effects, which should be taken into account with special focus on forestry practice and the analogous educational needs.

A proposal for structuring the university studies on forest sciences and their professions

Let me stress some characteristics of our era, which have a tremendous impact in the future developments in forestry:

- We have a permanently accelerating production of new knowledge and a remarkable amount of existing knowledge which becomes slowly or rapidly obsolete. In the decade of 1970 until 1980, Speidel (1992) estimated the percentage of obsolete knowledge in forestry to range about 25-28% per decade. Now it must be higher. This means that a colleague, who does not replace his volume of obsolete knowledge, has practically, at the last years of his professional life, very little competitive or antagonistic knowledge.
- Some developments outside the forestry, wood and environmental sector, for example information and telecommunications technology and applications, legislation, operational systems, labour and societal needs on forestry uses and priorities, create rapidly new frameworks of action and handling forestry treatments management and policy. Solving problems with participatory and multi-criteria decision making processes change rapidly the image and the functioning of forestry as we knew it 30 years ago.
- Taking into consideration the human capacity of learning and his willingness to be well aware on the latest scientific developments, we must accept that today and in the future nobody can absorb or learn the existing depot or volume of knowledge for his profession. As some wise men state the last universal scientists on earth were 1) Aristotle 384-322 B.C. and 2) Leibnitz in the 17th Century. Even for these great men this may be an exaggeration. Imagine now the knowledge of the 3rd Millennium.

All these facts mentioned above imply the need for some important decisions by any responsible man on forestry and academic matters. That means that we have to tailor the university education on forest sciences on a realistic basis for covering the professional demands and providing to each young scientist an adequate, modern, valid and dynamic volume of knowledge for confronting the new and coming professional challenges in the best possible way.

Forestry studies for generalists may be continued, leading to BSc in four years and to MSc after one (1) additional year of study. These people could have general duties, an overview on policy, tactical and policy issues, and may graduate in smaller numbers.

Analyzing what previously has been said, we conclude that our future efforts should put the main weight of forestry studies on specialists with carefully structured directions of university education. Although we have to combine these studies for specialists with the solution of employment and professional problems in the first phase, this choice shall be our fundamental option in the future.

Let me remind some recent and very important facts or statements:

- The Forest Service of the USA and especially the “Forest Research and Extension Services” have more than 50% of the personnel with titles and

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studies outside forestry (mathematics, biology, mechanical engineers, civil engineers, industrial engineers, wildlife scientists, hydrologists, economics, business administration, psychologists, etc.) because they have needs for specialized knowledge.

- The State Forest Service (“Staatsforstverwaltung”) of Baden-Württemberg in the decades 1970-80 and 1980-90 had a policy to increase the number of specialized academic personnel with postgraduate titles (mainly doctor degree) up to 40% or more if possible, for the academic staff, not only on the middle-peripheral level and the higher-ministerial level, but also on the forest-district level (“Forstamt”).

The curricula for specialized studies on forest sciences directions should have a duration of eight semesters (four years) leading to BSc plus one (1) year leading to MSc. The courses for each curriculum on special field of study with separate diplomas should be collected on the basis of relevance and support the concrete professional image and the respective integration of a self-steering and feeding specialization.

The specialization can proceed gradually, depending upon the professional characteristics in each country, which will appear to have remarkable differences, for example Germany, Greece, U.K., France, USA have serious deviations in the structure and operation of forestry profession in the state and private sector, which affects the education.

Taking all these facts into consideration I suggest the subdivision of university studies of forest sciences in the Faculty of Forestry and Natural Environment of the Aristotle University of Thessaloniki into the following Schools or Departments, respectively, of specialist studies:

- Forest Science (emphasis on general biological, economic and management issues).
- Forest Products Industries (emphasis on technology and management of forest operations, harvesting of wood and non-wood forest products, processing and economics of industries).
- Forest Engineering Works (emphasis on forest-technical issues, topography, road construction, cadastre, watershed management, erosion and torrent control).
- Wildlife, Range Management and Animal Breeding (emphasis on wildlife biology, ecology, management, hunting, fresh water fisheries, range and grazing management, animal production and breeding together with agriculture and veterinary medicine).
- Urban Forestry and Landscape Architecture (trees, parks and forests need a very specific study with appropriate design and a broader scenery; a very increasing interest of private and municipal authorities is growing here).

Finally, in all these specializations there is a vivid interest and concern for the environmental impacts and the need for interventions by specialists after detailed studies by competent specialists.

Teamwork, respect of all collaborators and their ideas as well as continuous education as a permanent and increasing need for all people, parallel to applications of modern information technology could bring a new creativity and success in forestry activities.

### **Concluding remarks**

Higher education in forestry is a challenging task because it needs to fulfil demands for both, generalists and specialists. At the same time, re-organization following the Bologna cycles requests the universities to be open and to support transfer of students between European universities. On the other hand, compact curricula and differences in the module structure substantially hinder the mobility of students.

Particularly under these challenging conditions, educational institutions need to act flexible and to re-structure curricula according to social needs and specific demands of the job market. The recent modifications of curricula at the Aristotle University of Thessaloniki are expected to help adequately in responding to these challenges. In addition, ongoing communication between European universities is essential in the improvement of forest curricula.

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## **THE UNDERGRADUATE STUDIES PROGRAMME OF THE FACULTY OF FORESTRY AND NATURAL ENVIRONMENT, ARISTOTLE UNIVERSITY OF THESSALONIKI: CURRENT STATUS AND PERSPECTIVES**

**F. A. ARAVANOPOULOS AND A. CHRISTODOULOU**

### **Abstract**

The Faculty of Forestry and Natural Environment of the Aristotle University of Thessaloniki is a historic institution that was even founded before the establishment of the University where it is currently being hosted, as it was originally part of the National Polytechnic University of Athens. In its history of almost a century, it has contributed to the education of most of the foresters of the Hellenic Forest Service and the private sector. It educated as well, especially at the graduate level, many students from the Balkans, Africa and the Middle East. In addition, it has a paramount contribution to the development of forest research in Greece, as well as the Balkans and the SE Mediterranean area. Despite its relatively large size compared to peer faculties across the world, with over 60 academic staff and about 1000 undergraduate and graduate students, it is considered as a rather small Faculty within the Aristotle University. The position of the faculty in the university, the reality of university-level education in Greece and the faculty's place in the European and international scene has been the centre of an intensive debate over the past decade. Everybody agrees that its current programme, which is based on a long tradition of central European forestry education influences, coupled with notable post-war inspirations of North-American forest science education schemes, is in urgent need of revision. In this communication the present status of undergraduate level education of the Faculty is presented in detail, while some ideas of potential perspectives are discussed in a critical manner.

### **Introduction**

The purpose of this communication is to illustrate the current status of the Faculty of Forestry and Natural Environment of the Aristotle University of Thessaloniki with respect to educational goals and practises and to provide some perspectives on its further development. At first an introduction to its hosting institution the Aristotle University of Thessaloniki (AUPh) is given, followed by a general presentation of the Faculty and a specific presentation of the Faculty's academic programme. A discussion on future perspectives is concluding this paper.

### **The Aristotle University of Thessaloniki – An Overview**

The Aristotle University of Thessaloniki (AUPh) is the largest university in the Balkans featuring 10 Faculties with 49 Schools, 42000 full-time students, 2200

academic staff and about 2000 support staff. The AUTH has run in the past 15 years about 12000 research projects (10882 completed, 1051 in progress) with an overall budget of 150 million € (Aristotle University of Thessaloniki, 2009). A total of 45 million € of the latter are funded by competitive schemes of the European Union. Over the past three years, 1700 research partners (universities, research institutes, private companies, etc.) have collaborated with 1340 AUTH staff and about 12000 external collaborator personnel, in 3500 research projects (Aristotle University of Thessaloniki, 2009).

## **The Faculty of Forestry and Natural Environment**

### *Historical Account*

The Faculty is a historic institution with a unique status in the Greek and South-Eastern European academic environment. The first Forestry School was founded in 1917 as part of the National Polytechnic University of Athens and operated there for 10 years. It was transferred to Thessaloniki as one of the first two Schools of the newly founded AUTH. Currently under the name “Faculty of Forestry and Natural Environment” it is one of the 12 faculties of AUTH.

### *Administration, personnel and student body*

In 1917, the Faculty encompassed three chairs. In 1977, 50 years since the foundation of the AUTH, the number of chairs has risen to 15 and the personnel included 12 professors, 2 associate professors, 5 assistant professors, 28 research assistants and 14 laboratory assistants. Since 1983, the School of Forestry and Natural Environment has been divided into five Departments: (1) Forest Production, Protection and Environmental Science, (2) Wood Science, (3) Range Science, Wildlife Biology and Freshwater Fisheries, (4) Forest and White Water Engineering and (5) Planning and Development of Natural Resources. These Departments are subdivided in 17 laboratories, one institute, one design/drawing facility and one computer network workstation. Currently in the Faculty serve 63 academic staff members, 17 full professors, 19 associate professors, 14 assistant professors and 13 lecturers. In addition, in the Faculty serve 42 technical support staff and university forests administration personnel. The student body of the Faculty exceeds 1000, including 920 undergraduate students, 105 graduate (MSc) students and 80 doctoral candidates (Faculty of Forestry and Natural Environment, AUTH, 2009).

### *Infrastructure and facilities*

Since 1956, the Faculty is housed in a wing of the “Agriculture and Forestry” building in the main University Campus occupying 900 m<sup>2</sup>. Since 1991, the Faculty possesses its own satellite campus in eastern Thessaloniki. This new campus was established within the area of the AUTH Forest Botanical Garden presenting a total covered surface of 14000 m<sup>2</sup>. For the purposes of student practica, training and research, the Faculty features facilities and installations for teaching, research and accommodation for students and personnel at the two University Forests of Pertouli (3300 ha of conifer forest) in the Pindos mountain range, and Taxiarchis (5800 ha

of deciduous forest) in Mt. Cholomon. Also within the Faculty operate: (1) two university forest district offices and a university forests administration fund central office, (2) a Museum of Natural History, (3) a Forest Botanical Garden, (4) experimental plantations and (5) nurseries, greenhouses and other facilities at the Agricultural Farm of AUTH (Faculty of Forestry and Natural Environment, AUTH, 2009).

### **Academic Programme**

#### *Milestones*

The Faculty of Forestry and Natural Environment has greatly contributed to the development of the Greek forestry science, to the improvement of management and development of Greek forests and natural resources and to the protection of the natural environment, through its teaching and research endeavours, books and publications, as well as through the various activities of its staff and graduates (Faculty of Forestry and Natural Environment, AUTH, 2009). The mission statement of the Faculty is to study, teach and research on sustainable multipurpose forestry and terrestrial environmental science.

The Faculty academic programme runs for five years (10 semesters) that lead to a Bachelor of Science (BSc) degree. There are 49 half-year compulsory courses. The students must also take credits from 12 half-year elective courses chosen from 92 electives offered. The equivalency to the European Transfer Credit System is fully operational; a minimum of 307 ECTS credits are compulsory for graduation. As the ECTS system has been adjusted to the current curriculum, the graduation equivalency is more than 300 ECTS credits, nevertheless in the next reform of the undergraduate curriculum there would be the provision of the 300 ECTS credits for graduation.

In addition, a BSc Diploma Thesis must be presented in public and evaluated (Faculty of Forestry and Natural Environment, AUTH, 2009).

#### *Courses and Field Trips*

Students are expected to succeed in the examinations of compulsory courses in order to obtain their degree. Students are also expected to successfully complete 12 elective courses which are divided in elective-general and elective-orientation courses. The latter, as specialized courses, are intended for an in depth study in particular areas of forest and environmental science. Students may attend more than 12 optional courses, but extra grades will not be taken into account in the grade point average calculation. Compulsory and optional courses are distributed in the 10 semesters, in order to advise students on the progressive order of their attendance. Students are expected to choose a particular scientific orientation (area of specialization) at the beginning of the 3rd semester. Students have a single chance to change the area of specialization until the 7th semester. At least seven optional courses should be chosen within the area of specialization. Laboratories, tutorials and field trips are mandatory within course work. Field trips represent an essential part of the curriculum and take place during the 4th, 6th and 8th semester. There are

usually one major (multi-day) field trip and some minor (one-day) field trips each year that take place during the last 15 days of May (Faculty of Forestry and Natural Environment, AUTH, 2009).

### *Practica*

Practical training is mandatory and takes place at the University Forests and the State Forest Service. Upon finishing the 4th, 6th and 8th semester, practical training takes place at the University Forests of Pertouli and Taxiarchis. During their stay, students also participate in daily excursions in Forest Service nurseries and in river basins and torrents outside the University Forests for educational and training purposes. Practical training takes place during the summer period, for three months inclusive under the supervision of the Faculty's academic personnel. Students, upon completing their 8th semester of practicums, should continue their training in State Forest district offices, for one month under the guidance of local forest managers. The objective is that the students are introduced to and informed of all activities they will have to work on as graduates (Faculty of Forestry and Natural Environment, AUTH, 2009).

### *BSc Thesis*

Students are expected to write a BSc Thesis. The subject and the supervisor should be chosen during the period of the 7th or 8th semester. After the thesis is approved by the supervisor, it is examined by a committee formulated by the supervisor and two other members of the academic personnel. The thesis is presented in public. Abstracts of the theses are published by the Faculty (Faculty of Forestry and Natural Environment, AUTH, 2009).

## **Perspectives**

The future of the Faculty especially with regards to its educational strategy and structure has been the centre of an intensive debate over the past decade. There are three cornerstones in this debate: (1) the position of the Faculty in the University, (2) the reality of university-level education in Greece and (3) the Faculty's place in the European and international scene. This Faculty, despite its considerable size among peer faculties in Europe, remains a rather small faculty within AUTH with limited capacity to influence decisions on education and on priorities regarding scientific disciplines. In addition, the central control of the State Education Ministry leaves a number of main strategic questions outside the control of the Faculty (e.g. the number of entering students at a yearly basis). The realization that forestry education in Europe is at crossroads and that other forestry faculties face similar questions has become evident and will hopefully assist the Faculty in developing future strategies.

Everybody agrees that its current programme, which is based on a long tradition of central European forestry education influences, coupled with notable post-war inspirations of north-American forest science education schemes, is in urgent need

of revision. However, the direction of this revision is still under debate. Current developments of scientific advance, such as informatics and bioinformatics at large, biotechnology, environmental science, management and applications may need to be addressed in the curriculum in a manner different than the contemporary approach (Aravanopoulos and Moulalis, 1999). In addition, part of this debate is a fraction of a more general debate in Greek academia regarding the realization of the Bologna declaration, which would foresee 10 semesters for Bachelor and Master programmes together. At this point the Faculty is offering a 10 semester Bachelor of Science degree with a compulsory thesis, involving at least 11 semesters of work (by taking into account the practica of three consecutive summer terms during the years of study). It offers after that a three semester post-graduate specialization diploma (PSD) – which is equivalent to MSc - with six specializations, but given the nature of the compulsory graduate thesis, students usually prolong their study time. Then it offers a thesis oriented PhD programme of a minimum of six semesters where PSD is a requirement. How these will evolve in the current and future European academic environment remains an open question and a source of painstaking discussion.

