THE OUTSIDE WITHIN: 
HETEROMONY IN THE TRAINING OF FOREST RESEARCHERS

by

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ABSTRACT

This study of research training in the University of British Columbia’s Faculty of Forestry is framed by Bourdieu’s theory of fields. Drawing from quantitative and qualitative sources of evidence, the study documents the training of recruits in a research field that is not autonomous (self-governed) but heteronomous (governed by others).

UBC Forestry plays a key role in the reproduction of the field of forest research. The field of forest research is the social space located at the intersection of the scientific field (where scientists conduct systematic inquiry) and the forest sector (where companies, government, and others decide on the use of forests and their products). Forest research is not governed by its own rules but rather by the combined logics of its two parent fields. At stake in the field is the capacity to mobilize leading science to identify pathways to the solution of pressing forest-related problems. The Faculty of Forestry and its members rely on various forms of capital from both the scientific field and the forest sector, embracing research problems with social, economic, political, and environmental implications, and collaboration with other organizations.

The faculty members, adjunct professors, and graduate students involved in the reproduction of the field of forest research come to Forestry with diverse disciplinary and professional backgrounds. Most research projects involve non-academic partners, and the impact of this involvement on students varies according to the partners’ involvement in research. The autonomy of students varies according to the ratio between the volume and forms of the capital they bring and the total capital required by their projects. Most students undertake a Master’s or Ph.D. degree program after observing a gap between their aspirations and the positions available to them. Their problematic relationship to their position of origin makes them likely to incorporate the habitus of forest research. As their training progresses, the majority of students become aligned with the field of forest research and aim to continue addressing forest-sector problems with the means of science. Some, however, strategically use their research training to launch or improve a different career.
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<th>Full Form</th>
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<tr>
<td>APRA</td>
<td>Australian Postgraduate Research Awards</td>
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<td>AUFSC</td>
<td>Association of University Forestry Schools of Canada</td>
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<tr>
<td>BMP</td>
<td><em>Bourses en milieu de pratique</em></td>
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<td>CAWP</td>
<td>Centre for Advanced Wood Processing</td>
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<td>CIFOR</td>
<td>Center for International Forestry Research</td>
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<td>CIFRE</td>
<td><em>Conventions industrielles de formation par la recherche</em></td>
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<td>CIHR</td>
<td>Canadian Institutes of Health Research</td>
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<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
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<tr>
<td>FCAR</td>
<td><em>Fonds pour la Formation des chercheurs et l’aide à la recherche</em></td>
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<tr>
<td>FQRNT</td>
<td><em>Fonds québécois de recherche sur la nature et les technologies</em></td>
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<td>FQRSC</td>
<td><em>Fonds québécois de recherche sur la société et la culture</em></td>
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<tr>
<td>FRBC</td>
<td>Forest Renewal British Columbia</td>
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<tr>
<td>FSC</td>
<td>Forest Sciences Centre</td>
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<tr>
<td>FSP</td>
<td>Forest Science Program</td>
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<tr>
<td>MITACS</td>
<td>Mathematics of Information Technology and Complex Systems</td>
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<tr>
<td>NSERC</td>
<td>Natural Sciences and Engineering Research Council</td>
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<tr>
<td>SSHRC</td>
<td>Social Sciences and Humanities Research Council</td>
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<tr>
<td>UBC</td>
<td>The University of British Columbia</td>
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<tr>
<td>WFPL</td>
<td>Western Forest Products Laboratory</td>
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CHAPTER 1
INTRODUCTION

“Why did you choose us?” It was June of 2007. The Dean of Forestry of the University of British Columbia and I shook hands and took seats across from each other in a “bubble.” From my chair in one of the three glass-walled meeting rooms that cling to the inside wall of the Forest Sciences Centre, I had a stunning view of the inside atrium of the building. The MacMillan Bloedel Atrium, named after the forest company soon before it disappeared in a wave of corporate consolidation, is a naturally floodlit showcase of British Columbia wood products, a modern yet warm space. As an aspiring educational ethnographer spending her working days in a boiling-hot “temporary” building on the other side of campus, how could I not be impressed by the surroundings, not to say a little envious?

Three years earlier, I had boarded a yellow school bus chartered by the Faculty of Forestry’s recruitment officer. Our destination was the University of British Columbia’s Malcolm Knapp Research Forest. I got there after seeing multiple signs suggesting that I “take a hike!” posted around my office. The ads targeted the hundreds of first-year undergraduate students who lived in the nearby Vanier Place residence. I emailed the organizers, confessing that, as a visiting researcher to the department of Educational Studies, I was devoid of ambition for a forestry career, but curious about UBC’s applied research facilities. Soon after, I received a confirmation message promising salamander-sightings and fabulous food. I concluded that it was okay for me to join the tour.

I showed up outside of the Forestry building at the crack of dawn and picked a seat in the middle of the bus. I examined the folder handed to me by the tour leader, whom I later learned was a recent graduate. Set against a forest background, the Weyerhaeuser logo stood
out. Over lunch, I expressed my surprise to our guide, who was not at all embarrassed over distributing the corporate folders. She did not have any UBC folders at hand, she explained, so she helped herself to a pile of leftovers from a recent conference.

On the two-hour bus ride back to UBC, images from the day filled my mind: planting trees on recently disturbed soil, questioning a forest worker about the installation of main lines to spar trees, listening to a graduate student who explained the experiment she was running in one of the forest’s streams, photographing the creeping moonscape of an ongoing partial cut. I had become increasingly frustrated with the limited explanatory potential of the survey data I had collected from graduate students involved in university-industry-government collaborative research, and visiting the research forest caused an epiphany. I could all of a sudden see myself, literally, with “muddy boots and grubby hands” (Punch, 1986), conducting an ethnographic study of research training in Forestry. The new project, which became this doctoral dissertation, just felt right; it probably struck a chord with many layers of my own habitus.

To the Dean, I offered a slightly sanitized version of this story, and more conceptual reasons as well, on which I will expand below. Whatever I said, it must have gone well with him: I noted in my research journal later that day that it almost seemed like the Dean wished he could carry out my project himself. Immediately after, I was introduced to the members of the Dean’s office who would look after me during my fieldwork period. I was “in,” only this time it would be more than a day trip. I felt at last that I was close to reaching “one of the most extraordinary rewards of the craft of sociology,” “the possibility it affords to enter the life of others” (Bourdieu & Wacquant, 1992b, p. 205).
Reasons to research

In 2005, 130,767 people in Canada were enrolled in a Master’s or doctoral degree program (Canadian Association for Graduate Studies, 2008), or four out of every 1,000 inhabitants of Canada. Approximately a quarter of these were in doctoral programs. Although popular culture enjoys poking fun at those who have “made a terrible life choice,” as noted by Marge Simpson in the popular TV series, it is usually assumed that graduate students are at least somewhat smart. So what makes them pursue more degrees?

In the late 1990s, I started working as an undergraduate research assistant and one of my first assignments concerned part-time faculty members in universities. Some of the literature on sessional lecturers overlapped with the ongoing controversy about the unionization of graduate teaching assistants and the challenging job market for scholars (Nelson, 1997; Nelson & Watt, 1999). My background as a student activist caused me to start entertaining some radical questions about graduate education and its role in the production of part-time labourers. Reading, at the same time, Ivan Illich’s bold essay in favour of education, but against schools (Illich, 1972), I wondered what would happen if research education was “disestablished,” or, in other words, if graduate school disappeared. Who, really, would miss it? I wondered if, despite everybody’s best intentions, enrolling ever-increasing numbers of smart, curious people into graduate degrees was really benefiting anything or anyone.

At the same time, it seemed obvious to me that once the lid was off Pandora’s box, creating more knowledge was a good idea. Graduate education did not seem like the worst way to do it. I see it as urgent to have more knowledgeable people asking sharper questions and finding better answers. Such people, in my view, should be employed not just in universities but also in public and private sector organizations, and generally participating in
society. Thus, I became dissatisfied with the critical discourses about the transformation of universities that opposed a blanket rejection to university-industry-government relations and favoured instead, more or less implicitly, an autonomous community of scholars. Published in what often amounted to little more than a pamphlet, the argument left me skeptical, even suspicious. Such autonomous communities, I thought, were probably more imagined than real. And even if they existed, how do we know that they were more than a refuge for privileged individuals who could afford the respite from the messiness of life thanks to large amounts of cultural, social, and economic capital? I wondered if there could be ways to unleash knowledge – and its production – into the world.

These questions have been at the core of the process I engaged in when I started my own doctorate in 2005, both as a personal reflection and as the implicit object of my research. The result is this ethnographic case study of research training in the Faculty of Forestry, with which I hope to shed light on the broader field of forest research and more generally on the processes of training and doing research in the applied natural sciences. The curious and smart people who train to become forest researchers learn to create knowledge in a space where scientific and practical concerns cohabit. Examining and analyzing their experience nourished my own curiosity but, beyond that, there are conjunctural and conceptual reasons making this dissertation timely.

**Depression and opportunities in the woods**

Forests have provided, for most of the 20th century, a “green gold” (Marchak, 1983) that supported the development of British Columbia’s public infrastructure and private wealth. It has now been a hundred years since the beginning of the reforms that led to the creation of the Forest Service to convert industrial excesses into a sustained stream of revenues for the province, and the forest industry is at an all-time low. The causes and
implications of the forest sector’s demise are beyond the realm of this dissertation and of my expertise, and will not be discussed here. However, as I will explain in greater detail in chapter 4 to 6, the Faculty of Forestry and its researchers are in many ways tied to the destiny of the sector. Academics are not at the helm of the forest sector, but nor are they captive passengers of a lower deck. They conduct and publish strategic research which informs public and private policies as well as contribute to changes in forest practices. They educate a large number of public servants, many consultants, and some corporate executives who are active in the forest sector. They sit on boards and serve as advisers and consultants to both public and private powers. They train new generations of researchers who will occupy similar functions in the near future. Forestry academics can certainly be considered to belong to the forest sector’s field of power, if as dominated agents, as is often the case for cultural producers.

The position of forest researchers, in academia and elsewhere, is contingent upon a struggle between different views of the forest and its products. As the latter’s uncertain destiny as a source of public and private wealth unravels, certain areas of research will increase in importance while others might shrivel. Forest academics are party to that struggle and how they train researchers today will have an impact on the outcomes of the struggle tomorrow.

The depression hitting the forest economy is also the source of many opportunities, and research is seen by some as a key to the renewal process. FPInnovations, a research consortium co-funded by the federal government and forest-sector companies, and possibly the biggest forest research organization in the world, identified four goals to reach “global competitiveness” in its 2008-2010 Strategic Plan:
Develop technologies that will enhance the forest sector’s value chain; build new partnerships, particularly with universities; put more emphasis on transformative technologies; and, focus on capturing the full opportunity offered by the emerging bioeconomy. (FPInnovations, 2008, p. 4)

These four goals emphasize the role that research might take in the forest sector, and they have received explicit political and financial support in Canada’s most recent federal budget (Flaherty, 2009, p. 170).

How the conjuncture will impact the researchers – established and in-training – of UBC’s Faculty of Forestry remains to be determined. The mechanisms of interaction between the dominant agents of the forest sector – which include government officials and industry leaders – and the forest researchers located in universities are complex. The demands to forest academics that emerge from outside of universities are, to some degree, translated into problems and programs deemed appropriate for the university setting. The reverse, however, is also true, as academic requirements can be interpreted by the Faculty of Forestry and its members in the light of their role in the forest sector. What should be done is always an object of struggle, historically determined and changing over time, especially in times of “crisis,” the declaration of which is also of course subject to debate.

**Beyond the forest**

Research training in the Faculty of Forestry may be a striking example of how some parts of the university are closely tied to the environment beyond the boundaries of campus. It is not, however, the only case.

The development of Canada has been driven by the exploitation of the vast country’s natural resources, which have been mined, caught and harvested to transform into staple commodities for export (Innis, 1995). After fur, cod, copper, and timber, oil and gas are now important sources of revenues for corporations and governments alike, fuelling the growth of
some provinces and drawing the population of other provinces to migrate for work. It is reasonable to believe that researchers in the areas of fisheries and petrology, for example, have played a role similar to that of forest researchers in enabling, supporting, and at times controlling the growth of those industries. Unfortunately, the sociology of higher education and of science has paid relatively little attention to such traditional applied, multidisciplinary fields. Instead, physics and biology have captured most of the research efforts in the social studies of science (Cetina, 1999; Kuhn, 1970; Latour & Woolgar, 1980; Pickering, 1999; Rabinow, 1996; Traweek, 1992), while studies focusing on the relationships between academics and industry have been mostly bound to the life sciences (Trépanier & Ippersiel, 2003). This state of the scholarship obscures an important motivation for the development of many institutions of higher education in North America: a desire to gain greater control over natural resources and industrial processes through specialized, scientific knowledge.

A parallel blind spot is found in studies of graduate education. Classic studies have eschewed applied, multidisciplinary knowledge areas which induced too many “complications” (W. G. Bowen & Rudenstine, 1992, p. 6). The authors of a major study of the doctoral experience in the United Kingdom did, however, include one multidisciplinary doctoral program in their sample, but their efforts did not yield conclusive results. Sara Delamont and her colleagues noted that the socialization of new researchers in such fields needed “careful evaluation in terms of the kinds of identities that are fostered, and the kinds of intellectual apprenticeship that are enacted under such conditions” (Delamont, Parry, & Atkinson, 2000, p. 172). Moreover, many studies of graduate education and in particular of doctoral students consider the latter primarily as future scholars destined to become “stewards of [their] discipline” (Golde & Walker, 2006; Walker, Golde, Jones, Bueschel, & Hutchings, 2007), which usually means faculty members. Despite the fact that fewer than
half of former graduate students will become members of the professoriate (Conseil supérieur de l'éducation, 2003; Kannankutty & Kang, 2001), their “professional identity development” is still considered to lead them first and foremost to the tenure-track (Sweitzer, 2009). Following a 1995 report on *Reshaping the Graduate Education of Scientists and Engineers* (Committee on Science, Engineering, and Public Policy, 1995), an active discussion and multiple initiatives have emerged to broaden the scope of graduate students’ professional preparation (Nicolas & Bourque-Viens, 2008), but the conversation has not significantly spilled over to the sociological literature. In sum, the role played by current and former graduate students in connecting universities to their social, political and economic environment has been largely ignored.

**Heteronomous zones**

To understand how problems emerging in society at large are translated into terms that make them acceptable in the academic science environment, Pierre Bourdieu’s theory of fields offers a useful model. His concepts shed light on the uneven distribution of resources and on the struggles of individuals and organizations for specific stakes. As I will explain in detail in chapter 2, fields are defined as areas of the social world which are relatively autonomous from the rest of society, which means they are governed from the inside and agents within them follow their own rules. In 1975, in an article in which he described the specificity of the scientific field, Bourdieu wrote that:

> The dominant class now grants the natural sciences an autonomy corresponding to the interest it finds in the economic application of scientific techniques, so that they are now (...) fully autonomised in relation to the laws of the social world. (Bourdieu, 1975a, p. 36)

While this statement probably was true for fields such as physics, it no longer seems applicable to other areas of the natural sciences, although of course one could argue that the
definition of science needs to be revised to include only strictly autonomous fields.

Nevertheless, even in universities, which benefit from some measure of autonomy, there are areas where what is understood as scientific research is conducted under at least some level of governance from the outside. Forest research, as I will show, is one such area. Yet, I will explain that this area of knowledge production, while not entirely autonomous, does not totally dissolve into the dominated space of the social world either. Rather, it retains a distinct logic at the intersection of forces emanating from the scientific field and from the forest sector. As a result, forest research, as it is practiced in the UBC Faculty of Forestry but also elsewhere, can be seen as a heteronomous field, a conception I will explore throughout this dissertation. Graduate research training programs are the primary mechanism of reproduction of the field of forest research. As such, they provide a valuable lens through which the distribution and transmission of valuable forms of capital in the field can be observed.

A word on definitions

Throughout this dissertation, the word “Forestry” will be capitalized to refer to the Faculty of Forestry of the University of British Columbia, the main site of my study. According to the Oxford Canadian Dictionary, forestry is “the science and practice of planting, caring for, and managing forests” (Bisset, 2004, p. 378). As chapter 4 will show, research in the Faculty of Forestry has a much broader scope, most notably including wood-related activities and other research that only remotely fit the definition of forestry. In the common language of the Faculty, forestry is also understood as what foresters do, and the majority of graduate students and faculty members are not foresters themselves. Thus, the use of the label “forestry” to designate the faculty as a whole is often discussed, sometimes deplored, and alternatives are debated, but the status quo remains.
To reflect my findings better, I have chosen to use the expression “field of forest research” to designate the plurality of organizations and individuals whose primary occupation is to conduct research about forests or forest products (including wood). I will define and explain the use of the concept of field in the next chapter, but for the moment I will simply say that the Faculty of Forestry is an important agent in the field of forest research, but certainly not the only one. I will also use the expression “forest sector” – which will also be further explained in chapter 2 – to designate the combination of private sector, government, and, to a lesser extent, non-governmental organizations concerned with forest issues broadly defined. I will often use “forest sector” where others would say “forest industry” in order to emphasize the joint presence of public and private organizations in it. The word “forestry,” without the capital “f,” will be avoided but, if used, will strictly refer to forest management practices.

The idea of a field of forest research evolved substantially over the year I dedicated to the analysis and interpretation of my study’s findings, affecting the construction of the research object. I started this project – and conducted my fieldwork – under the assumption that the field of forest research was primarily inhabited by academics from UBC’s Faculty of Forestry and other similar organizations. I thought the field was heteronomous because there were forces from the forest sector that influenced the positions and position-takings of agents within forest research. Such influences would come from government and private companies, of course, but also from increasingly pressing concerns for environmental values. I was curious to see how such heteronomous forces penetrated the field and in particular how they influenced the training of researchers within it.

As I wrote, it progressively became clear to me that the binary opposition between what is within universities and what lies outside of them was not analytically productive.
Evidence that both the organization (the Faculty of Forestry) and the individuals within it (the faculty members and the graduate students) were themselves sources of heteronomy was mounting. I also encountered individuals and organizations who were doing forest research while being located outside of universities. I adopted a more symmetrical view of the social space around forest research, placing the scientific field and the forest sector in equivalent roles as I realized that they simultaneously shaped forest research. The university does have a special position in the field of forest research because of its primary role in the reproduction of the field through the training of graduate students. But the field extends way beyond its gates.

This dissertation is based on a study design that, true to my initial conception, focused almost exclusively on academic agents. The scope, time, and funding allocated to the Ph.D. did not allow me to expand the study much further. I also wanted, from the start, to dedicate my research efforts to researchers-in-training. The result is a window into the reproduction of the field of forest research and the experience of the key agents involved: faculty members and graduate students. In the concluding chapter, I will offer suggestions for further research that would lead to a more complete understanding of this research field and of the relative position of diverse individuals and organizations within it, including those involved in training.

**Structure of the dissertation**

The next chapter will present the conceptual and methodological framework on which this study is based. More specifically, chapter 2 will provide an introduction to the main concepts deployed by Pierre Bourdieu to account for the relational dynamics between individuals, organizations, and somewhat autonomous social fields within the global social environment. The methodological implications of Bourdieu’s framework and the resulting
design that was adopted for this study are presented in the second half of that chapter, which concludes with a discussion of my own position as a researcher in the context of the Faculty of Forestry.

Chapter 3 offers a contrasted discussion of research training through graduate education at universities. First, I examine the main components of the “traditional” system of academic reproduction, a process which is largely closed to outsiders. Then, I review how heteronomous forces are bringing changes to the model, introducing graduate students to problems and partners from outside the academic field. The available literature measuring the impact of such alternative modes of research training is reviewed.

In the following three chapters, I present the empirical findings of the study. Chapter 4 introduces readers to the Faculty of Forestry at the University of British Columbia, positioning it within the field of forest research and analyzing the forms of capital that have currency within Forestry and in its relations with other organizations. Chapter 5 focuses on the individual agents engaged in the reproduction of the field of forest research, namely faculty members, adjunct professors, and graduate students. I highlight the combination of forms of capital that allows those agents to become engaged, in their respective capacities, in the training of researchers. Chapter 6 analyzes how these same agents proceed to align problems and people with resource providers in order to conduct research and concurrently train the next generation of researchers. It also discusses the possible futures of those who train in forest research, examining the issue from the faculty members’ and from the students’ perspective and also looking at what is known about the actual trajectories of M.Sc. and Ph.D. graduates.

The conclusion, chapter 7, integrates the findings from the previous three chapters and interprets them in the light of Bourdieu’s theory of fields and of what has been described
elsewhere as transformations in research training. More specifically, I discuss the specific stakes and habitus developed in the field of forest research and elaborate on the implications of this study of the reproduction of forest researchers for graduate education more generally.

The primary ambition of this dissertation is to broaden the spectrum of today’s discussion on the training of researchers, which reflects the struggle between autonomous and heteronomous forces. This conversation belongs partly to the field of higher education and partly to the field of sociology, which since Max Weber at least has been fascinated by the complex relationship between academics and society. I hope that the empirical material collected among this little-studied population and the resulting story, told through the lens of Pierre Bourdieu’s concepts, will contribute to a more complete and nuanced picture of the practices of research training in today’s university.

Despite the focus placed on sociological concepts and discussion, I hope that the friendly people of Forestry, curious as they are, will find interest in my perspective, as an outsider, on their research training practices. I hope to tell them nothing they did not know, but to tell it in a way that triggers new and exciting ideas about education in their own field. They certainly made me think hard about mine.
CHAPTER 2
CONCEPTUAL APPROACH AND STUDY DESIGN

The conceptual tools developed by Pierre Bourdieu and his colleagues are used in this study to examine the processes of reproduction at play in an applied area of science, more specifically forest research. I will first use the core concepts of field, capital, and habitus to assess the degree of autonomy of forest research within the Faculty of Forestry at the University of British Columbia and in relation to other areas of the social world. Then, I will seek to understand the position of the students who, under the supervision of established forest researchers, engage in a training process that could lead them to become forest researchers. At the onset of this study, forest research is thought of as a heteronomous field, or in other words as a field that is only partially autonomous. This claim will be thoroughly examined in the light of the empirical data assembled for this study presented in chapters 4 to 6. If forest research is a heteronomous field, then the training of recruits in this field is likely to differ from what is usually seen as the traditional mode of reproduction of the scientific field. Whether this is the case or not will be discussed through in-depth analysis of the material resulting from over a year of fieldwork among graduate students.

The core concepts of Bourdieu’s theory of fields are central in the elaboration of this study and thus will be defined and discussed up front, locating them in the context in which they were introduced and in the context in which they are used in this study. In this chapter, I will first introduce the conceptual framework which drove my inquiry into forest research training, and then present the methodology I adopted and the resulting study design. The chapter will conclude with a reflection on my position in relation to the social world I observed.
Bourdieu’s theory of fields

The core concepts developed by Pierre Bourdieu – field, habitus, and capital – are the building blocks of his general theory of the constitution and reproduction of society, a dynamic, relational model that sought to bridge macro- and microsociological perspectives. The careful use of these concepts simultaneously shines a light on the objective and subjective dimensions of our daily experience and offers a nuanced but powerful understanding of the enduring, yet constantly changing, relations of power between people and organizations. In this section, I will discuss how the conceptual tools developed by Bourdieu allow me to examine how an area of cultural production such as forest research interacts with other spheres of human activity such as more fundamental scientific disciplines, policy-making, industrial production, community life, and environmental conservation.

Throughout this work, which is anchored in a materialist perspective, I assume that social and economic structures pre-exist the individual persons and, to some degree, limit each one’s range of action. I tend to see individuals as agents within a social structure which pre-existed them, capable of taking action, making decisions, and attributing meaning, but within a certain range that depends on the objective conditions of their existence. The structure is not immutable, but rather in a perpetual state of tension and change; such change, however, results from much more than the simple volition of agents.

These assumptions lead me to a theoretical framework and to a methodological approach that support close examination of both external and internal factors, and of the dynamics of interaction between the two. I also seek to understand the relations between the objective positions of individuals within the social structure and their subjective perspective.
or point of view. Bourdieu’s work provides me with inspiration and adequate theoretical tools to guide my empirical study along these lines.

Pierre Bourdieu was born in 1930 in a rural region of France but his trajectory took him to the centre of Paris’ intellectual life, an unlikely outcome for someone of such modest origin. By examining the background of Bourdieu’s formative years, one can understand how the convergence of his biography and of the intellectual history of mid-twentieth century France resulted in a deeply-seated preoccupation with overcoming the opposition between the objectivist/structuralist perspective in sociology and its subjectivist/phenomenological counterpart. The notion of habitus, which he first extensively described in his 1972 *Esquisse pour une théorie de la pratique* (Bourdieu, 1977, 2000a), directly aimed at the resolution of this philosophical tension. Some critics emphatically deny that Bourdieu’s theory actually lived up to this goal of achieving balance between the two poles (Alexander, 1995; Jenkins, 2002). While I would agree that a summary of Bourdieu’s work would indeed stress the weight of the social structure more than the role of individual agency, it must be noted that he has also accumulated ample empirical evidence to support his claims, in the context of France at least. Bourdieu’s thick bibliography (Delsaut & Rivière, 2002) shows that his primary concern was not to develop theory, but rather to make sense (“*rendre raison*”) of social phenomena, something he did with the help of numerous collaborators, often publishing the results in his journal *Les Actes de la recherche en sciences sociales*.

When considering the social world, Bourdieu did not see free-floating individuals, but rather a relational space of objective positions occupied by agents struggling to maintain or improve their condition. By studying diverse social fields, he thought he would demonstrate how the confrontation of special interests in autonomous fields could paradoxically lead to the progress of universality (Bourdieu, 1985, pp. 23-24). I modestly inscribe my own work in
the continuity of this programme, as I ask whether this paradox extends to fields whose autonomy is contested.

A field, according to Bourdieu, is a social space in which individuals (or organizations) relate to each other as they compete for the same stake. It is a field of force, as each agent in the field has a different weight. The weight of agents is determined by their accumulated capital, and shapes the space around them accordingly. The “heaviest” agents dominate the field while the agents with little capital are in dominated positions. The similarities between this sociological vision of a relational space and the theory of relativity in physics are striking (Martin, 2003). However, the social field as Bourdieu sees it differs from the Einsteinian space-time continuum. In the latter, objects (planets, for instance) have a weight and a trajectory, but no capacity to act on their own. In a social field, agents enact strategies to improve their position within the field, either by supporting the rules of the field or seeking to subvert them in their favour (a possibility not available to planets). Thus, the social field is also a field of struggle. Agents do not experience absolute freedom: their actions and thoughts are bounded, limited to a certain range. Yet, even an astute observer cannot fully predict the actual range of options offered to agents, the strategies they will adopt or the results of the agents’ struggle with each other. But the social fields, the agents within them, and their trajectories can – and must – be grasped empirically, in order to understand the necessary character of experience from the agents’ point of view (Pinto, 2004).

Bourdieu’s sociology presents society in general as a relational space (Accardo, 2006). Within that global space, one may observe smaller, relatively autonomous fields and sub-fields with their own dynamics of force and struggle. Fields also interact with each other in a relational way, with some fields holding a dominating position in society while other
fields struggle to improve theirs. In sum, society contains no free particles: all individuals, institutions, and groups relate to all others, to some degree, even if they are unaware of each other’s existence.

This theory is only one of many theories deployed by sociologists to account for the differences and relations between individuals and between groups in society. According to Heilbron (1995), these differences were already a central concern for early secular theorists such as Montesquieu and Rousseau. Those who are usually identified as the founders of sociology, most notably Durkheim and Weber, were also interested in social differentiation and the emergence of autonomous “spheres.” Bourdieu, through closely knit empirical and theoretical work, has brought together several strands of social theory to further explain the construction, maintenance, and transformation of this complicated social order, examining the relations between its parts. Competing theories were formulated to tackle this problem, such as Luhmann’s theory of system ¹ (Luhmann, 1995) and, on a smaller scale, specifically addressing issues of demarcation in knowledge areas, Gieryn’s theory of “boundary work” (D. Fisher, 1993; Gieryn, 1983). The concept of field itself has been used by a number of social scientists (Martin, 2003).

Bourdieu’s 1966 article “Champ intellectuel et projet créateur” is generally recognized as the first occurrence of the concept of field in his oeuvre. In it, Bourdieu explains how intellectuals are neither absolutely free, nor fully determined by their social origins or by the affairs and topics of the day set by politics or by the economy. Instead, intellectuals are located in a field with other intellectuals where their position and position-taking (prise de position) depend on the positions of all others within the same field. The intellectual field, over the years and especially since the nineteenth century, has grown

¹ See Bourdieu & Wacquant (1992b, pp. 102-104) for a discussion of the differences between Bourdieu’s field theory and Luhmann’s theory of systems.
autonomous and its members now consider themselves accountable only to their own legitimating institutions and critics. In other words, they only follow the norms and rules established by their peers, and only seek the rewards granted within the field. Intellectuals and artists within the field do not act randomly; they position themselves and their work in relation to that of others and based on how they perceive their work to be received by other agents in the field. This relative autonomy of the field does not mean that its members ignore the rest of the world and its demands, but rather that these demands are mediated by the field itself. During the 1970s, Bourdieu published important articles on the study of fields: two discuss Weber’s sociology of religion and the emergence of the religious field (Bourdieu, 1971a, 1971b) while another addresses the specificity of the scientific field (Bourdieu, 1975a, 1975b, 1976 are three versions of the same article). He also worked with collaborators on studies of various fields, such as haute couture (Bourdieu, 1984a) and comic books (Boltanski, 1975). Later, Bourdieu published – to name only the milestones of his work on fields – Homo Academicus (1984b, 1988) about the academic field, La Noblesse d’État (State Nobility) (Bourdieu, 1989, 1998b) about the elite trained in France’s Grandes Écoles, Les Règles de l’Art (Rules of Art) (Bourdieu, 1996, 1998c) about the field of literature, and Les Structures sociales de l’économie (Social Structures of the Economy) (Bourdieu, 2000b, 2005b) in which he focuses on the residential housing market.

Field

Simply put, a field is “a playing space, a field of objective relations between individuals or institutions competing for an identical stake”\(^2\) (Bourdieu, 1984b, p. 197). The following characteristics should be observed in any field: (1) it is a system of relations in which agents hold positions related to each others’, (2) that is at once a field of forces (some

\(^2\) « J’appelle champ un espace de jeu, un champ de relations objectives entre des individus ou des institutions en compétition pour un enjeu identique. »
agents are dominating, some are dominated) (3) and a field of struggle (agents try to maintain or enhance their position, (4) in which agents accumulate and trade specific forms of capital (5) in a structure that is, to some degree, autonomous from the broader social world.

Although the entire social space is relational in Bourdieu’s sociology, fields do not cover its full surface. In other words, not every significant context of activity is a field, nor is everyone a member of a field (Lahire, 2001). So how does one recognize a field? Fields have to be examined empirically by studying their effects and cannot be determined a priori. In practice, this means that there is a field when there are agents who recognize each other as members of the same field, and establish conditions of membership, also called “admission fee,” determining who is inside and who is outside of the field (Bourdieu & Wacquant, 1992b); the more autonomous the field, the higher the admission fee, and the more homogeneous the agents in the field (Vandenberghe, 1999). The admission fee and the field’s zone of influence are not fixed: they are the object of a permanent struggle within the field.

Despite their ongoing involvement in the field’s struggle, the agents within it are bound by a common belief in the importance of that game: the illusio. Each field has its specific illusio, “a tacit recognition of the value of the stakes of the game and practical mastery of the game’s rules”3 (Bourdieu & Wacquant, 1992a, p. 93). In other words, “In order to fight one another, people have to agree on the areas of disagreement” (Bourdieu, 2005a, p. 36). To be a member of the field, one needs to fully adhere to the field’s illusio, to have internalized it. The investment in the field must be total, and those who express doubts or, worse, act as traitors by allowing outside stakes into the field, will be energetically penalized (Accardo, 2006, p. 194).

3 « … comme reconnaissance tacite de la valeur des enjeux engagés dans le jeu et comme maîtrise pratique des règles qui le régissent. »
Without thorough empirical examination, it would not be possible to determine whether researchers who study forests form a field of their own. In chapters 4 to 6, I will examine empirical evidence that will allow me to determine whether there is an admission fee and an illusio shared by the researchers which would point to the existence of a field effects specific to forest research, separate from the rest of the scientific field and from the social world in general.

**Capital**

The structure of a field reflects the distribution of capital in it (Bourdieu, 1986, p. 242). Different forms of capital are traded between members of the field, and the value of each form of capital is determined within the field. In the global social space, the forms of capital which are most frequently referred to are: social, cultural, economic, and symbolic. However, within a given field, Bourdieu preferred to talk of a “specific capital” as the type which was proprietary to that area of the social space. The exact nature and definition of that specific form of capital, within each field, is an object of struggle and must be submitted to empirical inquiry.

In that struggle, agents can adopt one of two strategies, a choice largely dictated by their current position, previous trajectory, and accumulated capital. They can seek to acquire more of the form of capital that is currently valued, or they can engage in a struggle to change the relative value of the various forms of capital and the definition of the specific capital within the field in favour of the type they already possess. Agents who benefit from accumulated specific capital within the field are more likely to adopt the conservative strategy and to defend the current order of things. They will also tend to seek small profits and to avoid risks. On the other hand, agents without a large volume of capital, or who have accumulated another type of capital that is not specific to the field, might adopt subversive
strategies in order to change the norms of the field to increase the value of the type of capital they possess. They might also take greater risks and attempt a *coup d’éclat* for a greater profit. Agents attempting to transfer from one field to another or even from one country to another are also more likely to adopt this type of strategy.

The various types of capital can be either objectified as goods (*e.g.*, equipment, works of art, music instruments...), institutionalized (*e.g.*, in titles, like “doctor”) or incorporated as the agent’s habitus. Symbolic capital plays a special role: one’s reputation and the respect received from the community will influence the value of the other forms of capital held by a given agent (Champagne & O. Christin, 2004). Agents in autonomous fields are often thought to be disinterested because, unlike agents within the broader social field, they have little interest in forms of capital which are highly sought-after in the global social space, for example economic capital. By showing their disinterest for economic capital, they actually increase their chances of making “symbolic profits,” increasing the respect they receive from others and hence the general effectiveness of their other forms of capital. In other words, within fields, agents have an interest in disinterestedness.

One key to establishing forest research as a separate field is to identify a specific form of capital. If the most valued form of capital in forest research is in fact the exact same as within the scientific field in general – scientific competence and technical capacity (Bourdieu, 1976) – then forest research is not differentiated within science as a field, while nonetheless being autonomous in relation to non-scientific forces. Conversely, if the most valued asset among forest researchers is the capacity to profitably exploit an experimental forest plot, the area of forest research can be seen as integrated to the broader economic field. As we will see, the forest researchers studied do value forms of capital which are akin to the general scientific currency while, in many cases at least, remaining sensitive to non-
specifically scientific values as well. In that sense, forest research is perhaps similar to the French field of management schools, which Pavis showed to be characterized by a combination of forms of capital (Pavis, 1998).

I now turn to the third Bourdieusian concept, which constitutes the cornerstone of his theory of practice.

**Habitus**

The concept of habitus, as appropriated by Bourdieu, was introduced in inchoate form in earlier publications, notably in *La Reproduction* (Bourdieu & Passeron, 1970), but his *Esquisse pour une théorie de la pratique (Outline of a Theory of Practice)*, first published in 1972 (Bourdieu, 1977, 2000a) carries the first explicit and lengthy discussion of the concept, in book form at least.

