

# TRANSFOR-M: A unique transatlantic forestry Master program leading to a dual European and Canadian degree

by Brigitte Leblon<sup>1</sup>, Heinrich Spiecker<sup>2</sup>, Jorma Neuvonen<sup>3</sup>, Marjoriitta Möttönen<sup>4</sup>, Andreas Hamann<sup>5</sup>, Anders Karlsson<sup>6</sup>, Christine Cahalan<sup>7</sup>, Marianne Stadler<sup>2</sup>, Alex Drummond<sup>5</sup> and Erik Valinger<sup>6</sup>

## ABSTRACT

To educate their students in modern sustainable forest and environmental management approaches sensitive to cultural and situational differences, three Canadian (Alberta, British Columbia, New Brunswick) and four European (Albert-Ludwigs-Universität, Freiburg, Germany; University of Eastern Finland, Joensuu, Finland; Swedish University of Agricultural Sciences, Umeå, Sweden; and Bangor University, Wales) universities have developed a new transatlantic forestry Master program leading to a dual European and Canadian post-graduate degree (TRANSFOR-M). The two-year English language program has the following key characteristics: 1) the optimal use of expertise at partner institutions to deliver effective, globally oriented programs in forestry and environmental management; 2) one intensive language course in the language of the host country for the Canadian students; 3) e-learning courses accessible among all partner institutions (and once tested through TRANSFOR-M, to a broader audience); 4) a "thesis" or research project report that is co-supervised by both a Canadian and a European professor; 5) access to work internships to provide practical experience in an international context and increase the employability of the graduate students and 6) two mandatory three-week field courses (one across the four European countries and one across the three Canadian provinces), where all program participants meet.

**Keywords:** international forestry Master program, graduate forestry students, internships, field courses, international forestry, dual-degree Master program

## RÉSUMÉ

Pour former leurs étudiants aux approches de gestion moderne durable des forêts et de l'environnement qui soient sensibles aux différences culturelles et de situation, trois universités canadiennes (Universités de l'Alberta, de la Colombie-Britannique et du Nouveau-Brunswick) et quatre universités européennes (Albert-Ludwigs-Universität, Fribourg, Allemagne; Université de la Finlande orientale, Joensuu, Finlande; Université des Sciences Agricoles de Suède, Umeå, Suède; et l'Université de Bangor, Pays de Galles) ont développé un nouveau programme de maîtrise transatlantique en foresterie qui conduit à un diplôme post-gradué double européen et canadien (TRANSFOR-M). Le programme de maîtrise de deux ans offert en anglais a les caractéristiques principales suivantes : 1) l'utilisation optimale de l'expertise des universités-partenaires pour offrir un programme en gestion forestière et environnementale qui soit orienté vers la globalisation; 2) un cours intensif de langue de la langue du pays européen d'accueil pour les étudiants canadiens; 3) des cours offerts via l'Internet qui sont accessibles à toutes les universités-partenaires (et une fois testés via TRANSFOR-M, à une audience plus large); 4) une thèse ou un rapport de projet de recherches qui est co-supervisé par un professeur canadien et par un professeur européen; 5) un accès à des stages de travail pour donner une expérience pratique dans un contexte international et pour augmenter l'employabilité des étudiants gradués et 6) deux cours obligatoires de terrain de 3 semaines (un dans les quatre pays européens et un dans les trois provinces canadiennes), durant lesquels tous les participants au programme ont une chance de se rencontrer.

**Mots-clés :** programme international de maîtrise en foresterie, étudiants gradués en foresterie, stages de travail, cours de terrain, foresterie internationale, programme de maîtrise à double diplôme

<sup>1</sup>Faculty of Forestry and Environmental Management, P.O. Box 4400, 28 Dineen Drive, University of New Brunswick, Fredericton, New Brunswick E3B 5A3. Corresponding author. E-mail: bleblon@unb.ca

<sup>2</sup>Institut für Waldwachstum / Institute for Forest Growth, Albert-Ludwigs-Universität Freiburg Tennenbacher Str. 4, 79106 Freiburg, Germany, E-mail: instww@uni-freiburg.de