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## **STRUCTURE AND FIRST RESULTS OF THE NEW FOREST SCIENCES CURRICULA AT THE TECHNISCHE UNIVERSITÄT DRESDEN**

**WERNER GROSSE, SVEN WAGNER AND STEPHAN BONN**

### **Abstract**

The process of implementing the Bologna reforms at the Faculty of Forest Sciences of the Technische Universität Dresden began with the establishment of Bachelor and Master programmes. The structure of these curricula is now modular. The modules comprise instruction and examinations. Students successfully completing the module exams are typically awarded five European Credit Transfer System (ECTS) points per module. These ECTS points are recognised nationally and internationally, and can be used to simplify exchanges and transfers between third level institutions. The topic structure of the new curricula is described in detail in the paper, as are the improvements to and acceleration of the process design by means of an Advisory Board established especially for the task. The first results and experiences made with the new study curricula have revealed both advantages and disadvantages. These are discussed in detail, and possible areas of improvement are highlighted.

### **Introduction**

The implementation at the Faculty of Forest Sciences of the Technische Universität Dresden (TU Dresden) of the reforms prompted by the Bologna Declaration started with the launch of the new Bachelor programme in the winter semester 2006/2007. The changed structure of the study programmes, separated into Bachelor (BSc) and Master (MSc) curricula, should provide more flexibility in education, greater efficiency in the study process, and improve international student mobility.

There have been some essential changes relative to the previous Diplom curriculum:

- The previous separation between fundamental study and specialised study has been abolished. Instead, the students reach the first level of professional qualification (BSc) after six semesters.
- The study structure is modular. The modules offered are predominantly interdisciplinary, taught by two or more professors from different disciplines. This gives rise to numerous synergetic effects for students and teachers.
- Different teaching methods and learning forms are combined. A large element of self-study is also included in the plan. This and special modules (e.g., on techniques of scientific working and learning) promote the general competences of the students (so-called transferable skills).

- The elective component of the courses has been increased substantially. The modules comprise organised study accompanied by an examination.
- For every module five ECTS points are awarded – a precondition being that the student passes the module exam.

This new structure should facilitate a higher quality of study and improve the ability of the students to take a more active part in international collaboration in future. The objectives of the new curricula are not only to transfer competences in the forest sciences, but also to improve knowledge and awareness of the interconnectivity of different disciplines and to promote a high degree of autonomy in scientific work.

### **Characteristics and objectives of the new study programmes**

The first level of the new study system ends with the Bachelor degree. This degree has to guarantee that the graduate is able to enter a job and possesses the necessary knowledge and skills. As a consequence, the structuring of the modules making up the six semesters of the BSc programme is quite difficult. In contrast to the previous pre-Diplom, the six semester BSc curriculum has to communicate basic and specialised knowledge. The objectives and contents of this new BSc curriculum are as follows:

- The study of forestry focuses on the whole forest ecosystem, including links to the abiotic environment and society; the sustainable management of the natural resource forest; the use of the raw material wood; and also aspects relating to trees and coppices in the open landscape.
- Knowledge of the following complexes is imparted:
  - Ecological interactions: plants, animals, soils, climate;
  - Figures and models: biometrics, forest growth & timber measurement, economics and management;
  - Humans and forests: planning of forests and landscapes, establishment and management of forests, techniques and technology, nature conservation, forest policy;
  - Benefits of forests: timber, social benefits, conservation of biodiversity;
  - International aspects.
- In addition to the transfer of pure expertise, ‘key qualifications and soft skills’ have become more important, e.g.:
  - A capacity for teamwork and greater social skills;
  - Communication and rhetorical skills;
  - Problem solving and decision making skills;
  - Scientific techniques and methods.

A key idea for the improvement and acceleration of the process of designing the new study programmes was the establishment of a Forest Sciences Advisory Board, appointed on February 1<sup>st</sup>, 2007 (see Figure 1). It is the first advisory board to the consult in study affairs at the TU Dresden. Even prior to the official appointment of

he board, numerous institutions had cooperated in the reform of the Bachelor curriculum. As a result of the positive experiences made, the Faculty of Forest Sciences decided to institutionalise this cooperation in the form of an advisory board for the further development of study programmes. The appointment is for four years and the members meet regularly to discuss the development of topics.



Figure 1: Forest Sciences Advisory Board.

Chosen from university alumni, the members of the Advisory Board are experts from institutions, private enterprises and state departments closely involved in the forest sciences and with a significant interest in terms of knowledge, abilities and skills. The current members of the Advisory Board are:

Mr. Braun, Director of the State Forest Enterprise of Saxony;

Mr. Funk, Director of Zellstoff Stendal GmbH;

Mr. Gaffert, Mayor of Wernigerode, previously Head of the Kellerwald – Edersee National Park in Hessen;

Mr. Hess, German Society for Technical Cooperation (GTZ);

Mr. Pollmeier, Director of Pollmeier Massivholz GmbH;

Mr. Sachse, Managing Director of the Saxony Forest Entrepreneur's Association;

Ms. Seeling, Managing Director of the Kuratorium für Waldarbeit und Forsttechnik (KWF);

Mr. Stock, Deutschen Bundesstiftung Umwelt, Head of the nature conservation division.

### Topic structure of the BSc and MSc programmes

The programme structure has, in accordance with the Bologna regulations, been adapted in such a way that instruction on the fundamental aspects relating to forest jobs is provided first (Bachelor level) and, based on this, a deeper insight into the specialist disciplines is provided subsequently (Master level). Presented in Figure 2 are the topic structure and the progression from the BSc programme to the different MSc curricula available at the Faculty of Forest Sciences in Tharandt. The first level of the higher qualification, and the precondition for the advancement to one of the different MSc curricula, is the BSc curriculum, where the student’s study path is consecutive. Consecutive in this context means that Bachelor students from the TU Dresden go on to do an MSc degree at the university. This applies to the Forestry Master’s (MSc1), with its three areas of specialisation, and the Wood Science and Technology Master’s (MSc2). The courses MSc3 and MSc4 are not consecutive. In this case, BSc graduates from other universities come to Dresden to do their Master’s.

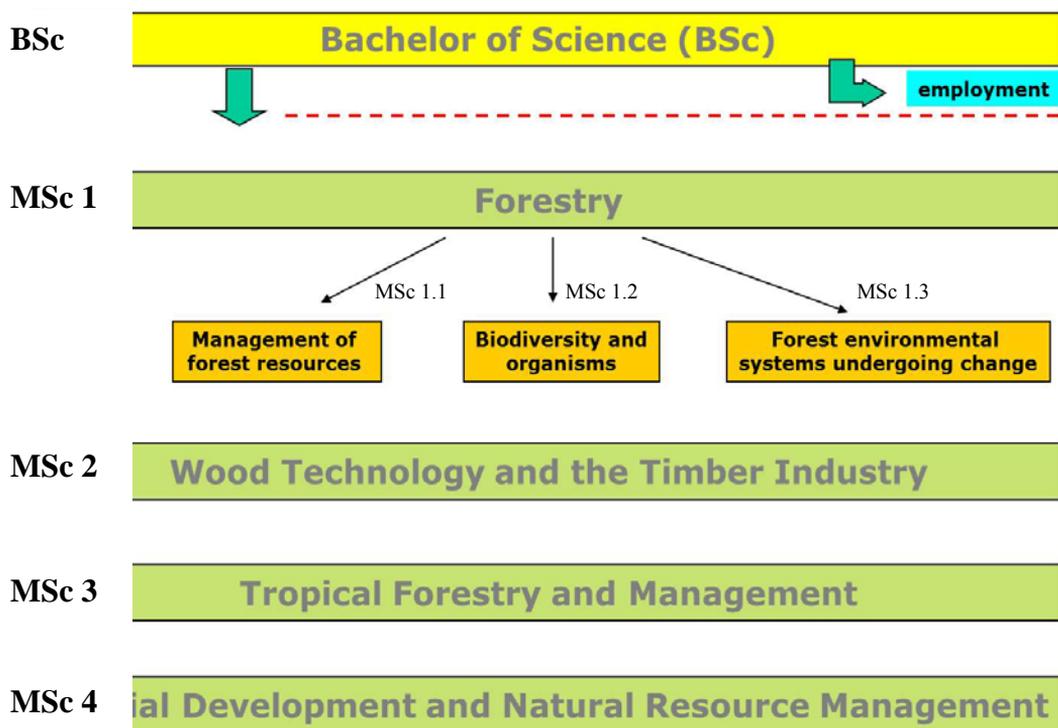


Figure 2: Topic structure of the BSc and MSc programmes at the Faculty of Forest Sciences, TU Dresden.

Generally speaking, the MSc curriculum is open to both fundamental and applied subjects. It is offered to students already in a position to analyse problems in a complex manner and with scientific depth (Bonn and Wagner, 2008).

Due to the growing divergences between the individual disciplines within the forest sciences, the structure of the Forestry MSc curriculum (MSc1) allows for a specialisation in one of three different areas:

- Management of forest resources;
- Biodiversity and organisms;
- Forest environmental systems undergoing change.

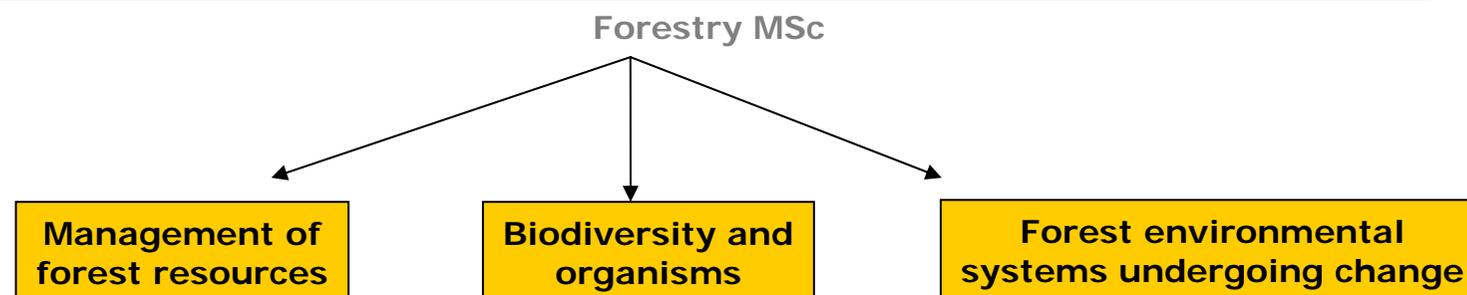
All of the Forestry MSc students begin with common modules focussing on issues that are of general importance to foresters (see Figure 3). The separation between the three specialisations only begins in the 2<sup>nd</sup> semester, further diverging in the 3<sup>rd</sup> semester. Also of note is the greater number of elective modules in the 2<sup>nd</sup> and the 3<sup>rd</sup> semesters. This promotes greater independence amongst the students and also improves their motivation. These are key elements of the Bologna Process and they have been put into practice in the new curricula.

### **First results**

With the completion of the first BSc curriculum cycle at the TU Dresden in the summer semester of 2009, and with the start of the Forestry MSc course in October 2009, some first results and experiences are up for discussion. There are significant advantages to the new curricula relative to the previous Diplom course. These include:

- The '6 + 4' semester study structure is more flexible than the previous Diplom system. The student also has greater freedom to decide whether to end his or her studies with the BSc degree or to continue to the MSc level.
- Interdisciplinary modules foster networking between the different disciplines. This new form of collaboration between professors in the teaching of the modules has had a significant synergistic effect. The subjects of the modules are already connected interdisciplinary in the lectures. This is also an important step in attaining the objectives of the Bologna Declaration through greater efficiency.
- One of the most serious problems has been solved, namely the creation of labour positions adapted to BSc graduates. The conference of the forest chiefs of the German states defined disciplines that are to be a compulsory part of the BSc profile, disciplines that have been successfully incorporated into the BSc curriculum. Indeed, job offers have recently been made by the German state forest enterprises for BSc graduates.

Next page: Figure 3: Structure of the Forestry MSc programme, showing the three areas of specialisation



1 <sup>st</sup> semester (modules)	<ul style="list-style-type: none"> <li>• Inventory design (I)</li> <li>• Business administration and leadership (I)</li> <li>• Economics of forest resources</li> <li>• Simulation programme</li> <li>• International processes</li> <li>• Project management and evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory design (I)</li> <li>• Business administration and leadership (I)</li> <li>• Economics of forest resources</li> <li>• Simulation programme</li> <li>• International processes</li> <li>• Project management and evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory design (I)</li> <li>• Business administration and leadership (I)</li> <li>• Economics of forest resources</li> <li>• Simulation programme</li> <li>• International processes</li> <li>• Project management and evaluation</li> </ul>
2 <sup>nd</sup> semester (modules)	<ul style="list-style-type: none"> <li>• Inventory design (II)</li> <li>• Business administration and leadership (II)</li> <li>• Precision forestry</li> <li>• Governance</li> <li>• Elective module I</li> <li>• Elective module II</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory design (II)</li> <li>• Business administration and leadership (II)</li> <li>• Forest research (I)</li> <li>• Habitat design in forests</li> <li>• Rare woods</li> <li>• Management and monitoring</li> <li>• Elective module I</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory design (II)</li> <li>• Business administration and leadership (II)</li> <li>• Soil protection</li> <li>• Water management in the landscape</li> <li>• Environmental chemistry</li> </ul>
3 <sup>rd</sup> semester (modules)	<ul style="list-style-type: none"> <li>• Control</li> <li>• Wood science, wood recovery and wood utilisation</li> <li>• Economics and marketing</li> <li>• Carbon sequestration</li> <li>• Elective module III</li> <li>• Elective module IV</li> </ul>	<ul style="list-style-type: none"> <li>• Ecological modelling</li> <li>• Genetics</li> <li>• Forest research (II)</li> <li>• Habitat design in forests (II)</li> <li>• Elective module II</li> <li>• Elective module III</li> <li>• Elective module IV</li> </ul>	<ul style="list-style-type: none"> <li>• Climate protection</li> <li>• Element budgets in biological-geological systems</li> <li>• Environmental systems undergoing change</li> <li>• Elective module II</li> <li>• Elective module III</li> <li>• Elective module IV</li> </ul>
4 <sup>th</sup> semester (modules)	Master's thesis	Master's thesis	Master's thesis

Where do the applicants for the new MSc courses come from? The new curricula offer students the possibility to change university upon completion of the BSc. The MSc courses offered in Tharandt were chosen by Forest Science BSc graduates from throughout Germany (see Figure 4).

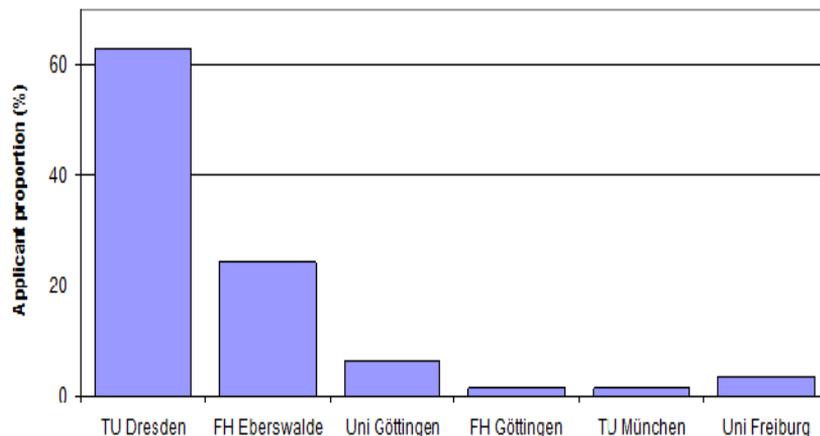


Figure 4: The German universities from which the MSc students enrolled in TU Dresden received their primary degree. FH = University of Applied Sciences.