The first formal definition offered by the English version of the book is less elliptical than the French one (the classic and elegant, but tongue-twisting, “*système de dispositions durables, structures structurées predisposées à fonctionner comme des structures structurantes,*” (Bourdieu, 2000a, p. 256) and contains an explanation of the workings of the habitus. A lengthy quotation is in order:

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4 Bourdieu was not the first to use the concept of habitus, which has a long history in philosophy. For a useful discussion of the history of habitus, habits, and other related concepts, see Kaufmann (2001). Bourdieu also discusses the genesis of the concepts of field and habitus in an article (Bourdieu, 1985).
The habitus, the durably installed generative principle of regulated improvisations, produces practices which tend to reproduce the regularities immanent in the objective conditions of the production of their generative principle, while adjusting to the demands inscribed as objective potentialities in the situation, as defined by the cognitive and motivating structures making up the habitus. It follows that these practices cannot be directly deduced from the objective conditions, defined as the instantaneous sum of the stimuli which may appear to have directly triggered them, or from the conditions which produced the durable principle of their production. These practices can be accounted for only by relating the objective structure defining the social conditions of the production of the habitus which engendered them to the conditions in which this habitus is operating, that is, to the conjuncture which, short of a radical transformation, represents a particular state of the structure. In practice, it is the habitus, history turned into nature, i.e. denied as such, which accomplishes practically the relating of these two systems of relations, in and through the production of practice. (Bourdieu, 1977, p. 78)

According to this definition, habitus is a relational device that connects the social structure (focus of the objectivist tradition) to the specific circumstances perceived by the interacting agent (focus of the subjectivist tradition) and generates practice. We see the world through our habitus, which acts as a classifying lens for our observations, and as an organizing principle for our actions.

Socialization – a word that Bourdieu seldom uses – produces the habitus, inscribing the social conditions in which it is constructed into the individual. Consequently, two individuals brought up under similar circumstances will carry a similar habitus and presumably act in similar ways in similar situations. Early experiences are the heaviest influences and set the grounds for the acquisition of further layers of habitus. The schemes of perception, understanding, and action that become embodied in the agent give meaning to all daily life events, even the most uneventful, saving us from having to think anew every single occurrence of analogical phenomena. The embodiment is here to be understood quite

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5 The connection to the “social construction of reality” (Berger & Luckmann, 1967) is flagrant here, although – as far as I know – unacknowledged by Bourdieu.
literally. From the day they are born, children start to learn by observing the others’ practices and detecting patterns in them, without having to use language to describe them. The observed schemes become part of their selves, located in their very bodies, as an “abbreviated and practical, i.e. mnemonic, form of the fundamental principle of the arbitrary content of the culture” (Bourdieu, 2000a, p. 94). It becomes difficult, if not impossible, to touch or to change the habitus through deliberate action.

The habitus cannot, by itself, explain or predict the agents’ actions. The habitus becomes actualized in a specific context – the conjuncture – which greatly impacts the generation of practices. Specifically, the social conditions in which the habitus is expressed can be more or less similar to those in which the habitus was formed. When the context of actualization of the habitus is too distant and dissimilar to the context of its production, the agent is likely to receive a negative sanction from other agents. In a stable, closed environment with little diversity (such as a traditional society), few dissimilarities may be observed between the two contexts, the current situation being nothing but a particular state of the structure in which the habitus was created. However, a transformation of the material conditions of existence, such as the radical one that was observed by Bourdieu in Algeria in the mid-twentieth century (Grenfell, 2004), will cause an hysteresis effect, a “state of being ‘out of place and time’: in other words, where structural field conditions alter before changes in the expectations produced by them” (Grenfell, 2004, p. 68).

Bourdieu seemed to recognize that each individual could incorporate more than one habitus. In a footnote to his first publication on the scientific field, he mentioned both “the habitus produced by early class education” and “the secondary habitus inculcated by
schooling” (Bourdieu, 1976, p. 100). Beyond schooling, there are many other important moments: each setting to which we affiliate brings a new phase of secondary socialization (such as work, church, volunteer organizations, gangs, etc.). I would add that for every field there exists a corresponding habitus, which is the incorporated form of capital constituting the admission fee.

These latter phases of socialization may come in contradiction with the primary habitus. A classic example is how the habitus of working-class children, acquired through primary socialization, contradicts the middle-class norms and values that the school system is trying to impose on them, through symbolic violence, as secondary socialization (Bourdieu & Passeron, 1970). However, in his early work on the concept of field, Bourdieu claimed that the primary habitus (based on social class) becomes in a sense secondary to the logic of the autonomous field to which one belongs, as the field filters or refracts the effects of external determination (Bourdieu, 1971c, p. 185).

The concept of habitus is at the core of this study and will be used in the later chapters, in which I will examine the trajectories of agents – apprentice-researchers and their supervisors, in particular – in the area of forest research. If forest research has some level of autonomy as a field, then the student researchers should be constructing new schemes of perception and practice as they progress. How such new schemes become superimposed on previous layers of habitus, acquired through primary socialization (gender, race, class, etc.) and later disciplinary and/or professional education and experiences is of special interest.

6 « L’habitus produit par la prime éducation de classe et l’habitus secondaire inculqué par l’éducation scolaire. »
The field of power

The concept of field of power was lengthily developed by Bourdieu in his book *La Noblesse d’État* (*State Nobility*) (Bourdieu, 1989, 1998b), in which he studies the distribution of capital among France’s ruling cultural and economic elite. He provides a detailed definition:

The field of power is a field of forces defined by the structure of the existing balance of forces between forms of power, or between different species of capital. It is also, inseparably, a field of struggle for power between those who hold different powers, a playing field where agents and institutions who possess a sufficient quantity of specific capital (economic or cultural, notably) to occupy dominant positions within their own fields, confront each other through strategies aimed at the conservation or transformation of that balance of forces.\(^7\) (Bourdieu, 1989, p. 375)

At any given moment, the field of power is in a (sometimes precarious) balance resulting in a “division of the labour of domination”\(^8\) (Bourdieu, 1989, p. 376). Not all agents or fields are located in the field of power. One can think of relatively autonomous fields – for example, the field of stamp collecting – that have little to do with the domination of society.

According to Bourdieu, at the time of his study, the dominant principle of classification in France within the field of power was economic capital, while cultural capital was the dominated principle. In other words, those with significant cultural capital – intellectuals, artists, professors, etc. – were part of the field of power and exercised some level of domination within society (by controlling the processes of cultural reproduction and its contents), but they were, within the dominant group, dominated by those with more economic capital. While this general social structure would probably have been thought by Bourdieu to

\(^7\) « Le champ du pouvoir est un champ de forces défini dans sa structure par l’état du rapport de force entre des formes de pouvoir, ou des espèces de capital différents. Il est aussi, inséparablement, un champ de luttes pour le pouvoir entre détenteurs de pouvoirs différents, un espace de jeu où des agents et des institutions ayant en commun de posséder une quantité de capital spécifique (économique ou culturel, notamment) suffisante pour occuper des dispositions dominantes au sein de leurs champs respectifs, s’affrontent dans des stratégies destinées à conserver ou à transformer ce rapport de force. »

\(^8\) « division du travail de domination »
be fairly prevalent around the world in our era, it remains a historic situation that needs to be assessed empirically, and not a universal, trans-historic state of affairs. Studying the field of power is required to understand the currency given to each form of capital.

One may wonder why the dominating agents of the dominating field (at this time, the economic field) accept sharing the field of power with the dominating agents of the dominated field (at this time, the cultural field). The economically dominating agents, to maintain their domination, need legitimacy (symbolic capital). Intellectuals can provide the dominating group(s) with an ideology which justifies it, transforming arbitrariness into necessity. Napoleon crowned himself emperor in the merely accessory presence of Pope Pius VII, only to end his life in exile. Unlike the disgraced emperor, enlightened agents among the dominant class know the value of seemingly independent support from autonomous agents. Such support appears more legitimate: “The prince can only obtain of his painters, poets or jurists a truly efficient symbolic service in as much as he abandons the capacity to rule in their domain”9 (Bourdieu, 1989, p. 553). To maximize the efficiency of this process, wider “circles of legitimation” are required: agents do not simply exchange endorsement, but instead complex chains of support are created, which allow the observer to ignore the actual relationships that keep the dominants and the dominated in their respective place.

All agents within autonomous fields, however, do not necessarily help support the current division of power. Those who do not are allowed to do so because their field is, to some degree, self-governed. The field resists the application of global rules to its jurisdiction, using its own rules instead. In autonomous intellectual fields, agents who possess a large volume of cultural capital and comparatively less economic capital, by virtue of their status as dominated within the field of power, are likely to align with those who are dominated in

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9 « Le prince ne peut obtenir de ses peintres, ses poètes ou ses juristes un service symbolique réellement efficace que pour autant qu’il leut abandonne la capacité de légiférer en leur domaine. »
the global social space, and to attempt to reduce the dominating power of those who possess vast quantities of economic capital.

How are forest researchers from the Faculty of Forestry located in relation to the field of power? One of the first steps of this research will be to locate, if approximately, the potential field of forest research in relation to the field of power. According to one historian of forestry in the Pacific Northwest, the role of forest experts until 1965 (at least) has been, for the most part, to support and legitimate the practices of the forest industry (Rajala, 1999). In other words, the “forest intellectuals” provided the dominant players of the forest economy with a scientific justification. My study, unlike Rajala’s, is focused on the contemporary period, and only on the forest researchers rather than on the entire forest sector. I will examine, through the lens of research training, the degree of autonomy that today’s forest researchers have in relation to the dominant agents of the field of power.

**Autonomy and heteronomy**

The key characteristic of fields is their relative autonomy or, in other words, self-governance. The social structure of a given field differs from that of the global social space, and agents within that field compete for a specific stake that may be meaningless to agents in other social fields. They are ready to invest their whole being into the struggle (Bourdieu, 1997, p. 25). Conversely, if a social organization directly reproduces the structure of society, then it is not a field. However, no field benefits from absolute or permanent autonomy. The relative character of the autonomy of fields translates into a relative dependence to the rest of the social universe. For a field to strive, historic, material, and social conditions of possibility must support its autonomy. As these conditions change, a field can lose its autonomy and disappear as a distinct entity (Fabiani, 2001) or simply become less autonomous, as Maton (2005) has argued in the case of English higher education. We then speak of heteronomy or
governance from the outside. The degree of autonomy characteristic of a field is, at any given moment, the result of a continuous struggle between autonomous and heteronomous criteria.

To illustrate this struggle, Vandenberghe offers the example of the scholarly field:

"At any moment in time, the field is the locus of struggle between two principles of hierarchization: a heteronomous criterion (success, as measured by book sales) that works to the benefit of those who dominate the field economically and politically (the people in “suits” who distribute the resources, sit on committees, and decide on the marketability of books), and an autonomous criterion (quality, as measured by the recognition by peers) that favors the “true scholars”. (Vandenberghe, 1999, p. 53)"

As with everything within Bourdieu’s system of concepts, the autonomy of fields cannot be taken for granted, but has to be measured empirically. The researcher must act carefully and be aware that, by using a field approach to study a region of the social space, she induces “methodological autonomization,” if only because she is treating the area “as a system governed by its own laws” (Bourdieu, 1971c, p. 162).

A number of characteristics can be used as indicators of the presence of an autonomous field: references to other members (present and past) and to their work by members of the field, educational programs (in schools), publications aimed at a public of agents who have been initiated to the field, presence of critics, awards recognizing the work of members, etc. In other words, within each field, there are “institutions of production, reproduction and celebration” (Boltanski, 1975) of the field and of its agents. The members of an autonomous field are expected to locate their work in relation to that of others – and to distinguish themselves from it – and to refuse outside influences and demands (Bourdieu, 1971c). This does not mean that external agents have no influence over the workings of the field, but rather that:
The relations between each of the agents of the system and the agents or institutions which are entirely or partly external to the system are always mediated by the relations established within the system itself, that is, inside the intellectual field. (Bourdieu, 1971c, p. 164)

External demands will be refracted by the field, and problems emerging from outside the field will be translated in the field’s own terms. The field is deemed very independent when it is nearly impossible to recognize the problem, as defined in the global social world, once it is translated within the field. In Poupeau’s analysis of sociology of education in France (Poupeau, 2003), for instance, this subspecialty within sociology is found to have little autonomy, as indicated by the way in which sociologists of education uncritically adopt the vocabulary and research problems as they are stated by the French Ministry of Education.

This study started with the intuition that forest research probably constitutes a field to some degree, but that its level of autonomy would be relatively low compared to other areas of research found in universities. This intuition was submitted to empirical examination through the methodological approach and study design that I will describe in the next section. As I have already noted in the introduction, I eventually confirmed that there is indeed a field of forest research. Defined as such, the field of forest research includes forest researchers located in many different organizations, including, but not restricted to, universities. To understand its dynamics and the position of agents within it, one has to see forest research at the intersection of the scientific field and of the forest sector, symmetrically seeing both as heteronomous forces that govern forest research from the outside. Moreover, in this context, the scientific field is understood as the social space where researchers conduct systematic inquiry to create new knowledge, while the forest sector is understood as the social space in
which companies, government agencies, non-governmental organizations, and others debate and decide on the use of forests and their products.\footnote{The concept of organizational field emerged from DiMaggio & Powell (1991). They designate, by this term, “those organizations that, in the aggregate, [that] constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products” (DiMaggio & Powell, 1991, pp. 64-65). Emirbayer & Johnson (2008) push further the relationship between DiMaggio & Powell’s concept and the concepts of field, capital, and habitus in Bourdieu’s sociology.}

Universities are the primary organizations where the reproduction of the scientific field takes place, and such is also the case for the reproduction of the field of forest research. It would, however, be a mistake to conflate the academic field, i.e. the field of university affairs, and the scientific field, which are guided by different logics: universities are driven by their educational role, while the purpose of science is to create new knowledge. Many of the forces and struggles at play within universities are not related to the production of knowledge, and a significant proportion of scientific activities are not based in universities. The two certainly overlap to some extent, and it could be argued that one controls the other (Gingras & Gemme, 2006), but the two in the end remain different.

To be closer to perfectly representing the dynamics at play in the reproduction of the field of forest research, I would need to also take into account the specifically academic forces and struggles at play and how they influence the training of forest researchers. For example, the composition of students’ supervisory committees, the requirements for doctoral comprehensive examinations, and the criteria for the tenure and promotion of faculty members are all based on university policies that reflect the evolution of struggles occurring in relative autonomy from the scientific field. But the dynamics of the academic field were beyond my reach as I concentrated my efforts on the scientific and forest-sector forces at play in the training of forest researchers. The only specifically academic forms of capital I will discuss here are grades and degrees, which I see as proxy measures of scientific capital for
students who still have not had specifically-scientific experiences. Further research will hopefully address this limitation.

**Methodology and study design**

The theory of fields, as Bourdieu developed it, came embedded in a methodological framework or, one could even say, *is* a methodological framework. Through his extensive empirical work, Bourdieu provided numerous examples of how one should study fields. Jenkins (2002, p. 86) summarizes the three steps suggested by Bourdieu: (1) What is the field’s position in relation to the field of power? (2) What is the map/objective structure of the positions that make the field? (3) What is the habitus of the agents and which constraints do they integrate?

This study offers a better understanding of the reproduction, through research training, of a “field” whose autonomy is uncertain, the field of forest research. Against the tendency to methodological autonomization, I use the concept of field to study an area of the social space whose status as a relatively autonomous field cannot be assumed. Forest research is an area of knowledge that benefits from an institutional identity (through departments, faculties, journals, etc.) but whose affairs are likely to be the object of numerous outside interventions, and which likewise intervenes in the affairs of other fields. How can Bourdieu’s three-step investigation process be adapted to the study of a potentially heteronomous field such as forest research?

I suggest that one should first localize the heteronomous field under study within (or in relation to) the field of power but, more broadly, within the social space, in relation to other fields. As in studies like *Homo Academicus* (Bourdieu, 1984b, 1988) and Bourdieu and Christin’s analysis of the reform of housing policy in France (1990), this first step will require an inquiry into the field’s social history to grasp the factors leading to its emergence.
and conditions of possibility. Second, one should seek to map the structure of capital within that field, additionally examining how capital flows from the outside toward the inside of the field, and vice versa. Third, the trajectories, habitus, and positions taken by agents not only within but also in-between fields, and their interactions, should be examined.

The approach of Bourdieu and his collaborators usually combined qualitative and quantitative methods. The former primarily allowed them to assess whether or not there was a separate field, to determine the field’s specific stake(s), and to identify the properties of agents which were efficient in the field, i.e. which would then allow them to determine the agents’ specific weight in the field. The latter would also be used to locate a given field within the broader social space, but most notably would build on the efficient variables identified to statistically map the social space of the field and the positions within it, usually relying on correspondence analysis. This study, as it approaches an area of knowledge production – forest research – that has not been submitted to field analysis previously, was focused on the exploratory phase, combining a statistical overview with qualitative material to locate forest research in the social space, find what is at stake, and understand the determinants of agents’ trajectories within the field and beyond its area of influence. The classic next step of field analysis – the precise drawing of the field’s structure and the identification of positions within it – will be left to future researchers.

**Methodological approach**

The impetus for this research project arose from previous work on the graduate student experience, for which the main data collection instrument was a survey (Gemme & Gingras, 2005a). The survey allowed us to grasp at once the experience of a wide range of graduate students, and started to shed light on some relationships between the experience of researchers-in-training and their professional perspectives. But for one who decided to train
in the social sciences to satisfy a deep curiosity about how people lead their lives, questionnaires proved to be frustrating. The survey findings revealed the tremendous diversity of graduate research arrangements, and I found that a single set of questions could not capture the richness of researchers’ trajectories. I found that, to gain depth, I would have to sacrifice some breadth. Setting aside the multi-site approach of the previous study, I decided to locate my doctoral research within a single university and a single unit of that university.

Guided, but not constrained, by Bourdieu’s theory of fields, I have used an ethnographic case study method, combining quantitative and qualitative methods to examine the training of forest research students and the outcomes of their education. The main research question I aimed to elucidate through this study is: How are researchers trained in the heteronomous field of forest research? Secondary questions included:

1. Is there such a thing as a heteronomous field of forest research and, if so, how is it located in relation to the field of power, to the global social space, and to other fields?
2. What form(s) of capital have currency within the field of forest research? Where is valuable capital obtained and how is it used?
3. Which agents are involved in the reproduction of the field and the training of new recruits within it, and what are their respective effects?
4. What are the positions, strategies, and trajectories of the recruits within the heteronomous field of forest research, or in relation to it?
5. What habitus is acquired by those training within the field or, in other words, what are the schemes of perception and action that they integrate as a second nature?

I sought to inscribe this ethnographic case study in the legacy of past field researchers from the sociology and anthropology of the sciences (Forsythe, 2002; Gusterson, 2004; Latour & Woolgar, 1980; Rabinow, 1996; Traweek, 1992) and from the sociology of education (Becker, Geer, Hughes, & Strauss, 1977; D. Fisher, 1990; MacLeod, 1995; Willis, 1981). As LeCompte and Schensul remind us, ethnography is, “quite literally, [...] ‘writing about groups of people’” (1999, p. 21) from a cultural perspective. This is a study of the group of agents involved in forest research at or around one organization – the Faculty of Forestry at the University of British Columbia – including graduate students, faculty members, and many others, and the patterns of action and perception that they share. In other words, this is not a study of individual psychological factors that determine personal decisions. The latter, instead, will be examined in their social context.

Culture can be defined in two ways: on the one hand, as a “mental phenomenon, that is, as consisting in what people know, believe, think, understand, feel or mean about what they do” and, on the other hand, “in terms of what people actually do (as observed) as opposed to what they say they do (as reported), or as “norms” (the expected) versus “practices” (the actual)” (LeCompte & Schensul, 1999, p. 22). In Bourdieusian terms, these two dimensions are embodied in agents as the habitus. Culture is also seen “within economic and political contexts that are marked by distinctive social arrangements, or how people relate to one another in institutions” (1999, p. 23). The latter are understood as the conjuncture in Bourdieu’s theory or, in other words, the context which shapes the habitus and triggers it to become enacted in a range of actions, strategies, and perceptions.
LeCompte and Schensul offer a list of the many circumstances in which ethnographic research might be appropriate, many of which apply to this project:

Ethnography should be used to: define the problem when the problem is not clear; define the problem when it is complex and embedded in multiple systems or sectors; identify participants when the participants, sectors, or stakeholders are not yet known or identified; clarify the range of settings where the problem or situation is occurring at times when the settings are not fully identified, known or understood; explore the factors associated with the problem in order to understand and address them, or to identify them when they are not known; document a process; describe unexpected or unanticipated outcomes; (...) answer questions that cannot be addressed with other methods or approaches... (LeCompte & Schensul, 1999, p. 30)

This description fits well with the description by Bourdieu and Christin (1990) of how they identified the efficient agents and efficient variables for the field of public housing: at first, the exhaustive list of agents and variables is not known, but through exploratory work, interviews, document analysis, etc. the researchers achieved a more definitive list of individuals playing a role in the definition of French housing policy, including the characteristics that contributed to their capacity to play that role. As the objective of this study is to verify the existence of a field of forest research (as observed through its effects) and to explore its range of participants as well as the dynamics of its reproduction, both internally and in relation to other fields, the ethnographic approach serves the purpose well.

Multiple sources of evidence were considered in the course of this research project, as is common in case studies (Yin, 2003). Interviews were the core method of data collection employed, but I also rely on documents, databases, and participant observation to reconstruct the structure in which forest research practices and the training of new researchers in this field are embedded.
Choice of case: the UBC Faculty of Forestry

At the time of the design of this research project, forest research was assumed to be an example of a heteronomous field, and Master’s and Ph.D. programs were thought to constitute the main devices through which that field is reproduced. The scope of a doctoral dissertation and the limited time available to collect and analyze empirical material – less than two years – called for a thoughtful selection of an accessible case to represent forest research.

I chose to study the University of British Columbia’s Faculty of Forestry in Vancouver. Forestry education at UBC started at the beginning of the 20th century and the Faculty, which was established in 1951, currently consists of three departments: Forest Resources Management, Forest Sciences, and Wood Science. Four graduate programs, which are centrally administered in the Dean’s office, are offered: the Ph.D., the M.Sc. (Master of Science), and the M.A.Sc. (Master of Applied Science, earned by trained engineers) are research-based programs, while a course-based M.F. (Master of Forestry) is also available. Only the first three – the research-based programs – are included in this study, as the contact of M.F. students with research activities is limited.

The history and environmental conditions of British Columbia lay a specific context for UBC’s Faculty of Forestry, which is different from that of other provinces. In each Canadian province, the periods and patterns of settlement interacted with the nature and accessibility of forest resources (species and landscape), resulting in a different range of challenges for the human communities depending on the land (Drushka, 2003). At the same time, all Canadian schools of forestry operate within the same constitutional regime, benefit from similar arrangements for the funding of research, interact with similarly structured organizations (provincial government ministries and agencies), and have a number of
partners in common (Canadian Forest Service, professional organizations, industry representatives, research consortia, civil society organizations, etc.). They are also united within the Association of University Forestry Schools of Canada, which indicates that they see themselves as having something in common. There are good reasons to believe that an in-depth understanding of the situation and context of forest research at one institution allows for some careful generalization to other institutions, as long as the specific contexts are taken into consideration. The better understanding of the British Columbia context for graduate forest education and research provided by this study will provide a base to extend this project to contrasting provincial settings and to other countries, as the local dynamics of forest use are increasingly impacted by world markets, international agreements, and other global processes (Hayden, 2003; Tsing, 2005).

While the Faculty of Forestry seemed like the obvious place to look for forest research, there are other forest researchers at UBC whom are not affiliated to the Faculty of Forestry. A simple search in the university’s directory of experts reveals that there are researchers in the Faculty of Applied Sciences, in the Faculty of Arts, in the Faculty of Science, and in the School of Business who list forests or wood as areas of expertise. There are, for example, a number of pulp and paper researchers in Engineering. The vast majority of faculty members who tackle problems related to forests and their products (wood and other derivates) are nonetheless located in the Faculty of Forestry. In the future, systematically comparing forest research and researchers from Forestry to those of other units on campus would offer insight on the specific organizational characteristics of the Faculty of Forestry.

**Access and preliminary fieldwork**

Access to the Faculty of Forestry was granted by the faculty’s Dean (Jack Saddler) and by the Associate Dean of Graduate Education and Research (Cindy Prescott), with the
informal support of the President of the Forestry Graduate Students Association (Alex Plattner), in June of 2007. During the preliminary phase of the fieldwork, in the Fall of 2007, I was invited to present my research to the senior management team of the Faculty, and then to the faculty members in the context of their respective departmental meetings. I was given access to office space which I shared with five graduate students. During that period, I started attending public events within the Faculty of Forestry and audited the course Forestry in British Columbia, meant to introduce international students and those without a forestry background to forestry practices in the province. I wrote fieldnotes and entries in my research journal throughout this phase of fieldwork.

In November 2007, I started approaching individual faculty members to gain access to their research group. A list of faculty members to approach was prepared with the intention of representing the diversity of situations present in the Faculty of Forestry. Attempts were made to balance rank, sex, department affiliation, and areas of expertise. I discussed the initial list of 20 faculty members – within which I intended to recruit only five to seven – with the Associate Dean of Graduate Education. She only notified me that one of the faculty members I had identified was shortly going to leave. She also answered my questions about the number of students or areas of expertise of some of the faculty members I had pre-selected. I then randomly chose one faculty member per department within my list, and progressively contacted more faculty members until I had successfully recruited at least one group per department and a total of five groups. Most first contacts, through email, were successful, although a small number of faculty members ignored my initial request or declined to participate for reasons seemingly unrelated to my study.

For each group, the objective was to collect data through participant observation in group meetings and to interview as many group members as possible, including current and
former students, post-doctoral fellows, research associates, and the group head. I also intended to organize shadowing sessions with individual graduate students. According to the UBC Behavioural Research Ethics Board requirements, I needed to secure consent from all group members to proceed (Appendix 2). The consent procedure varied based on each group’s circumstances: for those whose students were mostly working remotely, initial contact was established through email, whereas I attended the meetings of groups who gathered on a regular basis. For all groups in which members (beyond the head) were approached, access was granted as nobody refused to allow the research to proceed. Most of the individuals I met were enthusiastic and supportive of the research, although some did not wish to be interviewed or shadowed.

Gaining access to the non-academic collaborators of the participants to my study proved more difficult. My plan had been to get in touch with this category of participants during shadowing sessions, while I accompanied graduate students into their research activities. As such shadowing opportunities were rare, my opportunities to meet the non-academics I needed to talk with were diminished. Other attempts to reach such external collaborators were made through the heads of the research groups I was working with. In one case the faculty member followed up but the external collaborator did not. In the other cases, the faculty members did not have identifiable partners to refer me to, or did not respond to my occasional demands to introduce me to their contacts. In the end, with the closure of my fieldwork period approaching, I enlisted the Associate Dean of Graduate Education for support and asked her to introduce me to adjunct faculty members whom she knew were regularly involved in student supervision. She sent introductory messages to five such faculty members, and all of them immediately responded positively to my request for an interview.
The process through which those contacts were made will be discussed as I present this portion of the study’s findings.

**Sources of evidence**

I mobilized many different sources of evidence over the course of this research process, including documents, publications and awards databases, participant observation, fieldnotes, and interviews.

Recent and historic **documents** were sought in order to understand the broad context of forest research in Canada, the history and organization of the Faculty of Forestry, and the functioning of each research group. Beyond the secondary sources assembled by various scholars, I also used the two “informal history” books about the Faculty of Forestry (Kozak, 2004; Smith, 1990) and multiple documents produced internally as evidence: the Annual Reports published since 1991, the *Branchlines* newsletter published by the Faculty, and the Faculty’s web site. Newspaper articles mentioning Forestry faculty members were also gathered and analyzed.

To add to the understanding of Forestry’s location in relation to forest research, to the University of British Columbia as a whole, and to society in general, I used a number of **quantitative sources**, including lists of publications extracted from ISI’s Science Citation Index (SCI), Social Science Citation Index (SSCI), and Arts and Humanities Citation Index (AHCI) databases, research funding from UBC’s research awards database, an internal database of Forestry alumni, and UBC’s institutional research office data on all faculties and schools.

**Participant observation** proved to be an important way to become familiar with the culture of the Faculty of Forestry and also to build rapport with key informants, as I became
over time a familiar figure in the building. Participant observation sessions can be divided in
two main groups: sessions conducted in group settings and individual shadowing sessions
with graduate students.

I entered the field at the beginning of the academic year, at the same time as most
graduate students, and attended orientation events, visited the buildings and facilities, set up
my workplace in the office assigned to me by the Associate Dean, etc. I participated, as an
auditor, in the *Forestry in British Columbia* course (FOR547), a course meant to introduce
international students and those not initially trained in forestry to forest practices and policies
in British Columbia. I also attended the first session of the *Technical Communication Skills I*
course (FOR544), which is mandatory for all Master’s students, in order to introduce myself
and my research project to the incoming class, and to gain insight about the background of
the students entering the Master’s program. I also played a participant-observer role in other
public group settings such as meetings, seminars, lectures, public events, and social events. I
had the opportunity to participate to research group meetings in two of the five groups that
were included in the study. In those two groups, the head was keen to invite me to every
single meeting, and I was included on the group’s mailing list. I was also invited to social
functions at the supervisors’ homes, invitations I had to decline for scheduling reasons. In
two other labs, I attended one meeting in order to present my research project, but there were
no further opportunities for observation. In one of those latter two cases, there were simply
no group meetings held during the period when I was available to observe them. In the other
group, there were irregular meetings but getting myself invited to them proved difficult: from
what I could gather, the meetings were often held with external research collaborators, whom
the head of the lab seemed to think would be uncomfortable in the presence of an observer.
The only meeting I could have attended was scheduled at a time when I was unavailable to attend. The fifth group never meets, as its members are seldom in town at the same time.

Shadowing sessions with individual participants, which I had intended to be conducted systematically, turned out to be more difficult to arrange than I had hoped. Nonetheless, I conducted shadowing sessions with seven different students, at the rate of one, two, or three sessions each. I also attended a few thesis defences, but formally observed only one of them. I also observed some of the students I interviewed give talks or participate to a poster session in public settings. Each of these sessions was an opportunity to learn about the students’ work in an informal context, and in some cases to make myself useful by helping the students in their work. I did not, however, systematically carry such observations with all, or even a significant proportion, of the graduate students who participated in my study. Many factors converged to reach this unfortunate result. First, students spend the better part of the academic year doing office-based work such as reading, programming, and writing at the computer, and having me sitting there as they did it appeared to be of little appeal to most of them. Conscious of the students’ reluctance and unwilling to be a burden as they – as I did – struggled to complete their degrees, I did not insist when a student did not respond to my suggestion that I would like to observe them in such a context. As for participant observation in the students’ fieldwork, my own constraints might have limited the data I could collect as I was unable to commit myself to field trips to remote locations which were either long (more than a week) or organized at the last minute (as students needed, for example, to wait for a certain type of weather pattern to collect data). Finally, after mentioning the possibility of attending one-on-one supervisory meetings or committee meetings, I was unwilling to insist and repeatedly remind the students and supervisors about this option. In an informal conversation at an early stage of the project, one faculty member told me that he was
concerned that the presence of an observer would further worry some of his students who were already, at times, emotionally strained by the thesis- or dissertation-writing process. While this faculty member’s group did participate in the project in the end, this casual remark left me particularly careful not to intrude in contexts where the students could fear to lose face. Such reluctance on my part may have deprived me from one of the most fruitful contexts for observation, but I will leave it to future researchers to design an approach to overcome such sensitivities.

In the field, I adopted a peripheral membership role. Adler and Adler (1987) describe the peripheral membership role as the most marginal and least committed membership role that can be adopted by ethnographic researchers (compared to active or complete membership). As such, I did not have a functional role within the Faculty of Forestry. I never concealed my role as a researcher from the Faculty of Education although I did not continuously inform all in attendance of the exact nature of my project if it risked interrupting the flow of the ongoing situation. I never purposely failed to disclose my role or conceal it, and it made for great conversations during social events. At times, I slipped into temporary functional roles as I offered my services to the organizers of social events or to graduate students for the conduct of their field or laboratory work. I flipped burgers, helped with room set up, mixed innocuous substances under a flume hood, carried gear, and penciled tree heights on a data collection form. My lack of qualification and skill as a forest researcher, as well as my flimsy rubber boots, prevented me from being mistaken for a regular member of the field, although my agility at separating slices of cheese was noted by a respected dendrologist and barbecue organizer.

Interviews were the core form of data collection and allowed me to acquire in-depth information about the trajectories and current activities of graduate students (current and
former), faculty members, staff, administrators, and collaborators of the Faculty of Forestry. Thirty-eight (38) of the interviewees were affiliated to one of the five groups I studied, while nine were not. Forty-seven individuals in total were interviewed (two of whom had to be interviewed twice to cover all of the topics). Table 1 lists the primary affiliations of the individuals I interviewed.

Interviews were semi-structured in that there was a set opening question (about the current activities of the interviewee) and a number of topics which subsequently had to be covered; however, much freedom could be taken in the actual conduct of the conversation. The topics discussed included: current activities related to forest research, educational and professional background, and projects, aspirations, and expectations for the future. Opinions about forest-related issues or other matters were sometimes explored as well. For international students, the (sometimes, but not always, temporary) migratory experience was also discussed. Detailed interview grids are attached as appendices 5 and 6.

All interviews were recorded digitally and transcribed verbatim. The transcript was then offered to the participant for review. Participants were allowed complete discretion in revising the transcript, and could add, remove, change, or entirely discard the transcript. Some declined the opportunity to review their transcript but most participants took the time to read it and bring minor corrections. Only three participants asked for significant sections of their transcript to be removed.

Throughout this dissertation, efforts will be made to protect the anonymity of the participants who accepted to be interviewed. Their names or research topics will not be disclosed. A random name generator was used to attribute pseudonyms to participants to increase readability. A small number of student interviewees are or were supervised by a
faculty member who is jointly appointed between the Faculty of Forestry and another Faculty on campus. They are included in the analysis regardless of the Faculty they were assigned to.

Table 1  Primary status of interviewees at the time of their first interview

<table>
<thead>
<tr>
<th>Primary status</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator or staff</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Faculty member (any rank)</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Master's student</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Ph.D. student</td>
<td>8</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Former student (Master's or Ph.D.)</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Post-doctoral fellow or research associate</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Adjunct faculty member</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>15</td>
<td>47</td>
</tr>
</tbody>
</table>

Data analysis

The various sources of quantitative data were analyzed with descriptive statistics.

The qualitative data – including short documents, researcher profiles, newspaper articles, fieldnotes, and interviews – were introduced in a qualitative data analysis software (NUD*IST 6). Documents were coded according to two main grids: one grid included the concepts from the theoretical framework while the other grid allowed me to break down the material (particularly the interview) into themes very much along the lines of the interview grid. Reports were generated from the coding and further analysis was generated in table format, either in computer-based spreadsheets or on paper. Writing was also used as an analysis tool, as I wrote numerous journal entries about the data as I collected and analyzed it.

To ensure the internal validity of the findings presented in this dissertation, and offer a truthful representation of what I observed, care was taken to analyze the discourse of research participants and other pieces of evidence in their context. I was particularly careful not to interpret interviewees’ comments outside of their context, and to do so I constantly
referred to summary sheets that included all aspects of individual participants’ experience while I analyzed data on a specific theme across participants. I was also able to triangulate different sources to assess their validity. In particular, I could compare supervisors’ discourse on student recruitment to the actual composition of their student group, or their actual sources of funding (based on university data) to their verbal claims on the topic. By combining interviews with graduate students and with faculty members in the same study, as well as collecting data through participant observation, I was made conscious of the multiple perspectives cohabiting in the Faculty of Forestry, a diversity I have been careful to represent in the following chapters. This study design also makes me confident about the reliability of the study. I do not claim that the limited sampling I could afford has exhausted the diversity of UBC’s Faculty of Forestry, but my prolonged contact with the organization, its members, and some of its counterparts outside of the university allows me to feel sure enough that another researcher entering the same field with similar research questions and a related theoretical framework would not come to opposed conclusions.

As I wrote successive versions of the findings chapters, I was often caught between the desire to tell a richer story and my commitment to maintain the confidentiality of the participants’ contribution. The Faculty of Forestry is a small world that is also incredibly diverse, thus a single colourful detail can lead to the identification of a faculty member or of a student. I chose to err on the side of caution, even if sometimes it meant sacrificing my desire to offer readers a thick description of the processes of reproduction in the field of forest research.
The author in space

This dissertation is a product of the massification of graduate education. Two reasons, one related to the author, and the other to the object of study, explain that it would not have been written 30 years ago.