<sup>3</sup>Faculty of Forestry, University of British Columbia, 2618-2424 Main Mall, Vancouver, British Columbia V6T 1Z4. E-mail: jorma.neuvonen@ubc.ca

<sup>4</sup>University of Eastern Finland, Faculty of Science and Forestry School of Forest Sciences, P.O. Box 111, Yliopistokatu 7, FI-80101 Joensuu, Finland. E-mail: marjoriitta.mottonen@uef.fi

<sup>5</sup>University of Alberta, Department of Renewable Resources, 751 General Services Building, Edmonton, Alberta T6G 2H1. Email: andreas.hamann@ualberta.ca

<sup>6</sup>Swedish University of Agricultural Sciences, Department of Forest Ecology and Management, Skogsmarksgrand, SE-901 83 Umeå, Sweden. E-mail: anders.karlsson@slu.se

<sup>7</sup>School of Environment, Natural Resources and Geography, Bangor University, Bangor Gwynedd LL57 2UW, United Kingdom. E-mail: c.m.cahalan@bangor.ac.uk

## Introduction

Forests provide millions of jobs and billions of dollars' worth of employment income, tax revenue, and economic activity world-wide. In addition, they provide a broad range of ecosystem services including water, recreation, biodiversity, and carbon sequestration. All of these benefits depend on healthy forests, which are threatened by global problems including climate change, biodiversity loss, and forest conversion. We increasingly recognize that forests, and the broader environment that includes them, must be managed in a sustainable and globally responsible way. However, management approaches employed around the world reflect cultural differences and different historic contexts. Solving global environmental problems in a local context requires efforts from forest and environmental managers educated to have both a global perspective and multi-cultural awareness. The next generation of natural resource managers and scientists needs to be trained to consider cultural differences, take advantage of local opportunities, while understanding the global challenges of sustainable forest and environmental management.

"TRANSFOR-M" (TRANSatlantic FORestry Master programs leading to dual degrees) is an innovative and unique Canadian and European Master program that aims to internationalize Master degree programs in natural resource and environmental management. The program is a two-year, dual-degree Master program jointly organized among three Canadian and four European partner universities (<http://www.transfor-m.uni-freiburg.de/en/>). The specific form of the Master program varies depending on the Canadian and European partners involved, but each program has several common characteristics, such as the optimal use of expertise at partner institutions, intensive language courses in the host country for the Canadian students, e-learning courses available to all participating institutions, a thesis that is co-supervised by both a Canadian and an European professor, and two mandatory three-week field courses (one across the four European countries and one across the three Canadian provinces). Because an important objective of TRANSFOR-M is to increase employability of the graduates, students have access to international work internships to provide practical work experience.

TRANSFOR-M is the follow-up of the undergraduate TRANSFOR exchange program in the area of natural resource, forest, and environmental management that was initiated in 2005 (Spence *et al.* 2010). TRANSFOR-M is the only project that was funded so far under the Transatlantic Degree Partnership (TDP) initiative of the European Union-Canada Program for Co-operation in Higher Education, Training and Youth sponsored by Human Resource and Development Skills Canada (HRDSC) and by the European Education, Audiovisual and Culture Executive Agency (EACEA). Additional funding was obtained for organizing the European and the Canadian field courses from various sources. For example, the Canadian field course was supported by the Fundy Model Forest for the New Brunswick part, and participating universities and their government and industry partners for the Alberta and British Columbia parts.

## Origin and Structure of the TRANSFOR-M Program

Similar to TRANSFOR, TRANSFOR-M is organized as a consortium of forestry faculties that include in Canada, the University of Alberta (UofA), the University of British

Columbia (UBC), and the University of New Brunswick (UNB). In Europe, the participating institutions are the Albert-Ludwigs-Universität (ALU), Freiburg, Germany; Itä-Suomen yliopisto or University of Eastern Finland (UEF), Joensuu, Finland; Sveriges LantbruksUniversitet or Swedish University of Agricultural Sciences (SLU), Umeå, Sweden; and Bangor University (BU), Wales.