The majority of the MSc applicants came from the TU Dresden's Faculty of Forest Sciences in Tharandt, but 40 % came from other universities in Germany. It will be interesting to follow the development with regard to the origins of the students in the coming years. The number of students for the three profiles of the Forestry MSc course in 2009 is shown in Figure 5. The majority indicated a desire to select the profile 'Management of Forest Resources' from the 2nd semester. In terms of the reasons for this decision, it seems that:

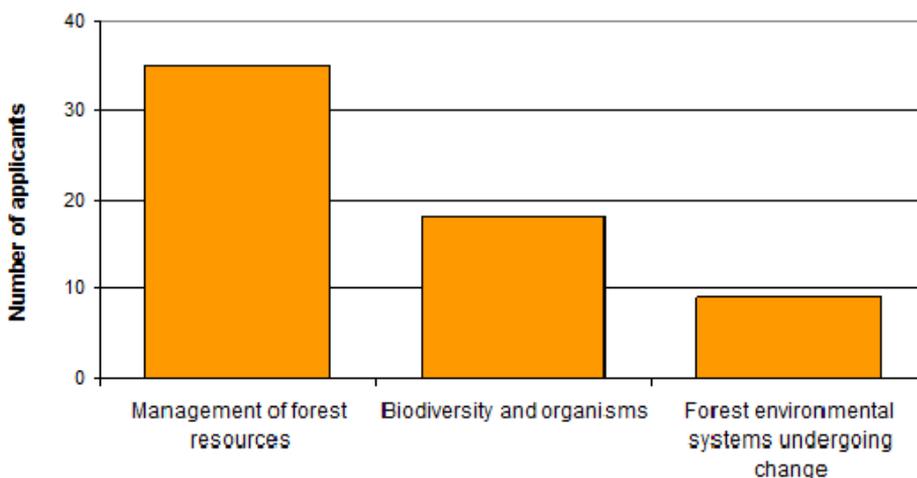
- the first MSc profile 'Management of Forest Resources' corresponds most closely to the previous Diplom in forestry;
- the students' decision making correlates with the better chances of getting a job connected with this profile.

As well as the afore mentioned advantages of the new curricula, there are also some elements still requiring improvement. These include the following:

- The balancing of the study content of the elective modules offered will become more and more difficult.
- There are too many exams (initially the Ministry of Education in Saxony demanded two exams for each module worth 5 ECTS points).
- Providing the number of elective modules currently offered is proving problematic. These modules require staff and equipment, and, therefore, dedicated funding. Without the necessary funding, organisational issues arise due to the limited time staff members have at their disposal, a heavy work load

for the teaching staff, and limits on the number of students that can take part in the exercises and practical courses.

- BSc and MSc programmes are essentially full-time jobs for students. It is not possible for them to engage in part-time jobs and still finish the curriculum in the allotted timeframe. An extension of the study duration for students with no alternative funding would be beneficial.
- The options for students to participate in international exchanges require fundamental improvement. At present there are no gaps in the curriculum to facilitate student mobility. International student exchange is one of the key aspects of Bologna. Strategies to promote international student exchange must, therefore, be developed urgently.



*Figure 5* Profile preferences of students enrolled in the Forestry MSc programme.

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## **THE PRESENT SITUATION AND FUTURE OF ESTONIAN HIGHER EDUCATION IN FORESTRY**

**HARDI TULLUS**

### **Abstract**

In Estonia, higher education in forestry can be pursued only at the Institute of Forestry and Rural Engineering of the Estonian University of Life Sciences (EULS) in Tartu. In 2002, the new BSc - MSc system, according to the Bologna declaration, was adopted in Estonian higher education. As regards the quality of higher education in forestry, all three education levels were assessed by an international expert committee in 2007 and were accredited. However, the university has not conducted an analysis of future financial risks based on demographic trends. The forestry sector as a whole, especially the management of state forests, was radically reformed and the number of jobs diminished. It is questionable whether the EULS will be able to maintain the offering of two viable Master's curricula: forest management and forest industry. Higher education in forestry at all three levels (Bachelor, Master and Doctoral) remains necessary also in the future and will receive support from society and the state in the form of state-funded study places.

### **Introduction**

In Estonia, higher education in forestry can be pursued only at the Institute of Forestry and Rural Engineering of the Estonian University of Life Sciences (EULS). The University has three departments devoted to forestry (the Departments of Forest Management, Forest Industry and Silviculture), two research units, and a training and testing site at Järvselja.

### **Curricula and students**

High education in forestry was started in Estonia in 1920. Through different political periods the curriculum length for university students has been five years until the reform in 2002 based on the Bologna agreement. Since Estonia regained its independence in 1991, the Estonian higher education scene has been characterised by liberalism when it comes to establishing institutions of higher education and launching new curricula – of which around 800 (!) have been registered. Forestry can only be studied at one university – EULS – with a choice of four curricula. Only one Bachelor's degree is offered, called Forestry. To obtain a Master's degree, students can choose between the Forest Management and the Forest Industry curriculum. Between 4 and 5 students each year can continue their studies and obtain a PhD in forestry. For more details, see EULS, 2011.

In Estonia, approximately 19,000 persons per year enrol in a higher education programme (Anonymous, 2010). In 2009 there were in total 94 study places for Bachelor's students in forestry, 47 state-funded, 24 non-state-funded and 23 for distance education. A total of 13 students with a Bachelor's degree were enrolled in the graduate programmes Forest Management and 20 in the Forest Industry Programme. Five students entered the PhD programme. When comparing the relative importance of these figures in Estonian higher education (see Anonymous, 2010) and the relative importance of forestry as a sphere of activity or as an economic sector in the statistical indicators of the Estonian economy (see Anonymous, 2009), it becomes evident that the number of forestry students is low. Also, the number of students graduating from an institution holds far more importance than the number of students entering it. In 2009, 54 students graduated at the Bachelor's level and 17 students at the Master's level. Therefore, the 'output' in this field of study is remarkably lower than the 'input'. Regarding PhD's, 2009 was quite a successful year – four Doctoral theses were defended.

### **Problems**

In 2002, the new BSc - MSc system, according to the Bologna declaration, was adopted in Estonian higher education. This means that after three years of education at Bachelor's level students receive a diploma and need to re-enter university to continue their education at the Master's level. This was a new trend on the European education scene. However, it has led to quite a few problems. As the Estonian economy developed rapidly, there was an abundance of jobs and students showed little interest in pursuing on MSc level. Unfortunately, a three-year BSc curriculum is not enough for a student to obtain a higher education in its proper sense. A total of 17 students graduating from the two Master's programmes are not sufficient for a sustainable development of Estonian forestry. Seven PhD theses defended during the previous four years is a good achievement, but barely satisfies the need for new teaching staff and researchers. In developed countries, a PhD degree guarantees a wider selection of prospective jobs, but the quality of the education at EULS by no means ensures this. Thus there is no reason to talk either of a large number of forestry students or an overproduction. The number of students is only too high when viewed from a certain aspect: non-state-funded study places have had a negative effect on the quality of education provided. Students on a non-state-funded places pay tuition fees, but their quality is low. In this way, the syndrome of a quantity-oriented university has also taken its toll on teaching forestry. This is a serious oversight on the part of higher education policy-makers.

### **Accreditation**

As regards the quality of higher education in forestry, all three education levels were assessed by an international expert committee in 2007 and were accredited. In 2010 a 'transition assessment' is being conducted in Estonian institutions of higher education, whose results determine which curricula a certain university can teach.

According to this assessment, the quality of the forestry education was accepted and Estonian University of Life Sciences has the right to teach forestry, being the only university to cover this field of study in Estonia. This is discussed in the next paragraph in more detail. Also in 2010, an international committee conducted an evaluation of forestry research and the results were excellent, which in turn creates a favourable background for the coming assessment of the PhD programme. Hence, at least in theory things certainly look very good.

### **Transition assessment criteria for higher education in forestry**

In the course of this transition assessment, conducted over the period 2010–2011, higher education curricula was analysed according to specific criteria. The analysis<sup>1</sup> of the higher education in forestry provided by the Estonian University of Life Sciences on the basis of the criteria used by the expert committees of the EKKA Quality Assessment Council indicate that the EULS is an ideal institution to offer higher education in forestry, as it fulfils the mission of such a university on the Estonian higher education scene. The forestry curricula respond to the needs of the labour market. The content and titles of the curricula are congruent. Up-to-date teaching methods are used and the curricula include a sufficient number of practical subjects. The curricula have a modern structure that takes into account their purpose and required results. The curricula meet the requirements of laws regulating Estonian higher education. Practical training is conducted in forest districts and in forestry-related companies. The process of developing the curricula is a continuous one, involving current and former students, as well as employers. The teaching staff have appropriate qualifications and, as a rule, good teaching skills. Members of the teaching staff participate in research and development activities. But there is a need to invite foreign teachers. Students are supported and advised throughout their studies and have excellent mobility opportunities at both the domestic and foreign levels. The age structure of teachers is normal. There is a sufficient number of study premises (rooms, laboratories etc.) and these are equipped with modern technology. E-learning is progressing and the library guarantees access to various databases of science journals. The number of students is stable and development plans have been prepared. However, the university has not conducted an analysis of future financial risks based on demographic trends. In summary, the quality of higher education in forestry provided at and the resources and sustainability of the EULS meet all of the requirements.

### **The future of forestry education in Estonia**

The period of rapid development of the Estonian economy and society is over and Estonia has entered a phase of disenchantment. In the sphere of higher education this means in the current situation that students ask themselves whether there will be enough jobs on the market in their profession. The forestry sector as a whole, 27

<sup>1</sup> Not published, data available from the author.

especially the management of state forests, was radically reformed and the number of jobs diminished. The importance of the forest and timber sector in the overall economy decreased (see Anonymous 2009, 2010). It is a fact though, that this field will have a stable future in the short and long term because Estonia is a country of forests, and high school graduates and their parents understand this. Thus there is and will be in future an interest in studying forestry and a need to teach it. It can be trusted that the government will grant a stable number of state-funded study places and the required financing.

Although the forestry curricula received a positive assessment, the current state of affairs gives little reason for optimism. It could be argued that the best curricula existed before World War II. Also, the curricula used during the Soviet era ensured a respectable and broad-based education for forest engineers. Financing rules established for universities in the last two decades have transformed curricula into narrow study programmes that centre on one specific field and on one structural unit of a university. But the phase, during which the prevailing thinking in higher education was more about economics and ecology, and more about English and computer sciences, and less about classical forestry topics, is over. Perhaps the forestry curricula need to be directed towards engineering-based education. Due to the fact that Estonia is a small country and a small nation, an eternal issue is the language in which the teaching should be done. Bachelor's studies should certainly continue in Estonian, but the only way to survive in conditions of international competition is to introduce Master's studies in English. The PhD programmes call for revolutionary changes, as does the way the employers value employees with a PhD. In many developed countries a Doctoral degree is becoming a required level of higher education for university teachers and researchers. A Doctoral degree does not necessarily imply a career as a scientist or lecturer, or an opportunity to work in high positions in government agencies or private companies, but there is long way to go to change the mentality of the Estonian society.

### **Inevitable future trends**

In the next three years Estonian universities will face an inevitable two-fold drop in the (enrolling) number of students, corresponding to the decline in the birth rate at the start of the 1990s. This means that the number of institutions of higher education and universities, their departments, curricula, study places and subjects cannot remain the same. Also, the number of teachers and lecturers needs to be reduced. The question is: which curricula will survive and which universities will be able to develop them sustainably.

Higher education in forestry at all three levels (Bachelor, Master and Doctoral) remains necessary and will receive support from society and the state in the form of state-funded study places. However, it is questionable whether the EULS will be able to maintain the specialisation of two viable Master's curricula (Forest Management and Forest Industry) on the basis of just one Bachelor's curriculum.

This is purely a question of finances and its solution requires changes in the financing rules for universities. Doctoral studies in forestry are also needed in future. The number of scientific articles published has increased and this ensures the high quality of PhD theses. Nevertheless, the volume of forestry science in terms of financial resources and teaching staff is by no means sufficient to support higher education in the subject. According to discussions with specialists from other universities, 70% of the budget should be for research and 30% for teaching (Tullus, 2010). Higher education is not sustainable without the substance and resources of research activities. In the case of forestry, this issue calls for a serious effort to be made and perhaps for changes in the structure of the university in order to maximise synergy between research and studies.

In the near future, the importance of E-learning will increase, also in the forestry curricula. The value of practical training, however, conducted in the surrounding natural environment (a network of unique sample testing plots at Järveselja) should not be underestimated. Whether the distance learning programme is viable and what the volume of further training is depends on the university – how visible and attractive EULS will be in society. One group EULS targets its curricula and its attention to private forest owners, who lack specialised education in forestry but are keenly interested in the field. The university and its teaching staff should not be ashamed of teaching common forest owners.

### **Competition, cooperation and sustainability**

The forestry education provided at the Estonian University of Life Sciences has an unrivalled position, simply because no other university teaches these curricula. Therefore the forestry teachers are used to regarding the fields of biology and environmental protection and their respective curricula as their main competitors. However, this attitude is short-sighted: those competing against Estonian higher education in forestry are not located in Tartu or Tallinn (both Estonia), but on the other side of the Baltic Sea and in Central Europe. Higher education in forestry in such a small country can only be sustainable when it is capable of managing the resources of forestry education in an optimal way, strengthening forestry as a science and finding a way to be indispensable to employers.

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## **TEMPUS FORPEC: DEVELOPING A NEW MASTER PROGRAMME “FOREST POLICY AND ECONOMICS” AT SAINT-PETERSBURG STATE FOREST TECHNICAL ACADEMY**

**OLGA SHAYTAROVA**

### **Abstract**

The Tempus FORPEC project is devoted to a new MSc curriculum in forest policy and economic development in accordance with Bologna principles and is developed by specialists in teaching forestry and forest policy and economics from four European countries. The programme introduces a modular structure of studies and innovative teaching methods, integrates policy and economic sciences, and advances the internationalization of higher forestry education.

Keywords: curriculum development, Bologna Process, Russia, forest policy, forest economics

### **Background**

With increasing pacification, all European countries are facing several remarkable developments that open up new possibilities but also pose challenges for forestry education. Globalization encompasses increasing flows of capital, people and information across the national borders and brings about numerous effects and controversies, from economic benefits due to reduced protectionism to cultural assimilation. The Bologna Process both is sparked by globalization and acts as an engine for globalization within higher education. Whether we like it or not, it forces transformations starting with more student-oriented teaching at a course level, curricula adaptations to implement the two-tier (Bachelor/Master) structure and ending with Pan-European frameworks for quality assurance (Brukas, 2008).