First, the conjuncture of my formative years has been exceptional in how it offered educational opportunities to a broader-than-ever range of pupils. The rush to increase the proportion of each generation that graduated from high school and earned some form of post-secondary credentials was a feature of educational systems all over the developed world. In French-speaking Quebec, the commitment to educate the masses grew even stronger as the widely-held conviction that the province was backward lead to ambitious collective schemes to “catch up” with neighbouring, English-speaking jurisdictions. By the time I was of schooling age, it was taken for granted that, the daughter and granddaughter of French-Canadian small-scale farmers, I would not only graduate from high school but also proceed to cégep. Nobody frowned when I entered university, although by the time I started graduate school my relatives no longer tried to understand of what use, if any, my studies would be. The fact that I received, as a student, a living wage from the provincial research council – another institution established to close the gap with the province’s science-rich neighbours – probably prevented me from receiving a negative sanction for what would have been, until recently, a daring move for one who did not inherit much cultural capital. But I am far from alone in this situation, as Quebec not only has now caught up with the rest of North America in matters of graduate education, but now has more graduate students per capita than the rest of Canada and the United States (Conseil national des cycles supérieurs, Fédération étudiante universitaire du Québec, 2008).
Second, until recently, my research object was barely there. In 1967, there were only 27 graduate students in the Faculty of Forestry, and in 1981 there were 84 (Smith, 1990). By 1991-1992, according the Faculty’s annual report, there were 134 graduate students. Today, there are approximately 250 of them, about half of whom are doctoral students. For the period since the early 1990s, the growth rate of the graduate student population in Forestry is comparable to that of Canadian graduate studies in general (Canadian Association for Graduate Studies, 2008). However, Forestry graduate studies at UBC between the late 1960s and the early 1990s grew at a breathtaking speed, as the number of graduate students was multiplied by almost five in just over 20 years. Such a growth is also in part to be attributed to a desire to “catch up,” in this case with the rest of the university, as Forestry was warned in the early 1980s by UBC’s central administration that it should increase its efforts to secure NSERC research funds (Smith, 1990). As we will see in chapter 4, it did, to the point that it now trails only the Faculty of Medicine for its amount of research funding per faculty member. While there is no quantitative data available on the socio-economic status of graduate students in Canada, the findings I will present later in this dissertation indicate that Forestry graduate students may be, in many cases, individuals who, like me, would not have had access to Master’s and Ph.D. degrees only a generation ago.

Since I started university, I have often found myself in a space of tension between my primary habitus, inherited from countless generations who worked the land for their livelihood, and the thick layers of schooling, readings and academic relationships that have also shaped my body and mind. I remain spontaneously skeptical of scholarly approaches to reality, yet have so far earned a living by turning people’s experience into written knowledge. I do not live in a space of acute hysteresis: after all, thousands have had a trajectory similar to my own as the doors of graduate schools were flung open over the last three decades. But my
trajectory in the academic world has circumvented more autonomous fields – such as sociology – in favour of science studies and education, allowing me to continue working on problems which emerged beyond the walls of the ivory tower, translating them enough to earn academic legitimacy but trying to avoid losing sight of the problems’ origins.

The Faculty of Forestry as an organization and the individual students and faculty members within it may be in a social space which is analogous to my own. Research and graduate education in Forestry may now be dominated, numerically, by non-foresters, but one cannot ignore the legacy of pragmatism and the conciliatory approach – core values of the profession – which are literally built into the faculty. Regardless of their initial training, nearly all of the students and faculty members I interviewed stressed the importance of going “out there” in the world, whether it was in the forest, in a company, in government, or in an NGO, to experience nature and society with their own senses. What further education and research would buy them, even temporarily, was a shelter to think just a few steps away from the elements.

This is also what I came for when I decided to do a doctorate. This dissertation reflects the tension I experience by exploring a space of tension – the Faculty of Forestry – in which people like me pursue ever-elusive answers to questions that sit somewhere between the global social space and scholarly contemplation. As the researcher’s social position is often analogous to that of her research object, the multiplication of students like me probably explains the increasing numbers of dissertations like this one.
CHAPTER 3
HETERONOMOUS FORCES IN RESEARCH TRAINING

In Canada, institutions of higher education – universities for the most part – have a monopoly over the certification of scientific researchers in the natural and social sciences through their graduate programs. This monopoly, however, does not prevent research training, just like all other educational endeavours, to be the object of a struggle between two principles of legitimation: the autonomous logic of the scientific field, which favours cultural capital, and the heteronomous forces whose strength lies in non-specifically academic assets, economic capital in particular. Depending on the historical period and on the specific location within the academic field, the balance of forces between these two principles varies, granting more or less ground and resources to “pure,” “disinterested,” autonomous research (knowledge for its own sake) compared to “applied,” “pragmatic,” heteronomous research. The latter’s purpose is to solve problems defined by agents located outside of the scientific field, such as deviance (in criminology), pest control (in agriculture), or cancer (in medicine).

In all likelihood, research training in universities will be affected by the balance of forces between the two principles at a given time and location within the field.

In this chapter, I will examine the forms of research training that correspond to the autonomous and to the heteronomous principles. More specifically, after discussing the definition of “research training,” I will summarize its ideal-typical process, i.e. the apprenticeship located in a university setting and involving only students and faculty members, in the most autonomous quadrant of the scientific field. I will then examine contemporary manifestations of the heteronomous logic in relation to research training: I will introduce the various ways graduate students are more or less vigorously encouraged to tailor their research projects to non-specifically scientific purposes, usually through university-
industry-government partnerships, and the few studies assessing their impact. For the most part, I will focus my attention on the situation prevailing in the physical and biological sciences, mathematics, and engineering, which I will loosely call “the sciences” for lack of a better label.

**Defining research training**

Research is an object of social struggle. Because being recognized as “doing research” brings rewards, agents fight to establish a definition and limits to the field of research that include the type of practices they exhibit. In universities, research performance is a criterion for awarding tenure and promotion, making the question of “what counts as research?” a crucial one for faculty members whose production might be hard to account for in terms of peer-reviewed articles. Researchers who aim outside of their peers’ gaze and translate the knowledge they produce into other types of cultural products, like theatrical plays (Butterwick & Dawson, 2005) or commercial outcomes like patents and company start-ups (Siegel, Waldman, & Link, 2003) might also feel that their work is inappropriately recognized by their institution. They may even be denied tenure, leading to legal battles (Fournier, Gingras, & Mathurin, 1988).

Research training will be defined here as the organized processes by which individuals acquire the knowledge, skills, and attitudes associated with research as a professional practice or, in other words, the researcher’s habitus. I deliberately use the term “training” instead of “education” in order to stress the internalization of ways of thinking, doing, and being that are expected to result from those processes, becoming like a second nature for the trained individuals. Throughout this dissertation, I adopt a minimal definition of research, defining it as systematic inquiry with uncertain outcomes. The term “systematic” denotes the deliberate character of the endeavour, and it is here assumed that researchers use
concepts and methods that are – or at least should be – made explicit. By referring to uncertainty, I mean that the results of the research are not known in advance, nor is it even guaranteed that there will be results. The concept of research here stands as shorthand for scientific research. I realize that this definition in itself is an object of struggle; however the debate on the definition of science and research lies beyond the scope of my work.

At the moment, most activities associated with research training in Canada occur within universities and, more specifically, in the context of degree programs for graduate (also called postgraduate) students. Additional periods known as postdoctoral fellowships could be considered to constitute a further level of research training. Initiation to research sometimes starts at the undergraduate level, and research training might be happening outside the institutional context of university degrees. Still, Master’s and, most importantly, PhD degrees constitute the most widely recognized certification processes for the broadly defined profession of researcher. Let me stress that this essay is not about graduate education, but about research training; university programs defined as “graduate” by institutions will only be considered if their primary goal is to train researchers.11

The traditional apprenticeship model of research training

How do lay people become researchers? What are the processes associated with their transformation? The doctoral degree has been established as the most important gate of entry to the research profession, at least symbolically, and evolved over the centuries to follow the development of universities. They have been used, since the beginning, as a selection mechanism to restrict access to faculty positions. Historically, and although non-doctors have been allowed to teach in universities under limited circumstances, only doctors are granted

11 A discussion of the transformations of graduate education and the proliferation of so-called professional degrees is available in Scott, Brown, Lunt, & Thorne (2004).
the duty and privilege of fostering the next generation of academics (Noble, 1994). The degree has been at the core of the identity of the academic profession (Henkel, 2000) since long before research became prominent in universities.

Research as we know it was not always a mission of the university, which for more than half a millennium was more concerned with the conservation and transmission of knowledge than with its creation. The most common doctoral degree known to us – the *Philosophiae Doctor* or Ph.D. – is a radical innovation of modern times which accompanied the foundation by von Humbolt of the University of Berlin (Noble, 1994). Whereas formerly the doctorate had served to crown meritorious erudites, the new degree added the requirement that the aspiring doctor should produce an original piece of research, which would be made public through the dissertation or thesis. As I will discuss in the next section, recent variations on the PhD theme suggest that another layer of competence development is being added to the doctoral process. However, in this section, I will mainly address what is currently known as the “traditional” way to train scientific researchers in the English-speaking world and more specifically in North America.

The North American model of doctoral education, developed initially in the United States but similar in Canada, is more structured than other national models (like the French and the British), integrating components like coursework and examinations. American (and Canadian) students, it is assumed, experience a sharper break between their “pre-advanced” education, which is not very specialized, and “advanced” education (Gumport, 1993). The usual sequence is well-known to us:

> a few years of prescribed coursework, followed by examinations for advancement to candidacy, culminating in a dissertation that reflects original research done by the student under the guidance of a faculty committee. (Gumport, 1993, p. 226)
In some schools, this process can be divided over the course of two degrees (a Master’s and a PhD), the first requiring a higher volume of coursework and the second giving more weight to original research; in other schools, the requirements are integrated in a single degree, the PhD.

Disciplines are the main community of reference for the identity of academics (Becher & Trowler, 2001; Henkel, 2000); in most cases, the discipline is translated institutionally as a department, to which faculty members belong while at the same time remaining associated with the invisible college of their disciplinary peers holding positions at other institutions (Crane, 1972). Through graduate education, and especially at the PhD level, faculty members tend to the reproduction of their discipline, attempting to transform lay people – the admitted doctoral students – into members of their discipline through “a protracted status passage, or set of status passages” (Delamont, Parry, Atkinson, & Hiken, 1994, p. 149). The education they receive goes beyond the acquisition of the skills or knowledge required of the “research student:”

… of equal – if not greater – significance is the development (or absence) of an “academic” identity. That is, an identification with intellectual traditions and groupings, with departments or disciplines, with academic peer-groups, networks, and learned societies. (…) He or she must also grapple with the more implicit, indeterminate facets of the intellectual life. (Delamont et al., 1994, p. 149 & 151)

Among these implicit aspects are “a variety of cultural elements, traditions, folk heroes and heroines, myths, key examples, “sacred” texts, centres of excellence, scandals, cycles of fashion” (Delamont et al., 2000, p. 14). To be successful at becoming a member of the discipline, students must “map the internal topography of their discipline in terms of key individuals, locations, and texts. They [must] recognize genealogies of influence and inheritance” (Ibid.). Lovitts (2001) calls this representation of the discipline’s social space a
“cognitive map”. She uses the concept to explain the difference in graduation rates between disciplines, as some offer more opportunities for socialization and integration while others offer much less. As a general rule, doctoral students in the natural sciences and engineering are more likely to complete their degree program, and to complete it faster, than in the social sciences and humanities (Association canadienne pour les études supérieures, 2003; Berelson, 1960; W. G. Bowen & Rudenstine, 1992; Golde, 2005; Sheridan & Pyke, 1994; de Valero, 2001). Such differences can be explained by a careful examination of academic integration (or lack thereof) at the departmental level. For undergraduate students, social and academic integration are deemed essential. Graduate students, however, must primarily identify with the faculty members of their department, through whom they will become familiar with the discipline they are studying (Tinto, 1993). Graduate students are thus exposed to the “discipline as filtered by their department” (Golde, 2005), and have to integrate both the “great tradition” of their discipline and the “small traditions” of their department (Delamont et al., 2000). I will now describe the three main components of the traditional model (supervision, knowledge acquisition, and knowledge creation) before describing its expected outcomes.

**Supervision**

More than forty years ago, in the United States, Warren O. Hagstrom (1965) interviewed scientists to come up with what may be seen as the ideal-typical supervisory arrangement in the so-called “hard” sciences: a structured and rather hierarchic environment in which the student’s progression, on a daily basis (or almost) is supervised by an experienced professor but also by other members of the laboratory, including postdoctoral fellows. Terry Shinn (1988) also observed a similar structure in a more contemporary French physics laboratory, where doctoral students, at the bottom of the proverbial totem pole, carry
most of the work described elsewhere as “normal science” (Kuhn, 1970). For the laboratory-based graduate students, contacts with more experienced researchers happen nearly daily, and it seems usual to have weekly meetings with the supervisor to discuss the ongoing research and the difficulties encountered. This relatively close supervision contrasts with the less structured approach to supervision in the social sciences (W. G. Bowen & Rudenstine, 1992). For example, Holdaway (1995) observes, in a Canadian study, that supervisors in the sciences were more likely than those of other disciplines to see a role for themselves in supporting the efforts of their students to give papers at conferences and publish journal articles.

The long period of isolation associated with fieldwork may be characteristic of some disciplines of the social sciences (Delamont et al., 2000), but also affects students in field-based natural sciences. In their study of the socialization of field ecologists, Roth & G. M. Bowen (2001) described how apprentice researchers can be left to their inexperienced selves to make decisions in the field without the support of their supervisors or of more experienced colleagues. Unfortunately, departments with a fieldwork or application component in the natural sciences, like ecology, geology, or forestry, tend to be multidisciplinary and, for that reason, somewhat neglected by researchers who study graduate education because it would introduce too many “complications” (W. G. Bowen & Rudenstine, 1992, p. 6). According to Delamont, Parry, Atkinson, & Hiken (1994), doctoral students in multidisciplinary areas in the social sciences primarily identified and designed their research from a disciplinary perspective and affiliated to a supervisor accordingly. However, this is a topic on which little research has been published, especially for the students who have studied in interdisciplinary programs throughout their university trajectory, i.e. from the undergraduate level.
Acquisition of prior knowledge

Once admitted to a program, doctoral students face two main tasks: learn what is considered by his or her community of reference to be the knowledge already created on a given subject, and then produce new knowledge to contribute to the discipline (Noble, 1994). Whether the subject of that knowledge is defined (and how well) before the beginning of the familiarization with previously established knowledge seems to vary by discipline, as well as the level of exhaustiveness of that familiarization and the forms it takes.

To describe how social and natural scientists locate themselves in relation to previous generations of researchers, Delamont, Parry and Atkinson (2000) refer to the concept of “personalized” and “positional” systems. When asked about their “genealogy,” to locate themselves in relation to others that came before them, natural scientists offer very factual and succinct stories. The scientific system is called positional because researchers “know their place” in the hierarchical structure of the laboratories they have inhabited, which offer a relatively clear hierarchy and a sense of pedagogic continuity between generations of students. The transfer of scientific capital from one generation to the next occurs in a direct and straightforward manner. Social scientists, on the other hand, offer rich biographical narratives linking personalities which might not even have been present in the same institution or even have lived in the same area. Such differences in identification reflect the ways in which young researchers become acquainted with their discipline’s legacy. In the sciences, according to Delamont and her team (2000), relevant pre-established knowledge in the form of ideas, materials and skills are encountered in the laboratory’s structure, methods, tools, and recent publications. Generations of students may transfer experiments, prototypes, or models to each other, each newcomer being asked to take the project, model or equation one step further than her or his predecessor. In the social sciences and humanities, on the
other hand, it is rare that another student will have worked on the very same topic before, and the new researcher will have to make her own trail through the literature. In those disciplines, the reliance on coursework and on comprehensive (or qualifying) examinations on the part of the department to ensure that students will acquire the relevant previous knowledge is more important than in the sciences. In a 1990-91 survey of department heads and experienced supervisors from five Canadian universities, Holdaway (1994) discovered that coursework was more important for faculty members in the humanities, where 89 per cent agreed on its importance, and in the social sciences (77 per cent) than in the sciences and engineering (66 per cent) and in the life sciences (56 per cent). Comprehensive examinations are also more important and consuming in the humanities and social sciences. The comprehensive examination requirements are thought in some disciplines to be a cause of the increased duration of doctoral studies, because students can prepare for months or even years, which has led some departments to reconsider and transform the requirements (Mullens, 2003).

**Creation of new knowledge**

The *pièce de résistance* of the doctorate since Humbolt is not an original interpretation of an old piece of knowledge but the contribution of *new* knowledge, a gift given to the disciplinary community in hopes of receiving recognition in return (Hagstrom, 1965). In Hagstrom’s days, full-length dissertations were probably still the norm, although a debated one (Berelson, 1960), and the supervisor and supervising committee were the only evaluators of students’ knowledge claims. An increasing number of faculty members, however, are in favour of replacing the dissertation by interrelated refereed journal articles, especially in the sciences (Holdaway, 1994), a situation which, based on recent observation, seems to have become mainstream.
The consensus is that the dissertation should “be an original and significant contribution to knowledge” but that, of course, leaves many questions up in the air: “what [is] sufficiently original and significant, what [is] contributory, and indeed, what [is] knowledge,” (Berelson, 1960, p. 160), questions which are left to the department or, I would say, to the supervisor and committee. It is only recently that researchers have started making implicit the implicit requirements of the doctorate (Lovitts, 2007).

Some have observed that the requirements and expectations in the social sciences and humanities may have escalated to become “unrealistic” (W. G. Bowen & Rudenstine, 1992; Delamont, Atkinson, & Parry, 1997). In a similar vein, de Valero (2001) noted that departments which put more pressure on their students for a “significant” contribution to knowledge had lower completion rates. Conversely, departments with a high completion rate and short time-to-degree period – more likely to be in the natural sciences – were reported to have a different approach:

As long as students were able to explain what they did, how they conducted the investigation, why they thought the results were not significant and suggested new ways to conduct future research, that was considered sufficient dissertation work. (de Valero, 2001, p. 357)

Long before students can produce results, they need to identify a topic for their research. Generally, the aspiring researchers in the sciences perceive their work to be located “within the broader context of the scientific work in their area carried out by all the researchers in their laboratory” (Delamont et al., 1997, p. 86), with their supervisor basically choosing their topic for them (Ridding, 1996). In Hagstrom’s study (1965), students were reported by their advisors to be unable to identify a scientifically important topic, which explains that students only become involved after the planning stages of a research program. Because the students’ work is so closely tied to the work of their supervisor, Walford (1983)
warned against reforms which would only consider students as trainees: they also contribute to research and form an essential part of small research teams in particular. In 1960, Berelson was reporting that many lamented the practice of integrating students to sponsored research projects, which would push students towards “safe” topic certain to bring fast results on the topic of the professor’s grant. Hence, creativity was being “built out” of doctoral work, making the student a mere “cog in the senior professor’s wheel” (Berelson, 1960, p. 152). Knowing that, in engineering, students perceive that the research topic is jointly agreed on between themselves and their supervisor, yet see themselves as employees and their supervisors as a boss (Ridding, 1996), one may think that the trend of the 1960s might have become fully established, as least in some disciplines. In the social sciences and humanities, the situation significantly differs and students still express a strong ownership of their research projects, strongly valuing their autonomy (Delamont et al., 2000; Ridding, 1996). The process of choosing a topic in the more applied and interdisciplinary areas of the natural sciences does not seem to have been systematically studied so far.

**Outcomes**

Beyond the “contribution to knowledge” produced by the students, what are the outcomes of the doctoral process? According to Hagstrom, the effects on the students are profound, at least in the sciences:

> The socialization of scientists tends to produce persons who are so strongly committed to the central values of science that they unthinkingly accept them. (…) These commitments are the outcome of a prolonged training process, lasting well into adult life, in which the student is effectively isolated from competing vocational interests and in which he is extremely dependent on his teachers. (Hagstrom, 1965, p. 9)

The taken-for-grantedness of the resulting way of practicing research is also highlighted by Delamont, Parry and Atkinson (2000): doctoral studies train academics who
have a clear, yet not codified, view of “what “counts” as research, and what “counts” as quality or originality” (p. 178). In other words, they have acquired a new scheme of perception and action, a new habitus.

Having acquired academic “good taste,” the aspiring researchers are ready to put their new indeterminate skills to use in mainly one environment: academia. Taylor (2006) notes that success is defined by academics as a tenure-track position in a research university. Former students who access other positions, even if they are gainfully and satisfactorily employed, are likely to experience negative feelings, afraid to have disappointed their former supervisor. Whether to tell one’s supervisor about plans to go on the non-academic job market is a frequent topic of discussion on graduate student electronic discussion forums such as PhinisheD.org. Bourdieu (1988) and Mangematin & Robin (2003) bring nuance to this statement: aspiring academics and researchers can be expected to be loyal if they stand a reasonable chance of reaping benefits from their investments once their studies are over. As the prospects of attaining a position similar to that of their supervisor decrease, so does their loyalty to the world in which they were trained. Yet, even if they may be conscious of their low chances to become an academic, the perceptions of suitable jobs by Ph.D. recipients may not change, as exemplified by French research on life sciences (Louvel, 2008). Åkerlind (2008) reports that Australian postdoctoral researchers see research careers and academic positions as the only suitable careers for themselves, and do not even think that they are qualified for other jobs anyway:

As long as postdocs are trained by academic researchers in an academic research setting, it seems inevitable that they will continue to aspire to academic and research-only jobs. (Åkerlind, 2008, p. 39)

Yet, as Zur-Muehlen mentioned as early as 1978 in Canada, the academic job market might not always be able to absorb all PhD recipients and doctors will have to consider non-
academic jobs. In Quebec, the proportion of recent PhD recipients employed in tenure-track positions at the end of the 1990s was thought to be approximately 27 per cent (Conseil supérieur de l'éducation, 2003, p. 85); in the United States, the proportion of recent PhDs employed as academics hovered at approximately 50 per cent, but that number includes temporary assignments and teaching-only positions (Kannankutty & Kang, 2001).

Interestingly, while some argue that PhD graduates are “too academic” for the prospects of the job market, others write that PhD students are ill-prepared for faculty positions (Austin, 2002), or that too many are turned off by a lifestyle they fail to perceive as meaningful (Golde, 2005).

The training of researchers is an object of struggle: it seems to be as difficult to agree on a description of what is actually going on than on what should be happening, resulting in the multiplication of variations along the lines of traditional researcher training. One of these variations is the increased effort to integrate student researchers in projects involving university-industry and/or university-government research partnerships.

**Cooperative research: a “new” context for training?**

In developed countries, policy trends since the 1990s have emphasized funding for research “in context of application” (Gibbons et al., 1994) or, in other words, “relevant” research conducted to respond to the needs of society, which often means of the economy. By changing the funding patterns, even marginally, such policies are effectively transforming the work of an important group of users of research funds: university professors (Slaughter & Leslie, 1997). Consequently, the socialization of aspiring researchers will also be transformed, especially as policy-makers directly target graduate education for reform (Milot, Couture, Leblanc, & Gingras, 2003). This section will briefly introduce the types of measures which affect the training of researchers in universities, and then present and discuss the
studies which have empirically examined the impact of these various measures on student researchers. Although this area of study still suffers from a paucity of empirical studies, there are now enough published studies to prevent us from being confined to discussion of potential difficulties as was the case only a few years ago (Stephan, 2001).

**Modes of integration**

Two main types of arrangements are used to integrate graduate students to research collaboration with non-university partners.\(^{12}\) First is *indirect support* through grants that fund collaborative research centres or teams, which create a new type of learning environment for the students supervised by the involved faculty members. Second is *direct support* offered to research students who commit to some form of collaborative work with non-university organizations, either in the form of a scholarship (which can be in part funded by non-academic monies) or of a contract. Graduate students also can be employed as research assistants to work on a project sponsored by a non-university organization such as a private company or a government agency. I will here only focus on work leading to the preparation of a thesis or dissertation.

Many types of university-based arrangements belong to the category of indirect support. Some grants are obtained by already-established university units who commit to collaborate with one or many non-university sponsors to work more or less jointly on a topic which is relevant to the external sponsor. Usually, the outside partners will be participating financially to the costs of the research, but research council funds will also be involved and a government agency administers the program. The proposals submitted under such schemes are screened for both scientific quality and relevance, with the potential contribution to the

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\(^{12}\) The expression “non-university partners” refers to any type of organization, outside of universities, that can be involved in partnerships, including companies from the private sector, government organizations, and non-government organizations. Those outside organizations may be for profit or not-for-profit.
training of researchers being part of the criteria that measure scientific quality. Examples of such university-based schemes include, in Canada, the Collaborative Research and Development Grants, the Strategic Network Grants, and the Research Partnership Agreements (Natural Sciences and Engineering Research Council of Canada, 2008a, 2008b, 2008c), as well as the Australian Research Council’s Linkage Projects program (Australian Research Council, 2008).

Another typical way for governments to support collaborative research between universities and industrial organizations is the creation of hybrid institutions located somehow between member universities, firms and government agencies. Training researchers, or some other form of education (such as the continuing education of industrial employees), usually is part of the mandate of such hybrid research centres, and despite usually being incorporated as individual organizations separate from the university, they are often hosted on a university campus. A notorious example in Canada is the Networks of Centres of Excellence program (Atkinson-Grosjean, 2006; D. Fisher, Atkinson-Grosjean, & House, 2001), while both the United States and Australia have a program funding “collaborative research centres.”

The direct funding category comprises of mainly two types of scholarships. In Australia and the United Kingdom, scholarships from respectively the Australian Postgraduate Awards (Industry) Scheme [APA(I)] (Powles, 1994, 1996) and the UK Cooperative Award in Science and Engineering (Science & Technology Facilities Council, 2008) are awarded to the students, but the proposal in itself is prepared jointly by university and industry representatives. The latter apply to the funding agencies and then, if successful, advertise the student position and find an appropriate candidate to fill it. In Canada, the NSERC Industrial Postgraduate Scholarship program (Natural Sciences and Engineering
Research Council of Canada, 2008d) and Quebec’s research council’s Industrial Innovation Scholarships, now jointly offered with NSERC (Fonds québécois de recherche sur la nature et les technologies, 2008; Gemme, Gingras, & Milot, 2005) work differently. Students write the proposal and secure the participation of both a university supervisor and an industrial partner. The French Conventions industrielles de formation par la recherche, or CIFRE (Lévy, 2005a) are similarly organized. In all cases, the funding awarded to the successful research students is jointly provided by a government research council and the non-academic partner organization. More recently, a new direct funding scheme emerged from a research centre in the field of applied mathematics, the Mathematics of Information Technology and Complex Systems (MITACS) Network of Centres of Excellence. The purpose of the program was to expose graduate students to industrial applications of their discipline by offering industrial scholarships partly funded by non-academic organizations. With additional funding from provincial and federal governments, the program has now been expanded to most research areas, and took the name of ACCELERATE CANADA (MITACS, 2009). During the period covered by their ACCELERATE scholarship, however, students may or may not be working on their thesis or dissertation.

**Effects on the training of the student researchers**

A small body of literature has accumulated since the 1980s on the actual experience of research students involved in some sort of collaboration with industrial or other non-academic partners. Empirical studies are scarce but nonetheless available for many countries. Unfortunately, they can be difficult to uncover due to the absence of a common vocabulary and to the failure of researchers to realize that they are not necessarily the first to study the phenomenon. Moreover, the studies are often sponsored by the research councils that fund the programs, and the findings published as reports or research notes, which may not be
readily available. I will here examine the results of the few empirical studies that I have been able to identify. Findings from the United States, France, Sweden, Australia, and Canada will be summarized. No studies from the United Kingdom have been found, although they must exist. These studies certainly do not offer an exhaustive overview of the situation, but bringing them together reveals some interesting trends. It should be noted that only literature in English and French has been included. Additional linguistic skills would certainly allow for the recovery of more literature, in German and Japanese in particular. This review is organized by country, as the policies and programs examined are, for the most part, embedded in national innovation policies and/or supported by national research organizations or councils.

**United States**

As early as 1987, Gluck, Blumenthal and Stoto published in *Research Policy* the results of an important survey of life sciences graduate students and postdoctoral fellows in the United States, with hopes of finding answers to the following questions:

Does industry funding of university research and training affect the educational experiences of students and fellows or their subsequent career choices? Does involvement in or exposure to UIRRs [University-Industry Research Relations] influence trainees’ scientific or commercial productivity? (Gluck et al., 1987, p. 327)

They collected data from 693 respondents from the most important American research universities in the life sciences, including many in the field of biotechnology. They divided respondents in three categories based on the source of their funding, distinguishing students who received direct industrial support (19 per cent of their sample) from those with indirect support (*i.e.*, involved through their supervisor) and finally those without any industrial support. The survey results indicated that students with direct industrial support experienced their training slightly differently than the other two types of students. They had
significantly less publications but were more likely to be involved in patent applications. Student categories did not differ significantly in their exposure to industrial secrecy. Indirectly supported students more frequently reported being affected by publication delays and felt more reluctant to talk about their research. However, the authors of the study report high rates of no response to these last two questions, and believe that respondents might lack the necessary information about their rights and responsibilities. Constraints on topic choice, post-graduation employment, obligations to train others or to do consulting work were imposed on approximately one third of the respondents with direct support.

Interestingly, the professional aspirations of the student researchers did not vary much: although it is true that those with direct support were slightly more interested in industrial careers, academic positions were still the preference of the majority, notwithstanding the source of funding, which led the authors to note that:

The ultimate behavior of students could differ from their stated intentions. However, expectations that industry support of university research will encourage large numbers of talented trainees to forsake academic careers do not seem justified, at least among the universities and departments surveyed. (Gluck et al., 1987, pp. 333-334)

Over all, about half of the respondents judged their training experience excellent and an additional 45 per cent thought it was either good or very good, with no variations along funding lines. Gluck et al. recommended that conflicts of interests and the regulation of university-industry research relations be kept in check, and that the true terms of collaboration should be clarified. Nevertheless, they reported they felt their respondents found the benefits of collaboration with industry outweighed the risks from the students’ point of view.
Another survey of American graduate students with industry ties was conducted by Behrens & Gray (2001) and published in the same journal. Although the original sample was bigger, the data presented in the article concerns 482 graduate students from chemical and electrical engineering in six major American research universities with support from the Industry/University Centers for Cooperative Research (I/UCRC) program. Among their survey participants, Behrens & Gray found 45 per cent who were “industry-sponsored” (in the context of a CRC, by a single company, or in a non-university based research consortium) while 35 per cent were “government-sponsored” (by a civilian or defence government agency), while the remaining students were not sponsored or received university funds.

Behrens and Gray found very few significant differences between the experience of industry- and government-sponsored students, leading them to say that the most important differences were related to being sponsored versus not. The industry- and government-sponsored projects were about as likely to form the core of the dissertation or thesis of the involved students, which indicates that it was thought by the supervisors to potentially bring a contribution to their field of study. No significant differences were observed in the choice of research topic (chosen, assigned, or developed), in feelings of control over the research, in interactions with industry representatives (which were always low) or in the perceived nature of the research produced. The two types of sponsored students were found to be more likely to publish than the non-sponsored students, but no differences were found based on sponsor type. Constraints on research and the quality of the climate were perceived in similar ways by all students. Unlike most of the students surveyed by other teams, only 28.9 per cent of Behrens & Gray’s sample expressed a preference for university employment after graduation, with the remaining two thirds reporting a preference for industrial positions. However, no
differences were observed between the three categories of students on this topic. The authors concluded that:

… given the concerns raised by the literature, the lack of differences between industry and university-sponsored research appears to be more noteworthy than these minor differences. (Behrens & Gray, 2001, p. 195)

A third study emanating from the United States (Mendoza, 2005, 2007) is more qualitative in nature, using a single case study to examine “How (…) high levels of industrial sponsorship within an academic department influence the socialization of doctoral students from students’ perspective” (2005, p. 85). Mendoza chose “a high-ranked science and engineering department in a large Research I University” (2005, p. 87). The centre received NSF funds to support its partnerships with industry. The case study method included a screening survey and in-depth interviews.

Unlike Behrens & Gray’s survey, Mendoza’s interviews do reveal some differences between students with industrial and government sponsorship. The latter were more likely to hold “more traditional views based on the idea that basic science is the realm of academia and the applications of science belongs [sic] to the realm of industry” (2005, p. 145). In their views, industrial research is disconnected from the general advancement of science and constrained within strict boundaries. Industry-sponsored students had a different view:

… they realize that applied research requires a fair amount of basic research and that there are many types of industrial research, including projects that are long-term and less specific. (Mendoza, 2005, p. 145)

Industrial students also seemed more likely to find funding plentiful and easily accessible, while government funds were perceived as scarce by government-sponsored students and thought more likely to constrain faculty members’ range of options.
Mendoza found that students were globally satisfied with their training experience. She mentions that industrial research opportunities might provide a more meaningful experience to graduate students, increasing their chances of successfully completing the research program. Despite their positive outlook on industrial research, students remain committed to academic norms and value publications in peer-reviewed journals. The diverse range of learning and research opportunities provided to students seem to create a positive experience for them. Academic and industrial sources of wealth can apparently be combined for the benefit of the research apprentices.

A fourth American study, by a team led by Sheila Slaughter (Slaughter, Campbell, Holleman, & Morgan, 2002), is not actually a study of student researchers but rather an article based on the secondary exploitation of 37 interviews with faculty members from various universities. Among other questions, they were asked: “Do graduate students face any particular problems in university-industry research?” Issues of research training were also discussed at other moments of the interview.

This article is perhaps the most critical empirical piece published on this topic. The authors suggest that graduate students are owned by faculty members, who use them as tokens that they offer to industrial partners in exchange of needed research resources like equipment or money. Industry partners benefit from the trade because it gives them access to scientific research and to potential employees, at very low or even at no cost. The article describes faculty members as careful to involve students in scientifically appropriate work involving more than routine tasks. Yet, the faculty members remained the primary point of contact and negotiators with the industrial partners, and there were no guarantees students would be protected against their mentors’ potential conflicts of interest. Furthermore, students’ progression and career advancement was potentially hindered by secrecy,
publication constraints, and subtle manipulation of the publications’ content and timing. The students would be encouraged to engage in research susceptible to yield private rather than public benefits. According to Slaughter et al., participation in industrial research diminishes the students’ experience and turns their commitment away from traditional scientific values towards the promotion of “a culture that commodifies research that benefits the elite universities and multinational corporations in their research networks” (Slaughter et al., 2002, pp. 308-309).

This hypothesis was later contradicted by Holleman, herself a co-author of the 2002 article. For her dissertation research (Holleman, 2005), Holleman interviewed 25 science doctoral students nearing completion of their program at two research-intensive American universities. Her informants were bathed in an environment of academic capitalism and new intellectual property policies. About half of her sample received at least some industrial funding, and as many (but not necessarily the same) intended to seek employment in industry after graduation.

Instead of students “socialized toward industry and business values” (Holleman, 2005, p. 211), she found individuals who accepted the new context of research as a fact of life, but who were very critical of the business-like functioning of their laboratories, of the tenure system, of the competitive atmosphere, and of the focus on short-term returns of research, not so much in commercial terms but in response to the publish-or-perish rule. Students who initially aspired to academic research careers often changed their project to aim for employment in less prestigious (and less competitive) institutions and teaching-focused careers, while those who actually were interested in industry employment found themselves to be improperly socialized with regards to the skills and networks they thought they should be acquiring to succeed on the job market. Holleman notes that, by the time researchers-in-
training enter graduate school, their aspirations and values have already been set and that consequently the values of academic capitalism do not have as strong a hold on them as could have been expected in earlier research.

**France**

Two studies of student researchers in industrial partnerships have been uncovered for France. The first one results from Marie-Pierre Bès’ doctoral work at the Université de Toulouse le Mirail. Bès studied doctoral students in Engineering Sciences whose theses were prepared in direct relation with an industrial partner (Bès, 2004). The students held different types of funding: a scholarship, a research assistantship, or a laboratory contract of governmental or industrial source. Unlike the American studies presented above, Bès’ work is not inscribed in an educational perspective but rather in the sociology of science. In particular, she is interested in the networks of human and non-human actors and in locating student researchers in those networks.