TRANSFOR-M is a two-year Master program leading to dual degrees in forestry and environmental management. The HRSDC-EACEA funding allows supporting 24 Canadian students and 20 European students over the three years of the funding during the year of exchange. Additional students may be accepted into TRANSFOR-M, with the provision that they must pay domestic tuition and other fees at the host institution. All the students pay tuition fees at their home institution. TRANSFOR-M is currently in its mid-term and so far, 25 Canadian and European students and eight professors have participated in exchanges among partner institutions (Table 1).

## A Two-year Master Program

The TRANSFOR-M study program relies on the Master programs that already exist in each university (Table 2), and from which an individual study plan is designed for each participating student. The study plan outlines the courses to be undertaken at the home university and at the host university, including their corresponding credit that is translated into European Credit Transfer System (ECTS) credits for the Canadian credits. The credit transfer between the Canadian and European partner universities for coursework to meet individual degree requirements is determined by each partner university granting the degree. The credit transfer is set up in such a way that one Canadian credit is worth between two and three ECTS credits, aiming at equality in total workloads across different Master programs. Table 3 shows an example of study plan made for UNB and BU students enrolled in the UNB Master of Environmental Management and the BU M. Sc. Conservation and Land Management programs.

When designing the study plan for each individual student, we aim at taking advantage of complementary expertise at partner institutions to deliver an effective and globally oriented program in forestry and environmental management. Design of study plans require that each institution have an experienced advisor, who is familiar with the European and

**Table 1. Numbers of students and professors participating in the various activities of TRANSFOR-M and types of support provided through the TRANSFOR-M grant**

Activity	Europe	Canada	TRANSFOR-M funding
	to Canada	to Europe	
Students	9	16	Air fares and living allowance
Professors	2	6	Air fares and living allowance
Project meetings	5	4	Travel expenses
Field courses	11 <sup>a</sup>	16	European field course costs for the Canadian students

<sup>a</sup>Including two European students who took part to the New Brunswick field course while not being funded by TRANSFOR-M.

**Table 2. Master programs on which TRANSFOR-M is relies**

University	Master programs
University of New Brunswick (UNB)	Master of Environmental Management M.Sc. in Forestry M.Sc. in Forest Engineering
University of Alberta (UofA)	M.Sc. Forestry Master of Forestry
University of British Columbia (UBC)	Master of Forestry
Albert-Ludwigs-Universität: Freiburg (ALU)	M.Sc. Forest Sciences
Bangor University (Wales) (BU)	M.Sc. Agroforestry M.Sc. Conservation and Land Management M.Sc. Environmental Forestry
University of Eastern Finland (UEF)	M.Sc. Agriculture and Forestry
Swedish University of Agricultural Sciences (SLU)	M.Sc. Forest Ecology and Management Euroforester Master M.Sc. Management of Fish and Wildlife Populations M.Sc. Agriculture and Forestry

**Table 3. Example of an individual study plan for a student enrolled in the Master of Environmental Management at the University of New Brunswick (Canada) and the Master of Science in Conservation and Land Use at Bangor University (Wales)**

EUROPE						
Bangor University			University of New Brunswick		Credits	ECTS
Number	Title	ECTS	Number	Title		
TRANSFOR-M 2012 <sup>a</sup>	European Field Course	10				
DXX-4016	Conservation Biology	10		Elective 1	3	7.5
DXX-4502	Evidence-Based Practice in Conservation	10	ENVS6007	Practicum in Water, Wildlife, and Forest Management	3	7.5
DXX-4520	Research Methods	10	FOR6913	Research Methods (Elective 2)	3	7.5
DXX-4013	Management planning	10	ENVS6002	Biophysical Foundations of Ecosystem Management	3	7.5
DXX-4038	Field Trip	10				
DXX-4042	Agriculture and the environment	10				
WG61	Welsh for Adults					
CANADA						
University of New Brunswick			Bangor University			
Number	Title		Credits	ECTS	Number	Title
FOR 6920	Canadian Field Course		4	10		
ENVS6001	Nature, Society and Social Ecology		3	7.5		
ENVS6003	Current Issues In Environmental Management		3	7.5		
ECON6755	Environmental Economics		3	7.5		
ENVS6004	Environmental Impact Assessment		3	7.5		
GGE4423	Advanced Geographic Information Systems		5	12.5		
ENVS6005	Master Project Report		6	15	DXX-4999	M.Sc. thesis
						30
TOTAL						
Number of ECTS						
Year	Courses	Field course	Thesis	Total		
In Europe	60	10		70		
In Canada	42.5	10	30	82.5		