Remarkable changes in the social perception of forest towards more natural-oriented values and increased environmental concern have been taking place for several decades. Forestry and, inevitably, forestry education should evolve from managing forest resources to managing the relationship between nature and people (Kennedy and Koch, 2010). This tendency brings about a great challenge of broadening the forestry curricula to include social disciplines and improve transferable skills, and at the same time maintaining knowledge of core forestry subjects. Forestry curricula need to incorporate social sciences, so that graduates are able to carry out policy and economic analyses, possess entrepreneurial skills, and are able to act under conditions of a market economy.

### **Project description**

Starting in 1990, the Trans-European Mobility Programme for University Studies (TEMPUS) has been introduced by the European Union to support the modernization of higher education in several partner countries, including Russia. In the framework of TEMPUS, a so-called Joint European Project (JEP) for curriculum development was launched in December 2007 to establish a new Master programme 'Forest Policy and Economics' at Saint-Petersburg State Forest Technical Academy (FTA). The programme was developed by a consortium, consisting of FTA as the core partner, the Swedish Agricultural University (SLU) as the grant holder, the Estonian University of Life Sciences (EMU), and Technische Universität Dresden (TUD, Germany).

The main objectives of TEMPUS FORPEC were:

- To develop a 2-year MSc curriculum in English at FTA according to the Bologna principles, focusing on forest policy and economics contents, and to start the lectures in September 2009;
- To quantitatively and qualitatively advance international educational activities at FTA during the two-year project.

### **The FORPEC programme**

The most extensive project output is a new MSc curriculum in forest policy and economics. It is the first Russian MSc programme in Forestry taught in English, developed in accordance with Bologna principles by specialists in teaching forestry, and forest policy and economics from four European countries. The programme introduces a modular structure of studies and innovative teaching methods, integrates policy and economic sciences and advances the internationalization of high forestry education.

### **Structure of the course**

The programme consists of four semesters: three semesters of course activity and one semester of MSc thesis work. FORPEC introduces a modular structure of studies serving as a pilot project at FTA. Individual courses in the new MSc programme extend from two to ten ECTS credits, depending on course topics and teaching forms.

Some courses and topics are new for forestry education in Russia; however, in order to use the available capacity in the most efficient and effective way, FORPEC also incorporates components from the existing courses where relevant and possible. The content of the programme is organized around three central themes, each roughly corresponding to one semester of studies:

- Russian and International Forest Policy;
- Management Planning for Sustainable Forestry in Russia;
- Modern Economics for Forestry in Transition.

*Theme 1: International and Russian Forest Policy*

Theme 1 provides students with a thorough knowledge of national forest policy in Russia with focus on the institutional framework and actors in the sector; regional-supranational, Pan-European and global forest policy regimes, skills in policy analyses, etc. Lectures and seminars are the prevailing teaching form, and visits to relevant stakeholder organizations are integrated into the programme. Examples of envisioned courses:

- Pan-European forest policy and multi-level governance;
- Policy tools for sustainable forestry in Russia;
- Forest certification, forest governance, and combating illegal logging.

*Theme 2: Management Planning for Sustainable Forestry in Russia*

Students develop knowledge and skills in forest management planning on various temporal and spatial scales. The starting point of the theme is the perspective on planning as decision support. Besides more traditional approaches, this block employs components of problem-based learning and case studies, where students work with real planning examples. Examples of envisioned courses:

- Methods and tools for decision support;
- Tree cover modelling on stand, forest and landscape level;
- Planning for multi-functional forestry – a case study.

*Theme 3: Modern economics for forestry in transition*

This theme introduces the economy theory as applied under market economy conditions. Applications of the theory in an economy in transition are examined using hypothetical and actual examples, employing discussions, exercises and simulations. Examples of envisioned courses:

- Economics of forestry at stand level;
- Market/profit oriented management of forest enterprise;
- Environmental economics.

The programme is aimed at developing the students' ability for continuous self-education, the skill of using their knowledge in practice. Its presupposes development of the students' professional, instrumental (ability for analysis and synthesis, decision-making, communication in the native and foreign languages), interpersonal (ability to work in a team, including an international team, ability for criticism and self-criticism, etc.) and system abilities (ability for self-education, for practical application of knowledge, initiatives, creativity, etc.).

### **Conclusions**

The FORPEC programme responds to the increasing number of issues in forest policy and economics and has the possibility to adapt to them. Hence, it has the opportunity to develop successfully for next years, attracting international groups of students.

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## **E-LEARNING IN FOREST SCIENCES – DEMAND AND PERSPECTIVES**

**SIEGFRIED LEWARK**

### **Abstract**

In the years after the SILVA Network conferences at Warsaw and Beauvais, the topic of E-learning did come up during SILVA conferences only in a few isolated presentations. So the question arises, what happened in the meantime – continuation of the initiatives and courses as described in 2002 and 2003, more use of the potential of E-learning, or E-learning falling into oblivion because of upcoming topics of greater relevance? I will try to give some answers to these questions while throwing some light on the present situation of E-learning in forest sciences, using accessible examples. I will conclude with some observations and reflections.

### **Introduction: E-learning and SILVA Network**

“ICT in Higher Forestry Education in Europe” was the topic of the SILVA Network conferences in 2002 and 2003 (held in Warsaw and Beauvais, see Tahvanainen and Pelkonen, 2004). The authors of nine papers described their ideas and experiences and gave an outlook on the potential of E-learning for higher forestry education:

*“ICT can give tools to create easily and cost effectively special or tailor made courses for international markets. It is no longer necessary for each university to produce the complete spectrum of courses to be competitive; the competitiveness could be created more and more through co-operational skills and networking. An effective educational network would enhance the attractiveness of European higher education over the other continents.”*

*“In spite of that, to be able to offer equal opportunities to everybody, even in the most remote areas of Europe, virtual mobility activities should seriously be strengthened. The supplying of international education opportunities and expertise could be brought available in almost any location using ICT.”*

*“However, E-Learning will not, and is not an attempt to put an end to face-to-face tuition or physical student and staff mobility programmes. ... E-learning is more an additional dimension and optional way to study and use tailor-made individual study programmes than a substitute for traditional education. It provides a way to share and bring extra expertise; courses we need from somewhere else or a way to continue interactive learning after the face-to-face situation to complement studies.”*

*“President of the SILVA Network, Paavo Pelkonen, ... sees virtual education as an imperative outcome of the integrated and harmonized European higher education area.” (all: Tahvanainen and Pelkonen, 2004)*

In the five years after this publication the topic of e-learning did come up during SILVA conferences only in a few isolated papers (Wageningen: Lewark, 2006, Valencia: Härkönen et al., 2007). So the question arises, what happened in the meantime – continuation of the initiatives and courses as described in 2002 and 2003, more use of the potential of E-learning, or E-learning falling into oblivion because of upcoming topics of greater relevance? I will try to give some answers to these questions while throwing some light on the present situation of e-learning in forest sciences, using accessible examples. I will conclude with some observations and reflections

### **Characteristics and potential of E-learning**

Distance learning is nothing new. It has been practised for long time through correspondence in the first place, later using radio, television and CD-ROM. With use of CD-ROM computer based learning started, which continued with online-lectures and the development of specific E-learning platforms. They allowed organisation of E-learning courses and participation in E-learning courses in a variety of ways. This has been described in short or at length in many places, always pointing out the great potential of E-learning: learning any time, any place and any pace.

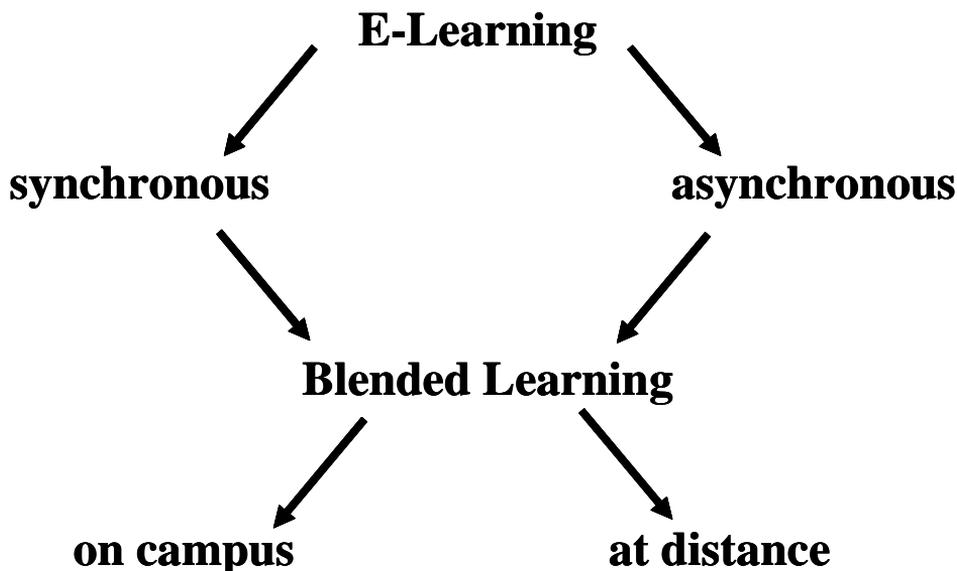


Figure 1: Basic characteristics of E-learning.

Use of E-learning platforms allows asynchronous learning phases or parts of courses, the condition for E-learning any time and any place, whereas elements like chats or direct online lecturing with interaction with the audience require the synchronisation, leading to mutual dependence of learners and teachers in time (Figure 1). But successful learning depends on more than a powerful learning platform, reliable and fast internet access and adequate hardware. Online learning is in a way more challenging than classroom learning, as personal contact and immediate reaction are not part of the learning and teaching processes as in face-to-face settings. To overcome this, often blended settings have been propagated and practiced, combining asynchronous and synchronous course elements or face-to-face and online phases.

Most important is that E-learning allows having learner and teacher groups who are based at different universities or locations, close to or far from each other – but the learning platforms may also be used to support learning processes for on-campus students (Figure 1).

### **Present use of E-learning tools in higher forestry education**

There is no up-to-date survey on the state of E-learning in higher forestry education, which cannot be done or presented in this paper either. Rather will I try to line out trends of development, using examples, more or less close to SILVA Network activities or SILVA Network member universities, and a few selected examples also from North America and Africa.

It is not easy to get an overview over the state of E-learning in higher forestry education. A google search with the key words “E-learning” and “forestry” results in more than four million hits (September 2012), but the situation is far from transparent.

For somebody who has followed the development over the last fifteen years, many E-learning initiatives in forestry education are known, but when looking at the actual situation of those E-learning courses and programmes you may find often outdated information, but no recent traces.

Sometimes there is no more activity after funding ceased to exist, there is no updated documentation in the internet, at least not visible or accessible. But not always the E-learning courses are not used any more. They may only not be accessible for outsiders, only for direct users. Likewise, other courses never showed up in the internet and were only used for a restricted number of inscribed users from the beginning.

The situation of E-learning in forestry education in 2005 has been summarized in Unasylyva by Lewark and Längin (2005) and again (2007)). Some examples will be

introduced in short, first initiatives aiming at distance education, then courses supporting on campus courses and finally blended courses.

### *Use of E-learning tools in distance education*

The Virtual European Forestry University, VIEFOR, seems to have been the most ambitious initiative from the side of SILVA Network universities. VIEFOR has been presented as a project with project funding in 2002 (Tahvanainen, 2004). The project is still working, but obviously only used for support of on-campus teaching at the University of Eastern Finland (formerly University of Joensuu), (mostly?) in the frame of the study programme Master of European Forestry. VIEFOR uses the learning platform SOFTTUTOR ([www.sordino.fi](http://www.sordino.fi)).

The online course “Forestry in changing societies”, another SILVA Network initiative, with much material prepared, available in printed form, partly accessible online (Pelkonen et al., 1999) prepared by many colleagues from different European universities, took place twice, then no more.

### *Use of E-learning tools in courses on campus*

At the BOKU (University of Natural Resources and Applied Life Sciences) in Vienna a really huge E-learning centre and programme of E-learning courses has been established in 2002 (<https://learn.boku.ac.at>), which is focused on use for on-campus teaching as well, now using the shareware of MOODLE.

The Faculty of Forest and Environmental Sciences of the University of Freiburg is supporting E-learning using the E-learning platform “CampusOnline”, the official E-learning platform of the university (<https://campusonline.uni-freiburg.de>). At the same time there are a number of other E-learning platforms in use for different courses and programmes, for different reasons, mainly because teachers are connected with different projects or networks, e.g. Ecology online (ILIAS) (Wöhrle et al., 2004; [http://www.bodenkunde.uni-freiburg.de/lehre/ilias/index\\_html](http://www.bodenkunde.uni-freiburg.de/lehre/ilias/index_html)).

### *Combining on campus and distance education in blended courses*

Many studies outside forest sciences, and inside (Längin et al., 2004), demonstrate the general advantages of blended learning, with a mixed approach, combining on campus and distance education (Figure 1).

“Gender Roles in Environmental Management” (Lewark, 2006) using egoware (this software is not supported any more) is an example for a blended E-learning course, with participation mainly, but not exclusively, by students of the Master programmes MEF (Master of European Forestry run by a consortium of six European universities) and MEG (Master of Environmental Governance at the University of Freiburg).

*New initiatives for distance education in forest sciences*

There are also new initiatives for online distance education: I name NRDLIC ([www.nrdlc.org](http://www.nrdlc.org)) with ten US American universities, AFOLM/ANAFE in Africa (Che and Lewark, 2011), and WELAN, which are in different stages of realization. It seems to be too early to say whether they will be successful and long living, also experiences are not sufficiently documented. Uncertain future is a characteristic of many E-learning initiatives, which are not anchored in curricula. So this is always something to look at carefully.

The WELAN initiative ([www.welan.info](http://www.welan.info)) made another attempt to overcome this situation, but it has not successfully taken off from the ground so far, the reasons wait to be analyzed. WELAN has been presented in Thessaloniki (as in six other international conferences, including the IUFRO world congress in Seoul, see Lewark 2010a, b, Lewark, and El-Lakany, 2010). For the basic ideas see box 1.



**WELAN: a frame for e-Learning courses & course packages ([www.welan.info](http://www.welan.info))**

WELAN is a partnership designed to promote, facilitate, organize and run e-learning courses in scientific education, further education and competence development in the fields of forestry and wood sciences as well as management of natural resources.

WELAN as a partnership for joint learning and teaching will be built around a core group of universities, among which there has been cooperation in earlier projects, The partnership will in the progress of WELAN include more universities with e-learning experiences or plans to start e-learning. Also students from other universities and professionals may participate in the courses.

The partnership will be supported by existing networks, which work in the field of improvement of higher education in the relevant disciplines (starting with IUFRO, SILVA-Network, IPFE, IFSA)

Box 1: Basic ideas of the WELAN initiative (Lewark and El-Lakany, 2010).

**Discussion and outlook**

Very often when propagating the potential of E-learning the possible use at distance has been pointed out, i.e. the potential of E-learning in distance education, for instance in international master programmes (Lewark, 2010a). But at first sight using E-learning tools on-campus seems to be by far the most common way of use. This obviously has its merits, whereas not the full potential of E-learning is used.

Only VIEFOR and some courses named as new initiatives (cf. above) were explicitly intended for distance education:

Other courses intended blended E-learning, but by far most others are meant for support of on-campus courses, but generally called E-learning, which may lead to a strange perception of E-learning. This restricted use on-campus in reality often is not pointed out: this is a limitation, but obviously many of the courses mentioned are working well or excellent.