Bès identified three types of student researchers in engineering among those with industry relations. Her first category can be translated as the “developers of knowledge,” while the others are the “translators” and finally the “innovators.” The developers prepare a “serial thesis” typical of their laboratory’s legacy, in which they apply their laboratory’s accumulated knowledge and methods to an industrial problem. Although there is a relationship with the industrial context, their closest relations are with their academic colleagues who have the needed resources and expertise. The “translators” do the opposite: they turn a new industrial problem into a proper scientific question, “reconstructing the industrial process in the laboratory.” These students must make many trips between the two “worlds,” confronting the industrial reality with the scientific literature. Finally, and more rarely, the “innovators” explored uncharted territory. They are very mobile geographically,
visiting other public or private laboratories, equipment providers, etc., and their research work involves significant “tinkering” in order to reach an appropriate solution to a problem they have newly constructed. The science they are involved in is “hot” and at the moving frontier of a given discipline’s technical development and they train others to use the new methods they developed, both in the industrial and the academic settings. In sum, Bès concludes, the “socio-technical networks” mobilized by student researchers involved in industry vary, among other reasons because of the exigencies of their respective research topics.

Rachel Lévy’s doctoral dissertation (Lévy, 2005b, 2005a) focused on the Conventions industrielles de formation par la recherche (CIFRE) award holders. Lévy represents the CIFRE student researcher as a mediator between the university and the firm, as a two-way bridge that makes knowledge exchange possible.

The doctoral student will translate the perspectives of each community into the other’s vision, and reduce the cognitive distance that separates the public research centre from the firm… (Lévy, 2005a, p. 85)

Her findings are based on a questionnaire sent to the students, university supervisors and industrial counterparts of 404 CIFRE agreements located within one French region (Alsace). A response was received from at least one partner in 131 cases, which she analyzed.

Lévy found that 81 per cent of the collaborative agreements yielded at least one publication in a scientific journal while patents (21 per cent), prototypes (30 per cent), new products (23 per cent) or new processes (36 per cent) were also common outcomes. The CIFRE system was found “stimulating” by nearly all respondents, but conflicts were reported to have emerged in approximately 15 per cent of the triads.
Two papers in which Lillemon Wallgren is a co-author (Salminen-Karlsson & Wallgren, 2005; Wallgren & Hägglund, 2004) focus on the situation of industrial doctoral students in Sweden. The 2003 piece is based on interviews with 23 industry doctoral students in the field of computer science and information technology. The authors offer a useful distinction between three types of settings in which the students can become involved with industry: (1) research-intensive environments, like a research and development (R&D) department within a large firm; (2) engineering environments, where matters of production are directly relevant; and (3) consulting environments, where the students’ role is to provide services to clients, usually with less intense interactions between the student researchers and their non-academic partners. The research-intensive environments are most similar to the academic structure and seem more conducive to doctoral work. The authors noted that, irrespective of the setting in which they were involved, students had to face complex balancing issues, a situation bringing some difficulties but also great satisfaction. The interviewed students did not report experiencing conflicts over the control of the research, although lack of communication with the supervisor or between the academic supervisor and his or her industrial counterpart was sometimes a problem. If anything, the students noted a lack of involvement on the part of the industrial partner.

The issue of dual supervision was explored in more depth in a later paper presented at the Triple Helix conference in 2005 by Salminen-Karlsson and Wallgren. A trigger for the paper seems to have been the previously discussed article about the “traffic” of graduate students (Slaughter et al., 2002). Rather than seeing the students as tokens for exchange, the Swedish researchers consider them as “boundary subjects” located between the academic and the industrial worlds. To explore this theme, they interviewed the members of 11 “functioning triads,” i.e. groups constituted of a graduate student and two supervisors (one
academic, one industrial) in two applied fields: bioinformatics, and building & interior environment. The dual supervisory arrangement was the result of a special program from the Swedish Foundation for the Advancement of Knowledge which started supporting “industry schools” offering funding to graduate students participating in cooperative projects with industry, in which students are expected to share their time between industrial and academic settings.

Salminen-Karlsson and Wallgren reject Slaughter’s team’s view of a student objectified by the two supervisors, arguing that both the academic supervisor and the industrial counterpart perceived the partnership not to be merely about the exchange of knowledge (episteme) or of tools, techniques and technology (techne), but truly about the formation of a person – the student researcher – capable of using episteme and/or techne to make a contribution to the collaborating organizations. Both supervisors used vocabulary indicating they consider the student as a genuine subject capable of self-direction.

In the cases examined, academic requirements were found to take precedence over the needs of the industrial sponsor, while the industrial side of the partnership was the most likely to report having learned something from the collaboration. It was also noted that joint supervision was facilitated when the industrial supervisor held a PhD. One concern seemed that, in case of a problem, the supervisory relationship might break down, as neither of the supervisors would take primary responsibility for the student. As in the first Swedish study mentioned, no issues regarding attempts, on the part of the industrial partner, to take over the project’s orientation or resulting publications were reported.

**Australia**

In 1990, the Australian Department of Employment, Education and Training launched the industrial version of its Australian Postgraduate Research Awards (APRA) Scheme to
increase university-industry collaboration, bringing academics and industrials to jointly supervise the training of researchers. The Department’s Evaluations and Investigations Program commissioned an evaluation of the program, which was conducted by Margaret Powles between 1993 and 1995 (Powles, 1994, 1996). Powles’ assessment was that, globally, and despite a few difficulties, the program was having positive effects on its participants.

A total of 369 awards were offered between 1990 and 1993 and all award holders were invited to participate to the evaluation by filling a survey questionnaire. Their academic and industrial supervisors were also invited to respond to a different questionnaire. The response rate was superior to 50 per cent for students and academic supervisors and slightly below 40 per cent for industrial supervisors.

Under the APRA(I) scheme, faculty members and industry representatives must jointly apply for an award which they may then advertise as a position to be held by an appropriate graduate student. The funds for the award must be provided in part by the industrial partner. Considering the process by which the projects are designed, it is not surprising to learn that in a majority of cases there were pre-existing relations between the two partners. Despite this, many participants reported that the APRA(I) funding had been essential for the viability of their project. The awards also led to new partnerships and collaborations, and academics, industrials, and students agreed that “the Scheme provides an opportunity for students to obtain a research degree while working on a real-world problem” (Powles, 1994, p. 219). However, an oft-mentioned difficulty was the recruitment of appropriate students to actually hold the award, and it is interesting to note that the academic standing of award recipients tended to be lower than that of regular APRA students.

Among the student respondents, 74 per cent had attended at least one conference, with 47 per cent (of the total) having presented a paper. Academic supervisors were surveyed
about journal publications arising from the APAR(I) projects and 39 per cent reported that publications had already emerged from the collaboration, and 55 per cent that publication was likely to occur before or after the student’s completion, while 4 per cent said that confidentiality agreements would impede publications and 2 per cent did not expect publication to arise at all.

With regards to supervision, students were generally satisfied but nearly one third reported that the arrangement was problematic. University supervisors also expressed slightly more satisfaction than their industrial counterparts.

An intriguing finding of Powles’ survey was that, while all agreed that the APRA(I) scheme shifted research practices away from basic research, students were less likely than their supervisors to agree that this was a good idea. The students, perhaps because they stood at the front-line of the collaboration, were also less optimistic about the chances of bridging the cultural differences between industry and academia. Nonetheless, satisfaction rates for students were similar to those of regular APRA holders, at about 60 per cent.

A broader study of Ph.D. students at two large Australian universities provided Grant and Kay Harman with an opportunity to compare the experience of industry-sponsored students to that of other students. The survey does not seem to distinguish APRA(I) recipients but it does identify students involved in a Cooperative Research Centre (CRC). In a primary analysis of the whole survey, Grant Harman observed that:

Some of the most satisfied students were those in CRCs or working with industry funding. CRC students generally enjoy a higher stipend scholarship level and relatively generous research project funding. Generally they have the advantage of working in team situations on projects where there are clear timelines and regular reviews. (G. Harman, 2002, p. 183)
This observation, along with CRC students’ seemingly different attitudes regarding industry, might have triggered more specific mining of the survey for data on the CRC students by Kay M. Harman (K. Harman, 2002, 2004). She concludes that the program is effective in fostering “industry-ready graduates,” something positive in her view. She notes that CRC students are more likely to be satisfied, have positive attitudes toward industry, and are less attracted to academic career, while questions are raised by some about whether their research topics are suitable for a good thesis. Some inconsistencies in the presentation of the analysis and the small sample make it difficult to assess the significance of her findings, especially in the absence of disaggregation by discipline.

Canada

To the best of my knowledge, the only Canadian publications on the experience of research students collaborating with industrial or governmental partners in Canada result from my work with Yves Gingras and a small number of collaborators. We have so far been supported by two grants from the Social Sciences and Humanities Research Council of Canada and the production of specific reports was funded by Quebec’s Fonds de recherche sur la nature et la technologie (FQRNT) and Fonds de recherche sur la société et la culture (FQRSC), as well as by the Université de Sherbrooke. The two Quebec councils sponsored specific reports about their joint scholarship program, the “Bourses en milieu de pratique” or BMP (called Industrial Innovation Scholarship in English) mentioned earlier, while the Université de Sherbrooke was interested in the outcomes of its specific cooperative research training program.

After a series of exploratory interviews, we prepared a survey which resulted in 896 usable questionnaires from current graduate students and recent graduates, all from research-oriented Master’s or Ph.D. degrees including the preparation of a thesis or dissertation. A
synthesis of the first survey results was published in 2005 (Gemme & Gingras, 2005a). Respondents from that first phase were invited to participate in a follow-up study in the summer of 2006 and the first results of that second phase were discussed at a recent conference (Gemme, 2008).

Survey participants were divided into four categories: (1) those who were awarded a scholarship for research in context of practice by the FQRNT or FQRSC and benefited from joint funding from the research council and a sponsoring organization; (2) those who had signed a contract to collaborate with a non-university organization (firm from the private sector, government department or agency, non-governmental organization, etc.), labelled contractual collaborators, 3) those who were indirectly involved in a partnership (through their supervisor), called non-contractual collaborators, and finally 4) the non-collaborators, who did not report ties with a non-university organization in relation to their degree program. The first two categories (the scholarship holders and those with their own contract) are also called direct collaborators. Perhaps one of the most important findings of our study is that the experiences reported are extremely diverse and that important differences are observed along disciplinary lines and depending on the intensity level of the collaboration, the latter being partly captured by our categories. Only the findings related to science and engineering students (excluding life sciences, social sciences, and humanities students) are presented in this section, representing 376 individuals.

Regarding the choice of a research topic, we have observed that collaborators seemed to have exercised more autonomy, choosing their topic before choosing a supervisor, while the collaborators in general more frequently report that non-university representatives were involved in the definition of their research project, with approximately 60 per cent of direct collaborators reporting non-university intervention against 33.1 per cent of non-contractual
collaborators and only 1.8 per cent of non-collaborators. Generally, most students involved in collaborative research joined projects that pre-existed them, indicating that their university and industrial supervisors probably already knew each other.

The students who are involved in some sort of collaboration generally have a positive outlook on their situation: between 82 per cent and 93 per cent of them find that the collaboration agreement brings more opportunities than constraints, and on average 77.7 per cent of student collaborators judge the participation of non-university partners was a necessary condition for them to realize their project. However, a small proportion of BMP holders (13.7 per cent), some contractual collaborators (28.8 per cent) and the majority of non-contractual collaborators (60.2 per cent) felt their participation was not a personal choice but instead imposed on them.

The type of collaboration also seems linked to the level of resources exchanged between the student researcher and the external organizations, the level of interests from the partners (as perceived by the student), and the frequency of meetings between partners. Direct collaborators were more likely to be dealing with highly qualified (Master’s or Ph.D. holders) representatives in non-university organizations.

In terms of outcomes, no significant differences existed between collaborators and non-collaborators, or between categories of collaborators, in publication rates and exposure to peer-review. Contractual collaborators were the most likely to report being submitted to constraints to publication (40.7 per cent) while non-contractual collaborators reported such constraints in only 8.7 per cent of cases. For BMP holders, this proportion was 24.7 per cent. Collaborators were more likely to be satisfied with the progression of their research, but the differences in overall satisfaction levels were not significant between each group.
In a 2006 article (Gingras & Gemme, 2006), we paid closer attention to the students’ professional preferences. We discovered university careers attracted only 41.5 per cent of direct collaborators while 57.7 per cent of non-contractual collaborators and 60.6 per cent of non-collaborators thought university positions were best. Unfortunately, our sample included too few graduates to provide a suitable understanding of post-graduation trajectories, a situation we hope to resolve with further analysis of the second survey.

**Discussion**

This survey of the effects of cooperative research programs and policies on graduate student training allows me to better assess the influence of such heteronomous forces on the traditional reproduction processes I described. Although they were designed based on different research questions, the studies reviewed converge toward two conclusions. On the one hand, indirect support programs, in which students’ involvement with non-academic research partners occurs through their supervisors, do not seem to significantly transform the forms of capital that matter from the students’ perspective or the habitus they acquire through their graduate education. On the other hand, direct forms of support have a greater impact on the training of new researchers as they expand the network of agents who can contribute to the formation of the students’ habitus and legitimize alternatives to the traditional academic trajectory.

The modes of support I have called indirect – for example the American and Australian Centres for Cooperative Research and the multiple forms of strategic grants available to Canadian researchers – are intended to bring academics closer to the “context of application” (Gibbons et al., 1994), with the intention of increasing innovation, productivity, and national competitiveness on the global economic scene. Such programs might be transforming the work of faculty members (Slaughter & Leslie, 1997), but the impact on the
construction of new researchers’ schemes of perception and action remains to be demonstrated. Graduate students involved in such indirect cooperation schemes with non-academic partners are as likely as their peers in traditional settings to see themselves in academic positions in the future, and they tend to be equally committed to submitting their research findings to peer review (Behrens & Gray, 2001; Gemme & Gingras, 2005b; Gluck et al., 1987). If anything, they might be more critical of a university research environment that puts too much emphasis on productivity, regardless of industrial involvement (Holleman, 2005). In the case of policies and programs that only indirectly support graduate student involvement in cooperative research, the students’ supervisors – established members of the field in which the students are trainees – might effectively be translating the requests of the non-academic organizations into scientifically-appropriate research problems and settings, effectively shielding graduate students from heteronomous influences. The students might be aware of their supervisors’ work context, but the forms of capital that researchers-in-training perceive as necessary to meet the scientific field’s admission fee remain unchanged.13

Students who are directly supported by cooperative research funding schemes, however, may be more exposed to heteronomous forces. They can even be conceptualized as vehicles of heteronomy themselves. The studies of the French industrial agreements for research training (CIFRE) and, to a lesser degree, of the Swedish industrial doctoral schools, demonstrate that some graduate students act as intermediaries between their academic and industrial supervisors, building bridges between two different fields (Bès, 2004; Lévy, 2005a; Wallgren & Dahlgren, 2007). In the Quebec case, we also found that directly supported students were more likely to have developed their own research problems and to have regular

13 Whether or not new forms of capital – such as the capacity to secure strategic grants – are required to effectively become a full-fledged participant in the scientific field, however, is another question which needs to be resolved empirically in a separate study.
interactions with non-academic research partners (Gemme & Gingras, 2005a). It is possible that those students initially intended to do “traditional” research, but were somehow attracted to cooperative research by the availability of industrial funding, trading some of their potential academic capital for economic capital. I would suggest that it is also likely that the students who directly embark in cooperative research projects may in fact be primarily attached to a non-academic field, and seeking to acquire academic capital to eventually trade it for other forms of capital more valued in their primary field. For example, an engineer could seek a Master’s degree in order to improve her position within the organization she works for, and take advantage of the cooperative research scholarship offered by the research councils to make her study leave more attractive to her employer (thanks to tax credits) and solve a problem encountered in her workplace. By making such scholarship programs available, the research councils – interface organizations between the scientific field and policy-making – are legitimizing trajectories that the scientific field did not favour through its own logic, thus giving an advantage to agents whose capital and habitus were not particularly valued previously. However, it is important to note that the students who are directly supported also seek scientific capital in the form of peer-reviewed publications (Gingras & Gemme, 2006) and that many of them do perceive themselves as future faculty members, a tendency that increases over students’ time in their program (Gemme, 2008). Even in contexts where students have ties with non-academic organizations, scientific capital does not seem to be a species at risk.

Direct and indirect forms of support for research training in collaboration with non-academic partners can be found in the Faculty of Forestry, where faculty members hold strategic grants and obtain research contracts while some graduate students secure a NSERC Industrial Postgraduate Scholarship, an ACCELERATE Canada Internship, or even research
contracts of their own. The impacts of such forms of encouragement on the formation of the students’ habitus will be discussed. More significantly, however, the next chapters will also show, from different angles, how what have so far been considered as heteronomous forces do not only come from outside of academic forest research but also live at its core. In other words, the outside is well established within the Faculty of Forestry.
CHAPTER 4
THE FACULTY OF FORESTRY IN ITS SOCIAL SPACE

By March 2008, I had been in the field long enough that what was initially strange
had become familiar. But when I received a message from the Dean about the events
organized for UBC’s “Celebrate Research Week,” I could not repress a smile of surprise. The
invitation read:

In order to ensure strong Faculty representation, I encourage you to RSVP for
the ‘showcase’ event of the year – a lecture by Ian de la Roche, President and
CEO of FPInnovations on the ‘new bio-economy’ and efforts to mitigate
climate change. (March 5th, 2008 email communication through the firstgrad-
news mailing list.)

Maybe the departments and centres I have been affiliated with in my lifetime have
been chauvinistic, but when “research day” events were organized, we usually seized the
opportunity to attract attention to what we thought to be our best work, and feature our own
stars prominently. Forestry, on the other hand, offered the centre stage to an outsider without
affiliation to the Faculty. Other features of the day included a workshop on climate change
with two panellists from the Faculty of Forestry and two from the provincial government, a
poster session for graduate students to display their work, and a “memorandum of
understanding signing ceremony” between UBC and FPInnovations. I silently thanked the
Dean and his staff for putting together a program that so eloquently illustrated what was
shaping up to be my thesis: here in Forestry, heteronomy was part of business as usual.
Further, it was a source of pride. How could I make sense of this?

After trying for years to understand how academics interact with their environment as
they produce and disseminate new knowledge, I now believe that the lens of university-
industry-government interactions is insufficient to seize the complexity of agents’ trajectories
and behaviours in the research environment. Instead, I suggest an approach based on
Bourdieu’s theory of fields which does take into account the conditions created by the organizational structures of universities, government agencies, and private organizations, but also incorporates as meaningful the structures that are built into the people who populate those organizations, which I see as habitus. The case of the field of forest research, and of UBC’s Faculty of Forestry within it, provide an illustration of this approach; I have no doubt that other areas of research where university-industry-government interactions are commonplace would provide further fruitful applications of this way of seeing.

I will demonstrate how UBC’s Faculty of Forestry and the individuals affiliated with it are located within the field of forest research, a social space located at the intersection of the scientific field and of the forest sector. At stake within the field of forest research is the capacity to mobilize leading scientific knowledge and methods to offer pathways toward the solution of pressing forest sector problems. As it takes position in this field that is simultaneously and inseparably part of the scientific field and of the forest sector, the Faculty of Forestry offers its Master’s and Ph.D. students a context of research training where industry, government, and sometimes NGOs are not “outsiders” but rather participants in the struggle over what counts and matters in research. This chapter focuses on the organizational level, briefly describing the historic context in which Forestry became established as a teaching and research unit within the University of British Columbia before examining the contemporary period in greater depth. I will show how the Faculty of Forestry presents itself and takes position through its buildings, web site, and public events, and examine the forms of capital it mobilizes at an aggregated scale. The next chapter will be dedicated to positions and position-takings at the individual scale, focusing on faculty members and graduate students.
Context surrounding the emergence of forest education and research

To understand the context that made the emergence of forest-related teaching and research in the university setting in British Columbia, one must grasp the importance of the forest industry in the province at the beginning of the 20th century. From its modest origins as a small industry supporting the exploitation of other natural resources, logging became an unprecedented source of both public and private wealth that fuelled the boom of the Canadian west coast.

Jean Barman’s book, *The West Beyond the West: A History of British Columbia* (2007), shows how the exploration and eventual settlement by Europeans of what is now known as British Columbia was largely motivated by the rich natural resources available in the province, starting with otter furs in the 17th and 18th century, followed by gold in the 19th century. For the first centuries of the colony, logging was a secondary industry. Early mills in Victoria on Vancouver Island were built in 1848 and 1849 to respond to the increased demand for building supplies created by the California gold rush. Ten years later, the gold fever came north of the 49th parallel and the first mainland sawmill started operating in Yale, in the Fraser Valley, in 1858, soon followed by more mills in Alberni (Vancouver Island), Vancouver, and Moody. Already, according to Barman, a significant portion of the mills’ production of lumber and shingles was exported to Latin America, Australia, and New Zealand; tariff barriers and competition from the Puget Sound sawmills curtailed to some degree exports to the United States. Accessible stands and valley bottoms were logged as areas were settled, often temporarily, a process also concurrent to the development of the railway after British Columbia became a Canadian province in 1871.

Nowhere and never was it easy and safe to cut down trees, but at first the terrain of British Columbia certainly proved a spectacular hindrance to the growth of a large-scale
forest industry. At the end of the 19th century, steam power and favourable market conditions converged to give lumber companies the impetus they needed to access steep hillsides, and the industry really took flight (Rajala, 1999). The province of British Columbia at first offered exceptional conditions to lumber investors, and American businessmen were particularly keen to seize the opportunity after the nationalization of forests in the United States in 1905 (Barman, 2007, p. 194). Railway developers were given wide tracts of rich and accessible timberland, while others secured rights to harvest on “temporary tenure” which were in fact practically permanent and devoid of obligations, so they could simply “clearcut and run” (Marchak, 1983, p. 35). In the first ten years of the 20th century only, the amount of lumber harvested in the province was multiplied by four (Hak, 1986) and the biggest mill in the British Empire was built by the developers of the Canadian Northern Pacific Railway in Maillardville (Barman, 2007). The forest industry boomed.

But the boom had its critics, and abuses were decried. A Royal Commission on Timber and Forestry advised in 1910 that urgent changes were needed in the attribution of logging rights and that a forestry service should be established; soon after, the Forest Act was adopted by the provincial legislature (Barman, 2007) and the province’s first chief forester, H.R. MacMillan, who held a Master’s degree from the Yale School of Forestry, was put to work (Drushka, 1995).

In 1913, only a year after the Forest Branch was created, and after being nudged by the BC Loggers Association (Rajala, 1999, p. 60), the Minister of Lands, W.R. Ross, wrote to President Wesbrook of the University of British Columbia to suggest that a “forest school” was now a necessity:
The fact that so large a proportion of the present public and private revenues of British Columbia are derived from the forest and that so large a proportion of the Province is chiefly valuable for the production of timber indicates the necessity for a forest school which will develop public sentiment, carry on research work and point the way for the wisest use and perpetuation of forest wealth. (Smith, 1990, p. 5)

The Minister even offered to Wesbrook the support of the Forest Branch staff over the winter months for the first two years of the program. At that stage, in Canada, forestry schools had already opened their doors at the University of Toronto (1907), at the University of New Brunswick (Fredericton, 1908), and at Université Laval (Quebec City, 1910). The Faculty of Forestry was authorized at the same time as the faculties of Arts and Science, Applied Science, and Agriculture in 1915, but did not open immediately, possibly for lack of qualified and available professors during the war. Again in 1917 the Pacific Logging Congress and the BC Forest Club reiterated the request to UBC president Wesbrook (Rajala, 1999, p. 60). As he hoped for funding from the provincial government to come through, Wesbrook tried to convince MacMillan to become Forestry’s first Dean, in vain (Gibson, 1973). Nevertheless, in 1918, a short forestry course was initiated and, in 1919, a department of forestry within the Faculty of Applied Science was established. Also in 1921, a research organization, the Western Forest Products Laboratory\(^\text{14}\), was created. The research activities of the Forest Branch of the Forest Service started the same year, although they were not formalized until 1927 (Schmidt & Parminter, 2006). Forestry would become a separate Faculty in 1951 (Smith, 1990).

Recent observers of the forest sector in British Columbia may not appreciate how important the industry was at the beginning of the 20\(^{\text{th}}\) century: the rapid growth of the

\(^{14}\) The WFPL was later to become Forintek and, recently, merged with FERIC and PAPRICAN into the new FPInnovations.
infrastructure of the province was fuelled by timber revenues. In 1914, the recently appointed MacMillan proudly reported that:

… half of the payroll of the province was derived from the forests. He also commented that the forest industry “employs more labour, distributes more money, consumes more supplies, produces more wealth and public revenues than any other Provincial industry, and it is one of the strongest influences promoting the opening-up and settlement of new undeveloped regions.” (Hak, 1986, p. 1)

Although one may think that MacMillan could have slightly inflated his claims for rhetorical purposes, it remains true that, as early as 1908, 40 per cent of the provincial budget came from stumpage revenues, and that was even before the reforms of 1912 (Barman, 2007, p. 196). Around the same period, the forest industry replaced the Canadian Pacific Railway as Vancouver’s largest employer. By offering training in forestry, the University of British Columbia was going to be part of the boom and help train the numerous new public servants required by the provincial government’s Forest Branch.

In British Columbia as elsewhere in North America, the beginnings of forestry education and research reflected the rise of conservationist thinking. Since the 1870s, voices had been rising in the United States and Canada to oppose the ongoing liquidation of timber reserves which would soon lead – it was said – to “timber famines” (Williams, 2006, p. 362). At a time when timber constituted an essential commodity as both fuel and building material, the pace at which new forested lands were secured increasingly trailed behind the pace at which they were harvested, leading to concerns about supplies and rising prices. Conservationists, the most famous representative of whom is probably Gifford Pinchot, first Chief of the United States Forest Service, proposed that a new science-based approach was urgently required to secure permanent reserves of timber as well as other benefits (wildlife, recreation, clean water, etc.). They quickly secured the attention of federal politicians in both
countries, and Theodore Roosevelt and Wilfrid Laurier became champions of conservationism (Drushka, 2003, p. 45; Williams, 2006, pp. 363-364). Consistent with modern advances in bureaucratic management, the future of forests should be trusted to experts:

A key component of conservationist thinking was that planning and management of forests and other natural resources should be undertaken by scientifically trained professionals, not by politically appointed officials, as was common practice at the time. Experts employing technical and scientific methods, rather than politicians or industrialists and other forest users, should be in charge of forests. (Drushka, 2003, p. 44)

The point of the conservationist moment was not to put forests out of industry’s reach, quite the opposite in fact. As MacMillan pointed out, “What is not cut is wasted in the end” (Drushka, 2003, p. 49). However, the rate of cut had to be determined scientifically to avoid over-cutting (leading to total depletion) and under-cutting (leading to waste) alike.

Thus, new professionals – foresters – needed to be scientifically trained to “ensure that forests were utilized in a manner that would provide for their future well-being” (Drushka, 2003, p. 48), and universities were the venues designated to provide the training and future scientific developments. Pinchot founded and had lifelong ties with the Yale University School of Forestry, where MacMillan trained. Another proponent of rigorous forest management, Bernhard Fernow, founded the University of Toronto’s Faculty of Forestry after first initiating forestry education at Cornell University. Fernow’s work involved not just the development of forestry teaching but also early research efforts in the field. At Cornell, Fernow supported the creation and became editor-in-chief of the Forestry Quarterly (which eventually became the Journal of Forestry), a role he maintained after moving to Toronto in 1907. The purpose of the journal, as highlighted in its first issue, was to “aid in the establishment of rational forest management” and “to offer an organ for the
publication of technical papers of interest to professional foresters in America” (Anonymous, 1902a). The editors hoped to go beyond “the propagandism of forestry” to be “devoted to the professional or technical interests of the subject” (Anonymous, 1902b). Schools of forestry, including that of UBC, were part of the project of forest rationalization, and the education and research missions of universities were intended to contribute to the continued – but measured – exploitation of this natural resource.

A full-fledged history of Forestry at UBC remains to be written. It would bring the expertise of historians to complement the extensive collection of fragments gathered by Forestry faculty members (Kozak, 2004; Smith, 1990). Such work is required to describe in greater detail and depth the conditions which made the emergence of forest education and research possible in the university and the evolution of these conditions as they allowed Forestry to persist and grow over the years. Of particular interest would be a closer examination of Faculty’s research activities as they oscillated between forest engineering and forest science over the years, a transition alluded to by Rajala (1999). Furthermore, investigations in the history of biology and ecology would be needed to assess whether specialization forces at play within biology simultaneously pressed for the establishment of separate units dedicated to the study of trees and forests.

As I will discuss in the following sections, political and economic forces remain significant players in the Faculty of Forestry today. Furthermore, UBC Forestry maintains to this day close ties with other research organizations that also emerged in the 1920s, in particular the Ministry of Forests’ Research Branch and the new incarnation of the WFPL, called FPInnovations. What will appear very clearly, however, is that scientific practices and resources – such as the training of Ph.D. students and funding from the Natural Sciences and
Acquisition and display of capital

The position of the Faculty of Forestry within the field of forest research and in relation to the field of power, as well as to the broader social space, is determined by the nature and volume of capital it has accumulated. While this capital can be analyzed in terms of its basic forms – economic, social, cultural, and symbolic – it is also necessary to consider its source. Some is granted by institutions or individuals that are clearly located within the field of science, while some comes from the forest sector. Indeed, the location of the Faculty of Forestry within a university gives it an advantage compared to other organizations of the field of forest research, as the relative flexibility of this organizational form allows academics to go after a broader range of resources compared to forest researchers located in government or private organizations. As we will see, current circumstances afford Forestry researchers a dominant position within the field of forest research; it also seems to be the case that forest research generally is well aligned with the dominant ideology of Canada’s dominant class. This position, however, is not to be taken for granted, as it results from the constant struggles of multiple forces. Whether being located at the intersection of two fields makes forest research more resilient or more vulnerable remains an open question; however, such an intersectional location does seem to press the pace at which the distribution of positions changes within forest research.

Such a theoretical understanding of the position and dynamics of fields contributes to a sharper understanding of the realities of forest research. It should not obscure the fact that, at the end of the day, the distribution of capital between the various positions of the field means that the lives of real persons are deeply impacted by this struggle. As what is valued
within the field changes, and as the distribution of valuable forms of capital evolves, the range of options open to organizations – and to the people within them – expands or contracts. For instance, it can open a number of positions to graduate students from developing countries through the offering of generous stipends, or cause young forest researchers to seek employment in other fields after graduation, leading to the disappearance over time of certain strands of research.

In this section, I will examine the forms of capital accumulated and displayed at the organizational level in the Faculty of Forestry. (The capital carried by individual agents, such as faculty members and graduate students, will be examined in depth in chapter 5.) When possible and relevant, I will also report on the distinctions between Forestry’s three departments, as it demonstrates that the Faculty of Forestry is not a unitary block. Rather, it is a space in which different approaches to forest research cohabit, cooperate, and struggle.

A “new” home

After being scattered over many buildings for years, Forestry faculty members were relocated in 1998 into a single 2-acre space at the southern edge of the university. The immediate neighbours of Forestry are all in the general area of applied sciences: the Institute for Computing, Information, and Cognitive Systems, the Pulp and Paper Centre, the School of Nursing, and the Faculty of Land and Food Systems. The University-Industry Liaison Office (UILO) is also nearby. More importantly, the buildings of FPInnovations, an important research partner of Forestry researchers, are only a five-minute walk away on university land.

There are a few doors to the Faculty of Forestry, each of which gives a quite different perspective on the activities within. My personal preference has always been to enter through
the building’s main door at the intersection of Main Mall and Agronomy Road, which leads into the four-story high wood-and-glass atrium of the Forest Sciences Centre (FSC). By simply taking a few steps into the building and pivoting on one’s feet, one can take a sweeping look at the office, meeting, and laboratory spaces where students and researchers work in the open or behind windows. The light shades of the wood panels that line the atrium make the space luminous even on a gloomy Vancouver day. In fact, the building was conceived as a showcase of wood products. The large beams that hold the glass ceiling, disposed in the shape of tree trunks with their branches extending to support the glass panes, are not single pieces of timber but rather “Parallam” beams – “Parallel Strand Lumber” – developed initially by MacMillan Bloedel, while the Douglas fir panelling is also not hard wood but rather wood veneer over a medium density fibreboard (MDF) core. In an untitled and undated set of notes that were used as a guide by building tour guides, it is emphasized that using MDF instead of solid wood means that the builders “have taken advantage of advances in technology that allows us to use waste wood and waste sawdust.” In the large auditorium, Douglas fir is replaced with cherry, but the concept is the same. The shift in values implied by the use of veneer-covered MDF panels is meaningful. It was not that long ago that newcomers to the province marvelled at the sight of towering Douglas fir and ten-feet-wide red cedars, which could be felled to yield massive pieces timber. Today, such giants are only to be admired in small enclosures such as Vancouver Island’s MacMillan Park – a park of only two square kilometres also known as Cathedral Grove – or remembered thanks to the stumps left behind in the nearby Pacific Spirit Park. That a Forestry school be built by using sawmill waste such as sawdust certainly reflects new environmental values, yet signals that a certain era is definitely over.
If the Forest Sciences Centre is the public and transparent face of the Faculty of Forestry, the adjoining Centre for Advanced Wood Processing (CAWP) feels like a more private and industrial compound. The first time I accessed it from a side door on Agronomy Road, I found myself in concrete halls and the closed steel doors displayed warning signs that made me fear that I was just about to take a wrong step. CAWP’s warehouse-style walls and high-ceilings are home to research and education in matters related to wood processing, and includes a machine shop, a timber yard, and laboratories which remained a mystery to me.15 Underneath, one finds a parking lot for the many field vehicles – mainly trucks and sturdy cars – used by faculty members and their students. Many of those who work in the Forest Sciences Centre only go to CAWP for the occasional seminars and parties held there, and access it through a 2nd floor walkway connecting the two halves of Forestry’s geography.

A new building clearly signals that many forms of capital – and most critically economic capital – converge to make construction happen. The FSC was built at the cost of nearly $50 million dollars, with $46,254,000 coming from the provincial government. According to a UBC Campus Planning and Development summary document obtained through Forestry, additional contributions were made by private donors in UBC’s “World of Opportunity” fundraising campaign (1989-1993) and the Faculty of Forestry’s “Growing for the Future” campaign (1996-1998). The donors were, for the most part, companies owning or exploiting forests, with the exception of some donations by families with ties to the Faculty of Forestry, and amphitheatres and classrooms were named after the donors, as can be seen in Table 2.16

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15 Unfortunately, none of the students I shadowed worked in CAWP.
16 The donations listed in Table 2 amount to more than the difference between the total cost of the building and the government funding received to support the project. Some of these donations may have been targeted to others uses in the Faculty of Forestry.
<table>
<thead>
<tr>
<th>Donor</th>
<th>Category</th>
<th>Room</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fletcher Challenge Canada Ltd</td>
<td>$2,000,000 to $9,999,999</td>
<td>FSC1005, a 250-seat amphitheatre</td>
<td>The company no longer exists.</td>
</tr>
<tr>
<td>MacMillan Bödel</td>
<td>$2,000,000 to $9,999,999</td>
<td>Atrium</td>
<td>Bought by Weyerhaeuser</td>
</tr>
<tr>
<td>Canadian Pacific</td>
<td>$1,000,000 to $1,999,999</td>
<td>FSC1406, a 40-seat classroom</td>
<td></td>
</tr>
<tr>
<td>Charlie &amp; Sue Johnson Family</td>
<td>$1,000,000 to $1,999,999</td>
<td>Charlie &amp; Sue Johnson</td>
<td>Charlie Johnson was a Ministry of Forests employee who, along with others, purchased provincial nurseries when they were privatized.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applied Forest Genetics and Biotech</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab; Also, the Loon Lake Cabins.</td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Weldwood of Canada Ltd</td>
<td>$1,000,000 to $1,999,999</td>
<td>FSC1221, a 99-seat theatre</td>
<td>Now part of West Fraser Timber Company.</td>
</tr>
<tr>
<td>Weyerhaeuser Company</td>
<td>$1,000,000 to $1,999,999</td>
<td>David L. McInnes – Weyerhaeuser</td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td></td>
<td>Undergraduate Student Lounge (2nd</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>floor)</td>
<td></td>
</tr>
<tr>
<td>Canfor Corporation</td>
<td>$500,000 to $999,999</td>
<td>FSC1003, a 65-seat theatre</td>
<td></td>
</tr>
<tr>
<td>International Forest</td>
<td>$500,000 to $999,999</td>
<td>FSC1001, a 65-seat theatre</td>
<td>Better known today as Interfor.</td>
</tr>
<tr>
<td>Products Limited</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific Forest Products</td>
<td>$500,000 to $999,999</td>
<td></td>
<td>Bought by Timber West.</td>
</tr>
<tr>
<td>Limited/Avenor Inc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Fraser Timber Co.</td>
<td>$500,000 to $999,999</td>
<td>FSC1404, Computer Lab</td>
<td></td>
</tr>
<tr>
<td>Gary &amp; Jean Burch</td>
<td>$250,000 to $499,000</td>
<td>FSC1222, 36-seat “Teaching lab”</td>
<td></td>
</tr>
<tr>
<td>Janet W. Ketcham &amp; Associates</td>
<td>$250,000 to $499,000</td>
<td>FSC1611, 24-seat classroom</td>
<td>Was a member of West Fraser Timber Co.’s board.</td>
</tr>
<tr>
<td>Lignum Ltd.</td>
<td>$250,000 to $499,000</td>
<td>FSC1002, 24-seat classroom</td>
<td></td>
</tr>
<tr>
<td>Dr. Gene &amp; Carol Namkoong</td>
<td>$250,000 to $499,000</td>
<td>FSC3027, Namkoong library (Centre for Forest Conservation Genetics)</td>
<td>Gene Namkoong was the head of the Forest Sciences department.</td>
</tr>
<tr>
<td>Family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noranda Inc.</td>
<td>$250,000 to $499,000</td>
<td>FSC1313, Research Lab</td>
<td>The company exited the forest industry and later was bought by Falconbridge.</td>
</tr>
<tr>
<td>Primex Forest Products Ltd.</td>
<td>$50,000 to $99,000</td>
<td></td>
<td>Bought by Interfor.</td>
</tr>
</tbody>
</table>
Economic capital is not merely dollars. It also embodies social connections, and the scale of the donations made – most of which were above half a million dollars and many over one million – shows that the donating companies and individuals had a stake in the development of UBC’s forest education and research activities. Ten years later, how have these social relations evolved? A quick survey reveals that the structure of the forest sector itself has undergone major changes in the intervening period, as half of the donating companies have been purchased by others or have been dismantled. Of course, the individuals who worked for those companies have not disappeared and social connections between the Faculty of Forestry and the province’s and continent’s forest industry remain very much alive as we will see. The rapid pace of change in the forest sector nevertheless indicates that Forestry cannot take its sources of capital for granted.