<sup>a</sup>credits from Albert-Ludwigs-Universität Freiburg

Canadian credit systems. Thereby, as detailed in the Program Management section, a TRANSFOR-M Liaison Officer was designated at each university to be responsible for coordinating the academic and administrative responsibilities for TRANSFOR-M.

### Language Course for the Canadian Students

One of the TRANSFOR-M program outcomes is that the enrolled students gain language skills and cultural awareness related to the partner countries, in addition to discipline-related skills and expertise. Although all TRANSFOR-M Master programs are delivered in English, there is an additional TDP requirement to have formal language training for the Canadian students through one intensive native language course of the European country/region (Germany, Wales, Sweden and Finland). For all the students, both the language skills and cultural awareness are gained during the full year that the student spends abroad. Students are also offered some language and cultural preparedness prior to their departure for the year abroad. For example, during the August 2011 Canadian field course in New Brunswick, there was a “German” minivan, a “Swedish” minivan and a “Finnish” minivan, so that Canadian students could acquire some language skills from the European students as a function of their European destination. Also, the Canadian students were paired with Faculty members or students at the home institution who are citizens of the European country where they spent the one year abroad.

### Development of E-learning Courses

Another outcome of the TRANSFOR-M program is the use of e-learning technologies for delivering existing or new courses. E-learning courses provide enhanced educational opportunity for students located outside the partner universities with access through the World Wide Web. Several e-learning products are already available to the TRANSFOR-M students. The University of New Brunswick (UNB) has the following online graduate courses in GIS and remote sensing: (i) FOR 6302 “Optical, Thermal Infrared and Radar Remote Sensing; (ii) FOR 6304 “Rada Polarimetry and RADARSAT-

2 SAR images”, (iii) FOR 6286 “Geographical Information Systems”, and (iv) FOR 6313 “Digital Image Processing in Remote Sensing”. The University of British Columbia (UBC) has developed new on-line learning resource that prepares students for studies at UBC. Contemporary Topics in Forestry and Natural Resource Conservation (<http://topics.forestry.ubc.ca/>) is an online learning resource containing introductory video lectures on a variety of topics. Viewers can watch lectures by experts many of whom are professors from the UBC Faculty of Forestry. The resource includes 20 modules covering the broad disciplines of forestry and natural resource conservation from forest genetics, sustainable forest management, engineered wood products and marketing to international forest policy. Several of the modules also include laboratory and field videos that expand on topics discussed in the lectures.

### Thesis or Final Report

A thesis or a research project report is required as part of the dual-degree program. The student’s research project is jointly supervised by academic advisers of both the Canadian and the European universities involved in the dual degree. While most of the Canadian Master programs involved in TRANSFOR-M are course-based Master degrees that require a report-type project, the report is worth 30 ECTS in each study plan according to the thesis requirement of the European Master degrees. Video-conferencing for defense of theses or reports allows students and faculty members from all partner institutions to participate, whatever their location. Table 4 lists some of the thesis topics of TRANSFOR-M students.

### Student Internships

The purpose of student internships is to increase the employability of TRANSFOR-M students through practical work experience in the forest and environmental industry, governmental and non-governmental organizations and, possibly, universities that pursue relevant work in natural resource management. In particular, the internships provide students with skills to solve practical forestry and environmental management problems dealt with by the host organization, cul-