The reason for that little use of E-learning distance courses is not on the technical side any more. In some parts of the world limitations of infrastructure (availability of hardware, insufficient bandwidth, prohibiting cost for private use of internet) certainly are still found (Längin, 2005). But this does not explain why it is not working where such restrictions are not given.

The main reason may lie on the side of the potential organisers, the universities, faculties and responsible professors: there seems to be little need and not sufficient will, which is needed in addition to competence and supporting organisational framework (Figure 2). In the universities there seems to be little incentive, on the level of the faculty there is not much demand anchored in study programmes and only few professors have the competence and the drive to do it. Most professors in forest sciences – as in other disciplines – do have a high workload, often an overload, in teaching and other duties. They have their obligations in the traditional or many new study programmes. Why should they bother with E-learning? Those who do seem to do it because of their individual interest in developing their own E-learning competence or a special need they see for it for their specific course(s). Certainly courses existing for such reasons are interesting enough to learn from the experiences, though this kind of motivation does not show up in the accessible course information, but would require a deeper analysis.

Concluding, we find that on-campus use of E-learning tools is done in many places, mostly supporting face-to-face settings. Enrichment by online courses at a distance is working astonishingly seldom, thinking of the number of initiatives and the statements and their establishment.

The potential of E-learning in forestry education is still given, but the treasure is still to be raised. An up-to-date survey and evaluation on the state of E-learning in higher forestry education may help to overcome some of the barriers which obviously exist.

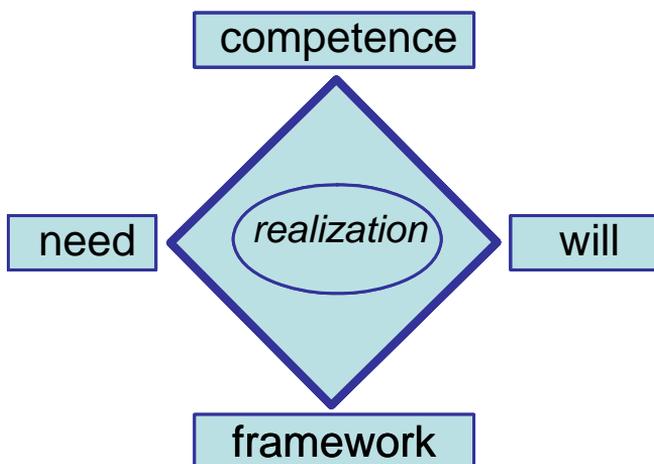


Figure 2: What is needed for the realization of successful and lasting E-learning courses and programmes (Lewark, 2010b).

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# EXPLORING THE POSSIBLE GAP BETWEEN HIGHER FORESTRY EDUCATION AND LABOUR MARKET IN EUROPA

JAVIER AREVALO<sup>2</sup> AND SARI PITKÄNEN

## Abstract

As requested by the Forest-Based Sector Technology Platform (FTP), a survey to explore the possible gap between higher forestry education and labour market in Europe was carried out during autumn 2009. Concretely, the survey examined the current status and importance of various labour-market relevant competencies as seen by programme coordinators and employers of forestry graduates in Europe, focussing at the MSc level. This article provides a brief introduction to the survey and a summary of its preliminary results.

## Introduction

As pointed out by several authors, there is a clear need to adapt higher forestry education to changing societal demands (e.g. Innes, 2005; Schmidt and Lewark, 2008; Temu and Kiwia, 2008). The need for universities to overcome mismatches between competencies acquired during studies and labour market needs has also been remarked within European Union's education agenda (European Commission, 2006). Along these lines, the Forest-Based Sector Technology Platform (FTP) has also identified the need for education and training in the sector to respond to major changes in society, updating higher education programmes to meet the challenges facing the forest-based sector (FTP, 2005). FTP is the European Technology Platform for the forest-based sector run by the European Confederation of Woodworking Industries (CEI-Bois), the Confederation of European Forest Owners (CEPF), the Confederation of European Paper Industries (CEPI), and the European State Forest Association (EUSTAFOR).

By request of FTP, a survey to explore the possible gap between higher forestry education and labour market in Europe was carried out during autumn 2009. The survey examined the current status and importance of numerous labour-market relevant competencies as seen by programme coordinators and employers of forestry graduates in Europe, examining only the MSc level of higher education. Accordingly, two online questionnaires were designed. Respondents were asked to rate various subject-specific and generic competencies taught in and learned from a generic forestry higher education programme according to: (1) the importance of that competency for the employment of graduates in the labour market for the next 10 years, and (2) the level of development achieved on that competency by current

graduates. In total, 25 responses from universities and 18 from employers were obtained. Detailed findings of the results of this survey can be found in Arevalo et al. (2010). Also the reports requested by FTP to other working groups covering the areas of pulp and paper (FTP, 2009), wood products, and bio-refinery and bio-energy can be found from FTP's webpage.

### **Results and discussion**

Preliminary results of the survey point out a consensus between universities and employers in the need for giving much more attention in the higher education curricula to the areas of environmental services and carbon sequestration, as well as to the ability to communicate with specialists and non-specialists. From the employers' perspective, more emphasis should be given to forest bio-energy, products trade and marketing, economics, and governance.

On the other hand, universities and employers agree that the actual attention given to subjects like tree biology, forest soils or ecology is good and should not be enlarged. In fact, employers saw even an excessive achievement by graduates in some of these competencies – especially tree biology and physiology - in relation to its relevance to the labour market, suggesting that these areas that could be de-emphasized in the modernisation of the curricula so that emerging issues can be incorporated.

Although the results of the survey cannot claim to represent the view from all universities and employers in Europe, we believe they contribute to the ongoing debate in higher forestry education by indicating current trends and issues that are highly relevant for today's higher forestry education and labour market in Europe. The general views of universities and employers in this study seem to be in line with the current general feeling in the profession that the European labour market for forestry graduates appears to be going through a difficult period. In this context, there is a clear need for stronger networking and partnerships between higher education institutions and employers. Collaboration through internships is suggested as a useful tool, as it seems that employers often hire those graduates, who have worked in their organization as interns during university studies.

As stated in FTP's Vision Paper (FTP, 2005), the European forestry sector represents one of the few major areas that can become truly sustainable by providing economic growth, rural jobs and a sustainable forest management. Increased information on the current state of higher forestry education curricula in Europe is needed, since the last standardized compilation with information from 30 faculties and universities dates from 1997 (Schmidt et al., 1998). There is a clear need to strengthen the cooperation between universities. Further collaborative studies on higher forestry education at European and global levels are recommended.

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## **SURVEY ON EMPLOYABILITY OF RECENT FORESTRY MSc GRADUATES OF THE POLYTECHNIC UNIVERSITY OF VALENCIA, SPAIN**

**EDUARDO ROJAS-BRIALES<sup>3</sup>, ANTONIO JONAY JOVANÍ-SANCHO,  
NEREA SANTOS AND EDUARD CALABUIG**

### **Abstract**

The results of a survey conducted in autumn 2009 under more than 80% of the graduates of the first six years of the Forestry MSc programmes at the Polytechnic University of Valencia (UPV) are presented. Despite the rapid increase of forest graduates in the labour market a strong employability is observed. Progressive signs of a maturing job market for forestry graduates are identified as well. The interrelations between study satisfaction, preceding studies, grade point average, gender, and graduation year are analyzed.

Keywords: MSc Forestry, employability, professional survey, junior professionals, Spain.

### **Introduction**

MSc studies in Forestry exist in Spain since the middle of the XIX century but only the University of Madrid has a long tradition here. Only in the early 1990s some new faculties offered forestry studies at MSc level, strongly linked in every case to agriculture programmes (Universities of Lleida, Palencia, Lugo, or Cordoba). In 1999, the Polytechnic University of Valencia (UPV) was the last university that established a MSc studies in forestry (*Ingeniero de Montes*) in the traditional Spanish way. The region of Valencia is generally considered a poor forest region regarding the main forest features (i.e., small forest area, low level of exploitation, restricted economic performance of forestry, high forest fire risk, low growth and quality). Even at the UPV strong voices doubted the viability of forest studies in Valencia.

Since 2004, more than 150 students have graduated in forestry at UPV. In 2009, the new study plan for BSc in forestry according to the Bologna agreement was drafted and supported by the responsible boards of the UPV. Just before that, a complete survey of the forestry graduates of the first six years was conducted, its main results it are presented in this paper.

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<sup>3</sup> Corresponding author. Presently FAO, Forestry Department, Rome. The present publication corresponds to previous research conducted as professor of the Polytechnic University of Valencia and not under FAO. There for, the conclusions included in this paper should not be understood as any official position of FAO.

## Objectives

The main objective of this paper is to analyze the employability of the recently graduated MSc in Forestry of UPV considering the fact that the supply of university-trained forestry graduates on the labour market multiplied suddenly by more than ten times, and that in a poor forest environment. Employability is understood in a broad sense including success degree, fields, areas and locations of activity, or linkage to specialization. Interrelations between employability and preceding studies, satisfaction with the forestry study, gender, grade point average (GPA), or year of graduation, are analyzed. A secondary objective searched feedback from the junior professionals regarding major issues of their forestry studies in order to be considered during the drafting of the new Bologna type study programmes. This part is not discussed here.

## Materials and Methods

The survey was conducted based on the administration of the correspondent faculty (UPV ETS Ingeniería Agronómica y del Medio Natural). The graduates of the first six years of Forestry MSc programmes (2003/4 to 2008/9) were identified as the total population (154) and contacted, mainly by phone. The survey was conducted during the period October-November 2009. Regarding the year of graduation, three groups have been made by joining graduates of two consecutive years, in order to obtain sufficient statistical significance.

In order to assess the validity of the obtained results, the error committed was calculated for the whole population and also disaggregated by gender and graduation year. For the purposes of the study, the confidence interval was stated at the 95% confidence level, and for the parameters “p” and “q”, due to the lack of time and resources for a pilot survey, a value of 0.5 was chosen. Moreover, two statistical tests were used to prove possible relationship between the studied variables.

First, an ANOVA test was conducted to find any possible correlation between satisfaction degree with the finished study programme Forestry, grade point average (GPA), and the other studied variables. Due to the different numbers of data between each combination of factor levels, a general linear model, a more flexible implementation of the ANOVA technique, was chosen to test the multiple possible interactions. At the same time and in order to validate the results achieved by the ANOVA test, a variance homogeneity test was carried on, accepting the results of the analysis, if the variances were equal, what means an obtained value higher than 0.05.

Second, a chi square ( $\chi^2$ ) test was realized to study the association between the categorical variables: gender, year of graduation, studies abroad and GPA, and the given factors employability and unemployment time. A contingency table was realized for each combination to investigate possible dependencies. The minimum cell value accepted for the expected frequencies was chosen as 5. Therefore, when the cell value was less than 5, the data of different categories were combined into

just one category for both, observed and expected frequencies, in order to achieve reliable results. In those cases where the contingency table consisted in two rows and two files, and in consequence with only one degree of freedom, the Yates correction was used to avoid type I errors, overestimating the true  $\chi^2$ -value.

All the statistical analysis were conducted using the statistical software Minitab 15 and in all cases the significance level was chosen as  $\alpha = 0.05$ .

## Results

A total of 124 (80.5%) students completed the survey, committing an error of 3.9%. This error can be considered statistically valid for all the global results and conclusions of the study. Also, the errors disaggregated by gender and graduation year committed (see Table 1) confirm the validation of the following results. Only the graduation year 2003/2004 & 2004/2005 group, has an error somewhat higher than 10%. The reason for that is the low number of graduates that followed the MSc forestry studies during these first two years. Despite the high percentage rate of answers of this group, 81%, a larger sample would be needed in order to achieve a lower error.

Table 1. Total population, sample surveyed and error in disaggregated populations (confidence 95%).

Gender and year of graduation	Graduates			Error
	Total	Sample	%	
Male	87	68	78.25	5.6%
Female	67	56	83.6	5.3%
2003/2004 & 2004/2005	21	17	81.0	10.6%
2005/2006 & 2006/2007	51	39	76.5	7.7%
2007/2008 & 2008/2009	82	68	82.9%	4.9%

The first ANOVA test did not show any correlation between the satisfaction degree of the graduates with the followed forestry studies and the other variables (see Table 2). However, a correlation was found between the GPA and the variable preceding university studies (see Table 3). Students with preceding Bachelor studies got a better final mark, probably because of their deeper knowledge about forestry. While at the Bachelor level courses are more specific and related to forestry, at the MSc Forestry given at the UPV faculty ETS Ingeniería Agronómica y del Medio Natural in the traditional Spanish system (ten semesters), courses are less specific, with an important agricultural influence and with a very strong engineering basis; specially during the first five semesters.

Another finding of the study is that there is not any significant difference between the GPA and the gender and in consequence there should not exist any correlation between the employability, the unemployment time and the gender. This was confirmed through the Chi square test and no correlation was found between the employability and gender (see Table 4) and the unemployment time and gender (see Table 5). Moreover, against the typical thought among the academic staff, that

students follow international study programmes to improve their GPA, no correlation was found between the GPA and studies abroad (see Table 3).

Table 2. Results of the ANOVA test, showing the correlation between the satisfaction degree of the followed forestry studies and other variables.

Variable	p-value	Variance homogeneity test	Significance level
Gender	0.284	0.428	0.05
Previous university studies	0.669	0.362	0.05
Employment state	0.951	0.753	0.05
Unemployment time	0.132	0.083	0.05
Studies abroad	0.098	0.725	0.05
GPA	0.462	0.373	0.05
Graduation year	0.750	0.066	0.05

Table 3. Results of the ANOVA test showing the correlation between the GPA and other variables.

Variable	p-value	Variance homogeneity test	Significance level
Gender	0.256	0.941	0.05
Previous university studies	0.039	0.846	0.05
Studies abroad	0.681	0.778	0.05
Graduation year	0.490	0.333	0.05

On one hand, the Chi square test indicated some dependencies between the employability and the categorical variables (see Table 4). First a very strong correlation between the employability and the graduation year exists. Students graduated during the last two years showed a greater unemployment rate than the graduated during the first years. Furthermore, the graduates with better GPA had better employability, with almost no unemployment. Moreover, the graduates who followed studies abroad showed also better employability than those who did not follow any international student exchange.

On the other hand, no dependency was found between the unemployment time and the categorical variables (see Table 5). Before testing, it was assumed that there would be a strong correlation between the graduation year and the unemployment time, but the analysis showed that it was not true.

Table 4. Results of the Chi square test, showing the interdependency between the employability and the categorical variables.

Variable	Chi-sqstatistic	Chi-sqCRIT	DF	p-value	Significance level
Gender *	2.089	3.84	1	0.148	0.05
GPA	8.189	5.99	2	0.017	0.05
Studies abroad *	3.961	3.84	1	0.047	0.05
Graduation year **	10.223	5.99	2	0.001	0.05

\* With Yates correction

\*\* Graduation year groups 1&2 joined and with Yates correction

Table 5. Results of the Chi square test, showing the interdependency between the unemployment time and the categorical variables.