The Forest Sciences Centre may no longer be totally new, it remains an attractive work space that can facilitate the recruitment of graduate students and staff members. Its very existence and the markings that highlight the philanthropic contribution of major players of the forest sector send the message that the university, the provincial government, and industry take the Faculty of Forestry seriously.

**Forestry according to itself**

Forestry’s building is a strong material representation of its accumulated capital, but the organization also has other ways to display its capital, taking position through its official online and printed publications. While the written word and even photographs lack the authority conferred by a building’s physical presence, it nonetheless offers insight into what an organization perceives as valuable and worthy of display. Whether such a representation is consistent with the capital actually held is to be assessed empirically, and it will be discussed
later in this chapter and in the chapter 5. In any case, such reports of Forestry’s work, and in particular of its research activities, are deemed crucial to increase the general public’s awareness of the importance of forest research. Indeed, as still unofficial reports that the Forest Science Program – a major source of research funds for Forestry, as we will see later in this chapter – was threatened by provincial budget cuts, the Associate Dean, Graduate Studies and Research, enjoined her colleagues to start writing about the relevance of their work. In an electronic message to the community distributed on the 24th of April, 2009, which I here reproduce in full, she wrote:

We have reason to believe that some decision-makers in governments are of the opinion that science is a luxury and does not really contribute much to the well-being of our province – financially, socially or even environmentally. This seems to be the case even in areas like forestry which you would think to be a no-brainer in terms of direct impact on the viability of our most important industry in the province, the well-being of citizens in communities throughout the province, and the sustainability of the ecosystems on which we depend for much of this well-being. It appears that we have not been doing enough to promote the importance of the science and scholarship that we do, and the contributions that we make to policy and practices throughout the province.

I am inviting each of you to think about the research that you do and the other contributions that you make in each of these important areas that benefit the province and write a short article to be published in Branchlines and on our website, and broadly distributed throughout the province, to demonstrate what we do:

RESEARCH THAT MATTERS – RIGHT HERE, RIGHT NOW.

I know that we do many other good things – fundamental research and research that matters throughout the world, and we will be promoting these in the future.

Think about it, please. (Distributed e-mail from Cindy Prescott, 24th of April, 2009)
As demonstrated by the pressing tone of this message, the urgent character of demonstrating forest research’s relevance is deeply felt in the Faculty of Forestry. Even at times when no specific threats are issued, there remains a high emphasis on relevance in Forestry’s written representations of its work.

**Online presence**

For many first-time visitors to the Faculty of Forestry, and perhaps even more so for prospective students, the first contact with Forestry will not be made in person, but rather through the Faculty’s web site.

The home page of its web site, shown in Figure 1, is designed in shades of green and offers information about the Forestry’s training programs and research activities. The heading of the home page consists of the Faculty’s logo with forest understory in the background, on the right of which a random image labelled “Welcome to our classroom” is shown. The “classroom” is actually, in all but two of the images displayed, an outdoor location: one can see a young woman in a kayak on a lake, aerial views of forests and lakes, and various photos of young people in the forest. Among the randomly displayed photos, there is a view of the FSC atrium and a photo of two smiling men in the Centre for Advanced Wood Processing, operating a machine. It is implied that, in Forestry’s classrooms, there are no desks, no chairs, and no blackboards.
The left and centre parts of the page respectively offer a selection of links for certain categories of website visitors and to the Faculty’s academic programs’ information pages, including four “Bachelor of Science” programs and the graduate programs. The right-hand side of the page offers news and feature items that go beyond basic academic information. There is a photo of one of the “featured faculty members” (see analysis below), also randomly displayed, and a list of “news” items. As of January 9th, 2009, the news items informed readers about the opening of new facilities at a research forest, the Dean’s research work on the impact of biofuels on climate change, a National Aboriginal Achievement Award received by the co-chair of the Faculty’s First Nations’ Council of Advisors, recent
provincial investments in the training of aboriginal foresters, and the granting of the top award of the Society of Canadian Ornithologists to Kathy Martin, a professor in the Forest Sciences department. In a single web page, visitors can see the two sides of Forestry: its simultaneous engagement in scientific education and research (illustrated by the academic programs and the award won by Kathy Martin) and in socially relevant endeavours (such as climate change and aboriginal affairs).

Visitors delving deeper in Forestry’s web site by clicking the link to “Forestry Graduate Programs” (see Figure 2) may notice that this page has a different header, this time illustrating themes dear to Forestry: “tough decisions,” “technological advances,” “complex issues,” “vibrant economies,” “conservation of biodiversity,” and “global solutions.” A sub-header, with another water body in the background, sequentially displays the labels of research areas: “landscape ecology & design,” “sustainable forest management,” “forests & society,” “forest ecosystems,” “forest genetics,” “watershed hydrology & ecology,” “wood science & technology,” “business management & marketing,” “biomaterials & biotechnology,” “conservation,” “biometrics & measurement,” and “timber building technology.” Here again, the designers of the web site decided to allude to both scientific and forest-sector themes.
I mentioned earlier the link to “featured faculty profiles” on the web site’s front page. The profiles, which represent the current activities of a select group of faculty members to web site visitors, offer interesting insight into what the Faculty deems important to showcase.

The ten faculty members profiled as of early 2009 are about equally distributed between the three departments, and the proportion of women among those featured is roughly equal to their proportional weight within the Faculty as a whole. The profiles do not follow

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The faculty members featured are: Robert Fürst, Taraneh Sowlati, Nicholas Coops, Stavros Avramidis, Sue Grayston, Robert Guy, John Innes, Yousry El-Kassaby, Jack Saddler, and Stephen Sheppard.
an identical, formal structure, but rather are written as plain-language articles with few technical terms. Two main observations emerge from the analysis of those profiles.

First, the profiles reveal that these faculty members work in very diverse research areas and bring in a wide range of academic, scientific, and professional backgrounds, but that for the most part their work is directly connected to trees or forests, or to the products and services associated with them. A primary source of diversity lies in the bodies of knowledge mobilized by the researchers. They are not at first identified to a scientific discipline, but there are a few references to knowledge areas, including a small cluster in ecology, biology, and genetics (El-Kassaby, Grayston, Guy, and Saddler to some extent). The other faculty members are scattered between different areas of expertise: forest management (Innes), industrial engineering (Sowlati), mathematics and physics (Avramidis), planning (Sheppard), and remote sensing (Coops). One profile directly refers to the importance of combining natural and social sciences (Innes). But the diversity does not stop there: the faculty members come to Forestry with previously established ties to other regions (elsewhere in Canada, the United Kingdom, Australia, the United States, Germany) and organizations, notably after years of experience working in government (Coops, Grayston) or industry (El-Kassaby, Fürst). Furthermore, the faculty members are told to be working collaboratively with government (El-Kassaby) and industry (Fürst), as well as with scientific colleagues, including their students and other faculty members. For those whose collaborations are mentioned, the countries from which the researchers are said to draw their collaborators are mostly within the Commonwealth, although the list also includes Japan (Fürst) and China, Mexico, and Brazil (Innes). Four faculty members are noted to have (or have been) involved in international organizations or committees (El-Kassaby, Innes, Saddler, and Sheppard). While the Faculty can boast to benefit from international
connections, those – based on the featured profiles – seem to be primarily based in the English-speaking world.

The second observation concerns the faculty members’ research areas, which can hardly be distinguished from the intended purpose of that research. In all but one of the featured profiles, the questions raised are at the same time problems for science and problems for human societies in general:

Is it possible to develop rigorous sophisticated models to describe the various physical-chemical phenomena that take place within the microstructure of wood in processing and in service? Can natural and artificial intelligence be used to develop new processing methods and decision support systems to help industry reduce fibre losses and increase revenues? (Avramidis)

Population and quantitative genetics, breeding theory, reproductive biology and ecology, seed and seedling production, GIS, and biotechnology techniques and genomics tools. All of these approaches can help forest geneticists supply our forests with improved seedlings that will grow a superior forest. (El-Kassaby)

How can forestry be changed so that it is actually beneficial to the environment and to the people that live in or near forests? How can it better integrate with other land uses so that there are no adverse cumulative effects? (Innes)

The only exception concerns the work of Rob Guy, who is said to seek answers to the following questions: “How do plants adapt to and react with the changing environment? How does photosynthesis actually work? Why can some plants tolerate drought better than the others?” The questions are framed in more scientific terms, but the relevance to humans is only a step away, as finding the answers to such questions could directly impact the capacity to select crops that will support survival.

When the Faculty of Forestry presents the work of its researchers to the wider world by the way of its web site, it emphasizes its relevance and even its critical character to a
broad range of stakeholders. Companies may decrease their waste and increase their revenues
if they learn from some faculty members’ work (Avramidis, Fürst, Sowlati). Policy-makers
may find their planning efforts facilitated by the work of others (Sheppard). Government and
industry alike, and eventually the entire population of British Columbia, have an interest in
monitoring and improving trees and forests (Coops, El-Kassaby) or their management
(Innes). Everyone will be impacted by the development of alternative energy sources
(Saddler). The microscopic life inhabiting soil even supports our very survival (Grayston), as
do the plants that manage to grow even in adverse times (Guy). Those researchers’ work is
couched – for the web site readers’ eyes – in terms of its potential or actual impacts on
human activities, with little to no attention paid to its scientific context or importance. This
might be the result of a deliberate decision on the part of the author(s) of the profiles based
on the assumption that the audience reading the profiles does not have the necessary
scientific background to appreciate such a discussion. The focus on application in the profiles
nonetheless indicates that the Faculty of Forestry is aware of the social, environmental,
political, and/or economic context and possible implications of its research activities. At least
for those in charge of the web site, the potential applications of forest research are an asset
that should be displayed prominently.

*In print*

Over 2,000 individuals with ties to the Faculty of Forestry (as alumni) or otherwise
active within the forest sector receive the printed publications of the Faculty of Forestry: its
annual report and the *Branchlines* newsletter, now published twice (formerly thrice) a year.
The Annual Report is largely an accountability tool centralizing data about the evolution of
the Faculty of Forestry in a single source, which I use later in this chapter to discuss the
evolution of funding over the years. *Branchlines*, on the other hand, has become since 2005
an elaborate, full-colour mini-magazine featuring recent developments in UBC Forestry
research and, to a lesser degree, teaching activities. The list of cover-page titles presented in Table 3 shows that research that matters to more than just the scientific community is often featured.

Table 3  Branchlines newsletter cover-page article titles, 2004 to 2009

<table>
<thead>
<tr>
<th>Issue number</th>
<th>Date</th>
<th>Title and subtitle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume 15, No. 1</td>
<td>March 2004</td>
<td>Forestry as an asset to the community</td>
</tr>
<tr>
<td>Volume 15, No. 2</td>
<td>September 2004</td>
<td>Culturally modified trees: A case study for education. Differences in values between industrial forestry and indigenous people have immediate practical effects.</td>
</tr>
<tr>
<td>Volume 15, No. 3</td>
<td>December 2004</td>
<td>Where have all the flowers gone? Emily Gonzales is determined to found [sic] out</td>
</tr>
<tr>
<td>Volume 16, No. 1</td>
<td>March 2005</td>
<td>Where have all the fish gone? A team from Forest Sciences looks at why salmon are perishing during migration.</td>
</tr>
<tr>
<td>Volume 16, No. 2</td>
<td>September 2005</td>
<td>Mountain pine beetle research at UBC</td>
</tr>
<tr>
<td>Volume 16, No. 3</td>
<td>December 2005</td>
<td>Future forest ecosystems</td>
</tr>
<tr>
<td>Volume 17, No. 1</td>
<td>March 2006</td>
<td>Wood Science at UBC</td>
</tr>
<tr>
<td>Volume 17, No. 2</td>
<td>September 2006</td>
<td>Biofuels and bioenergy – challenges and opportunities</td>
</tr>
<tr>
<td>Volume 17, No. 3</td>
<td>December 2006</td>
<td>Percy Barr’s research forest</td>
</tr>
<tr>
<td>Volume 18, No. 1</td>
<td>March 2007</td>
<td>Stanley Park’s recovery</td>
</tr>
<tr>
<td>Volume 18, No. 2</td>
<td>September 2007</td>
<td>Making smarter conservation decisions for migratory species</td>
</tr>
<tr>
<td>Volume 19, No. 1</td>
<td>2008</td>
<td>Our Changing Climate</td>
</tr>
<tr>
<td>Volume 19, No. 2</td>
<td>2008</td>
<td>Investing in the future. Graduate education and research in the Faculty of Forestry</td>
</tr>
<tr>
<td>Volume 20, No. 1</td>
<td>2009</td>
<td>Creating Great Graduates</td>
</tr>
</tbody>
</table>

To offer some insight into how the Faculty of Forestry represents its work in its newsletter, I randomly selected three issues among the above-listed to examine their content more closely: March 2005, December 2006, and September 2007. Of the 24 total articles found in those three issues, seven did not refer to research activities and were not analyzed. For the other 17, I systematically took note of mentions of science, technology, interdisciplinarity, utility, stakeholders, and partners (scientific or not).
Every article referred to science and/or technology, and also to some type of use or need that either triggered the research or would ensue from it. While the mentions of utility were easy to label, those of science or technology sometimes were more implicit. For instance, in articles about the research forests, the authors noted the importance of monitoring forests over the long term and of regularly taking measurements on long-standing experimental plots, insisting on the benefits of the increased knowledge made possible. The systematic character of the endeavour is here understood as scientific, although the exact body of knowledge that such longitudinal observations build upon and contribute to is not specified. In most cases, however, there was a clear, explicit mention of a knowledge area and/or of a technological advance linked to a need to fulfill. Architecture and engineering would come together to improve the use of wood in building construction. The entomological study of *G. sulcatus* and *G. retusus* – two types of Ambrosia beetles – were supporting the development of pest management. A combination of avian biology, chemistry, and decision theory would bring improvements to conservation efforts regarding migratory species. Geographic information systems and new spatial analysis techniques could be used to improve ecosystem managements and even to support the oral history accounts of Haida elders. Science and/or technology, in the context of *Branchlines* articles, are means to ends.

The fact that forest research is done with a utilitarian horizon in mind does not mean that no new scientific knowledge is created. John McLean, professor in the department of Forest Sciences, recalled the work he conducted with mentors, colleagues, and students at the Malcolm Knapp Research Forest, and the dual outcomes:

In conjunction with the extensive knowledge of the most numerous ambrosia beetle *Trypodendron lineatum*, collected by John Borden and colleagues, we have been able to set up an ambrosia beetle pest management operation around the new custom cut sawmill and adjacent log building enterprise at the Malcolm Knapp Research Forest. (McLean, 2006, p. 4)
In fact, the scientific contribution of the researchers – *because* of its scientific character – was thought to be of great value in improving the quality of the policy-making process:

Although most of the students in the Hinch lab come from backgrounds in animal ecology, they learn quickly that management issues on important fish such as sockeye salmon are complex and require working with a diverse group of stakeholders – and knowledge of more than biology. Hinch says that this is perhaps more apparent this year than in the past. “This year, members of our research team have been called upon to provide testimony at a recent federal inquiry into the management and conservation of Fraser salmon... the work conducted by my students is helping to bring real science to debates that typically involve little science and a lot of finger pointing.” (Cooke, 2005, p. 2)

Notably, the two most recent issues of *Branchlines* were dedicated to graduate students and their work. Most articles in those two issues are written by graduate students who are paired up to write about each other’s work. Although more focused on the students’ biographies, the articles again highlight the centrality of potential applications, if not in the daily practice, at least as a motivation. Nevertheless, the focus of the *Branchlines* newsletter, as that of the Faculty of Forestry’s web site, is on the close ties between forest research activities and the social, political, economic, and environmental issues they can help address.

**Getting together**

Over the period of my fieldwork in the Faculty of Forestry, a number of public lectures, academic events, and social gatherings were held, at the rate of approximately one major event per month between September and April. The gatherings that attracted a large number of individuals tended to be organized by the staff of the Dean’s office and/or by the Forestry Graduate Students Association; events organized by departments would have risked going unnoticed for me, as I was not subscribing to departmental mailing lists. If departments
did organize events involving faculty members and graduate students, it would have been at a much smaller scale.

The event which the Dean encouraged us all to attend that I mentioned in this chapter’s introduction was indeed a key moment of the 2007-2008 academic year. A day-long special event held on March 11th, it seemed to have been broadly advertised outside of the Faculty of Forestry as part of UBC’s Celebrate Research Week. The day opened at 11:30 a.m. with a “memorandum of understanding signing ceremony,” in the context of which the Dean of Forestry, the Dean of Applied Sciences, and the president and chief executive officer of FPInnovations ceremonially signed an agreement formalizing their long-standing collaboration. Interestingly, however, as I asked around, nobody could tell me what the agreement entailed exactly, and a disillusioned professor later told me that while agreements were often signed it would not translate into increased funding. The ceremony was followed by a workshop lasting the entire afternoon organized by the BC Forum on Forest Economics and Policy about climate change, where two faculty members (Sally Aitken and Stephen Sheppard) and two non-academics (the executive director of the provincial government’s climate change policy and the province’s Chief Forester) shared the stage to discuss what climate change “means for BC’s forests, communities, and economy.” Held in one of the larger first-floor classrooms, the workshop gathered a full audience for the entire afternoon. The last event, a lecture by FPInnovation’s president and CEO Ian de la Roche, was held in the Fletcher Challenge Canada Theatre, which was filled to capacity. The speaker’s lecture was titled “Trees: The Building Blocks of a Global Bio-Economy” and emphasized the capacity of forest products to be economic drivers beyond the currently depressed situation of the industry. A poster session was held throughout the afternoon, and graduate students
presented their research to their Forestry colleagues as well as to outsiders who had come to attend one of the day’s events, including public servants and FPInnovations employees.

A showcase-event like this one reveals how well integrated forestry researchers are with outside research organizations and with the forest sector more generally. Forestry professors shared the stage with key actors from other organizations, and although there might have been disagreements over certain points I did not perceive an oppositional climate.

In fact, my experience of Forestry events leads me to describe the climate as generally quite welcoming. The “faculty research seminars” exemplify this. According to a September 17th, 2007 e-mail sent on the behalf of the Associate Dean of Graduate Education and Research, the purpose of those seminars was “to address grad students’ concerns that they did not have an opportunity to find out what faculty members other than their supervisors were working on.” There was only one such seminar in 2007-2008 (“Ethics and Integrity in Scientific Research: Some Reflections,” by Tom Sullivan) but four were organized in the Fall of 2008 alone. A collage of the posters advertising them, prepared by Forestry’s graphic designer and distributed by email as well as in print, is shown in Figure 3.
The three I attended (Sullivan, Mitchell, and Innes) were presented to a crowd of 50 people or more, filling the CAWP case room seats and causing members of the audience to sit on tables and stand in the doorways. Quick headcounts reveal that a dozen or less faculty members were in attendance, as well as a handful of staff members, the rest of the audience comprising, as far as I could tell, of Forestry graduate students. Snacks and drinks were offered, provided by the Dean’s Office. The presentations started on time or so, and generally there was little movement among the audience until at least the end of the formal presentation, when some people would leave before the start of the question period. Except for Innes’ talk, which was scheduled for two hours (and lost some more of the audience before the end), all seminars were held in only one hour, and finished on time as well.
A similar set-up was in place for the Global Tea House Talk Series, organized by the Forestry Graduate Student Association and featuring international graduate students talking about some aspect of their country of origin (which may or may not be exclusively focused on forestry). Countries covered included Chile, Argentina, Iran, India, and France, and there was also a talk on Africa in general. I attended those on Chile and India.

Because the five talks I attended were so different, I will not venture general conclusions about the content of the seminars from the fragmented evidence afforded by my fieldnotes. However, two general observations revealing important traits of the Faculty of Forestry’s culture can be made.

First, coming from the social sciences, I was struck every time by the heavy reliance of presenters on visual support and in particular on photographs during Forestry
presentations. It seems like the use of photographs responds at the same time to functional and aesthetic concerns: sometimes, they illustrated the speakers’ points or were discussed in detail, but at other times they were not discussed at all, did not represent something specifically announced in the oral portion of the talk, or were shown as an aside, sometimes with humour. The photographs offered a representation of “reality” into the talk, opposed to the “abstract” written or spoken words. They were never examined critically in terms of the circumstances in which they were taken or used by the researcher. There were, at the same time, pragmatic and playful aspects to those colourful illustrations: it was as if the presenter (and the audience) wished they could be outdoors, in closer contact with reality, and in a place they also found more enjoyable than the windowless seminar room.

The second observation concerns note-taking and particularly struck me because it exposed me as an outsider. As a fieldworker taking copious amounts of notes, I thought I would be inconspicuous among audience members at an academic seminar; surprisingly, I found my observer status given away by the fact that the people around me usually took no notes at all! Casual conversation with a number of informants leads me to believe that audience members attend faculty-wide seminars out of curiosity and interest for the work of their colleagues, but that they see few connections with their own work and thus do not feel compelled to take notes. Had I attended smaller-scale seminars where only researchers working in a similar field were in attendance, I was told, I might have seen more pens hitting the paper.

I have appreciated this friendly curiosity myself almost every time I introduced myself and the purpose of my presence in the Faculty of Forestry. A participant noted that he thought it was “very cool” to be the object of someone else’s research, and whenever I came across Forestry people, in their building or elsewhere on campus or in town, they would ask
about how my research was progressing and about my findings. A few insisted that I should let them know when I was going to defend my dissertation or present some results. My work was never questioned in a critical, aggressive or defensive matter. This is the same behaviour that I observed within Forestry ranks in the context of faculty-wide events: colleagues showed interest by attending each others’ lectures and asked questions to understand the subject of the talk better, but seldom, if ever, challenged the presenters in such a wide-open context. If there is a debate about what belongs or does not belong to Forestry, or what is or is not acceptable in terms of research practices, it is not a debate that surfaces in the organization’s public events.

**Interventions in mainstream newspapers**

The Faculty of Forestry is represented in both internal (UBC) and external media on a regular basis. To capture some of the organization’s image on campus as well as on the provincial and Canadian scene, I analyzed the coverage of UBC Forestry by official campus publications and mainstream media in 2007 and 2008.

In 2007, *UBC Reports* published three articles representing work emanating from Forestry. The first issue of the year, under the title “The Next Big Thing,” offered a full page to Dean Jack Saddler and to his research associate Warren Mabee who published an essay discussing how wood could replace oil in the “forest biorefinery” (January 4th, 2007, p. 7). In the November issue of 2007, associate professor Gary Bull’s reforestation work in Afghanistan was prominently featured in an article emphasizing the international collaborations and the complex, multi-faceted problem he and his student KiJoo Han are facing, requiring contributions from many disciplines of the sciences and social sciences. The third article mentioning the Faculty of Forestry that year was a short announcement of the Faculty’s new undergraduate program, the Global Perspectives major, which brings
undergraduates to work on international case studies and sends students abroad for hands-on international experience, a component that, according to an interviewed faculty member (Scott Hinch), corresponds to the demand from students. No articles about work in the Faculty of Forestry were found in the *UBC Reports* for 2008.

There were also UBC media releases that mentioned the Faculty of Forestry members during those two years. One, released on June 14th, 2007, celebrated the 50th anniversary of the arrival of the Sopron School of Forestry students and faculty members in Vancouver. Besides offering a recollection of the circumstances of the arrival of the Sopron students and faculty members, the news release underlines the Sopron’s contribution to Canada – 80 per cent of them, according to the release, stayed in the country after graduation – and heralds their collective scientific contribution, consisting of:

1,200 refereed papers, 1,000 conference proceedings, 46 books and 56 patents in 26 academic fields including pulp and paper, forest regeneration, timber engineering, fire protection, and park management.

The other two media releases only briefly mention the Faculty of Forestry. One is about a recent publication by Jorg Bohlmann and colleagues in the *Proceedings of the National Academy of Sciences* (January 14th, 2008). Bohlmann is described as collaborating with the B.C. Ministry of Forests, the Canadian Forest Service, and the forest industry, but his primary affiliation is said to be the Michael Smith Laboratories, while he has a teaching appointment in the department of Forest Sciences, among other affiliations. The third release announces the award of an important NSERC grant to a group of researchers working on pulp and paper, to which an adjunct professor from the department of Wood Sciences, Rodger Beatson, is affiliated.
There were more mentions of Forestry faculty members in external media over the same period. A total of 62 articles corresponded to the search criteria, were examined in greater depth and coded. Nine of those were duplicates or quasi-duplicates, and published by different newspapers (on the base of a press agency release or of a newspaper group newsroom, as in the case of CanWest publications). The Vancouver Sun was the most common venue for forestry-related articles (11 articles), followed by the Globe & Mail (10 articles), the National Post (8 articles), which has a journalist who regularly covers forest industry matters (Nathan Van der Klippe), and the Victoria Times Colonist (4 articles). The rest of the articles were divided between other capital or major-city newspapers (such as the Ottawa Citizen) and regional newspapers (like the Prince George Citizen).

Forestry faculty members, and sometimes their students, are mostly introduced in articles as expert commentators. While it is likely that they spent a fair amount of time being interviewed by a journalist, and may have informed and influenced the construction of the news story, their contribution is usually only identifiable thanks to a short quote. Dave Cohen, for example, from the department of Wood Science, was mentioned three times in articles about the forest economy, and this quotation from the November 13th, 2008 Calgary Herald is typical of this journalistic technique: according to Cohen, the value of timberland has increased “based on its future value for environmental services. There’s a lot of people with a lot of money who think it’s going to come to fruition.” The quote adds to the authority of the journalist’s story. Sometimes, the Forestry academics’ perspective was presented as a counterpoint to another perspective mentioned earlier in the article. For example, on April

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18 To assess Forestry’s media presence in the general media, the English-language online database Canadian Newsstand was searched for 2007 and 2008 for the phrases “University of British Columbia” or “UBC” combined with either “forestry,” “forest science,” “forest resource management,” and/or “wood science” in the full text of the articles. Thus, articles referring to a Forestry faculty member without mentioning that faculty member’s affiliation are not included, a decision justified by my purpose, which was to explore the representation of the Faculty of Forestry outside of UBC.
12th, 2007, the *Globe & Mail* published an article about an audit of the B.C. Finance Ministry that raised concerns about the independence of scalers (the licensed professionals paid by forest companies to assess the value of the trees logged on crown land). Offering a different point of view to that of the audit report, Kevin Lyons – presented as a “former logger and now assistant forestry professor” – noted that “it is common practice to have professionals being charged with protecting the public interest and being paid by industry – for example, engineers,” although Lyons agreed, according to the article, that “lack of training” was a problem in the industry. In another instance, Gary Bull is called on to rebut an environmentalist’s claim that logging old growth forests releases carbon (*Vancouver Sun*, October 9th, 2007). Bull is quoted as saying that comparing old growth to plantation forests is not appropriate, and that old growth actually does not store much new carbon because the trees in it have stopped growing.

Occasionally, the academics’ contribution occupies a more important role in the article. Such interventions tend to revolve around statements, by the academics, of a problem that they think should be of public interest. For example, an article in the *Vancouver Sun* extensively quotes Michael Feller, from the department of Forest Sciences, about the fire hazard posed by the damaged forest around University Endowment Land properties (February 22nd, 2007). Similarly, John McLean, supported by additional quotes by Steve Mitchell, warns that insects may benefit from the 2006 Stanley Park storm that killed or weakened many trees to invade our parks (January 27th, 2007). Phil Evans, from Wood Science, is reported as attempting to guide forest industry leaders towards the development and marketing of more innovative wood products in order to revitalize manufacturing towns (*Alberni Valley Times*, January 14th, 2008). The Dean of Forestry, Jack Saddler, issued a warning of a different kind: following the closure of BCIT’s forestry programs in early 2007,
he was interviewed by a *Vancouver Sun* journalist and noted that there is a “big problem in enrolment in forestry programs” because while the number of students registered decline, the social needs for trained professionals in the field remain high (February 6th, 2007).

Other times, in a small number of cases (18 different articles), Forestry faculty members or students are at the core of a newspaper article, and their research work is prominently featured. Such an appearance usually follows the publication of an article in a prestigious scientific journal, the award of a prize or of research funding, or the beginning or end of a collaborative research project with government organizations to tackle a problem of public interest. For example, four separate articles were dedicated to Younes Alila and/or Markus Weiler’s hydrological work in both the North Shore and the Fraser River watershed and to their assessment of the flooding risks posed by changes in the forest cover, either due to increased urban development or to the Mountain Pine Beetle epidemics. Two of those articles note the recent research funding received by the researchers, while the other two demonstrate the application of their model to forecast future water levels. The Collaborative for Advanced Landscape Planning initiative, led by Stephen Sheppard, was also presented in two different articles, one related to the municipality of Kimberley’s hope that CALP would receive funding to apply their visualization tool to that city’s landscape (*Daily Bulletin*, Kimberley, July 24th, 2008), and the other on the UBC researchers’ collaboration with the municipality of Delta, an area where thoughts about rising water levels are a cause for public concern (*Vancouver Sun*, December 1st, 2007). Recent articles published in the *Proceedings of the National Academy of Science* (by Jorg Bohlmann) about the sequencing of the poplar genome and in *Science* magazine (by John Innes and Guangyu Wang) about sustainable forest management initiatives in China also have triggered media attention. On rare occasions, there seems to be no particular event at the source of the media attention: in a
September 15th, 2007, *National Post* article, Sally Aitken’s Ph.D. student Sierra Curtis McLane’s research on whitebark pine growth areas is featured (along with a large photo of her in full fieldwork gear).

Across all of the mainstream newspaper articles examined, none conveyed explicit or even covert criticism of the UBC Faculty of Forestry or of its researchers. When, as we have seen above, the journalists called on Forestry faculty members to counter another protagonist’s arguments, there never was a third protagonist invoked to counter or criticize the Forestry researcher’s point of view. When non-Forestry individuals were quoted discussing Forestry work, it was usually as collaborators or allies, such as in the context of Stephen Sheppard’s work with the municipal governments of Delta and Kimberley.

Conversely, Forestry researchers were not portrayed as critics of the forest sector. For the most part, they appear as experts who share their knowledge and, in some cases, their concerns with the public. They are represented as seeking improvements to forest management or to other related processes, explaining the current situation, sometimes suggesting incremental reforms, but never radical transformations.

**Publications: a source and a display of scientific capital**

Publications in peer-reviewed journals are a widely agreed-upon form of cultural capital that is specific to the scientific field (Bourdieu, 2004). As academic researchers, Forestry faculty members are expected to publish such articles, and analyzing their production allows for a better understanding of Forestry researchers’ position relative to the scientific field more generally. The scientific publications simultaneously serve as a source of scientific capital that improves researchers’ position and as a display of the capital that they
already have, as the journals in which the articles are published and the colleagues with whom they are co-written reveal where forest researchers stand.

Data about the publications of Forestry faculty members in scientific journals was extracted from the Science Citation Index (SCI), the Social Sciences Citation Index (SSCI), and the Arts and Humanities Citation Index (AHCI), three databases maintained by the Institute for Scientific Information or ISI\(^\text{19}\). To be included in the initial, rough set of data, articles had to have at least one author with the same last name as one of the faculty members on the list posted on the Faculty of Forestry’s web site, and at least one author address had to be within British Columbia. The period was limited to 2001-2005, for which a complete dataset was available. Through iterative phases of data cleaning, I narrowed down the list to a total of 583 articles associated with Forestry faculty members. This sum only includes publications in journals indexed by the three above-mentioned databases, excluding, among other types of publications, articles in non-indexed journals, conference papers, and reports. A total of 58 individual UBC Forestry faculty members were identified as having at least one article within the examined databases\(^\text{20}\). An important part of the production of indexed articles is the result of a small number of researchers: 13 faculty authors are responsible for nearly 50 per cent of Forestry’s production (287 of 583 articles), although 40 faculty members (or approximately 60 per cent) have published at least one indexed article per year.

\(^{19}\) Vincent Larivièrè of the Observatoire des sciences et des technologies extracted the data in June 2007. 

\(^{20}\) Preparing the data on Forestry publications proved to be challenging due to the fact that some faculty members have more than one affiliation, have recently changed affiliation, and/or do not systematically identify themselves as belonging to the same organization. The method employed allowed me to account for articles published by a given faculty member during the period but signed under a different organizational address, as long as it was located in British Columbia. The production of faculty members who recently arrived to UBC from a different province or country would thus be under-represented in this analysis.
**Distribution by discipline and specialty**

The articles were published in 173 different journals. The most important journal for UBC Forestry authors is, by far, the *Canadian Journal of Forest Research* (76 articles), followed by *Forest Ecology and Management* (36 articles) and the *Forest Products Journal* (33 articles). As shown in Table 4, 348 articles, or 60 per cent of the total volume of articles, are concentrated within the 27 journals that have at least 5 articles each.
Table 4  Journals with at least 5 articles by UBC Forestry faculty members, SCI, SCCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number of articles</th>
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<tbody>
<tr>
<td>Canadian Journal of Forest Research</td>
<td>76</td>
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<tr>
<td>Forest Ecology and Management</td>
<td>36</td>
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<tr>
<td>Forest Products Journal</td>
<td>33</td>
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<tr>
<td>Abstracts of Papers of the American Chemical Society</td>
<td>19</td>
</tr>
<tr>
<td>Wood and Fiber Science</td>
<td>19</td>
</tr>
<tr>
<td>Applied Biochemistry and Biotechnology</td>
<td>13</td>
</tr>
<tr>
<td>Canadian Journal of Botany</td>
<td>12</td>
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<tr>
<td>Holzforschung</td>
<td>12</td>
</tr>
<tr>
<td>Canadian Journal of Fisheries and Aquatic Sciences</td>
<td>11</td>
</tr>
<tr>
<td>Hydrological Processes</td>
<td>10</td>
</tr>
<tr>
<td>Journal of the American Water Resources Association</td>
<td>8</td>
</tr>
<tr>
<td>Mycological Research</td>
<td>8</td>
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<tr>
<td>Theoretical and Applied Genetics</td>
<td>8</td>
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<tr>
<td>Drying Technology</td>
<td>7</td>
</tr>
<tr>
<td>FEMS Microbiology Letters</td>
<td>7</td>
</tr>
<tr>
<td>Oecologica</td>
<td>7</td>
</tr>
<tr>
<td>Plant Physiology</td>
<td>7</td>
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<tr>
<td>Silvae Genetica</td>
<td>7</td>
</tr>
<tr>
<td>Wood Science and Technology</td>
<td>7</td>
</tr>
<tr>
<td>Canadian Journal of Civil Engineering</td>
<td>6</td>
</tr>
<tr>
<td>Bioscience</td>
<td>5</td>
</tr>
<tr>
<td>Biotechnology and Bioengineering</td>
<td>5</td>
</tr>
<tr>
<td>Journal of Agricultural and Food Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Journal of Fish Biology</td>
<td>5</td>
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<tr>
<td>Journal of Heredity</td>
<td>5</td>
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<tr>
<td>Proceedings of the Royal Society of London Series B – Biological Sciences</td>
<td>5</td>
</tr>
<tr>
<td>Water Resources Research</td>
<td>5</td>
</tr>
</tbody>
</table>

According to ISI’s classification, more than 8 out of 10 articles are in one of three main disciplines: biology collects almost half of the articles (279 articles or 47.9 per cent), followed by Engineering (100 articles or 17.2 per cent) and Biomedical Research (92 articles or 15.8 per cent). Other important fields are Chemistry (33 articles or 5.7 per cent) and Earth
and Space (32 articles or 5.5 per cent). Table 5 shows how the remaining articles are scattered in journals across the disciplinary spectrum, while a few remain unclassified.