**Table 4. List of thesis topics undertaken by TRANSFOR-M students**

Thesis topic	European university	Canadian university
Challenges and opportunities facing the involvement of Northern indigenous communities in the management of local natural resources: a case study analysis of the Canadian Inuit and Finnish Sámi peoples	UEF	UNB
GIS modelling for conservation planning in the Upper St-John River (NB)	UEF	UNB
Does disturbance impact tree regeneration in Finland?	UEF	UofA
Climate change impacts and forest management adaptation measures in Sweden and British Columbia, Canada	SLU	UBC
Mapping wetland areas on forested landscapes using Radarsat-2 and Landsat-5 TM data	SLU	UNB
Commercial thinning and its potential for contribution to the timber supply	SLU	UBC
Use of RADARSAT-2 images for fuel moisture monitoring in woody savannas	ALU	UNB
Biomass estimation with hyperspectral and Lidar information using kNN method	ALU	UBC
GIS modelling for conservation planning in the Miramichi River (NB) and in Wales	BU	UNB
Conservation of Arctic wildlife	BU	UNB

tural experience in a working environment, and opportunities of improving their language skills.

In most of the Master degree programs, an internship is not mandatory, except at ALU and UEF where it is worth 10 ECTS. However, students were encouraged to do an internship, ideally related to their thesis subject. We found that internships were particularly easy to organize abroad, as the students' living expenses were covered by the TRANSFOR-M program. Table 5 lists locations where TRANSFOR-M students did their internship. Early feedbacks from students suggest that their internships provided particularly valuable experiences.

### Summer Field Courses

A key component of the TRANSFOR-M program is two, three-week summer field courses that all students are required to take for credit. Each field course is worth 10 ECTS, so that the field course allows meeting one of the TDP requirements, i.e., having the students acquiring at least 10 ECTS in another European country than the one of the university that is granting the European degree. Because the program is relatively small at this point, Canadian and European field courses are scheduled in alternate years, so that two cohorts can attend each field course concurrently. The Canadian field course covers visits to three provinces (British Columbia, Alberta and New Brunswick) and the European field course is organized across four European countries/regions (Sweden, Finland, Germany and Wales). Part of the costs associated with such travel-intensive field courses are covered through in-kind contributions and additional funds by several other sources (participating universities and their government and industry partners in Alberta, British Columbia and Europe, Fundy Model Forest in New Brunswick), while the remaining balance is being split amongst the participants (students and staff). Some funds from the HRSDC grant were also used to support Canadian participation to the European field courses.

Field courses were designed to introduce students to forestry and environmental management practices and context across the visited provinces/countries. They are delivered by professors, but often with the help of students from the

host institutions. Another goal of the field courses was to create an esprit de corps among the various student cohorts as the field courses are the only time during the two years of the program when all the students are together.

Each student has to submit a written report for each field course that is graded. For the Canadian field course, the report should summarize the activities of each of the three weeks of the field course, and compare practices, issues, and provincial context among the provinces. The report should provide an in-depth analysis of the lessons learnt and be based on the impressions and comments recorded in the journal each student keeps during the field tour. For the European field course, each student completes two individual assignments. First, a condensed oral presentation of the field course is required at the end of the field course. Second, a written report is required, containing a comparative analysis among the visited European countries on a topic directly related to the field course. So far, one field course has been organized in Canada and one in Europe.

### Faculty Members Exchange

The HRSDC-EACEA funding allows 21 faculty members (nine from the Canadian institutions and twelve from the European institutions) to take part in short-term teaching activities. Besides these direct international activities, the experiences gained by the Faculty members taking part in the exchange translate to better international perspectives on academic activities at their home institution, even after the end of the HRSDC-EACEA funding. Also, Faculty exchanges are an opportunity for developing joint research projects with their European partners. Several Faculty members involved in the exchange are co-supervising TRANSFOR-M student thesis work.

### TRANSFOR-M Project Management

The TRANSFOR-M consortium consists of seven universities, which results in unusual management challenges. The Canadian universities do not benefit from a uniform credit system as they are governed under various provincial jurisdictions; in contrast, the four European universities benefit from some common rules, such as the ECTS accounting sys-