Variable	Chi-sqstatistic	Chi-sqCRIT	DF	p-value	Significance level
Gender	3.900	7.815	3	0.273	0.05
GPA	4.160	12.592	6	0.655	0.05
Studies abroad	1.481	7.815	3	0.687	0.05
Graduation year**	1.213	7.815	3	0.750	0.05

\*\* Graduation year groups 1&2 joined and with Yates correction

### *Employability*

The number of surveyed graduates is given in Table 1. A total of 45% of the graduates that answered the survey were female. The reply rate was slightly higher by the female graduates (by 6%). The reply share was highest in the graduates from the 2008/2009 course (94%) and the lowest rate was observed in the graduates of the 2006/2007 course (70%).

Most of the graduates (78%) enrolled at UPV without a preceding degree (see Figure 1). The number of those who did have one, declined from 47% in the first two courses to 15-19% in the following four courses. In total 67% of them had obtained a BSc degree in forest studies, the other a BSc or MSc in agriculture.

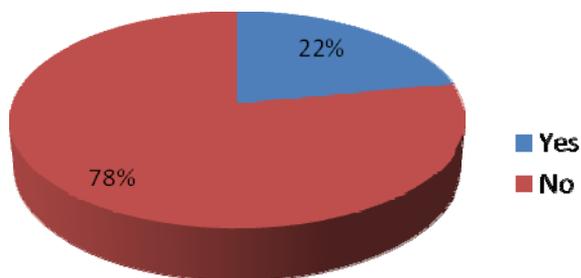


Figure 1 Distribution of the surveyed population regarding preceding university studies.

As can be seen from Figure 2, 66% of the graduates are working in a forest related field, 16% in another professional area, 13% are unemployed and 5% are studying further. Whereas employment in a forest related field is to a higher share male predominated, unemployment and especially pursuing further studies is female predominated. Graduates who possessed another degree are to a higher degree working (96%) and only exceptionally studying further. There is a clear tendency of reducing the share of forest related jobs to non forest related ones (76% to 59%) but as well an even stronger reduction from the share of non forest related jobs (24% to 12%). Unemployment is not represented at all in the graduates from the first two courses and rises up to 19% in the last two courses (see Figure 2). Pursuing further studies appears as an option only in the last two courses (10%).

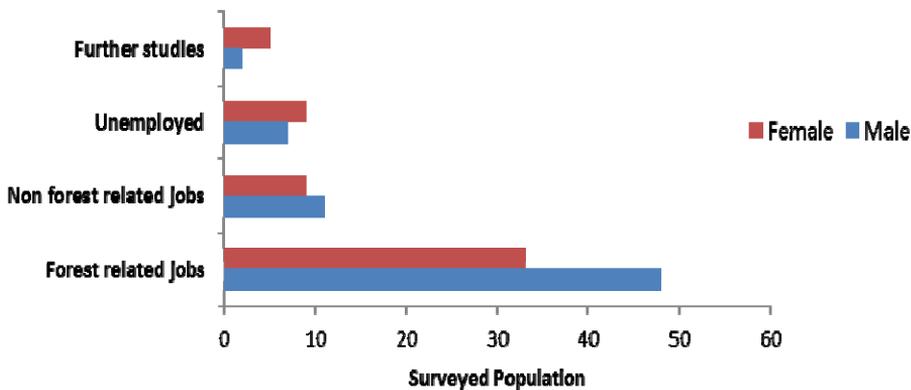


Figure 2. Distribution of the surveyed population by activity (forest related jobs, non forest related jobs, unemployed and further studies) and gender.

The graduates working in forestry-related jobs (67%) can be traced to 15 fields, predominating projects, forest management, forest civil engineering, forest research or land planning (see Figure 3 and Table 6). The part occupied in other non-forestry related jobs (16%) include informal education, non-forest formal education, gardening, renewable energies (excluding biomass), health and safety, business administration, environmental quality assessment, or meteorological services.

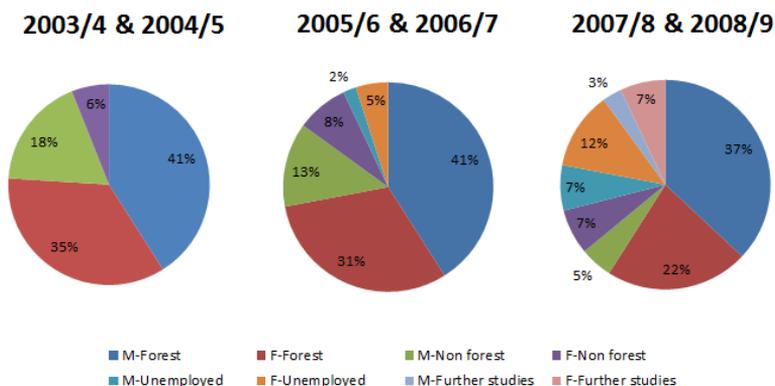


Figure 3. Development of the surveyed population by activity and gender regarding the year of graduating.

Table 6: Overview of the professional forest fields.

Professional Forest Fields	Percentage
Projects	26%
Forest management	13%
Forest civil engineering	12%
Forest research	11%
Land Planning	9%
Land restoration	5%
Wildfire prevention	5%
Bioenergy	4%
Phytopathologist	4%
Wildlife management	3%
Protected areas	2%
Forest inventory and valuation	2%
Watershed management	2%
NGOs/Social institutions	1%
Wood industry	1%

A shift is observed from a clear predominance of projects in the early graduates (35% to 10%) to more diversified professional options. The only increasing field is forest research (0% to 9%).

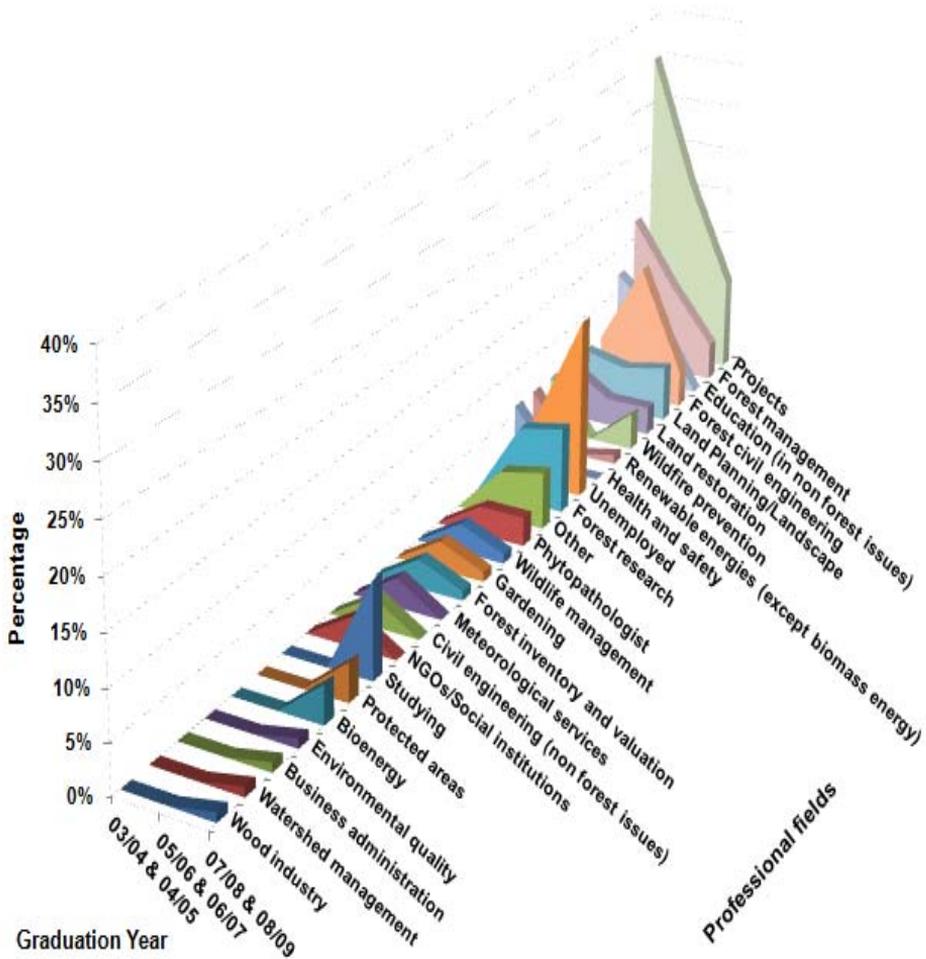


Figure 3. Development of the surveyed population by activity and gender regarding the year of graduating.

Regarding the employee type (see Figure 5), private companies predominate (37%), followed by public companies<sup>4</sup> (25%), regional governments (14%), NGOs (11%) and municipalities (7%). Only 4% were self-employed. The weight of the public companies has reduced from 35% to 21%, whereas that of the regional government increased from 0 to 17% after the first two courses. The NGOs share has developed similarly from 0 to 15%. Public companies acting in forestry were an easy field to cover in the first stages but have become overcrowded later so that new areas have been identified (municipalities, NGOs).

<sup>4</sup> ) Public companies are frequently used by the Spanish Forest Services in order to execute their activities (planning, forest management and restoration projects, fire fighting, etc.).

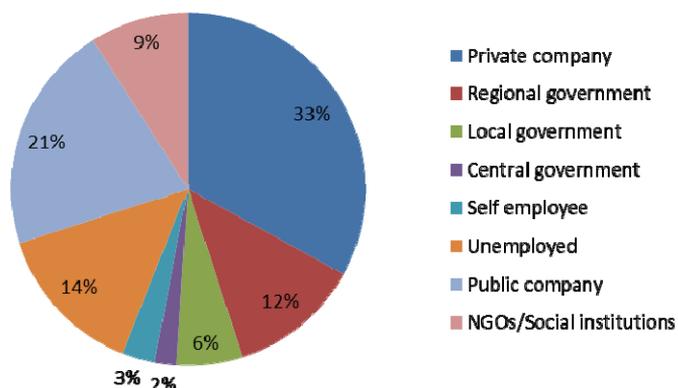


Figure 5. Distribution of the forest graduates working in forestry and non-forestry fields by employee type.

Regarding GPA<sup>5</sup>, 64% of the surveyed had an average mark of 6 (medium), 30% of 7 (good), 5% higher than 8 (very good) and 1% of 5 (fair). In Figure 6, two groups of graduates can be identified, those below 7 (65%) and those above it (35%). Only 4% of the second group is unemployed, whereas for the first group the unemployment share is 19%. Significant interdependence was identified between average marks and preceding studies. Graduates with preceding degrees from other universities show a significant better mark.

Half of the graduates have worked constantly since graduation (see Figure 7) and an additional 20% was unemployed for less than two months. This share has been constant for the six analyzed courses. Graduates from the courses 2005/2006 and 2006/2007 show longer unemployment than the other ones. The restricted period of time between graduation and time of the survey has to be considered when the unemployed status of recent graduates is concerned. Longer unemployment is affecting to a greater extend women than men. Graduates who already hold another degree, have presented a 37% less probability to be unemployed than those without a preceding degree.

<sup>5</sup>) The Spanish mark system for GPA calculation uses 10 as the top mark starting at 0, and 5 is the minimum required threshold.

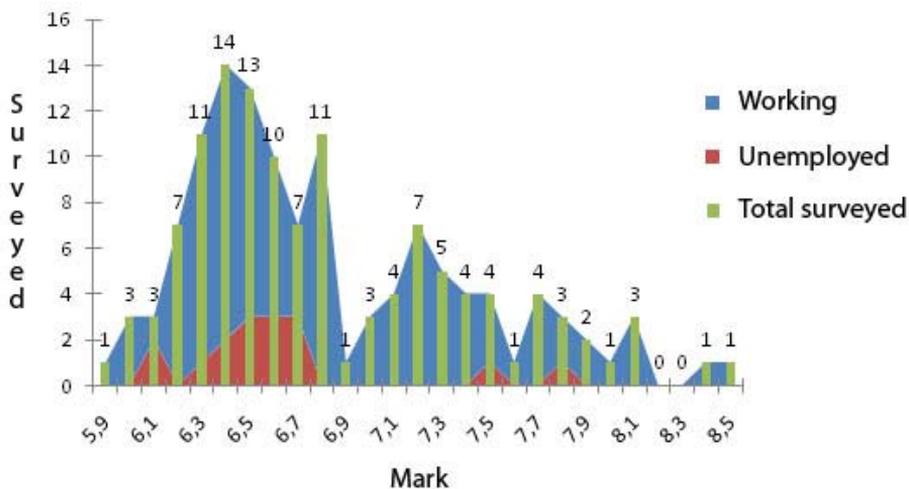


Figure 6. Distribution of the surveyed population by mark and activity (forest related jobs, non forest related jobs, unemployed and further studies).

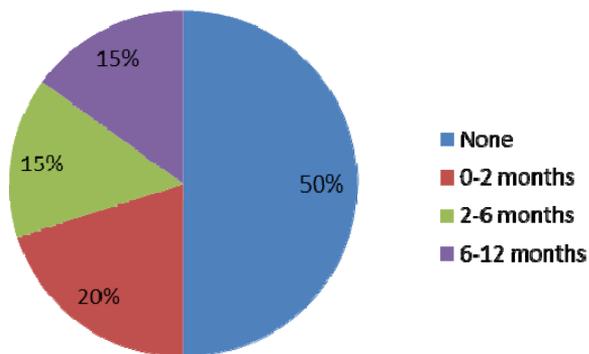


Figure 7. Total unemployment time of the surveyed population.

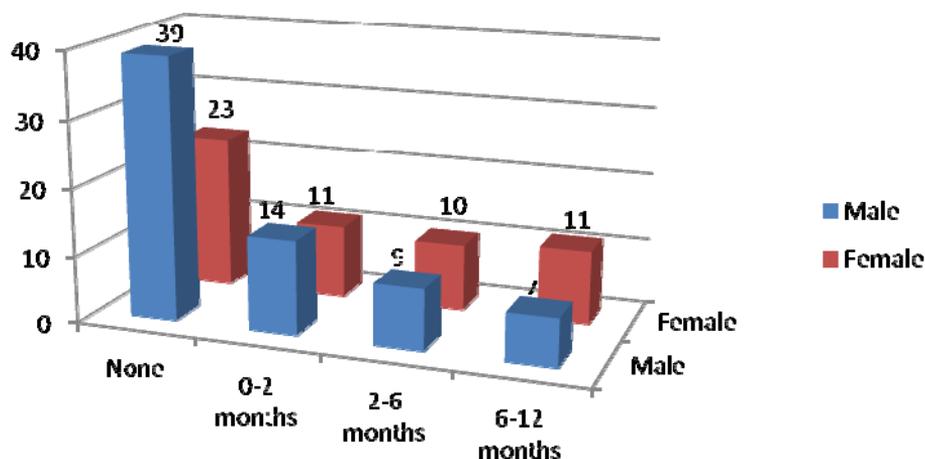


Figure 8. Total unemployed time of the surveyed population by gender.

The geographical dispersion of the graduates of UPV (see Figure 9) is quite limited as 60% of them work in the province of Valencia where the Faculty is located, followed by Madrid (7%), Lleida and Teruel (4% each). Only 4% are located outside a radius of 400 km from Valencia including two cases in other European countries. The share of graduates working in the Region Valencia (including Alicante and Castellón provinces) has dropped from 88% to 60% from the first two courses to the ones that followed. No significant gender differences are found in this respect.