The department of Forest Sciences is most heavily concentrated within biology with more than three quarters of its articles published in this discipline. Wood Science, on the other hand, accounts for most of the Engineering articles, which represent 44.1 per cent of its publication effort. The department of Forest Resources Management is the most diversified from a disciplinary perspective, with 32.3 per cent of its articles in biology, 25.3 per cent in Earth and Space, and 10.1 per cent in Engineering, with 15.2 per cent in fields more closely associated with the social sciences (Economics, Law, Philosophy, Political Science, Public Administration, and Sociology). Across all departments, the specialties of biology that account for the highest number of articles are botany (141 articles) and ecology (68 articles), while materials science accounts for the majority of publications in engineering (76 articles).

I further classified journals in two categories: forest-specific and non-forest specific. Forest-specific journals were identified based on the journal title or subtitle, which had to directly refer to forests, forestry, trees, wood, or pulp and paper. Across the faculty, 36.7 per cent of all articles (214 of 583) were found in forest-specific journals, a trend that was similar in all three departments. Thus, the vast majority of publications by Forestry faculty members are not to be found in forest-specific journals (Table 6).
Table 5  Discipline of articles published by UBC Forestry faculty members, by department, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Forest Resources Management</th>
<th></th>
<th>Forest Sciences</th>
<th></th>
<th>Wood Science</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>N 32</td>
<td>% 32.3</td>
<td>N 218</td>
<td>% 77.3</td>
<td>N 29</td>
<td>% 14.4</td>
<td>N 279</td>
</tr>
<tr>
<td>Biomedical Research</td>
<td>3</td>
<td>% 3.0</td>
<td>N 48</td>
<td>% 17.0</td>
<td>N 41</td>
<td>% 20.3</td>
<td>N 92</td>
</tr>
<tr>
<td>Chemistry</td>
<td>0.0</td>
<td>% 1</td>
<td>N 32</td>
<td>% 15.8</td>
<td>N 33</td>
<td>% 5.7</td>
<td></td>
</tr>
<tr>
<td>Earth and Space</td>
<td>N 25</td>
<td>% 25.3</td>
<td>N 7</td>
<td>% 2.5</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 32</td>
</tr>
<tr>
<td>Economics</td>
<td>1</td>
<td>% 1.0</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>10</td>
<td>% 10.1</td>
<td>N 1</td>
<td>% 0.4</td>
<td>N 89</td>
<td>% 44.1</td>
<td>N 100</td>
</tr>
<tr>
<td>Geography</td>
<td>0.0</td>
<td>% 1</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td>1</td>
<td>% 1.0</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.5</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.5</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td>1</td>
<td>% 1.0</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>0.0</td>
<td>% 1</td>
<td>N 0.4</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Political Science</td>
<td>8</td>
<td>% 8.1</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 8</td>
<td>% 1.4</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>0.0</td>
<td>% 2</td>
<td>N 0.7</td>
<td>% 0.0</td>
<td>N 2</td>
<td>% 0.3</td>
<td></td>
</tr>
<tr>
<td>Public Management</td>
<td>1</td>
<td>% 1.0</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 1</td>
<td>% 0.2</td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td>3</td>
<td>% 3.0</td>
<td>N 0.0</td>
<td>% 0.0</td>
<td>N 3</td>
<td>% 0.5</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>14</td>
<td>% 14.1</td>
<td>N 3</td>
<td>% 1.1</td>
<td>N 9</td>
<td>% 4.5</td>
<td>N 26</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>% 100.0</td>
<td>282</td>
<td>% 100.0</td>
<td>202</td>
<td>% 100.0</td>
<td>583</td>
</tr>
</tbody>
</table>
Table 6  Articles published in forest-specific journals, by department, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Type of journal</th>
<th>Department</th>
<th></th>
<th></th>
<th></th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Resources</td>
<td>Forest Sciences</td>
<td>Wood Science</td>
<td>Forest-specific journals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Management</td>
<td>Management</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>36</td>
<td>36.4</td>
<td>100</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management</td>
<td>Non-forest</td>
<td>63</td>
<td>63.6</td>
<td>182</td>
<td>64.5</td>
<td>124</td>
<td>61.4</td>
<td>369</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>Total</td>
<td>99</td>
<td>100.0</td>
<td>282</td>
<td>100.0</td>
<td>202</td>
<td>100.0</td>
<td>583</td>
</tr>
</tbody>
</table>

**Distribution by degree of application**

The “degree of application” variable was created by the firm CHI Inc. and assigns a value ranging from 1.0 (very applied) to 4.0 (very basic) to journals. Not all journals indexed by ISI have been attributed a degree of application. Within our database, 529 articles were in journals with a known degree of application.

As shown in Table 7, members of the department of Forest Resources Management are pictured to be publishing articles in the most applied journals based on this indicator, with a rating of 1.94 and a low standard deviation. Forest Sciences faculty members publish in more basic journals, with an average rating of 2.91. Wood Science authors stand in between. Over all, the average degree of application for Forestry publications is 2.66, which places Forestry research closer to the “basic” end of the spectrum.
Table 7 Degree of application of the journals in which UBC Forestry articles are published, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Degree of application</th>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>1.0</td>
<td>17</td>
<td>25.0</td>
<td>34</td>
<td>12.3</td>
</tr>
<tr>
<td>2.0</td>
<td>44</td>
<td>64.7</td>
<td>81</td>
<td>29.3</td>
</tr>
<tr>
<td>3.0</td>
<td>1</td>
<td>1.5</td>
<td>37</td>
<td>13.4</td>
</tr>
<tr>
<td>4.0</td>
<td>6</td>
<td>8.8</td>
<td>124</td>
<td>44.9</td>
</tr>
<tr>
<td>Average</td>
<td>1.94</td>
<td>2.91</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.79</td>
<td>1.11</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>N of articles</td>
<td>68</td>
<td>276</td>
<td>185</td>
<td></td>
</tr>
</tbody>
</table>

Collaborations

Most of Forestry faculty members’ publications are co-authored: to the 583 articles identified were associated a total of 1,285 signatures, which means that on average there were 2.2 signatures per article. As shown in Table 8, while the majority of those 1,285 signatures were from UBC, researchers from other organizations were also involved with UBC Forestry faculty authors. The majority were affiliated to either Canadian (83) or international (207) post-secondary institutions, but over 10 per cent were from government agencies or organizations in Canada (117) or abroad (56). A few articles were co-authored with researchers from the private, for-profit sector (72) while significantly less were co-authored with non-government organizations or international organizations authors (27). Some trends by departments can be noted: the department of Forest Sciences has a lower proportion of its signatures within UBC and is more involved in collaborations with Canadian academics and government affiliates from Canada. Wood Science and Forest Resources Management, on the other hand, have more UBC signatures. Wood Science collaborates more with NGO or INGO (including industry associations) researchers.
Table 8  Types of organizations associated with signatures of UBC Forestry faculty members’ publications, by department, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Type of organization</th>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>UBC</td>
<td>114</td>
<td>59.1</td>
<td>294</td>
<td>41.9</td>
</tr>
<tr>
<td>Canadian PSE</td>
<td>14</td>
<td>7.3</td>
<td>62</td>
<td>8.8</td>
</tr>
<tr>
<td>International PSE</td>
<td>30</td>
<td>15.5</td>
<td>112</td>
<td>16.0</td>
</tr>
<tr>
<td>Gvt in Canada</td>
<td>13</td>
<td>6.7</td>
<td>95</td>
<td>13.5</td>
</tr>
<tr>
<td>Foreign Gvt</td>
<td>5</td>
<td>2.6</td>
<td>31</td>
<td>4.4</td>
</tr>
<tr>
<td>NGO or INGO</td>
<td>3</td>
<td>1.6</td>
<td>7</td>
<td>1.0</td>
</tr>
<tr>
<td>Private Sector</td>
<td>11</td>
<td>5.7</td>
<td>42</td>
<td>6.0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.5</td>
<td>32</td>
<td>4.6</td>
</tr>
<tr>
<td>Unknown/Not Sure</td>
<td>2</td>
<td>1.0</td>
<td>27</td>
<td>3.8</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>100.0</td>
<td>702</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The detailed list of the collaborators’ affiliations further illustrates those differences by department, as the social networks of researchers seem to vary from one department to the next. Across the faculty, as shown in Table 9, the B.C. Ministry of Forests and the Canadian Forest Service are the most important collaborators, resulting primarily from the collaborations of researchers in Forest Resources Management and Forest Sciences, while they are absent from the list of Wood Science collaborators.
Table 10 shows the list of collaborating organizations with three or more signatures in common with UBC Forestry authors, by department.

Table 9  Organizations associated with signatures of UBC Forestry faculty members’ publications, five or more signatures, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Affiliation of collaborators</th>
<th>N of signatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia Ministry of Forests</td>
<td>39</td>
</tr>
<tr>
<td>Canadian Forest Service</td>
<td>30</td>
</tr>
<tr>
<td>North Carolina State University</td>
<td>20</td>
</tr>
<tr>
<td>Simon Fraser University</td>
<td>19</td>
</tr>
<tr>
<td>Applied Mammal Research Institute</td>
<td>16</td>
</tr>
<tr>
<td>Forintek Canada Corp.</td>
<td>16</td>
</tr>
<tr>
<td>Oregon State University</td>
<td>14</td>
</tr>
<tr>
<td>Agriculture &amp; Agri-Food Canada</td>
<td>11</td>
</tr>
<tr>
<td>United States Department of Agriculture</td>
<td>11</td>
</tr>
<tr>
<td>University of Toronto</td>
<td>10</td>
</tr>
<tr>
<td>Macaulay Land Use Research Institute</td>
<td>9</td>
</tr>
<tr>
<td>Canadian Wildlife Service</td>
<td>8</td>
</tr>
<tr>
<td>Canadian Pacific Forest Products Research Ltd.</td>
<td>7</td>
</tr>
<tr>
<td>Kyoto University</td>
<td>7</td>
</tr>
<tr>
<td>University of Alberta</td>
<td>7</td>
</tr>
<tr>
<td>Ontario Ministry of Natural Resources</td>
<td>6</td>
</tr>
<tr>
<td>Pennsylvania State University</td>
<td>6</td>
</tr>
<tr>
<td>University of Saskatchewan</td>
<td>6</td>
</tr>
<tr>
<td>Carleton University</td>
<td>5</td>
</tr>
<tr>
<td>Max Plank Institute for Chemical Ecology</td>
<td>5</td>
</tr>
<tr>
<td>McGill University</td>
<td>5</td>
</tr>
<tr>
<td>Okanagan University College</td>
<td>5</td>
</tr>
<tr>
<td>Purdue University</td>
<td>5</td>
</tr>
<tr>
<td>University of California (Berkeley)</td>
<td>5</td>
</tr>
<tr>
<td>University of Oxford</td>
<td>5</td>
</tr>
<tr>
<td>University of Washington</td>
<td>5</td>
</tr>
<tr>
<td>University of Wisconsin</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 10  Organizations associated with signatures of UBC Forestry faculty members’ publications, three or more signatures, by department, SCI, SSCI and AHCI, 2001-2005

<table>
<thead>
<tr>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon State University</td>
<td>British Columbia Ministry of Forests</td>
<td>North Carolina State University</td>
</tr>
<tr>
<td>British Columbia Ministry of Forests</td>
<td>Canadian Forest Service</td>
<td>Forintek Canada Corp.</td>
</tr>
<tr>
<td>Canadian Forest Service</td>
<td>Applied Mammal Research Institute</td>
<td>United States Department of Agriculture</td>
</tr>
<tr>
<td>Canadian Pacific Forest Products Research Ltd.</td>
<td>Simon Fraser University</td>
<td>Equilibrium Consulting Inc.</td>
</tr>
<tr>
<td>Kyoto University</td>
<td>Agriculture &amp; Agri-Food Canada</td>
<td>Ministry of Land, Infrastructure &amp; Transport</td>
</tr>
<tr>
<td>Simon Fraser University</td>
<td>Macauley Land Use Research Institute</td>
<td>Australian National University</td>
</tr>
<tr>
<td></td>
<td>Canadian Wildlife Service</td>
<td>Purdue University</td>
</tr>
<tr>
<td></td>
<td>Oregon State University</td>
<td>University of Oxford</td>
</tr>
<tr>
<td></td>
<td>University of Alberta</td>
<td>Korea University</td>
</tr>
<tr>
<td></td>
<td>Ontario Ministry of Natural Resources</td>
<td>University of Toronto</td>
</tr>
<tr>
<td></td>
<td>Okanagan University College</td>
<td>Read Jones Christoffersen Ltd.</td>
</tr>
<tr>
<td></td>
<td>University of Saskatchewan</td>
<td>Forestry &amp; Forest Products Research Institute</td>
</tr>
<tr>
<td></td>
<td>Carleton University</td>
<td>University of Tokyo</td>
</tr>
<tr>
<td></td>
<td>University of Wisconsin</td>
<td>Pulp &amp; Paper Research Institute of Canada</td>
</tr>
<tr>
<td></td>
<td>North Carolina State University</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max Planck Institute for Chemical Ecology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>McGill University</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of California (Berkeley)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Washington</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Toronto</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fisheries &amp; Oceans Canada</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Korea Forest Research Institute</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pennsylvania State University</td>
<td></td>
</tr>
</tbody>
</table>

The publications of Forestry faculty members in peer-reviewed journals again demonstrate the diversity of Forestry researchers’ collective contribution to the scientific field, as well as their simultaneous investments in basic and applied research. They are not bound to the field of forest research, as defined by forest-specific journals, but instead submit
their work to a range of disciplinary and topical communities. Further, the data presented in
this section has shown that a notable proportion of the scientific production of Forestry
researchers is jointly authored with researchers located outside of the Faculty of Forestry,
including many in government agencies and some private organizations, as well as a range of
academic colleagues in post-secondary institutions.

Research commercialization

The numerous collaborative ties between the Forestry researchers and non-academic
organizations, and in particular the faculty’s ties with for-profit companies, could be expected
to lead to the commercialization of some research findings. Based on preliminary data
obtained from the UBC University-Industry Liaison Office (UILO), however, this does not
seem to be the case.

Table 11 shows that, between 2004 and 2008, Forestry researchers disclosed only 9
inventions to the UILO which, even when considered in proportion of its number of faculty
members, is very little compared to the faculties of Applied Sciences and Science. The
Faculty of Land and Food Systems, in comparison, with fewer faculty members and much
less research funding, has disclosed twice the number of inventions during the same period.
The number of patents filed and issued is also very low, and there were no active agreements
for the exploitation of UBC Forestry intellectual property for the period covered by UILO
data.
Table 11  Patents filed and issued, invention disclosures and intellectual property agreements, by faculty, UBC, 2004-2008 (preliminary data)

<table>
<thead>
<tr>
<th>Top-level unit</th>
<th>FTE Faculty members</th>
<th>Patents filed</th>
<th>Patents Issued</th>
<th>Invention Disclosures</th>
<th>Agreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Sciences</td>
<td>163</td>
<td>174</td>
<td>22</td>
<td>181</td>
<td>26</td>
</tr>
<tr>
<td>Arts</td>
<td>410</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Commerce</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Dentistry</td>
<td>33</td>
<td>3</td>
<td></td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Education</td>
<td>141</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Forestry</td>
<td>52</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Graduate studies</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Land and Food Systems</td>
<td>43</td>
<td>22</td>
<td>64</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Medicine</td>
<td>505</td>
<td>747</td>
<td>156</td>
<td>390</td>
<td>85</td>
</tr>
<tr>
<td>Pharmaceutical Sciences</td>
<td>36</td>
<td>55</td>
<td>19</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Science</td>
<td>373</td>
<td>563</td>
<td>292</td>
<td>275</td>
<td>82</td>
</tr>
<tr>
<td>Others</td>
<td>520</td>
<td>95</td>
<td>344</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>N/A</td>
<td>2088</td>
<td>650</td>
<td>1262</td>
<td>271</td>
</tr>
</tbody>
</table>

Source: UBC University-Industry Liaison Office

At the very least, it can be said that the type of research conducted in the Faculty of Forestry does not seem conducive to protection by legal means, such as patents. On the other hand, commercially-driven research in the Faculty of Forestry might be more likely to be protected by non-disclosure agreements. I encountered little evidence that such confidential research is conducted in Forestry; however I have no mean to assess the prevalence of such practices in quantitative terms at the moment, or to compare Forestry’s confidentiality practices to those of other faculties.

Extramural and research funding

Economic capital, while not sufficient, is a necessary condition of research: it is needed to purchase equipment, facilitate access to field sites, and support the livelihoods of those who conduct much of the data collection and analysis procedures, for the most part graduate students. An examination of the economic capital used by Forestry researchers – aggregated at the Faculty and departmental scales – illustrates the balance of scientific and
forest sector sources mobilized and some of the resulting opportunities and constraints for
individual researchers, which will be further discussed in chapter 6.

Based on the data published in the Faculty of Forestry’s Annual Reports from 1991 to
2007, extramural funding – most of which supporting research activities – started to exceed
the general purpose operating budget fund in 1994-1995. At that time, they both hovered
around $5,000,000. In 2007-2008, extramural funding, at $13,296,000, was nearly double the
GPOB of the Faculty ($6,850,000).

Figure 5 illustrates the distribution of Forestry’s extramural funding by category of
source. The provincial and federal governments have most contributed to the growth of
Forestry’s extramural funding since the early 1990s. The contribution of the provincial
government has been fluctuating inconsistently over the years while federal funding has
grown much more regularly, except for a short downturn in 1997-1998. The most spectacular
feature of Figure 5 is the sudden increase in provincial funding in 1995-1996 and 1996-1997,
which was almost immediately followed by a rapid reduction in provincial funds. This period
 corresponds to the establishment and rapid demise of the Forest Renewal British Columbia
(FRBC) program, which despite its short lifespan allowed Forestry to recruit six new faculty
members in endowed chair positions. The program stemmed from the rapid increase in
stumpage revenues. The amounts contributed to Forestry were very high during the
program’s first two years, as the sponsored chairs were established, and remained significant
until the program was cancelled by the new Liberal government elected in the province in
Funding from private sources has also been irregular over the years. At its peak in 2002-2003, such sources represented over 22 per cent of the Faculty of Forestry’s extramural funding sources and reflected the profitability of the Canadian forest industry under favourable structural circumstances. Since then, revenues from private sources have been decreasing, and currently represent 10.5 per cent of all extramural funding. Generally speaking, Canadian forest companies have a low contribution to research and development by international standards (Hayter, 2000, pp. 360-361).

The division of funding into only four broad categories, as presented in Figure 5, only starts to reflect the fluctuations of forest research funding. In fact, each group of sources includes many different programs, which also change over time and each come with their own specific requirements. For example, funding from the NSERC Discovery Grants Program comes with very few constraints compared to contracts from other federal government agencies, yet both are counted as federal funding. In order to better understand
how its sources of research funding position the Faculty of Forestry, detailed data was recovered from the online awards database of UBC’s Office of Research Services. All awards attributed to the Faculty of Forestry for the period extending from 2002-2003 to 2006-2007 were extracted from the database, for a total of $59,682,707 in five years.

Breaking down the funding by department, as shown in Table 12, reveals that the departments of Forest Sciences and Wood Science retain the largest share of the funding.

**Table 12  Research funding by department or unit of the Faculty of Forestry, 2002-2003 to 2006-2007**

<table>
<thead>
<tr>
<th>Department or Unit</th>
<th>$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Resources Management</td>
<td>11,519,325</td>
<td>19.3</td>
</tr>
<tr>
<td>Forest Sciences</td>
<td>25,460,301</td>
<td>42.7</td>
</tr>
<tr>
<td>Wood Science</td>
<td>21,233,192</td>
<td>35.6</td>
</tr>
<tr>
<td>Applied Conservation Biology</td>
<td>620,656</td>
<td>10.4</td>
</tr>
<tr>
<td>Advanced Wood Processing</td>
<td>566,938</td>
<td>9.5</td>
</tr>
<tr>
<td>Research forests</td>
<td>282,295</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59,682,707</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Furthermore, research funding in Forestry is somewhat concentrated in the hands of a small number of faculty members, which is not atypical. Two faculty members (Saddler and Lam) brought approximately $1 million a year during the period under observation, and 50 per cent of the entire Forestry research funding for the period is associated with only 12 faculty members. Nonetheless, there are 39 faculty members (approximately 60 per cent of all faculty members, including retired professors) who received at least $100,000 a year over the period.

Finding appropriate categories to organize the data is difficult. For example, the Coast Forest and Lumber Association, an association that represents forest companies from Coastal B.C., is a not-for-profit organization just like the Gwaii Trust Society, yet it did not seem meaningful to lump them in the same category. I have thus decided to present the most important funding agencies and programs without amalgamation.
For the Faculty of Forestry as a whole, there are 12 funding agencies/programs that each account for more than $1 million for the five-year period. As shown in Table 13, government sources are most important, with Natural Resources Canada and the Forest Science Program (B.C. government) being the most important sources. NSERC is the most important funding agency, with over $12 million in contributions, however in the table below NSERC funding is broken down into its separate programs.

**Table 13** Agencies/programs contributing over $1 million in research funds to the Faculty of Forestry, 2002-2003 to 2006-2007

<table>
<thead>
<tr>
<th>Agency / Program</th>
<th>$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Resources Canada</td>
<td>5,752,223</td>
<td>9.6</td>
</tr>
<tr>
<td>Forest Science Program (B.C. gov.)</td>
<td>4,678,572</td>
<td>7.8</td>
</tr>
<tr>
<td>Discovery Grants (NSERC)</td>
<td>4,209,919</td>
<td>7.1</td>
</tr>
<tr>
<td>Strategic Projects (NSERC)</td>
<td>4,139,760</td>
<td>6.9</td>
</tr>
<tr>
<td>B.C. Ministry of Forests</td>
<td>3,754,338</td>
<td>6.3</td>
</tr>
<tr>
<td>Research (Networks of Centres of Excellence)</td>
<td>3,304,759</td>
<td>5.5</td>
</tr>
<tr>
<td>International Marketing Program (B.C. gov.)</td>
<td>3,016,640</td>
<td>5.1</td>
</tr>
<tr>
<td>Coast Forest and Lumber Association</td>
<td>1,807,613</td>
<td>3.0</td>
</tr>
<tr>
<td>Canada Research Chair Tier II (NSERC)</td>
<td>1,508,334</td>
<td>2.5</td>
</tr>
<tr>
<td>Strategic Network Grant (NSERC)</td>
<td>1,243,048</td>
<td>2.1</td>
</tr>
<tr>
<td>Mountain Pine Beetle Program (federal gov.)</td>
<td>1,034,115</td>
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</tr>
<tr>
<td>Canada Research Chair Tier I (NSERC)</td>
<td>1,000,000</td>
<td>1.7</td>
</tr>
</tbody>
</table>

In all three departments, there is a wide gap between the average award and the median award, indicating that most of the resources come from a small number of programs and agencies. This is particularly true in the department of Forest Sciences, where the average award ($303,098) is almost six times the median award ($53,870) while in the other two departments the ratio is between 3 and 4. Table 14 lists the top-50 programs and agencies funding research in each department. There are a total of 70 programs and agencies funding research in Forest Resources Management, 84 in Forest Sciences, and 80 in Wood Science.\(^{21}\)

\(^{21}\)Funding from the Canada Foundation for Innovation (CFI) seems to be identified with more than one label in the data provided by UBC’s Office of Research Services, including “Infrastructure Operating Fund.”
Table 14  Top 50 agencies/programs funding research in Forestry, by department, in dollars, 2002-2003 to 2006-2007

<table>
<thead>
<tr>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research (Networks of Centres of Excellence)</td>
<td>1,649,786</td>
<td>3,703,031</td>
</tr>
<tr>
<td>Natural Resources Canada</td>
<td>1,025,385</td>
<td>2,811,491</td>
</tr>
<tr>
<td>British Columbia Ministry of Forests</td>
<td>942,847</td>
<td>1,989,884</td>
</tr>
<tr>
<td>Canadian matching funds</td>
<td>847,000</td>
<td>1,924,954</td>
</tr>
<tr>
<td>Forest Science Program</td>
<td>801,406</td>
<td>1,874,251</td>
</tr>
<tr>
<td>Discovery Grants Program – Individual</td>
<td>747,250</td>
<td>1,185,948</td>
</tr>
<tr>
<td>International Marketing Program</td>
<td>718,343</td>
<td>1,048,073</td>
</tr>
<tr>
<td>Canadian Forest Products Ltd.</td>
<td>585,930</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Woodflow Systems Corp.</td>
<td>316,050</td>
<td>863,778</td>
</tr>
<tr>
<td>Canada Research Chair Tier II (NSERC)</td>
<td>291,667</td>
<td>855,000</td>
</tr>
<tr>
<td>Slocan Forest Products</td>
<td>266,000</td>
<td>747,527</td>
</tr>
<tr>
<td>Dean of Forestry</td>
<td>244,780</td>
<td>601,500</td>
</tr>
<tr>
<td>British Columbia Knowledge Development Fund</td>
<td>218,000</td>
<td>472,241</td>
</tr>
<tr>
<td>Collaborative Research and Development Grants - Project</td>
<td>198,020</td>
<td>373,460</td>
</tr>
<tr>
<td>Standard Research Grants program</td>
<td>190,656</td>
<td>366,667</td>
</tr>
<tr>
<td>Forest Research Extension Partnership</td>
<td>190,500</td>
<td>342,500</td>
</tr>
<tr>
<td>Research Partnership Program</td>
<td>184,500</td>
<td>336,850</td>
</tr>
<tr>
<td>Organisation</td>
<td>Amount</td>
<td>Type</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>British Columbia Ministry of Forests and Range</td>
<td>180,030</td>
<td>Donation</td>
</tr>
<tr>
<td>lISAAK Forest Resources Ltd.</td>
<td>158,190</td>
<td>BIOCAP Canada Foundation</td>
</tr>
<tr>
<td>PP Systems Inc.</td>
<td>155,000</td>
<td>Dean of Forestry</td>
</tr>
<tr>
<td>Canada Research Chairs Infrastructure Fund</td>
<td>117,999</td>
<td>Collaborative Research and Development Grants – Project</td>
</tr>
<tr>
<td>Strategic Projects</td>
<td>101,700</td>
<td>International Forest Products Ltd.</td>
</tr>
<tr>
<td>New Opportunities</td>
<td>100,000</td>
<td>British Columbia Ministry of Forests and Range</td>
</tr>
<tr>
<td>Lignum Ltd.</td>
<td>87,920</td>
<td>Canada Research Chairs Infrastructure Fund</td>
</tr>
<tr>
<td>Environment Canada</td>
<td>86,436</td>
<td>British Columbia Ministry of Environment, Lands and Parks</td>
</tr>
<tr>
<td>Research Tools and Instruments - Category 1</td>
<td>76,200</td>
<td>Forest Genetics Council of British Columbia</td>
</tr>
<tr>
<td>Centre for International Forestry Research</td>
<td>75,025</td>
<td>Weyerhaeuser Canada Ltd.</td>
</tr>
<tr>
<td>BIOCAP Canada Foundation</td>
<td>74,050</td>
<td>Research Tools and Instruments - Category 1</td>
</tr>
<tr>
<td>Administration</td>
<td>61,875</td>
<td>Parks Canada Agency</td>
</tr>
<tr>
<td>International Environmental Institute</td>
<td>60,000</td>
<td>American Association for the Advancement of Science</td>
</tr>
<tr>
<td>Forest Practices Board</td>
<td>59,000</td>
<td>British Columbia Hydro International Ltd.</td>
</tr>
<tr>
<td>Aboriginal Research</td>
<td>57,801</td>
<td>Special Research Opportunity Program</td>
</tr>
<tr>
<td>Forintek Canada Corp.</td>
<td>50,000</td>
<td>Western Forest Products Ltd.</td>
</tr>
<tr>
<td>SSHRC/NSERC/CFS: Research Partnership Program</td>
<td>49,517</td>
<td>Research and Network Grants</td>
</tr>
<tr>
<td>Research Partnership Program</td>
<td>46,250</td>
<td>Johnson's Family Forest Biotechnology Fund</td>
</tr>
<tr>
<td>Forest Trends Association</td>
<td>40,703</td>
<td>Weyerhaeuser Canada</td>
</tr>
<tr>
<td>Organization</td>
<td>Amount</td>
<td>Organization</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>----------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>British Columbia Ministry of Water, Land and Air Protection</td>
<td>40,000</td>
<td>Canadian Forest Products Ltd.</td>
</tr>
<tr>
<td>Coast Information Team</td>
<td>37,433</td>
<td>Pacific Salmon Commission</td>
</tr>
<tr>
<td>Future Generations</td>
<td>28,091</td>
<td>New Opportunities</td>
</tr>
<tr>
<td>Exploratory Workshop Grant</td>
<td>25,000</td>
<td>Forestry Innovation Investment Research Program</td>
</tr>
<tr>
<td>Weyerhaeuser Canada Ltd.</td>
<td>25,000</td>
<td>GV Instruments Canada Ltd.</td>
</tr>
<tr>
<td>Parks Canada Agency</td>
<td>24,281</td>
<td>Slocan Forest Products</td>
</tr>
<tr>
<td>UBC Department of Forest Resources Management</td>
<td>20,697</td>
<td>Weyerhaeuser Co. Ltd.</td>
</tr>
<tr>
<td>Weyerhaeuser Co. Ltd.</td>
<td>20,003</td>
<td>Washington State Natural Resources Agency</td>
</tr>
<tr>
<td>British Columbia Ministry of Environment</td>
<td>20,000</td>
<td>Tembec Industries Inc.</td>
</tr>
<tr>
<td>Envision Sustainability Tools Inc.</td>
<td>19,250</td>
<td>Forintek Canada Corp.</td>
</tr>
<tr>
<td>UBC: Killam Faculty Research Fellowship</td>
<td>18,000</td>
<td>Government of Canada</td>
</tr>
<tr>
<td>Canadian Forest Service</td>
<td>15,000</td>
<td>Endangered Species Recovery Fund Research</td>
</tr>
<tr>
<td>Fisher Scientific</td>
<td>13,084</td>
<td>Fraser River Estuary Management Program</td>
</tr>
<tr>
<td>British Columbia Integrated Land Management Bureau</td>
<td>13,000</td>
<td>Discovery Grants Program - Northern Research Supplement</td>
</tr>
</tbody>
</table>

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The diversity of the funding sources, beyond the most important federal and provincial funding programs, is a striking characteristic of this faculty’s research funding profile, although one would need to compare Forestry’s situation to that of other units in the university to see whether this is common or unusual in the natural sciences. Nonetheless, the practical consequence of such diversity in the daily life of faculty members and staff – and in some cases of graduate students as well – is that, because each individual program and agency has its own requirements, forms, and agreements, the time and efforts invested by academics to gather their research funding have to be substantial. Researchers who benefit from large awards are not exempted. Jack Saddler and Frank Lam, for example, brought together respectively 32 and 38 different awards over the period of five years for which we have data in order to accumulate approximately $4 million (each) in research funding. For this period of five years, researchers receiving funds from more than 10 different awards were the norm rather than the exception, although some awards may be obtained from different sources but with a single proposal. It remains safe to say that the coordination efforts associated with research funding have to be an important aspect of researchers’ work.

As Figure 5 indicated earlier, most of the funding currently is provided by federal and provincial government programs and agencies. NSERC Discovery Grants are an important source of funding, but by no means the most important one. Natural Resources Canada and the B.C. Forest Science Program, for example, both distribute funds through a process that considers the scientific merit of the projects and investigators, but within a set of priorities which are decided upon centrally through processes that usually involves more than just scientific stakeholders. Programs like NSERC’s Strategic Projects also favour researchers who can gather the support of partners beyond the academic realm, such as government agencies and private organizations, although the partners in this case do not have to
contribute monetarily. Large forest companies, such as Canadian Forest Products (Canfor), Ainsworth Lumber, and Weyerhaeuser are among the most important private contributors to research funding in Forestry, along with organizations supporting or representing the industry such as Coast Forest and Lumber Association and Forintek (now a part of FPInnovations). Few funding programs and agencies seem to stand outside of government and industry spheres. Among the few exceptions, one finds the Gwaii Trust Society, Forest Trends, Future Generations, and the Center for International Forestry Research (CIFOR). A total of 70 private organizations (excluding industrial associations) were identified among the contributors to Forestry’s research funding. While, even aggregated, they may not contribute as much as, for instance, the provincial government, they represent a significant source of economic capital supporting research and, perhaps more significantly, an important source of social capital which may be legitimating the research work of Forestry in industrial circles. Such associations also are necessary conditions to other grants and awards.

To make further sense of Forestry’s sources and volume of research funding, I have used data from UBC’s Planning and Institutional Research Office for 2006. This dataset allows me to locate Forestry within the university as a whole and to compare its capital to that of other units.

Based on its demographic weight compared to the entire student population of UBC, Forestry placed 11th of 23 top-level units in 2006. It had, however, a slightly higher ratio of graduate to undergraduate students, placing the Faculty 8th within UBC. It also had more faculty members, with 52 full-time equivalent professors of any rank (excluding emeriti),

22 The number of top-level units changed in 2007 and 2008 following the integration of the School of Nursing into the Faculty of Applied Sciences and the disappearance of the School of Social Work. The last year for which there is a complete and reliable set of data available from PAIR’s web site is 2006. The Faculty of Graduate Studies has been excluded from the data of PAIR’s data due to its different role in the institution. The College of Health Disciplines was also excluded because, as of 2006, it remained in development, having only two faculty members but significant research funding.
lecturers, and instructors. Based on those numbers, Faculty of Forestry faculty members each obtained, in 2006, $22,519 on average in research funding. As we can see in Table 15, this places Forestry in second position, behind only Medicine as far as research funding per faculty member is concerned.

When considering only Tri-Council (CIHR, NSERC, and SSHRC) dollars, Forestry came fifth for total dollars as well as for Tri-Council dollars per faculty member. With $51,806 in Tri-Council funding per faculty member, Forestry remains outperformed by Pharmaceutical Sciences ($52,680), Science ($75,851), Applied Sciences ($77,519) and Medicine ($100,837). Except for Applied Sciences, those faculties rank highly on the scale of CIHR funding, which largely explains the difference with Forestry.