**Table 5. Locations of internships for TRANSFOR-M students**

Location	European university	Canadian university
Arctic Centre at the University of Lapland	UEF	UNB
UNB Remote Sensing Laboratory and Nature Trust New Brunswick	UEF	UNB
UEF School of Forest Sciences	UEF	UofA
Vilhelmina Model Forest, Sweden	SLU	UBC
UNB Remote Sensing Laboratory and Canadian Forest Service	SLU	UNB
UBC Alex Fraser Research Forest, Williams Lake, BC	SLU	UBC
European Forest Institute – Central European Regional Office and Observatory for European Forests	ALU	UNB
Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg (FVA), ALU Department of Forest Ecology and Department of Biometry/Informatics	ALU	UofA
Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg (FVA) and ALU Department of Forest Growth	ALU	UBC

tem of credits. The entry and course requirements for each Master program both in Europe and in Canada can be very different among universities. For all of these reasons, the following program management structure proved useful. Two universities (ALU in Europe and UNB in Canada) are responsible for the budget management and the relationship with the granting agencies. At each partner university, there is one Liaison Officer who is a Faculty member responsible for coordinating the academic and administrative responsibilities for the TRANSFOR-M Program. The Liaison Officers meet annually alternatively in Europe and in Canada. So far, four annual face-to-face planning and organization meetings were held over a two- or three-day period in Freiburg (2010), Fredericton (2011), Joensuu (2012) and Vancouver (2013). The meetings aim to discuss and compare progress of the project to date in terms of student and faculty exchanges as well as to organize the summer field course. Another important task of the meetings is the selection of the students, which is done as follows:

1. By the end of January, a full application is sent to the Liaison Officer of the student's home institution
2. The Liaison Officer assesses the eligibility of the applicants. In particular, the Canadian students must be Canadian citizens, landed immigrants or refugees between the ages of 15 and 30. European students are citizens of the European Union or third-country nationals who have been legal residents in the European Union for at least three years. Also, the applicants must be eligible to apply to a Master program in both the home and host institutions.
3. There is an internal ranking of the applications at each home institution on the basis of academic merit as reflected by transcripts, professional experience and social engagement.
4. In mid-February, the selection of students is finalized during the Liaison Officer's meeting. The final selection is done based on the background and interest of each student with the aim of achieving an approximately equal distribution of the students among partner universities.

The meetings end with short field excursions to expose the Liaison Officers to forest and environmental sector issues of the visited country or province.

### **Benefits for the Participants and the Partner Universities**

Principles of forest, natural resource, and environmental management are currently taught at each institution in a specific, locally relevant context. TRANSFOR-M is built on the basic opportunities currently provided by each individual Master program and is a unique platform through which Master students can become aware of how natural resource and environmental management issues are adapted to varying cultural context. As a result of their program, the participating students should come to understand sustainability as a participatory process with social and cultural dimensions.

The cross-cultural aspects of TRANSFOR-M, including cultural immersion, language training, international study, field courses and working experiences through internships provide uncommonly valuable experiences and are highly attractive to students. The cross-cultural aspects of TRANS-

FOR-M are benefiting not only the student participants, but also students at partner institutions who are not going abroad. Both the foreign students and the students returning from exchange improve the international awareness among students and professors at host/home institutions by sharing their international experiences in the classroom or through informal activities. Internationalization of the classroom is also possible thanks to the cross-cultural experiences gained by the exchange faculty members who take part not only in short-term teaching activities, but also in thesis work co-supervision. Study visits of faculty members are also occasions for developing joint research projects.

TRANSFOR-M students gain experiences not only from an international (Canada–Europe) perspective, but also from an interregional perspective. Indeed, the field courses across four countries in Europe and three provinces in Canada allow European students to discover other European realities and Canadian students, other provincial contexts. In Canada, such discovery is important as two of the universities (UBC and UNB) are located on opposite sides of Canada.

Field courses and internships allow students and faculty members to develop strong linkages with NGO, government and companies in the forestry and environmental sector, both locally and internationally. TRANSFOR-M also benefits students from outside the partner universities thanks to the e-learning courses that are offered by the partner institutions.

Now that most of the difficulties in establishing coherent dual-degree Master programs have been addressed, the TRANSFOR-M partners are looking for new funding opportunities to continue supporting students during their overseas year. The flexibility associated with the delivery of the program through individualized study plans allows also easy involvement of other universities in the program. Overall, such a program provides strong a international perspective to the student training. It also allows more deep collaborations between the participating institutions, both from the academic and from the research point of views. It will be a building block for future collaboration in various ways.

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