Table 7. Location of the presently working surveyed population.

Location	Percentage.	Location	Percentage
Valencia	59	Zaragoza	2
Madrid	6	Girona	1
Lleida	4	Bilbao	1
Teruel	4	Asturias	1
Cuenca	3	Canarias	1
Castellón	3	Mallorca	1
Murcia	3	Tarragona	1
Barcelona	3		
Alicante	3	Belgium	1
Albacete	2	Germany	1

#### 4.2 Studies

The satisfaction degree regarding the forestry studies is relatively high, mostly between 7 and 8 out of 10. No interdependences were found regarding the satisfaction degree of the graduates and other items.

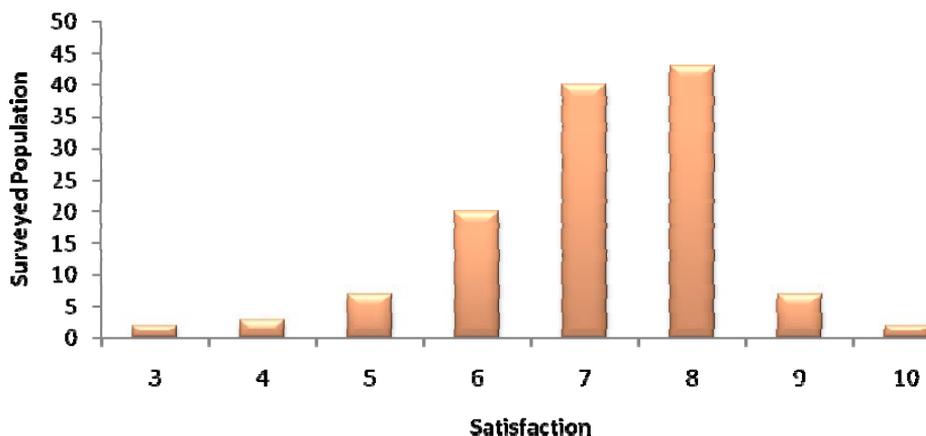


Figure 9. Overall satisfaction degree regarding the forestry studies.

The establishment of a Forest Industries Specialization in the new BSc Forestry studies according to the Bologna structure is supported by 89% of the present graduates. A total of 38% have been following Erasmus exchange programs. The main chosen countries were Czech Republic, United Kingdom, Finland, Italy and Greece (see Figure 10).

#### Conclusions

The liability of this survey is assured by the high level of responses (81%). The employability of the MSc graduates in Forestry from the Polytechnic University of Valencia has been quite successful for the first six years. Seventy percent have not been unemployed longer than two months. The employment rate is high, as well as the share of forest related jobs. Nevertheless, the job market shows a progressive maturation with increase geographical and thematic dispersion, despite keeping the predominance of forest related jobs (about 70%). Nevertheless, the concentration of the UPV graduates in the region is very high (in the value of 2/3). Unemployment is modest and affects the more recently graduates, graduates with lower GPA, graduates without preceding university studies, as well as women. A growing answer to rising unemployment is continuing university studies (PhD or another MSc). Nevertheless, self-employment is still very low (4%).

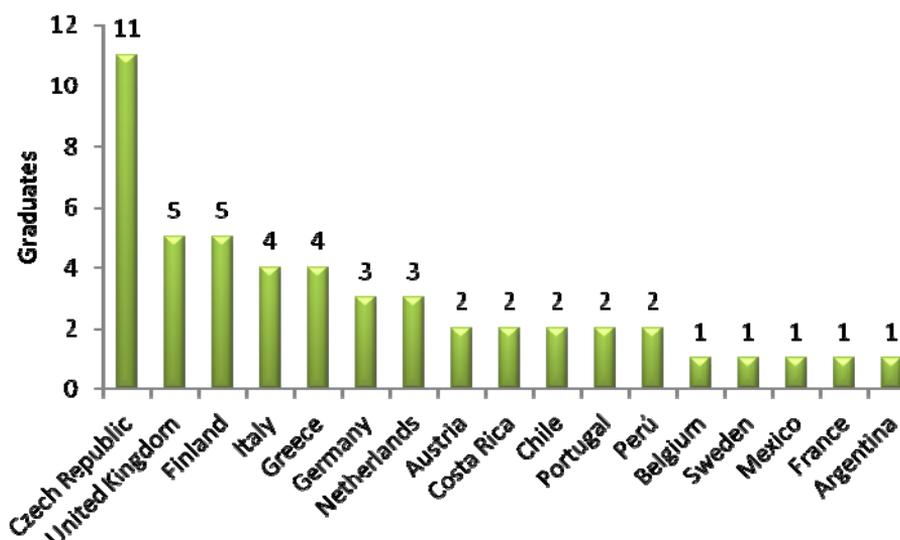


Figure 10. Number of graduates that have followed international exchange programs by countries.

Students who already obtained a degree before enrolling in the forest MSc programmes show significantly better marks than those lacking preceding studies. Employability is significantly higher for graduates who graduated already before (BSc), graduates with studies abroad and those with higher marks.

Regarding the studies, the satisfaction mark is rather high (7.5/10). A high share of the surveyed followed Erasmus exchange program (38%).

## **CONFERENCE OF DEANS AND DIRECTORS OF EUROPEAN FORESTRY FACULTIES AND SCHOOLS (CONDDEFFS): PROJECTS OF A NEW EUROPEAN ORGANIZATION AND POTENTIAL FOR COOPERATION WITH SILVA NETWORK**

**FERNANDO GARCÍA ROBREDO**

### **Abstract**

The Conference of Deans and Directors of European Forestry Faculties and Schools (ConDDEFFS) is a new organization related to forestry education in Europe. It originated from contacts kept among several deans, directors and heads of department of different European forestry academic institutions, and was officially established at a constituent meeting held in Madrid in late May 2009. This contribution intends to present, to the SILVA Network community, the origin of the Conference, its objectives, its mission, the universities that have joined the organisation, the development of the constituent meeting and the documents approved by the conference, as well as the actions that have been initiated. Finally, particular ideas on potential cooperation with SILVA Network are pointed out.

### **Introduction**

The Conference of Deans and Directors of European Forestry Faculties and Schools (ConDDEFFS) has been designed as an answer to a growing concern among the forestry academic community: despite the tremendous importance of forests to the environment, society and economic well-being, the forestry profession is not receiving the recognition it deserves. It is the responsibility of the forestry academic institutions to mould and train the next generation of foresters, but in many countries there has been a decline in students entering the forest sector. Moreover, the community of forest sector educators is fragmented at the European level. In addition, European universities are facing structural changes regarding the adjustment to the European higher education area. It is necessary to encourage cooperation and to improve the quality of forestry education and research among the European forestry faculties and schools, considering matters of common interest, articulating the needs of these institutions and influencing public opinion and legislation for the improvement and advancement of forestry higher education.

In this context, the people in charge of some accredited forestry faculties, schools or other university administrative sub-units across Europe considered the option that the European forestry faculties and schools be organized in a Conference, where they would be represented by their respective deans and directors, and which could become the voice of the forestry academic institutions before the national and international decision bodies regarding forestry issues and associated problems. As a result of this concern, such Conference was established at a constituent meeting

held in Cercedilla, Madrid, in late May 2009 under the auspices of the School of Forest Engineering of the Technical University of Madrid (UPM).

### **Objectives**

The general purpose of the Conference is to encourage cooperation and to improve the quality of forestry education and research among the European Forestry Faculties and Schools. It is founded for the purpose of considering matters of common interest relating to forestry higher education and research, articulating the needs of forestry higher education, and influencing public opinion and legislation for the improvement and advancement of forestry higher education through appropriate channels.

- The purpose and role of the Conference can be expressed by means of the following specific objectives:
- To exchange information on programmes, resources and means of the participant institutions so that cooperation actions can be established from that knowledge.
- To identify the common problems forest education and research must face, analyzing them in the present context, and foreseeing possible future scenarios. In particular, to learn from the experience gathered in different countries in the course of adaptation to the “Bologna Declaration” in order to safeguard the long-term quality of forestry education in Europe.
- To investigate possible solutions to the problems that may emerge and identify lines of action.
- To specify projects from the lines of action and build a programme of short and medium term activities.
- To present the problems identified and the solutions proposed to the institutions in charge of forest and environment policies, both at the national and European level, and to the main companies in the forest sector.
- To disseminate the Conference position on different topics to society with the aim of building public conscience about the importance of forestry education for the sustainability of the forest sector in Europe and in the rest of the world.

In summary, to foster cooperation among the participant institutions to strengthen forestry education in Europe.

### **Partners**

There are 29 institutions from 20 different European countries which are members of the Conference since its foundation. The names of these institutions are listed in Table 1.

Table 1: Conference members

Country	Institution
Austria	University of Natural Resources and Applied Life Sciences (Vienna)
Belgium	Faculty of Bioscience Engineering, Catholic University Louvain Faculty of Agronomical Sciences of Gembloux
Bosnia-Herzegovina	Faculty of Forestry, University of Banja Luka
Czech Republic	Faculty of Forestry and Wood Sciences, Czech University of Life Sciences (Prague) Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry (Brno)
Estonia	Institute of Forestry and Rural Engineering, Estonian University of Life Sciences
Germany	Faculty of Forest and Environmental Sciences, University of Freiburg Faculty of Forest Sciences and Forest Ecology, University of Göttingen
Greece	Department of Forestry and Natural Environment Management at Drama, Technological Institute of Kavala.
Hungary	Faculty of Forestry in Sopron, University of Western Hungary
Italy	Faculty of Agriculture, University of Padova
Latvia	Forestry Faculty, Latvia Agriculture University
Lithuania	Faculty of Forestry and Ecology, Lithuanian University of Agriculture
Poland	Faculty of Forestry, University of Agriculture in Krakow Faculty of Forestry, Poznan University of Life Sciences Faculty of Forestry, Warsaw Agricultural University
Portugal	Department of Forestry, College of Agriculture, Polytechnic Institute of Coimbra
Romania	Faculty of Silviculture and Forest Engineering, University of Transylvania at Braşov
Russia	Forestry Faculty, Moscow State Forestry University
Serbia	Faculty of Forestry, University of Belgrade
Slovakia	Faculty of Forestry, Technical University in Zvolen
Slovenia	Biotechnical Faculty, Department of Forestry, University of Ljubljana
Spain	School of Forest Engineering, Technical University of Madrid School of Forestry and Agricultural Engineering, University of Córdoba School of Engineering at Lugo, University of Santiago de Compostela School of Agricultural Engineering, University of Valladolid Faculty of Science and Arts, Catholic University of Ávila
United Kingdom	National School of Forestry, Faculty of Science and Natural Resource, University of Cumbria

### **Actions developed**

A constituent meeting was held on 28-30, 2009 May in Madrid. Initially, the purpose and role of the Conference was presented and discussed. During the debate it was decided that the Conference needed a mission statement to be specific about its future actions. A draft of bylaws was proposed, discussed and an agreement was reached on most of the issues. A final resolution was approved. The decisions listed in the resolution are the following:

- To establish the “Conference of Deans and Directors of European Forestry Faculties and Schools (ConDDEFFS)” (see ConDDEFFS, 2009)
- To approve the proposed bylaws of the Conference, including the establishment of a Steering Committee (composed of three individuals) as the main executive

conference authority, able to co-ordinate the work of future meetings, which will take place at least once a year in a host European country.

- To approve that the members of the Steering Committee until the 2010 meeting will be Prof. Ioan Vasile Abrudan, Dean of the Faculty of Silviculture and Forest Engineering of the University of Transylvania at Braşov, Prof. Antonio Notario Gómez, Director of the School of Forest Engineering of the Technical University of Madrid and Prof. Vilém Podrázský, Dean of the Faculty of Forestry and Wood Sciences of the Czech University of Life Sciences at Prague.
- To approve the following “Mission Statement” of the Conference:
- To work towards a common set of academic and professional competences for the forestry and forest engineering curricula in Europe
- To identify and promote mobility pathways between the participating forestry and forest engineering curricula (with the ultimate goal of establishing durable and sustainable links between research teams).
- To establish an EU recognized network (possibly through a COST proposal) focused on forestry and forest engineering pedagogy at a strategic and operational level.
- To act as brokerage network for multi-institutional educational and research proposals to the European Commission.
- To influence the direction of EU research funding relevant to the forestry sector.
- To present a common public relations front to national or international organizations.
- To develop a Conference support body or Secretariat, that will be responsible for gathering, preparing and distributing documents and information among participant institutions and international and national organizations.
- To propose that the next ConDDEFFS meeting will be held in Braşov, Romania, from 14 to 17 of October 2010.

Immediately after the Constituent meeting, the following actions were started:

- The web page of the conference was created. Its URL address is: [www.forestrydeans.eu](http://www.forestrydeans.eu), and it contains information on the objectives of the conference, its mission, list of partners, text of bylaws, meetings and news.
- A questionnaire was sent to all the members of the conference to ask for input and gather information on study programmes, management position of graduates, funding system, Socrates/Erasmus partners, programmes/courses in English and other subjects such as political issues.
- A COST proposal was presented. The name of the proposal was “Developing the science of forest sector education across the COST communities: producing the forest sector scientists of tomorrow (FORSCIED)”.

### **Potential cooperation with SILVA Network**

The primary objective of SILVA Network is “to stimulate and facilitate educational co-operation in the field of forestry in Europe”. The idea of cooperation is the essence of SILVA Network. This cooperation among forestry academic institutions can be extended to other organisations, such as ConDDEFFS, which have a similar general objective, different specific objectives, and especially a different way to reach them. Some potential actions for mutual support between both organisations can be identified.

The SILVA Network is focused on students and staff mobility, information exchange for curriculum development, and organisation of joint courses. There is a need for information exchange on programmes, resources and means of the member institutions and ConDDEFFS has already started to gather this information from its members. Regarding curriculum development, it would be very interesting to cooperate in the design of a common set of academic and professional standards for the forestry curricula in Europe. Both organizations could also take advantage of a common action related to the promotion of mobility pathways between the participating forestry curricula. ConDDEFFS and SILVA Network are not competitors, they complement each other very well and there is a potential for cooperation. They can and should work together for the benefit of higher forestry education in Europe.

### **Acknowledgements**

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## **ICA IN SUPPORT OF CHANGE IN THE APPLIED LIFE SCIENCES**

**SIMON B. HEATH**

### **Abstract**

Founded in 1988, ICA, the Association for European Life Science Universities, is an open network of more than 60 European Universities. These universities focus on the life sciences relating to agriculture, forestry, the food and non-food chains, natural resources, rural development and the environment. ICA's vision is to enhance our members' success in the international market place, in Europe and globally, by providing a supportive environment to share experience, to cooperate in new ventures, and to benefit from the resulting synergy. ICA supports staff in its member institutions through networking, professional updating, and supporting the development of a European dimension to teaching and learning. To provide this support ICA promotes conferences in collaboration with its partners and members, and also leads and participates in projects. ICA links seven ICA Standing Committees, either subject specific or support networks. SILVA Network is one of these subject specific networks. The paper demonstrates how the initiative taken by ICA in leading projects has resulted in the initiatives being taken further forward. For instance, one project supported the development of the SILVA Network and the subsequent initiative of the ERASMUS Mundus MSc in European Forestry. ICA also has partners at the global level, particularly with the US and Canada. ICA depends upon the active participation of staff in its member universities, these staff then become important agents of change in their own universities.