In 2006, 77 per cent of the Faculty of Forestry’s research funding came from non-Tri-Council sources, a proportion that is only exceeded by Architecture and Landscape Architecture and Journalism. Even in Applied Sciences, only 45 per cent of the research funding arose from non-Tri-Council sources. In Medicine, however, the proportion is similar to that of Forestry, at 71 per cent. For non-Tri-Council research funding, only Medicine faculty members, with $222,124 on average, surpassed Forestry faculty members, who each secured $170,713 on average from non-Tri-Council sources.
<table>
<thead>
<tr>
<th>Department</th>
<th>Total N of Faculty members</th>
<th>Sum of NSERC Dollars</th>
<th>Sum of Total Tri-Council Dollars</th>
<th>Tri-Council $ per Faculty</th>
<th>Non-Tri-Council Dollars</th>
<th>Non-Tri-Council Dollars per faculty member</th>
<th>Total of Research Funding</th>
<th>Total of Research funding per faculty member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Sciences</td>
<td>163</td>
<td>12 435 553</td>
<td>12 635 676</td>
<td>77 519</td>
<td>10 465 013</td>
<td>64 203</td>
<td>23 100 689</td>
<td>141 722</td>
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<tr>
<td>Arch and LS Arch</td>
<td>21</td>
<td>-</td>
<td>32 762</td>
<td>1 560</td>
<td>459 422</td>
<td>21 877</td>
<td>492 184</td>
<td>23 437</td>
</tr>
<tr>
<td>Arts</td>
<td>410</td>
<td>1 526 014</td>
<td>8 292 102</td>
<td>20 225</td>
<td>11 170 295</td>
<td>27 245</td>
<td>19 462 397</td>
<td>47 469</td>
</tr>
<tr>
<td>Audiology &amp; Speech Office</td>
<td>7</td>
<td>26 000</td>
<td>120 434</td>
<td>17 205</td>
<td>1 474 530</td>
<td>15 201</td>
<td>3 383 707</td>
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<td>1 909 177</td>
<td>19 682</td>
<td>2 001 394</td>
<td>60 648</td>
<td>3 663 142</td>
<td>111 004</td>
</tr>
<tr>
<td>Dentistry</td>
<td>33</td>
<td>42 600</td>
<td>1 661 748</td>
<td>50 356</td>
<td>2 001 394</td>
<td>60 648</td>
<td>3 663 142</td>
<td>111 004</td>
</tr>
<tr>
<td>Education</td>
<td>141</td>
<td>40 000</td>
<td>1 633 015</td>
<td>11 582</td>
<td>1 869 485</td>
<td>13 259</td>
<td>3 502 500</td>
<td>24 840</td>
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<tr>
<td>Forestry</td>
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<td>2 634 596</td>
<td>2 693 908</td>
<td>51 806</td>
<td>8 877 057</td>
<td>170 713</td>
<td>11 570 965</td>
<td>222 519</td>
</tr>
<tr>
<td>Human Kinetics</td>
<td>25</td>
<td>212 231</td>
<td>500 293</td>
<td>20 012</td>
<td>727 554</td>
<td>29 102</td>
<td>1 227 847</td>
<td>49 114</td>
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<tr>
<td>Journalism</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Land and Food Systems</td>
<td>43</td>
<td>1 568 544</td>
<td>1 886 752</td>
<td>43 878</td>
<td>2 879 432</td>
<td>66 964</td>
<td>4 766 185</td>
<td>110 842</td>
</tr>
<tr>
<td>Law</td>
<td>40</td>
<td>-</td>
<td>345 904</td>
<td>8 648</td>
<td>426 866</td>
<td>10 672</td>
<td>772 770</td>
<td>19 319</td>
</tr>
<tr>
<td>Library, Arch. Info. St</td>
<td>11</td>
<td>-</td>
<td>20 000</td>
<td>1 818</td>
<td>27 081</td>
<td>2 462</td>
<td>47 081</td>
<td>4 280</td>
</tr>
<tr>
<td>Medicine</td>
<td>505</td>
<td>1 156 614</td>
<td>50 922 865</td>
<td>100 837</td>
<td>112 172 714</td>
<td>222 124</td>
<td>163 095 578</td>
<td>322 962</td>
</tr>
<tr>
<td>Music</td>
<td>29</td>
<td>-</td>
<td>63 816</td>
<td>2 201</td>
<td>15 500</td>
<td>534</td>
<td>79 316</td>
<td>2 735</td>
</tr>
<tr>
<td>Nursing</td>
<td>45</td>
<td>-</td>
<td>1 877 715</td>
<td>41 727</td>
<td>1 635 934</td>
<td>36 354</td>
<td>3 513 649</td>
<td>78 081</td>
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<td>Pharmaceutical Sciences</td>
<td>36</td>
<td>109 810</td>
<td>1 896 498</td>
<td>52 680</td>
<td>4 713 021</td>
<td>130 917</td>
<td>6 609 519</td>
<td>183 598</td>
</tr>
<tr>
<td>Rehab Sciences</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Scarp-Plan</td>
<td>11</td>
<td>-</td>
<td>148 672</td>
<td>13 516</td>
<td>108 654</td>
<td>9 878</td>
<td>257 326</td>
<td>23 393</td>
</tr>
<tr>
<td>Science</td>
<td>373</td>
<td>23 472 440</td>
<td>28 292 268</td>
<td>75 851</td>
<td>28 376 661</td>
<td>76 077</td>
<td>56 668 930</td>
<td>151 927</td>
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</tbody>
</table>
In 1980, a President review could criticize Forestry’s poor research standing and in particular its apparent inability to secure funding from NSERC (Smith, 1990). This is no longer the case as of 2006. Compared to their peers within UBC, Forestry faculty members secure a fair share of funding from specifically scientific sources (such as NSERC) at the same time as funding from other sources. The reliance of Forestry faculty members on non-Tri-Council sources of funding for its research activities may at once be a blessing and a curse. With such a diversified funding base, Forestry researchers are less dependent than their colleagues of Science and Applied Sciences on the fortunes of a single federal government program. On the other hand, it makes some of Forestry’s activities dependent upon the health of the economy as a whole, as the sums that the forest sector is likely to invest in university research usually shrink during periods of financial turbulence. Moreover, a large part of the provincial funding for research comes from stumpage revenues, which are prone to dramatic fluctuations. Sudden growth of the forest industry due, for example, to a change in trade relations between Canada and the United States can bring rapid growth to the Faculty of Forestry, as was experienced with the Forest Renewal B.C. program. While the chairs’ endowment remains today, albeit contracted by poor returns and by the global crisis of the financial market, the rest of the FRBC program was shut down without much prior notice, severely curtailing research activities and, as we will see later in this chapter, causing a sharp decrease in Forestry’s capacity to support graduate students. At the time of writing this dissertation, there are signs that the Forest Science Program, which was recently bringing as much as one million a year in research funds, is going to be deeply transformed. It is even unclear whether the provincial government will distribute the funds that were granted in multi-year awards. Such uncertainty seems to be a feature of forest research in British Columbia, and occasionally jeopardizes the Faculty of Forestry’s capacity to maintain some of its research activities and to financially support graduate students.
In the past and present, the provincial and federal governments have sought to stimulate forest-related research when the industry’s business hit cyclical lows or other structural difficulties. Were such difficulties, which currently reach historic levels, to persist in the long term instead of being replaced by a new upward phase, and governments to lose faith in their capacity to earn revenue from forests and the taxation of forest workers, the Faculty of Forestry would likely become challenged to again redefine its funding base.

The relatively generous flows of research funding into Forestry are first and foremost perceived as economic capital. They represent, however, much more than that, as funding also incorporates social, cultural, and symbolic capital. Research funds, with the exception of Tri-Council dollars intended for curiosity-driven, “discovery” research, incorporate social relations with other academic and also non-academic agents who are called upon to support the research proposals submitted by faculty members or, on occasion, approach researchers themselves with their problems. As we have seen, Forestry does not necessarily receive large amounts of private funding, but it comes from an extended network of companies and organizations, most of which are industrial. Such social relations are also a vehicle for cultural capital, such as research problems, resources that are used or borrowed by researchers for their work (equipment, land, chemicals, etc.), and operational knowledge. The symbolic capital attached to research funding also cannot be neglected, although its currency can only be assessed in relation to a specific field. In the strictly defined scientific field, capital – whatever its form – coming from organizations and agents for which the primary stakes are not those of the scientific field may be worthless, or even may lessen the value of the cultural production that results from the use of such non-scientific resources. On the other hand, for agents in the forest sector, seeing industrial actors supporting research activities might increase the currency of the resulting research.
Discussion

Forest research in British Columbia developed in three different institutional locations at approximately the same period: in the 1920s, a department of Forestry was created at the University of British Columbia, the federal government created the Western Forest Products Laboratory to serve industry, and a research branch was developed within the provincial forest service. The necessary momentum for the creation of a corps of researchers who would work on forest problems, but remain one or more steps removed from day-to-day forest operations, was provided by a two-sided realization: that timber could provide abundant wealth to the population of British Columbia and support the development of its infrastructure, but that the province would have to manage its assets more wisely to provide long-term revenues. The data presented in this chapter has shown that UBC Forestry, the B.C. Ministry of Forests, and FPInnovations, which is the inheritor of the WFPL, despite the differences inherent to their organizational specificity, remain related today. There are some reasons to believe that, along with the Pacific Forestry Centre of the Canadian Forest Service\(^\text{23}\), they form the provincial field of forest research, and belong to a broader, worldwide network of organizations which share a common concern for research on forests.

While they may have interests in common, the organizations located within the field of forest research are also shaped by the dynamics of their respective organizational setting. In the case of the Faculty of Forestry, belonging to a university entails responsibilities relative to the education of students as well as some specific expectations with regards to research funding and scientific production which makes work in universities different, to some degree, from work in government or industry. One of the particularities of universities

\(^{23}\text{Few private companies in British Columbia still conduct forest research.}\)
in the field of forest research is that they are responsible for the training of all researchers, including those who will eventually find employment in the private or public sector.

How autonomous is the Faculty of Forestry in setting the conditions in which it will train graduate students to become researchers? The data we have presented in this chapter reveals that Forestry researchers and graduate students are located in a space which is, to some degree, shaped by forces beyond its reach, but there are also hints that they might be, in return, shaping the social space beyond the boundaries of the Faculty.

The heteronomy of the Faculty of Forestry as a research training environment arises mostly from the sources of funding that are mobilized to support research activities, including the salaries of graduate students as research assistants. As we have seen, individual “Discovery” grants from NSERC are an important source of funding, but they represent only 7 per cent of the total research funding for Forestry research activities, and barely 11 per cent even when including funding from the Canada Research Chairs program. Nearly all of the other sources of funding on which Forestry faculty members depend to conduct their research are, in some way, “strategic,” in that they are more or less closely tied to the priorities and objectives of stakeholders from the policy and/or industrial spheres. As we will see later, the degree of freedom of researchers in the execution of such research varies, and in most cases it can hardly be said that those priorities are forced onto them. In fact, the next chapter will explore how some Forestry researchers may be active participants in the elaboration of such priorities and contributing to shaping the demand for strategic research.

The Faculty of Forestry publicly presents itself as embracing, not resisting, problems that emerge beyond the field of research itself. Through its web site, its Branchlines newsletter, and its events, such as the faculty-wide seminars and the Celebrate Research Week activities, Forestry shows a concern for problems that matter for political, economic,
environmental, or social reasons. The problem may have been translated into terms which are understandable within the boundaries of a discipline, allowing for the publication of articles beyond forest-specific journals. Yet, the stakes remain recognizable to outside, non-academic agents who may have an interest in the resolution of the problem, and who occasionally collaborate with academic researchers, as evidenced by their signature alongside that of Forestry faculty members on peer-reviewed articles. The problems may even be accessible to the general public, and suitable for discussion in mainstream newspaper articles.

The position of researchers in the UBC Faculty of Forestry is neither that of an entirely autonomous scientific community of forest researchers setting its own research priorities without regard for the issues affecting the forest sector more broadly, nor that of a valet to the combined interests of government and industry. Rather, university forest researchers might be carving a space for themselves in which currency from the scientific field and from the forest sector can be combined to improve their position within the field of forest research.

The programs that directly or indirectly support graduate student involvement in research partnerships with non-academic organizations, which I have described in chapter 2, were conceptualized as heteronomous layers added to attempt to re-shape the traditional scientific training of graduate students to research. In the case of the heteronomous field of forest research, however, would the entire research-training environment be of a different shape? I will explore this possibility empirically in the next two chapters, first by examining who are the agents involved in the reproduction of forest researchers in the Faculty of

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24 In fact, in the case of the forest sector, policy-makers can very well be considered to be part of industry, as the provincial government has a direct interest – due to stumpage and taxation revenues – in the health of forest companies.
Forestry in chapter 5, and then by analyzing the position-takings and trajectories of the graduate students themselves in chapter 6.
Before I started fieldwork in UBC’s Faculty of Forestry, in the spring and summer of 2007, I went through what more experienced researchers will probably recognize as a typical case of “field fright.” Having conducted dozens of interviews in the context of previous research projects, I was already familiar with the milder condition I call “interview fright.” In the latter, the interviewer, as she waits for the next participant to arrive, secretly and shamefully hopes for a no-show that would save her from having to ask questions to a stranger about his or her life. Field fright, because of the higher stakes implied by multiple months of regular contact with a community of informants, lends itself to more anxiety-generating questions. What if I can’t create rapport with key informants? What if I unwittingly land in the middle of an ongoing power struggle? What if they collectively turn against me? Will I embarrass (or even endanger!) myself with a lack of outdoors skills? I inventoried possible problems and brainstormed reasonable ways to respond if my work was challenged. I read books about how informants talk back to researchers. I wrote and rewrote the details of my procedures on the ethics review forms. I knew I had gone too far in planning for the worst – and perhaps overly impressed by the sharpness of some wood-working tools – when the Behavioural Research Ethics Board advised me to “consider the legal implications of research that could jeopardize the safety of the participants by something as trivial as the observer not remaining quiet.” Forty-five interviews and many hours of observation later, I am glad to report that no graduate student fell into a veneer peeling lathe as result of my study. I even came through as helpful in the forest one time. When meeting new people and describing my research objectives – which to me were obviously different from those of the researchers and students I spoke with – I was often asked who in Forestry supervised me. To
many, I must have looked just like any other Forestry graduate student. On the other hand, the lack of drama resulting from my presence in the field was somehow disappointing at first: did I “go native” too easily? Did I miss something?

As I analyzed the material collected and wrote successive versions of this dissertation, I came to realize that the fact that I did not experience an outsider clash, or even just mild resistance, as a social scientist in the Faculty of Forestry was actually a finding. I already pointed out in my discussion of Forestry’s faculty research seminars in the previous chapter that I never witnessed anyone or anything being challenged for failing to belong, and myself or my work were no exception. Of course, certain individuals may have entertained silent thoughts about the silliness of my research questions, or about the relevance of one of their colleague’s research interests. Nevertheless, the fact that over 18 months I have not directly or even indirectly encountered such open criticisms (of myself or others) indicates that the definition of who belongs to Forestry is a broad one. If anything, I heard that the focus of forest research should be broader and make more room for problems that emerged in the wider world.

In this chapter, I will introduce the individual agents who are most directly involved in the reproduction of the field of forest research: the faculty members of the Faculty of Forestry and their research students. Among the faculty members, a special category – the adjunct professors – will be presented in some detail, as they represent \textit{a priori} an obvious source of heteronomy in the training of graduate students. As I describe the career trajectories and previous experiences of those forest researchers, established and in-training, it will become increasingly clear that what the inclusion criteria defining who and what belongs to the Faculty of Forestry and thus to forest research is very wide. Furthermore, I will show that agents come to Forestry with a mix of capital accumulated in the scientific field and in the
forest sector, which then form the base on which their forest research habitus will further develop. There is not a single right balance of the two types of capital. Instead, the multitude of possible combinations of the two further increases the diversity within Forestry and in the broader field of forest research.

**Faculty members**

**Profile of the Forestry faculty body**

In 2007-2008, according to UBC’s Planning and Institutional Research office data, the Faculty of Forestry had 51 full-time equivalent faculty members, which represents 2.4 per cent of UBC’s total number of faculty members (2,152). The only smaller faculties were Dentistry, Land and Food Systems, Law, and Pharmaceutical Sciences. However, a headcount based on the Faculty of Forestry’s 2007 annual report (covering the 2007-2008 academic year) shown in Table 16 reveals that there are 62 individuals at one of the following ranks: assistant, associate, or full professor, lecturer, and instructor. The difference between the number of full-time equivalent faculty members and the headcount is explained by the fact that one’s professor’s appointment is supported by the Canadian Wildlife Service while others are jointly appointed with other departments within UBC. Two are jointly appointed with Civil Engineering, two with Geography, one with the Institute for Resources, Environment, and Sustainability, four with the Faculty of Land and Food Systems, one with Landscape Architecture, one with Mechanical Engineering, one with the Michael Smith Laboratories and Botany, and one with Sociology.

There are very few women among the faculty members in Forestry. As shown in Table 16, slightly more than a third of faculty members in the department of Forest Sciences are women but in Forest Resources Management and Wood Science there are respectively only one and two women. They are scattered at all ranks among the professoriate. The UBC
Planning and Institutional Research office, because it considers only full-time faculty members in establishing the proportion of women in the Faculty of Forestry, arrives at an even lower tally, with only 15.7 per cent women. This count makes Forestry the faculty with the lowest proportion of women on campus, although the Sauder School of Business, with only 17.2 per cent, is a close second.

Table 16  Male and female faculty members in the UBC Faculty of Forestry, by department, 2007-2008

<table>
<thead>
<tr>
<th>Position</th>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>Instructor, Lecturer or other</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Assistant professor</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Associate professor</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Full professor</td>
<td>1</td>
<td>9</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>22</td>
<td>8</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: 2007 Annual Report, Faculty of Forestry

Table 17  Country of Ph.D. of UBC Forestry faculty members, by department

<table>
<thead>
<tr>
<th>Country of Ph.D.</th>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada (UBC)</td>
<td>8 (5)</td>
<td>14 (9)</td>
<td>6 (4)</td>
<td>28 (18)</td>
</tr>
<tr>
<td>USA</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>UK</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Europe</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Australia /New Zealand</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No PhD</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>22</td>
<td>17</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: 2007 Annual Report, UBC Faculty of Forestry

Consistent with the generally recognized requirement for faculty members across universities in North America, all regular faculty members, except those holding instructor positions, have a Ph.D., which they have received sometime between 1970 and 2003. Table 17 shows the distribution of faculty members based on the country of their Ph.D. Almost half
were earned in Canadian universities, and of those 18 were from UBC, making its faculty body approximately 30 per cent inbred\textsuperscript{25}, although not all of those who received their Ph.D. at UBC did so in the Faculty of Forestry. Faculty members who did not earn a Ph.D. in Canada did so in the United States (18), in a country of the Commonwealth (seven in the United Kingdom, one in New Zealand, and one in Australia), or in Europe (France, Germany, and Switzerland). The country of Ph.D. on its own is a limited indicator of diversity, as it reflects only one stage, albeit an important one, of a researcher’s socialization. Nevertheless, the fact that half of Forestry’s faculty members were at least partially foreign-trained increases the distance between those forest researchers and the province’s forest sector, which is more anchored in the immediate geographic area due to ecosystem-specific constraints.

To capture the diversity of scientific expertise present in Forestry, I used the online profiles of faculty members posted on Forestry’s web site. The posted profiles were integrated into the qualitative database and coded to identify clusters of themes. The profiles of emeriti faculty members were included for the purposes of this analysis, yielding a total of 69 profiles. Table 18 presents the clusters of themes.

\textsuperscript{25} There is no definitive study assessing the proportion of faculty members who obtained their Ph.D. from the institution that employs them, but 10 to 20 per cent seems like a reasonable estimate to many. Professional schools (law, medicine) are thought to have a higher proportion of inbred faculty members. At 30 per cent, Forestry would be on the higher side, but not particularly exceptional.
Table 18 Clusters of themes observed in UBC Forestry faculty members’ profiles

<table>
<thead>
<tr>
<th>Cluster (number of mentions)</th>
<th>Examples of themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disciplines (43)</td>
<td>Biology and variants; Engineering; Economics and variants; Physics.</td>
</tr>
<tr>
<td>Values (18)</td>
<td>Conservation; Sustainability; Quality.</td>
</tr>
<tr>
<td>Products of the forest (17)</td>
<td>Wood; Wood products; Materials; Forest products; Timber.</td>
</tr>
<tr>
<td>Forest management (12)</td>
<td>Forest management; Silviculture; Measurement; Nutrition.</td>
</tr>
<tr>
<td>Methods and techniques (12)</td>
<td>Modeling; Visualization; Planning; Biometrics.</td>
</tr>
<tr>
<td>Forests for production (6)</td>
<td>Forest operations; Forest inventory; Logging; Growth and yield.</td>
</tr>
<tr>
<td>Object of research other than tree-specific (6)</td>
<td>Birds, Mammals, Fish, Wildlife, Plants</td>
</tr>
<tr>
<td>Policy (5)</td>
<td>Forest policy; Environmental policy; Governance.</td>
</tr>
<tr>
<td>Business (4)</td>
<td>Globalization; Commerce; Trade; Economic development.</td>
</tr>
<tr>
<td>People (3)</td>
<td>Public participation; Public perception; Aboriginal; Communications.</td>
</tr>
<tr>
<td>Scale of study (16)</td>
<td>Landscape, Stand, Ecosystem.</td>
</tr>
</tbody>
</table>

The focus of most faculty members implies human intervention in the forest or some other related part of the environment, or use of the forest’s products by humans. In some cases, the purpose of research is to improve aspects of timber harvesting procedures through research (and possible intervention) at the pre-harvesting, operations, and post-harvesting stages. In other cases, the focus is on the transformation of forest products – wood in particular – and on the use of the resulting wealth. “Forest management” is often mentioned, although the aims of management activities are usually left implicit. Indeed, the goals of management can be varied: whereas “managing for timber” might have been the first meaning of the expression, one can now manage the forest to improve wildlife habitat, or to increase the yield of other forest products such as mushrooms for example. What is clear (and probably obvious to those in the field) is that humans can – and must – intervene in forests with the goal of improving them, and that intervention should benefit humans, or at least prevent losses.

Some faculty members’ research interests show a specific concern for “conservation,” which implies an ethical commitment to slow down or halt the loss of biological diversity,
especially that caused by humans. Again, this implies that humans can and/or have to somehow intervene to reach some goals. In itself, conservation is not incompatible with human wealth, and actually it is often argued that it is necessary to wealth. However, one can easily imagine that tensions can emerge between conservation goals and production goals, tensions which one could expect to see reflected in the everyday research work of forest researchers.

Whether researchers describe their research interests in the vocabulary of production or conservation, it remains remarkable that the research problems they mention in their profiles are, for the most part, easy to understand from a non-scientist’s point of view. The problems Forestry faculty members tackle are connected to values and problems located outside of the narrowly-defined scientific field and recognizable as such. This observation does not take away from the complexity of Forestry’s research problems. In fact, an often-heard Forestry saying goes like this: “Forestry is not rocket science. It’s a lot more complicated!” What it does mean, however, is that problems are not translated in scientific terms beyond the point of recognition by non-researchers and laypersons.

This does not mean that Forestry faculty members are unable to speak in science-specific terms. Indeed, looking further down in their individual profiles, one can easily see that the technical vocabulary typical of scientific discourse is also used, and that faculty members’ work is recognized as scientific through its publication in peer-reviewed journals. Table 19 offers a random sample comprising of approximately 10 per cent of the articles published in the 2007-2008 academic year, for the most part published in scientific journals.
Table 19  Random sample of Forestry faculty members’ publications, 2007-2008

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Year</th>
<th>Journal</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haley, D. and H. Nelson</td>
<td>Has the time come to rethink Canada's crown forest tenure systems</td>
<td>2007</td>
<td>Forest. Chron.</td>
<td>83(5):630-641</td>
</tr>
<tr>
<td>Lyons, C.K. and K. Day</td>
<td>Biodegradable roads. UBC Faculty of Forestry Newsletter Branchlines</td>
<td>2007</td>
<td>18(2):10-11</td>
<td></td>
</tr>
<tr>
<td>Mimura, M. and S.N. Aitken</td>
<td>Increased selfing and decreased effective pollen donor number in peripheral relative to central populations in Picea sitchensis (Pinaceae)</td>
<td>2007</td>
<td>Am. J. Bot.</td>
<td>94:991-998</td>
</tr>
</tbody>
</table>


Thus, Forestry’s faculty members operate on two different planes: they choose problems closely tied to the challenges facing the forest sector, plainly describing them as such, yet at least part of the output of their work on those problems is conveyed in a manner
that is suitable for scientific publications. Such publication practices may result from their socialization as researchers through the doctorate. But where does their capacity to identify forest-sector problems come from?

Part of the explanation for the prevalence of practical problems among Forestry faculty members’ research interests might reside in their career trajectory. Indeed, it seems like spending significant time outside of the academic realm is a common preamble to faculty careers. Based on an analysis of the faculty members’ curriculum vitae submitted for the 2006 “self-study” report of the Faculty, as many as 61 per cent of the full-time faculty members in the Faculty of Forestry – 34 of the 56 for whom a c.v. was available – had worked for at least three years outside of academia prior to taking their position at UBC. They had worked in a government agency somewhere in Canada (10 out of 56 or 18 per cent), in the private sector (either in a company or as a full-time consultant; 25 of 56 or 45 per cent), and/or in either a non-government organization or a foreign government agency (9 of 56 or 16 per cent). Some faculty members had worked for more than one type of organization. Table 20 shows the breakdown by department.
Table 20  UBC Forestry faculty members with at least three years of non-academic work experience

<table>
<thead>
<tr>
<th>Type of organization</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forest Resources Management</td>
</tr>
<tr>
<td>Government agency in Canada</td>
<td>5</td>
</tr>
<tr>
<td>Private sector (including consulting)</td>
<td>9</td>
</tr>
<tr>
<td>NGO or foreign government</td>
<td>5</td>
</tr>
<tr>
<td>Sub-total of faculty members with at least 3 years of non-academic work experience*</td>
<td>14</td>
</tr>
<tr>
<td>Total N of faculty members with available CV</td>
<td>20</td>
</tr>
</tbody>
</table>

Source: Curriculum vitas collected prior to the 2006 external review of the Faculty
* Some faculty members were employed in than one type of organization.

While each department had a significant proportion of its faculty members with such prior non-academic work experience, the department of Forest Sciences was perhaps the most traditional in the sense that only 35 per cent (7 of 20) of its full-time faculty members at the time of the external review had such prior non-academic work experience. Five of those seven had worked in the private sector. The two other departments, however, had more numerous connections in the non-academic world: 70 per cent of Forest Resources Management faculty members had prior non-academic work experience, including nine individuals who worked in the private sector. In Wood Science, even more had non-academic work experience, which in most case (11 of the 13 out of 16) was from working in the private sector.

I also counted the number of faculty members who reported having performed at least three mandates as consultants for non-academic organizations, such as governments or companies from the private sector. The curriculum vitas did not indicate the dates of such mandates and it is impossible to know whether they were conducted while on faculty or
previously. Surprisingly, a lower proportion of faculty members – only 24 out of 56, less than half – reported such experiences in their c.v. Consistent with the trend for non-academic work experience, the faculty members from Forest Resources Management and Wood Science were more likely to report consulting activities, as shown in Table 21. Based on anecdotal evidence, I suspect that the proportion of faculty members actually performing consulting mandates is probably higher, but under-reported.

<table>
<thead>
<tr>
<th>Department</th>
<th>At least 3 consulting mandates</th>
<th>Total N of faculty members with available CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Resources Management</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Forest Sciences</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Wood Science</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>56</td>
</tr>
</tbody>
</table>

Source: Curriculum vitas collected prior to the 2006 external review of the Faculty

The data on Forestry’s regular faculty body demonstrates that, although they are located within the academic setting of a major research university, and perform regular scientific duties such as publishing articles in peer-reviewed journals, they are also intimately connected with the outside of the so-called ivory tower. The problems they work on reflect those that organizations and individuals of the forest sector, and society more generally, are confronted with. Although to some degrees the problems are translated in terms of a discipline or another, they are still very much recognizable. Based on a survey of Forestry’s faculty members’ professional trajectories, it seems unlikely that those research problems are imposed upon them by outside granting agencies or contract collaborators, as most of the faculty members themselves have had significant work experience outside of academia and have most likely encountered those problems in their own careers.
One could still think, based on the evidence that I have presented, that those faculty members that worked outside of the academic setting for a number of years did so out of necessity, while they were waiting for a faculty position to become available. While this scenario may apply to some, I have accumulated significant evidence about the articulations of their careers to know that their trajectories are in fact much more nuanced. In the following section, I will examine a few faculty members’ careers more closely.

**Career trajectories**

When I selected the groups that would become part of my study, I was not aware of the high proportion of Forestry faculty members who had significant non-academic work experience. It is something I was only able to measure near the very end of my research. I had heard through the grapevine that some fields, such as engineering, were increasingly hiring assistant professors with industrial experience, but it did not occur to me that it would be happening in Forestry.

This assumption was of course wrong as far as UBC Forestry is concerned. I cannot say whether the high proportion of professors with non-academic work experience is the result of a conscious strategy on the part of departments. The end result is that all of the faculty members that I have interviewed about their role as supervisors of graduate students have had at least three years of non-academic work experience prior to entering their professorship. Had I known what I know now, I would have tried to include in my sample at least one or two faculty members with little to no work experience in government or the private sector, and hopefully future research will overcome this limitation of my work. Nevertheless, even among the seven faculty members I interviewed about their role as supervisors, the kind of career trajectories they had, as well as the resulting types and volume
of capital they had accumulated, were sufficiently different to shed some light on faculty career articulations.

It is difficult to strike a proper balance between telling a compelling story and protecting the anonymity of my research participants, who live and work in a small social world. The faculty members may not be very worried about being identified by readers, but as most of them also supervised the graduate students whose experience I will discuss later in this chapter, special care had to be exerted to maintain the confidentiality of those more vulnerable participants. Readers of this dissertation will, I hope, forgive me for sacrificing colourful anecdotes and sticking to a more generic narrative as I strive to maintain my commitment to research participants.

Although we may often think of an assistant professorship (proceeded or not by years as a post-doctoral fellow) as the beginning of an academic’s career, there is in effect much diversity among entrants. None of those that I interviewed had jumped into a faculty position at the end of a linear, uninterrupted schooling trajectory. However, some did join the academic ranks at a relatively early point in their career, when they had only (relatively) little scientific capital accumulated, while others came as established researchers, sometimes even having held other academic positions previously. The faculty members I interviewed were no longer at the very beginning of their career, thus that stage was discussed retrospectively during the interview.

Both the volume and the source of the faculty members’ scientific capital at the time of hiring varied. At one end of the spectrum were those who started their career below the grade of assistant professor: they were hired to teach as instructors before or soon after finishing their Ph.D. and were – it seems – found good enough at the task of educating Forestry undergraduate students. Holding a bachelor of forestry themselves – as was the case
for most of those in this category – perhaps helped. One emphasized how much he enjoyed student contact:

    It was really when I began to work on teaching that I realized that maybe that was the real call. (...) As much as I was enjoying the consulting, and enjoying the science, the teaching was really a lot of fun. (Prof. Nick Rhoda, 276-282)

    While they might have first been hired on the basis of their teaching, showing “promise” as a researcher was thought to have been important, and they knew that they needed to deliver in that regard to secure a tenure-track position. Interestingly, none of them did a post-doctoral fellowship, but they deployed other strategies to develop their research portfolio. When asked how he could get his research production going while teaching a heavy load, Prof. Loughran mentioned collaboration with other researchers:

    What I learned fairly early on, which is advice I would give to anyone entering a university position, is to collaborate as much as possible and work with people. Yes, you won’t be the lead investigator on this project, but you’ll do some work and you’ll get your name on a publication and you will maybe get a grad student or something. You cannot all of a sudden start a research program. I found the path of least resistance to be to find people that had similar interests and latch on. Just work with them. That was my strategy, which has seemed to work. (Prof. Kurt Loughran, 771-782)

    Another young professor, who spent a number of years doing consulting work after earning her Ph.D., also managed to accumulate enough scientific capital – in the form of publications – to be eligible for a faculty position:

    As a consultant (...), I was lucky to end up with projects that were scientific projects, so I could publish. And I insisted on those, and I published enough that when this position opened I had enough publications to be current, so I could be competitive for a position like this. (Prof. Maribel Nocera, 572-577)

   26 Numbers following the pseudonym of the participant quoted refer to line numbers in the qualitative database.
The career of those professors who were hired at a time when they were still junior researchers reflects the dynamics expected of a professional school. They were predominantly trained in a school of forestry (or in another school of applied sciences) at the undergraduate and graduate level, and sometimes had become certified as Registered Professional Foresters (RPF) over the course of their career. Their professional credentials and teaching experience, however, did not release them from the obligation to publish in peer-reviewed scientific journals, which were perceived as important conditions to meet in order to earn tenure as faculty members.

At the other end of the spectrum were the researchers who came to faculty positions in Forestry with much heavier scientific baggage. After obtaining their university degrees in an uninterrupted sequence in a disciplinary field (for instance, biology), these individuals held entry-level, often temporary academic positions for a short time, but eventually those ended (under various circumstances). While one says that his short stint as a lecturer turned him away from university positions, pushing him into the open arms of a government research organization, another just found a government research position conveniently available at a time when academic doors seemed closed. In both cases, one position led to another and eventually they found themselves in charge of a team of researchers, albeit at different levels of seniority. Whether or not publishing in scientific journals was a requirement of their positions or something they did out of their own volition is unclear, but it does seem that their position of responsibility in a government research organization allowed them to increase their scientific output and more generally their scientific capital. As circumstances changed in their respective organizations, they found themselves looking for a new position again and encountered an opportunity at the Faculty of Forestry. Unlike their
above-mentioned junior counterparts, they may have had some teaching experience, but it did not constitute an important aspect of their career prior to being hired as a faculty member.

Overall, it seems that the “admission fee” to the professoriate in the Faculty of Forestry requires a significant amount of specifically academic capital (teaching experience) or of specifically scientific capital (as demonstrated by publications in particular), but not necessarily a lot of both. Younger individuals with demonstrated teaching ability may be “given a chance” as long as they show some potential as researchers; presumably the university retains the capacity to deny them tenure if they fail to perform as hoped. More mature individuals may be recruited on the base of their demonstrated scientific credentials, which at this stage of their career may include the capacity to lead a team of researchers. The latter experience is perhaps seen as transferable to the supervision of graduate students.

Whether or not the potential to teach undergraduates plays an important role in the hiring decision for faculty members at this level of seniority, I cannot tell. It is also likely that there are exceptional young researchers with little to no teaching experience who were hired shortly after obtaining their Ph.D., however I did not encounter any as part of my study.

The faculty members I interviewed also brought some volume of capital acquired in the forest sector, which they acquired in different ways and times. For most of the faculty members who were hired as junior researchers, forest-sector experience actually came before their Ph.D. As I have mentioned, they had earned a bachelor and sometimes a Master’s degree in applied sciences – most often in a school of forestry – which they put to use on the non-academic job market. Their position did not necessarily involve research, but they became familiar with the problems that mattered to the forest sector and thus to the field of forest research. They also became acquainted with individuals and organizations active in forest research. The motives that pushed them to “go back to school” and earn research
degrees are varied. One simply pursued a Ph.D. in a research area closely related to her work in a forest-related government agency because, she says, “Isn’t it fun?” (Prof. Eugenia Bjerke, 50). Another, who worked in forest research for a few years, disliked his work environment and starting a Ph.D. was the way out. A third one, who worked in a more operational context, was finding his management-oriented job too narrow. At the time, he was hoping to become a sought-after consultant who would develop and share the expertise needed to tackle frustrating operational problems he had encountered in the field. At a different moment in the interview, he mentioned to me that, for an inherently curious person, working in industry can have dampening effects:

Maybe that’s why my colleagues in industry are less than inspirational as mentors, or less inspirational than they could be as mentors, because maybe their little lights aren’t burning as strongly, or they have gone out. Because being in the positions they are in, trouble-shooting a lot, they are not doing much research anymore. (...) I think that puts out the light pretty fast if you come in as a scientist. (Prof. Nick Rhoda, 1252-1258, 1260-1261)

Despite the frustrations encountered in the forest sector, none had the intention – at least initially – to break with it. They insist they undertook a graduate degree without any thought of becoming a professor. One participant even noted that he had to be coaxed into applying for an open position, as he was still holding on to his dream career as a consulting expert, which also had the potential to be more lucrative and less stressful than a faculty position. Yet, partly because of their teaching skills, they sooner or later found themselves to have become assistant professors. In the next chapter, I will show how their social relations and cultural knowledge acquired in the forest sector would become important in the constitution of their research program and in particular in the alignment of topics and resources as they advanced in their fledgling faculty career.
The more experienced researchers who were hired as faculty members – who were initially trained in a fundamental scientific discipline – did not have the same direct contact with the forest sector as their colleagues with an education in forestry or applied sciences. Until they became faculty members, they had spent most of their time in a government agency doing forest or forest-related research, where their contacts with the production-oriented forest activities were limited or mediated through their organization’s clear research mandate. Compared to those hired as junior researchers, they had many more years of experience working in the non-academic job market. However, those years were spent doing research, supervising other researchers, and, to some extent, publishing scientific papers, activities that were not so different from what they were doing now as faculty members.