### **The development of ICA**

ICA, the Association for European Life Science Universities, is a network of more than 60 European Life Science Universities open to all universities in Europe which have a focus on the applied Life Sciences. The scientific background of the member institutions of ICA is rapidly diversifying from the classical agricultural and the related sciences to the applied life sciences, whilst retaining a strong and characteristic focus on agriculture, forestry, food, the environment and rural development.

In 1988, the *Interfaculty Committee Agraria (ICA)* was formed with the aim to facilitate co-operation between faculties of agriculture in European universities. The organisation was re-constituted as the *Inter-university Conference for Agriculture and Related Sciences in Europe (ICA)* in 1996, the first in a series of modifications of the association's name, mission and geographical scope. In 1999, the organisation adopted the name *Interuniversity Consortium for Agricultural and Related Sciences in Europe*, which, in 2006, was replaced by *Association for*

*European Life Science Universities*, the name under which the association is known today. However, the acronym ICA, which was well known among our stakeholders, was retained.

This last adaptation of our name reflects our member institutions response to the 21st century's economic, societal and environmental challenges of a sustainable rural economy, food security, food safety, rural depopulation, bio-renewable resource use, climate change, retention of biodiversity, the development of the food and non-food chains, the protection of natural resources and the need for technological innovation. A full presentation of ICA and our activities can be viewed at [www.ica-europe.info](http://www.ica-europe.info).

### **ICA as a Network**

One of the most significant challenges that a European higher education institution faces is the competition from other higher education institutions at the European level and worldwide. To succeed, an institution needs to strive to enhance the quality of its provision for education, research, and innovation, and to engage in the international arena.

ICA is the only open general network covering all of Europe, from Portugal to Russia and Finland to Turkey (the European Higher Education and Research Area), focusing on the applied life sciences. ICA's vision is to enhance our members' success in the international market place, in Europe and globally, by providing a supportive environment to share experience, to cooperate in new ventures, and to benefit from the resulting synergy. In fulfilling this vision, our mission is to:

- stimulate and support our member institutions in the life sciences in the development of a European dimension in education, research and innovation through the elaboration of joint actions and global engagement;
- support networking in the life sciences to share expertise and understanding, and in doing so facilitate change;
- represent the general interest of our members at the European level and globally.

Several ICA Standing Committees are working with ICA to achieve this mission.

### **ICA's governance**

ICA is governed by the ICA General Assembly which comprises one representative from each member institution. The ICA General Assembly elects the ICA Board. The Board members are senior members in the life science community. The *modus operandi* of ICA is determined by the ICA Statutes.

These Board members play a key role in developing the policies of their own universities and faculties. With this overview they are able to focus the activities

and planned outcomes of ICA to support the staff of ICA's member institutions in their professional careers. The Board reports to the annual meeting of the ICA General Assembly. The Board elects the President of ICA. The ICA Secretariat is responsible for implementing the policy decisions of the ICA Board and for the day to day management of ICA.

ICA links seven ICA Standing Committees under the umbrella of the newly constituted ICA Council. The ICA Standing Committees are networks which have either a discipline or cross discipline support focus.

- Discipline Specific Network
  - AGRIMBA, International Network for the MBA Agribusiness and Commerce
  - ERABEE-TN, Education and Research in Biosystems Engineering in Europe
- Thematic Network
  - SILVA Network, European Forest Science Academic Network
  - Support Networks
  - AGRINATURA, The European Alliance on Agricultural Knowledge for Development
  - CASEE, The ICA Regional Network for Central and South Eastern Europe
  - ECHAE, European Conference of Higher Agricultural Education
  - IROICA, European Network of International Relations Officers at Higher Education Institutes for Agricultural and Related Sciences

The Council acts as a forum for dialogue between all parties with a view to preventing unnecessary competition, and to benefit from cooperation and the resulting synergy. For example, this has been of particular benefit in past ICA led projects where AGRIMBA, SILVA Network and IROICA have jointly contributed to the development of projects and their execution.

### **ICA's collaboration with our partner Networks**

ICA, in seeking to fulfil its mission, collaborates closely with several international networks. The most active of these has been the collaboration with Association of Public and Land Grant Universities (A-P-L-U, previously known as NASULGC<sup>6</sup>) in the United States of America. A Memorandum of Understanding was signed between NASULGC and ICA in 2000.

This main outcome of this collaboration has been a series of conferences. In 2010 we celebrated the success of this collaboration and signed a new Memorandum of Understanding, this time also including the Canadian Faculties of Agriculture and Veterinary Medicine (CFAVM). The purpose of the Memorandum is to “help strengthen the cooperation between the parties in a collaborative effort to lead the

world towards a better future through agricultural and life science education, research and innovation”.

ICA also collaborates with CEDIA, the European Confederation of Agronomist Associations, and has held joint conferences. Moreover, ICA is an *ex officio* member of the Executive Committee of GCHERA, the Global Consortium of Higher Education and Research for Agriculture. GCHERA, founded in 1999, was conceived as a global association of universities with the objectives of:

- developing a world system of cooperation in Higher Education and Research for Agriculture;
- supporting activities and close cooperation with international organisations;
- strengthening the influence of the agricultural universities on a global scale.

Since 1999 there has been a biannual GCHERA conference held in several continents. In 2011 ICA is promoting with APLU the 7th GCHERA Conference to be held at the Institut Polytechnique LaSalle Beauvais (France).

### **Delivering outcomes for ICA’s members**

The benefits of the membership of ICA is through networking between members, professional updating, supporting the development of a European and international dimension and representation of ICA’s members interests at the European level.

ICA organises and promotes conferences and projects that enhance networking between ICA members’ staff to share expertise and understanding. Attendance at ICA conferences and involvement in ICA’s projects supports the development of communities of practice in which the members build confidence in each others capabilities which then lead to new joint initiatives.

### **ICA’s Conferences**

ICA’s conferences for university leaders, faculty and administrators serve as a forum to discuss innovative practice and concerns, thus acting as a clearing house for information exchange, professional updating and the discussion of strategic issues. These conferences are regularly organised in association with our member institutions, ICA’s Standing Committees, or our international networks. For the latter this has been particularly successful with APLU from the US.

The APLU-ICA Conferences have been held annually alternating between a focus on education and on research issues with the objective of developing a transatlantic dialogue. The conferences focused on research, development and outreach are designed to address topics in the field of the applied life sciences where there is mutual concern for improved understanding, or the resolution of disagreement in approaches on either side of the Atlantic. The recent conferences are outlined in box 1.

**Box 1: Recent and Upcoming Conferences 2011**

From 11 to 13 June 2009 ICA held its annual conference in collaboration with CEDIA and University of Leuven titled Models for successful collaboration and partnerships of purpose between universities, industry, and NGOs.

The APLU - ICA Conference Water Policy 2009 – water as a vulnerable and exhaustible resource was held at the Czech University of Life Sciences, Prague, from 22 to 26 June 2009. See <http://www.fzp.czu.cz/waterpolicy2009/> for more details and the presentations.

The APLU-ICA Conference, 7-9 April 2010, held at Ghent University: Doctoral and post-doctoral professional development in Agricultural and Life Sciences - Challenges for the next decade. See [http://www.fbw.ugent.be/APLU\\_ICAconference2010/](http://www.fbw.ugent.be/APLU_ICAconference2010/) for more details and the presentations.

The ICA-ECHAE Conference, 16 to 19 June 2010 at the Faculty of Agriculture, University of Zagreb: Bologna Declaration 10 years on - Promising and delivering quality in life science education across Europe. This Conference concluded the ICA Week of Conferences which this year involved meetings of AGRIMBA, IROICA and SILVA. See under Past ICA Conferences [www.ica-europe.info](http://www.ica-europe.info) for more details and the presentations.

In 2011 ICA will promote with APLU and AGRINATURA the 7th GCHERA Conference from 27 to 30 June to be hosted by the Institut Polytechnique LaSalle Beauvais, France: Universities of Agriculture and Life Sciences: entrepreneurs for sustainable rural development – for more information see [www.gchera.com](http://www.gchera.com).

In September 2011 ICA will promote with APLU and CFAVM the Water Policy 2011 - Harmonizing management strategies for ecological and social objectives to be hosted by University of Natural Resources and Applied Life Sciences, Vienna (BOKU).

**ICA Projects**

Since 1996 ICA has either led or been actively involved projects led by others. ICA led the European Commission funded SOCRATES Thematic Network projects called DEMETER 1996 - 2000, Thematic Network for agriculture and related sciences, and the subsequent follow on project AFANet 2000 - 2004, Thematic Network for agriculture, forestry, aquaculture and the environment. The aim of these projects was to develop a European dimension to education and co-operation.

A number of workpackages were executed during these projects which demonstrate the benefits of European wide networking in support of developing a European dimension to higher education. The following were the AFANet Workpackages.

- The development of curricula resources for Integrated Rural Development, Animal Bio-ethics, and Animal Breeding and Genetics;
- Modern technology in the development of the Agricultural Engineering curricula;
- The design and development of a Virtual European Forestry Faculty (VIEFOR);
- The development of learning resources to support understanding of the impact of European agricultural, environmental and rural policies on farm and associated agri-businesses;

- Support of internationalisation through the development of international relations offices (IRO) within institutions of higher education;
- Development of resources to support the language training of students;
- ICT, information and communication technology, in support of the development of virtual teaching and learning.

More recently ICA has been funded by the European Commission to lead two projects, AMEU and Quality. The AMEU project, 2004-2008, focused on enhancing the attractiveness of Master programmes at European universities in agriculture, the applied life sciences and the rural environment. The QUALITY project, 2006 -2008, addressed the quality assurance and accreditation of international Master degree programmes in the life sciences and the rural environment. These projects have resulted in the establishment of the European Accreditation Agency for the Life Sciences (EAALS, [www.eaals.eu](http://www.eaals.eu) ). The success of both projects depended heavily upon the active engagement of staff from ICA member institutions. ICA has also participated as a partner in the TEMPUS project Support network for improvement of strategic planning (led by Hohenheim and Zagreb Universities), 2006-09.

These projects have supported change within our institutions and the initiatives that were established by the work packages have evolved to support new ventures and cooperation between ICA member institutions' staff members. Some examples of these developments from the DEMETER and AFANet projects are highlighted in box 2.

### **ICA Future ambitions**

Whilst continuing the kinds of activities outlined above ICA would like to support the development of regional networking activities as exemplified by the recent innovation of the CASEE Standing Committee. We would also like to develop a strong working relationship with ICA members' economic environment through developing a partnership with enterprises and NGOs. We can offer such partners access to a stratified network of contacts in the life sciences as a gateway to new knowledge and opportunities for collaboration. In return ICA members will benefit from the involvement of our stakeholders in the development of our curricula and in the quality assurance of our degree programmes. ICA envisages the development of the ICA University-Enterprise Platform. The ICA Board also proposes to develop the opportunities for representation of Life Sciences at the European level. By no means least, in order to achieve these ambitions, ICA must enhance its economic base.

### **Box 2: Off spin of some DEMETER and AFANet projects**

- The Forestry work package supported the development of the SILVA Network. The network has since prospered and out of which a number of projects have been undertaken worldwide and the most successful Erasmus Mundus MSc in European Forestry established.
- The partnership which developed the international curriculum in animal breeding and genetics has subsequently been successful in developing the Erasmus Mundus MSc Animal Breeding and Genetics.
- The workpackage which focused on exploring the impact of modern technology on the agricultural engineering curriculum went on to obtain two successive EU funded thematic network projects which has led to the recognition in Europe of a curriculum for the new discipline of Bio-systems Engineering.
- The workpackages which focused on the use of ICT in education were subsequently funded under the SOCRATES Minerva programme to implement online agricultural and environmental case studies which could be used for delivery of student project work in the curriculum across Europe.
- In developing a European dimension to teaching and learning it is necessary to address the development of the second language skills of our students. A work package was developed to explore the support required by language teachers in our faculties. This led to a project funded by the Socrates LINGUA programme to develop language teaching opportunities focused around the development of case studies and simulations, this being a much more rewarding approach to learning a second language than the more traditional approaches of language teachers.
- European cooperation between universities in education and research is supported by international offices in each university. From 1996 there developed a strong work package which brought international officers together to discuss good practice in internationalisation of universities. This group developed into the ICA Standing Committee IROICA which meets annually to support networking and the staff development of its members.

### **Conclusion**

ICA supports the development of strong relationships with and between its member institutions. In doing so ICA provides our members' staff with professional updating through the ICA promoted conferences, membership of a "professional club" where staff can develop their skills and understanding, opportunities to become involved in ICA led projects resulting in the adoption of innovative practice and the development of institutional strategy, and linkage to worldwide developments through ICA's global networking activities.

Although ICA's membership is identified by the name of the institution, in reality the success of ICA depends upon the actions of individual staff members. By networking as individuals, within the community represented by ICA, we will share and gain expertise and understanding, and in doing so we can become important agents of change within our institutions in helping to address the 21st Century's economic, societal and environmental challenges.

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## CONCLUDING REMARKS

**PIETER SCHMIDT**

### **Development of forest sciences curricula in Europe**

Looking at the title of this meeting and at the previous meetings of the SILVA Network, I have to state that Curriculum Development is ongoing business since the conference of the SILVA-Network in Wageningen in 1997. The change from forestry education to forest sciences curricula, respectively the subject in Wageningen in 1997 and the subject here in Thessaloniki in 2009, indicates that quite a lot of work, of creativity and thought had to be put in the development of these new curricula with a new focus. This change in focus of our curricula was not discussed here but its existence is quite evident, even if differences in emphasis or direction of the development in the various universities and countries can be seen. And the end of this development as a result of societal development has not yet been reached and will probably never be reached

I mentioned this development first, because it is a forestry internal one. Other driving forces are external ones, such as the rise - or perhaps better described boom - of ITC, the change in emphasis from teaching to learning, the new insight in the need of life-long learning and changes in student mobility and changes in the labour market and expectations of the employers. The Bologna Declaration, of course, should be mentioned here specially. I am sure this summing up is not complete. Curricula will continue to develop and to be developed.

In curriculum development quite a lot of parties should be involved. I listened to teachers here and I saw a couple of deans. Employers belong to these parties too, as do students. The former would be difficult to involve but I was very happy to see a couple of students participating in this meeting. Without students there would not be a reason to offer curricula at all. The SILVA Network has a long tradition of involvement of students involved in forest(ry) (sciences) curricula and should continue to do this.

In forestry both generalists and specialists are involved. This is true for all countries and hence all universities have to cope with this issue. This holds for both the traditional universities and the universities of applied sciences. The generalist, with the broad overview, educated to be a general forest manager, able to talk to and understand all specialists in forestry, governors and managers, politicians, and the general public. The specialist, with his or her deep knowledge in a smaller field, educated to generate new knowledge and to translate it for and implement it in practice. Here also the discussion how to balance this issue of educating generalists and specialists at university will continue.

The discussion on development of curricula for forest sciences will not stop here. Societal change will demand changes in universities and curricula. The SILVA Network has reasons enough to continue to exist as a Network and a discussion platform for students and teachers.

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