These observations on the career trajectories of Forestry faculty members highlight the limitations of a framework simply dividing the world in two: academic and non-academic environments. Conceptualizing the field of forest research as a social space at the intersection of the forest sector and of the scientific field allows me to better understand the continuities and breaks in the trajectories of agents. Indeed, I am discovering that for forest researchers the transition from a non-academic work environment to an academic environment, and vice versa, may not constitute a radical break. Furthermore, it provides me with a way to account for the value of capital acquired by agents in the scientific field and in the forest sector, which both have currency in the field of forest research.

I will pursue this demonstration on the relative integration of the academic and non-academic worlds of forest research in the next section as I introduce adjunct professors.

**Adjunct professors**

Early in my fieldwork period, I became intrigued by adjunct professors. Who were these people, what was their role, and why did they do it? According to the 2007 Annual
Report, there are 38 of them in the Faculty of Forestry. As far as I know, they all hold a full-time position elsewhere, but are accepted as members of a Faculty of Forestry department, which allows them to co-supervise graduate students as long as a regular professor acts as a co-supervisor. Their names occasionally surfaced in the e-mail messages announcing M.Sc. defences or final doctoral examinations. That people who were not full-time university professors would dedicate some of their time to the supervision of graduate students could be interpreted in two ways. The cynical assumption was that, as representatives of government or of the private sector, they were using graduate students as “cheap labour” to conduct research projects at low cost. A more charitable interpretation was that adjunct professors and other non-academics involved in the supervision of graduate students in fact were professeurs manqués. I thought that they perhaps wished they had become professors themselves, and that occasionally supervising graduate students allowed them to maintain a part of their habitus, satisfying the instinct to reproduce the field they were trained in. It thus set out to find out more about adjunct professors, a quest that revealed itself more difficult than I hoped, as I will discuss below. Some general data was however easy to gather.

Of the three departments, Forest Resources Management has the most adjunct professors, and their primary affiliations are the most diversified, as shown in Table 22. The department of Forest Sciences also has many, but almost all of them are employed in the provincial or federal forest service. Wood Science has fewer adjunct professors compared to the other two departments, and four of them are employed by Forintek (now FPInnovations). All adjunct professors hold a Ph.D., except for two in the Forest Resources Management department, both of whom have a Master’s degree.
Table 22  Primary affiliation of adjunct faculty members, by department, UBC
Faculty of Forestry, 2007-2008

<table>
<thead>
<tr>
<th>Organization</th>
<th>Forest Resources Management</th>
<th>Forest Sciences</th>
<th>Wood Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC Ministry of Environment</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>BC Ministry of Forests and Range</td>
<td>4</td>
<td>7</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>BCIT</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Canadian Forest Service</td>
<td>3</td>
<td>6</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Canadian Wildlife Service</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CIJBC World Markets Inc</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Consultant</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Environment Canada, Adaptation &amp; Impacts Research Division</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fisheries and Oceans, Canada</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Forestry Department, FAO/UN</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Forintek</td>
<td></td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>International Centre for Research in Agroforestry, Mozambique</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>J.S. Thrower &amp; Associates</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Tongji University</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>WWF Canada</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>15</strong></td>
<td><strong>6</strong></td>
<td><strong>38</strong></td>
</tr>
</tbody>
</table>

Source: 2007 Annual Report, UBC Forestry

While adjunct professors have supervisory privileges in theory, whether they use them in practice is another matter. I analyzed the notice messages sent by the Faculty of Forestry’s graduate program assistant ahead of every Master’s thesis defence or final doctoral examination. A total of 87 notices were sent between June 11th, 2007 and April 28th, 2009. In 13 of the 87 cases (14.9 per cent), there was at least one adjunct professor (based on the 2007 Annual Report lists) on the examining committee, although not necessarily in the position of
“co-chair of the supervisory committee.” Three adjunct faculty members served twice over the period, so a total of 12 out of 38 adjunct professors – almost one in three – were involved in the final examination of Master’s theses and doctoral dissertation over the last two years. Of the twelve, five were affiliated to the BC Ministry of Forests, three to the Canadian Forest Service, and two to Forintek, while the last one was a consultant. I have recorded anecdotal evidence that at least sometimes adjunct professors are involved in the daily supervision of graduate students but do not participate to the defence as an examiner, a matter that would warrant further investigation. Conversely, there are also individuals who are not adjunct professors who serve as examiners. Over the same period, I noted 12 more examiners who were indicated to belong to either a government agency or a private organization. As synthesized in Table 23, 23 of the 87 defences announced, or slightly over one in four, had at least one non-academic or adjunct professor as an examiner.

Table 23 Presence of adjunct faculty members and other non-academics at Master’s defences and doctoral final examinations, UBC Faculty of Forestry, 2007-2009

<table>
<thead>
<tr>
<th></th>
<th>Master’s degree</th>
<th>Doctoral degree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjunct professor</td>
<td>12</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Other non-academic</td>
<td>10</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Total defences with a non-academic</td>
<td>21*</td>
<td>2</td>
<td>23</td>
</tr>
<tr>
<td>Total N of defences</td>
<td>64</td>
<td>24</td>
<td>88</td>
</tr>
</tbody>
</table>

* There was one defence with an adjunct professor and another non-academic.

Finding adjunct professors to interview was a challenge. True to my study’s design, I asked to the faculty members who headed the groups I studied to put me in touch with their non-academic collaborators, which in some cases included adjunct professors. Perhaps I did not insist enough, but I was not successful at recruiting adjunct professors that way, either because the faculty members’ collaborators did not respond to their colleague’s request or because the request was never made. I eventually turned to the Associate Dean of Graduate
Education and Research who accepted to send a message to a small group of adjunct professors, asking them to participate to my study. She put me in touch with only five, but all of them responded promptly and positively to my request for an interview. Whether this means that the Associate Dean chose the keenest among the Faculty’s adjunct professors, or that they are trying to please the Associate Dean by being compliant, or that they find it important to help a graduate student (me) conducting research on the topic of graduate education – or a combination of the three – I will never know, but I was grateful for their participation. Time constraints seemed generally more pressing for adjunct professors than they were for regular faculty members; on the other hand, they were very prompt to revise and return the transcripts of the interviews. Over all, the adjunct professors I contacted and interviewed gave me the impression that supervising graduate students was a part of their work that they cared about and enjoyed, and were happy to talk about with an outsider. It is possible that the recruitment method skewed my sample but despite its obvious limitations the resulting data offers novel insight into the world of adjunct professors.

Examining these adjunct professors’ professional trajectories allowed me to identify some of the conditions of possibility that allow one to become an active participant in the supervision of graduate students. The adjuncts that I interviewed all earned a Ph.D., including two who received their terminal degree from the UBC Faculty of Forestry. Also, and as did the regular faculty members I interviewed, they did not start in their academic functions immediately after graduating. Except for one who had held operational positions in the forest sector for some time before undertaking graduate degree programs and later taking on a research position, they spend their entire career in the field of forest research, in which conducting and eventually in some cases managing research was their primary occupation. Their primary purpose, however, is not to publish papers in scientific journals; some of them
actually insisted that publishing peer-reviewed articles was really just “gravy,” something that was well-regarded in their work environment but definitely not a requirement, and also that many of their colleagues did not do so. Their responsibility is rather to perform the research needed by the organization employing them (or by the organization’s clients), and to report the results in various ways which are internal and support the mission of their stakeholders. This adjunct professor summarizes it well:

As the scientist role, I'm supposed to identify issues that are out there in the market place, sort of proactively identify issues or listen to the industry’s issues, design, determine what science might be able to address those issues, design the experiments, sometimes bring in the money to allow us to do the work. Interpret the data, write up the reports, usually, provide those two, the funding agency or the industry, and ultimately if, if the work is worth publishing, which many times it isn't in my view, although a lot of people would publish it, and they do, I publish the good stuff - we will publish in refereed journals. (...) The industry is impatient for the results, and is limiting with how much money it will expend on it. So one can often design the ultimate experiment, but more often than not our experiments don't cover off all the variables that we'd like to and it's very rare that we're ever able to repeat our experiments. (...) We don't really want to be publishing one-off results. (Adj. prof. Gordon Greenwald, 36-46; 50-57)

Those with management responsibilities also were less likely to be conducting the research themselves, instead supervising the research work of others:

I manage about, internally and remotely, ten people, and what that means is that it's a lot of day-to-day stuff around funding and human resourcing and people's holidays and sick days, all that stuff, you have to look after that, and just in terms of managing the research that's just typically ongoing in terms of providing feedback on what research activities are being undertaken and assisting when we get to various turning points when decisions need to be made, in terms of what needs to get done. On top of that, there would be people like students or research associates that may be located at a university that also require feedback and then I'll spend some time interacting with them on a (...) periodic basis, if I haven't heard from them, or pretty much right away if I hear from them. (...) You really never have one big block of time to do one thing; it's always this whole range of activities getting done simultaneously. (Adj. prof. Lester Mortenson, 29-45)
The adjunct professors did say, however, that they tried to publish peer-reviewed articles on a regular basis; a bibliographic search reveals that they all published at least a few articles in recent years, often with UBC researchers as co-authors.

The circumstances in which they started to collaborate with UBC Forestry researchers and eventually became involved in the supervision of graduate students vary. For the two adjunct professors who obtained their degree from UBC, it seems that collaboration followed their completion of the Ph.D. As they took research positions, they kept in touch with regular faculty members and opportunities for joint work arose. The adjunct professor who earned his Ph.D. after a few years of operational work noted that the doctoral degree did not change much to his work, but changed his relationship with the academic world:

It doesn’t change much in my job [to have a Ph.D.] (...) [My employer] values it to a certain extent but if I had just carried on in my job with a Master’s degree everybody would have been happy. It certainly changes things in the broader academic community, because you get more respect.

*From the academic people, you mean?*

It makes a difference to them. I probably wouldn’t be doing all this stuff with UBC if I just had a Master’s degree. (Adj. prof. Lewis Heimann, 159-168)

Two of the other adjunct professors somehow “inherited” the relationship with UBC Forestry researchers as part of their job: when they started to work, there were already collaborative links established between UBC Forestry and their organization, and it was part of their work to participate in a number of joint endeavours. In some cases, the UBC researchers were in fact former employees of the adjunct professors’ organization, although off-hand comments indicate that it did not necessarily promote harmonious collaboration. In one case, the adjunct professor and the full-time faculty member have known each other from meeting at a conference in their field many years ago, and the circumstances eventually allowed them to develop joint research projects. It is interesting to note that in some cases the
regular faculty members with whom adjunct professors collaborate were hired in part thanks to the financial contribution of the adjunct professors’ organization, or at least that a significant portion of the regular faculty member’s research funding comes from the adjunct’s employer. One adjunct professor even directly participated in the hiring process. The adjunct professors also occasionally jointly write grant proposals with their full-time counterparts, for the Forest Sciences Program for example. There are thus deep and enduring organizational and personal ties linking some adjunct professors to researchers from the Faculty of Forestry.

There are, of course, many non-academic researchers who collaborate with faculty members without becoming involved in the supervision of graduate students. The exact circumstances in which adjunct professors become committee members for graduate students were difficult to pinpoint and, when I asked them about it, they did not have a ready-made answer to my question. Basically, “it just happened.” On top of their head, they do not know exactly how many students they were involved in supervising over the course of their career, which indicates that it is not an activity that they are evaluated for by their employing organization. Nevertheless, when probed a bit further, most of the adjunct professors revealed that the initiative usually came from the academic side, and that they were sought for their scientific expertise in the specific topic the student was going to work on:

A professor had a student whose interests matched the stuff I was doing. Or they knew about my work. (...) I think it was one of those situations where the student was interested in pursuing similar studies to the kind of things that I’ve done in the past. That’s how I got started. (Adj. prof. Lewis Heimann, 175-183)
If it’s a project that I’m involved in and I have particular insight that I can bring, I’ll be invited, but I don’t go asking for it. (...) I’m busy already. If I can go ahead and meet the deliverables and the agreements that we have on particular projects and I don’t have to be involved, that’s fine too. I’m not looking to ingratiate myself into the different committees. But I do enjoy being on them and when I am on them I make sure to give a solid effort so that the student has an improved experience from having me involved. (Adj. prof. Lester Mortenson, 171-181)

Probably my scientific interests and background, very little of it because of my managerial responsibilities, other than because I can move things around and make things happen (...). But, when all is said and done: are these interesting problems that serve us, that are of value to [our organization] and the program and the research questions that graduate students can do a good job on, and if it’s in [my specific area of scientific expertise]. (Adj. prof. Hector Pitzer, 136-151)

The relative role of the adjunct professor within the supervisory committee varies. It seems that, in many cases, adjunct professors play the role of a committee member, deferring to the authority of the full-time academic as the primary supervisor who recruits the students and “calls the shots.” Outside of committee meetings, they will only communicate directly with the student if their expertise is specifically needed and, as one adjunct professor mentions, will send copies of the email conversations to the supervisor.

Sometimes, adjunct professors have a different approach, in general or in the specific context of one student’s supervision, playing the role of a primary supervisor. In one case, this appears as an anomaly in the adjunct professor’s career. Until now, he had only sat on committees, but because of a combination of technical and social reasons pertaining to the nature of the research project he thought should be conducted by a graduate student, he ended up co-supervising the student himself with a regular faculty member appointed as the other supervisor, whose role was mostly to make sure that UBC’s requirements were met. An advertisement was posted, a few candidates were interviewed jointly by the co-supervisors, and one student was chosen for the task, which will be carried for the most part at the adjunct
professor’s place of work. As a result, he has a much closer supervisory relationship with the student, which he models after his relationship with the rest of his staff. “I’ve learned how to manage a group of researchers, within this organization, and I hope that those similar skills are going to work for students,” he adds, noting that he has found the Faculty of Graduate Studies’ bulky Handbook of Graduate Student Supervision useless for him. With some humour, he says:

The problem is that I don’t know what’s missing, I don’t know what I’m not doing, and that works until I make a mistake or we get to a point where the student is going home crying or something, I don’t know, “What the hell did I do or not do?” That’s the worrying thing. (Adj. prof. Gordon Greenwald, 171-181)

One adjunct professor is also closely involved with graduate students although not necessarily as an official co-supervisor. The students will usually come to his place of work to conduct their fieldwork, and he will accompany them in the field a number of times to help them set up their data collection. He takes advantage of those opportunities to multiply the informal conversations, during which he may bring the students to think about the implications of their research in the context of policy and forest practices in the province. The communication mostly is one-on-one with the student, and does not transit via the supervisor:

If something comes up, something important that may affect their program or something, then I’ll write an email to them with a cc: to their supervisor so that everybody knows what is going on. But most of the stuff is just... chatting. Chatting is important. (Adj. prof. Lewis Heimann, 593-597)

Another adjunct professor has been regularly involved as a primary supervisor for a number of years. He takes one or two students at a time, recruiting – often internationally – with the support of advertisements and word-of-mouth among his colleagues, and gets funding from an NSERC Discovery grant to support them. Due to his adjunct status, he must have a regular faculty member of Forestry assigned as the co-supervisor; while so far he has
had good experiences with his UBC colleagues, he seems mildly annoyed at the fact that he has to seek someone else’s signature to supervise students or apply for NSERC funding. Supervising students allows him to learn more on topics that interest him but that are not of direct importance to his organization; if they were critical projects, they would be assigned to the professional staff on his team. “The student projects are more experimental, exploratory.” (Adj. prof. Vernon Hoefer, 403-404)

Why do they do it? Adjunct professors report that supervising graduate students is not officially part of their job description and that while it may be regarded positively it is not specifically encouraged by their organization. They could nonetheless identify some benefits that they incurred personally as well as from an organizational standpoint.

A chief benefit of student supervision for adjunct professors is the contact it allows them to have with enthusiastic young people:

First, I get to interact with young people which, if you work in [my organization] is getting to be pretty rare these days. (...) New ideas and energy and all that. And they challenge you, they are asking questions. Just the interaction, being challenged by young people and seeing them get really excited and interested in a topic, and do well on it. That’s a lot of fun! It’s very satisfying. (Adj. prof. Lewis Heimann, 383-392)

Interactions with academics in general are also seen as a benefit:

I just like having the interaction with the faculty members and hearing what the student has really gathered, what they feel is the state of the art. Or they might discover something new that you might not have come across yet yourself, or the other faculty member might have a suggestion that is quite unique and helps you look at something a little bit differently. That, I think, is my main benefit. (Adj. prof. Lester Mortenson, 237-244)

The social capital they get from maintaining such ties to the academic world, as we can see from the above comment, is closely tied to the new cultural capital that can be acquired in the process in the form of new knowledge. When asked to define a successful
collaboration involving a student, this adjunct professor explained how having a student dedicating himself or herself to one topic could bring important new light to his work:

If the student comes to me with stuff that I would have never have thought of in a million years [that’s wild success]. And that’s what I’m hoping for out of this. Because [our organization] has to please (...) all people all the time, I can’t spend long on anything. And chances are I’m missing all sort of stuff because I’m just not spending enough time. By getting somebody that can go deep into that area, hopefully they [the students] are doing to come back with something that I would just have never even considered. Or (at least) they are just going to come up with information that I can interpret. (Adj. prof. Gordon Greenwald, 498-511)

Whether or not the adjunct professors earn symbolic capital in their organization because of their supervisory activities is hard to tell. However, four of the five whom I interviewed mentioned that, in their immediate work environment, few of their peers, despite having a Ph.D. and collaborative ties with university researchers, did as much supervision work as they did. Their supervisory activities can be seen as a mark of distinction, an activity that sets them apart. The fact that their commitment to students is disinterested – there are few organizational rewards attached to supervision – adds to its symbolic power.

I did not directly ask adjunct professors whether they would have preferred to find a position in academia after their Ph.D. but many of their comments led me to believe that, whether it was their intention originally or not, these individual researchers are satisfied with their current position and have adopted a habitus that is aligned with their organization. The fact that most of them have a formal management role supports this. Nonetheless, through their connections with faculty members and their role in training new researchers, they keep on earning value from the specifically-scientific capital they had acquired during their own years as researchers-in-training.
As far as their organization is concerned, however, the adjunct professors did not perceive that the benefits were quite as compelling. The most commonly shared view was that careers in non-academic research organizations were not well-known to graduate students in Forestry and thus that their work as committee members or co-supervisors exposed the students to career alternatives and gave them the opportunity to ask questions. Two of the adjunct professors reported that former students of their own or of one of their colleagues had been hired by their organization following graduation. In terms of possible knowledge transfer, however, the perspectives were less obvious. From the adjunct professors’ point of view, the work performed by graduate students was interesting because it was more fundamental than what they would normally do themselves, but for that same reason it was also not of any immediate consequence for the organization. As mentioned earlier, really important or urgent work would be delegated to paid staff. There are, however, information needs that graduate students can help fulfill, and they may bring more enthusiasm and autonomy to the task than a technician would. Furthermore, two adjunct professors noted that, under the current economic circumstances, their organization does not allow them to hire new researchers. Collaboration with academics, including graduate students and post-doctoral fellows, allows them to have access to research which they would have been able to support with internal resources. Finally, for those who belong to collaborative project involving significant funding from their organization to UBC researchers, participation to student committees is just another way to make sure that the direction of the research is consistent with the intention of the provider of the funds, and to learn from the research itself. According to one adjunct professor, however, the amount of efforts required to fulfill this function is misunderstood by his organization’s higher administrators:
[Our organization] gives a lot of money to universities for research, and the expectation is that the research will have relevance and there might be some involvement. But the involvement [the organization] would prefer would be to give the money, go to a few meetings, make sure the work is on the right way and come back to take care of business here. But it does take a lot of time [which is only nominally rewarded]. (Adj. Prof. Hector Pitzer, 403-410)

Extending from the perspective of adjunct professors, it is not the graduate students who are “cheap labour” for the organization. Rather, it is them – the non-academic researchers who accept to participate to the supervision of students – who are working for rewards that are cultural, social, and symbolic, but not economic. There is evidence that their employing organizations are benefiting, mostly indirectly, from the process and outcomes of their supervisory work. But, for those adjunct professors, commitment to the training of Forestry graduate students seems to be a way to maintain their connection to the more autonomous region of the field of forest research, pursuing their scientific habitus vicariously through their students’ work. In so doing, they also expose students to broader range of possible trajectories within the field of forest research, increasing the volume of non-specifically academic cultural and social capital of the students and perhaps extending the students’ habitus in a way that would not have happened if the students had not had an adjunct professor on their supervisory committee.

However, one may wonder what would be the impact of the context in which partner organizations are cutting research budgets and relying more on their collaborations with academics to pursue new knowledge. If outside organizations increasingly count on universities for research that responds to pressing needs, are the adjunct professors’ expectations of their graduate students going to remain as low as they claim? Closer participant observation which would allow more access to supervisory interactions and to the exchanges between the various supervisors would provide greater insight on this question.
Graduate students

Research on graduate education and graduate students usually makes very little of the students’ background, as if they joined their graduate program as blank slates ready to be shaped into the same mould as their supervisor. Based on such a model, one could think that, knowing how Forestry faculty members and adjunct professors carry heteronomous forces within themselves, the students necessarily would follow suit and become in turn carriers of heteronomy. Such an assumption would fail to take into account the students’ previously formed habitus, which in many cases already embeds the results of a combination of scientific and forest-sector experiences. How the two will influence the students’ futures while in the program and after will be discussed in chapter 6. In this section, after an overview of the Forestry graduate student population, I will examine individual trajectories in greater detail.

While the numbers of Forestry undergraduate students have remained stable or decreased over the years, usually remaining between 500 and 600 since the mid 1990s, the graduate student population has grown steadily, except in the early years of the current decade (Figure 6). Interestingly, as can be seen in Figure 7, the decrease of the early 2000s is associated with a sharp reduction in the number of male students which did not affect female graduate students as much, allowing them to represent, for a short period, as much as 46 per cent of graduate students. Normally, however, the proportion of female graduate students hovers between 30 and 40 per cent.

A characteristic of the Faculty of Forestry is its high number of international students. Based on data from Forestry’s annual reports, the proportion of international students climbed from 36 per cent in 1991-1992 to 43 per cent in 2003-2004. According to the web site, the proportion of international students is now of 52 per cent, with students originating
from 38 different countries. The method of accounting for international students may explain the difference between the 2003-2004 numbers from the annual report and the web site figure. Many students from abroad obtain permanent residency status partway throughout their program and thus may no longer be counted as international students by some measures.

**Figure 6  Graduate students in Master’s and Ph.D. programs, 1991-1992 to 2007-2008**

Source: Compiled from Faculty of Forestry Annual Reports
Figure 7  Graduate students, by sex, 1991-1992 to 2007-2008

![Bar chart showing graduate students by sex and year](chart.png)

This makes the UBC Faculty of Forestry the biggest venue for the training of graduate students in Canada. According to the data of the Association of University Forestry Schools of Canada, with more than 250 graduate students in 2006-2007, as can be seen in Figure 8, UBC Forestry has consistently had more researchers-in-training than all other forestry schools, except for Université Laval’s Faculté de Forsterie et de Géomatique in 2003-2004. In the meantime, most other faculties experienced stable enrolments, with the exception of the University of New Brunswick.
Figure 8  Graduate students at AUFSC member schools, 2000-2001 to 2006-2007

Some data on graduate student funding is available in the annual reports for years 1991-1992 to 2004-2005, which allows us to understand better the economics of graduate education in Forestry. As Figure 9 shows, the funding from graduate teaching assistantships (GTA) has remained relatively stable over the years, while scholarship-based funding fluctuates greatly from year to year. The source of funding that increased the most over the years is graduate research assistantships (GRA), \textit{i.e.} funding based on faculty members’ grants or research contracts. As we will discuss in chapter 6, this balance of funding sources directly impacts the research work of graduate students.
On a per-student basis, there is a clear increase in available funding, as in 1991-1992 funding was $7,285.89 per graduate student while the last year for which data is available, 2004-2005, saw per-student funding climb to $14,059.23, nearly double the figure from 13 years earlier. In the same period, the inflation of goods and services was of approximately 26 per cent according to the Bank of Canada’s Consumer Price Index. In other words, and assuming an (unlikely) equal distribution of funding, the purchasing power of Forestry graduate students, as an aggregate, has increased over the years. However, tuition fees have also doubled over the period, increasing from $1,847 per year to $3,712 (UBC Planning and Institutional Research, n.d.), erasing a significant portion of the gains for students.²⁷

²⁷ For part of the 2000s decade, UBC offered new doctoral students a tuition waiver for the first four years of their program, which would have made a difference for Forestry Ph.D. students in 2003-2004 and 2004-2005. It no longer applies to new Ph.D. students as of September 2008.
The graduate students of the Faculty of Forestry do not join their research-training program as uninitiated neophytes, raw material waiting to be shaped into whatever form their professors model them to adopt. They all join their Forestry graduate program with some academic capital resulting from previous education – in Forestry or elsewhere – and an at least a partially formed habitus linking them to a professional or disciplinary culture. Moreover, many have work experience, either in an academic setting or in the forest sector, which contribute to their accumulated capital. Taking into account the students’ previously accumulated capital is essential to understand how they take positions during their research-training program and beyond it.

**Accumulated capital and previous layers of habitus**

*Education and credentials*

Even if in some cases it was ten or twenty years ago, all of the graduate students that I interviewed have earned a Bachelor’s degree prior to starting their graduate education at UBC. In the case of most Ph.D. students, they also previously earned a Master’s degree, or met the requirements to transfer halfway through a Master’s program into a Ph.D. program. I was surprised to find students in the Ph.D. program who confided in me – under the promise that they would remain autonomous – that they had previously done significant work toward, or even obtained, another Ph.D. somewhere in the world before starting over at UBC, a situation of which their supervisors were aware but that had not necessarily been pointed out in their admission documents, as some stigma seems to be attached to the idea of going through the doctoral process twice. One student has earned a diploma in forest technology, a program in the course of which he says he learned a lot about the “how” but very little of the “why” of forest practices, a limitation that further studies in a university forestry degree program allowed him to overcome.
Among the current and former students that I interviewed, Bachelor’s degrees in forestry or forest engineering were most common, closely followed by variants of biology and ecology degrees. I also encountered a student with engineering background, and there are no doubt others in the Faculty. While I encountered some students who are doing social research, only one had a degree from a social science discipline among my interviewees.

Of those students who are Canadians, most have obtained their Bachelor’s degree from UBC (7 of 12) while the others graduated from the University of Victoria, Simon Fraser University, Université Laval and University of Toronto. All of the international students had obtained their first credentials from one of their national universities, except for one student who held a joint-degree after participating in an exchange program.

Many graduate students confessed that their previous academic life had not always been stellar. Playing music, engaging in sports, or other pursuits had been a priority over their undergraduate years, which impacted their grades and caused a bit of concern when they sought admission to the program. Feeling that they were lacklustre students might have barred higher academic aspirations, and for some it was the active intervention of their would-be supervisors that caused them to discover Master’s program as a real possibility for them. For example, one student, who after a Bachelor’s degree in biology found work as a laboratory technician, was dissatisfied with what she perceived as a dead-end job. She happened to meet with a Forestry professor who thought she would make a good graduate student:

She told me, “You should come and do your Master’s with me.” So I said, “But I have pretty bad grades.” She said: “We can figure stuff like that out.” So I quit my job and now I’m here. (...) It turns out that I actually had enough grades to get in, with the required four courses over 80 per cent or whatever. But my average is quite low overall. (Mallory, 94-97; 417-419)
Another student seemed to take for granted that he would proceed to a graduate program after his Bachelor’s degree, but realized toward the end of his undergraduate years that his “B average wasn’t going to impress grad schools” (Julio, 343-344), so with the help of a family friend who was also an academic he tried to accumulate more experience as a research assistant. While such experiences helped him get a foot in the door of the Faculty of Forestry, his grades remained a liability that he had to plead his way through:

There was some consternation about my grades, they said my grades weren’t high enough to be admitted, but they actually were! It was just an issue of translating the numbers. You need a 80 per cent average to get into Forestry, and I had that, but it was recorded as a B- average on my transcript. At UBC, B- is much worse than 80 per cent. So I told them, “No, I did get 80 per cent, it’s just not called the same thing at my university.” Anyway, it was hard for me to get into the Faculty. (Julio, 444-452)

Somehow, this student pleaded his way into the Master’s program and his “bad grades” are now behind him, in part thanks to his ease at “playing the system” acquired through life-long contacts with academics. For students who are less familiar with the North American academic system, however, “bad” grades can represent a much costlier obstacle, in particular for international students without familiar credentials who are not quite meeting the admission requirements for the Master’s program. Neil, a forest engineering graduate from a developing country, had been lucky enough to find lucrative work straight out of school despite only doing what he needed to pass his courses. But, applying to UBC, he was hit by academic exigencies when trying to start a Master’s degree in Forestry: he had to spend a year as an unclassified student to earn the required grades, a stressful, expensive, and risky endeavour as he had to pay full international tuition fees without certainty as to whether he would make it into the program the next year. While he is about done paying the financial price of his undergraduate grades, he is still, he says, paying the price academically: “There are some things that I’m still not good at. I’m not a born academic” (Neil, 596-597).
“Bad grades” are not forever, and some of the more mature students were both quick to admit that their initial performance in college was poor, but that they were outperforming many of their younger peers when they made their academic comeback later in life. A student who had initially been rejected from a UBC undergraduate degree program based on a poor showing in college was determined to “show them” how well he could do when he returned later on as a transfer student. Another student whose grades were “not the best” and who failed a few classes several times during his Bachelor’s degree, Max, was encouraged by his employer to seek further training to improve his career prospects. He signed up for a few courses as an unclassified student, taking it as “a stepping stone in one direction or another: either it isn’t for me and I’ll seek another career, or I enjoy this and want to continue the process” (Max, 286-291). He surprised himself by doing extremely well even if he was the “old guy” in the class and continuing his full-time job. Max was approached by one of his teachers, a newly recruited faculty member, to be her first graduate student. Accepting my suggestion that he was an academic late-bloomer, he concluded: “Maybe I just matured” (Max, 319).

If some describe the reasons for their poor undergraduate performance in terms of lack of dedication for which they made up later on, other do not perceive themselves to have changed much, but rather to be in a more suitable environment now. One student admits that he was not very “teachable” and has little tolerance for being supervised by others. His undergraduate research experiences were dotted with conflicts with his academic supervisors, but as a graduate student he seems to now be thriving, even taking an assertive role in complex collaborative research projects.

Interestingly, when “bad grades” were mentioned, they were always earned in programs outside of Forestry. Once in the Faculty of Forestry – either at the undergraduate or
graduate level – the students I interviewed did occasionally report being challenged, but not failing or poor performance. I did not, however, seek to verify this. It could be the case that undergraduate students in biology and related fields often experience a very competitive climate due to the struggle, among a number of their peers, for a limited number of seats in medical school. Thus such students may perceive their grades as low (compared to their most competitive peers) even though by other standards their academic standing may be normal or even high.

A few of the graduate students have also acquired academic experience abroad prior to undertaking their graduate degree. This is mostly the case, however, for those who came to Forestry’s graduate program as international students. Among domestic students, only one spoke of an experience studying abroad, which he describes as a turning point that made him more critical of forestry practices in British Columbia. Among international students, having had previous experience studying abroad is more common, with half having gone on exchange as high school or undergraduate students.

The previous educational experiences of Forestry graduate students earned them cultural capital in the shape of degrees. While some of these degrees were earned in the Faculty of Forestry – allowing the students to get to know the faculty members who could later become their supervisors, a precious form of social capital – for many others the degrees were from disciplinary rather than professional areas within the university, such as biology. One could think that the currency of such degrees would be higher for symbolic reasons, as they are more fundamental areas of study, and thus easier to convert into access to prestigious graduate programs. However, those students with biology degrees, when they were trained in Canada, often perceived that their grades were lower than their peers, placing them in a weak position to compete for positions in either medical school or graduate programs in the life
sciences. Forestry – and perhaps in particular the Wood Products Processing program – might see more of its undergraduates hit the job market after graduation, leading to a relative scarcity of graduate students compared to the research needs of faculty members. The available capacity can then be filled with students from the biological sciences, or offered to international students.

**Work experiences**

I have shown earlier in this chapter that the majority of faculty members have had significant professional experience outside of academia at some point prior to their appointment as a faculty member in Forestry. The graduate students they supervise are very much the same, bringing a rich baggage of work and even professional experience to their new program. Many of them also have noteworthy scientific research experience.

University research experience

Roughly half of the students that I interviewed came to their Forestry graduate program with some prior research experience in the academic sector, which contributed in many ways to their capital accumulation. Those experiences were of various kinds: some students had been research assistants as undergraduates – usually in biology and/or chemistry – while others had previously been registered in other graduate degrees (whether they completed them or not). Two had held faculty positions at foreign academic institutions.

Such research experiences allowed the students to accumulate some form of cultural capital which directly supported their new position. Besides the degrees they earned (for those who already completed a research-based Master’s degree) and the skills they developed (collecting data, conducting experiments, writing, learning to use software, etc.), the students also, in some cases, created some scientific infrastructure for themselves, which they brought into their next degree program. For example, one international student now in the doctoral
program is using plots that he established during his Master’s degree research at a different institution, and while his project does not directly build on the findings of the previous study, he no doubt is advantaged by his past experience. Another student who was previously a research associate in a large, international project will use the data she collected in the past to complement her doctoral research, and also has access to data collected by peers worldwide. Not all students are able to transfer the gains of previous work into their current endeavours, but for those who can it is definitely an advantage.

The social capital gained through prior research experiences also may contribute to the current position of the Forestry graduate students. Former research supervisors may have written letters of reference, facilitating admission into the graduate program. In other cases, the previous supervisor played a crucial role in introducing the student to a colleague at UBC. This was the case, among others, for two international students whose supervisors had connections with Forestry faculty members through international organizations, journal editorial boards, or past conferences. In some of the cases encountered, the now-graduate student had started to work with the supervisor as an undergraduate research assistant, a period of trial which had resulted into a longer-term commitment in the form of a Master’s program. Later, it turned into a doctorate. Perhaps more subtly, a student’s knowledge of “who’s who” in his or her field may prove valuable when discussing with potential supervisors.

There are no reports that would allow me to believe that past academic work experiences are a direct source of economic capital. However, some international students in developing countries benefited from the material resources available in their place of work in the process of applying to their UBC graduate program (computer and access to the Internet).
The above-mentioned forms of social and cultural capital may also have been instrumental in earning economic and symbolic capital in the form of scholarships.

Forest-sector experiences

The majority (approximately two-thirds) of the graduate students I interviewed had accumulated some work experience in the forest sector. At the very least, they had worked for forestry or forest products companies in the context of co-op placements during their undergraduate degree; in a few cases, they had been employed for over a decade in the private sector, government agencies, or non-government organizations, in Canada and abroad. A few students were still employed full-time as they pursued their graduate degree, with the support of their employer.

Appraising the cultural capital that might have been gained from work experience is difficult, particularly when such an experience is discussed retrospectively. There would be, no doubt, plenty of knowledge that the now-graduate students would have acquired in order to function within non-academic organizations. When asked for details about what they did in their work life, most participants offered generous explanations about the organization(s) they worked for, the roles and responsibilities they held, the activities of their daily lives, and the challenges they faced. Furthermore, prompted as often as not, they complemented their narratives with opinions about the greater context of the organization they worked with/for and sometimes also about the state of the forest sector more generally. Exceptions to this trend concern some students who spent no more than a few months in a non-academic organization, and also international students who were less fluent in English. The latter were less likely to provide a high level of detail unless they were prompted with very precise questions.
A few of the students with forest-sector work experience not only *acquired* knowledge in the context of their work but also *created* some, as they worked as researchers or consultants in the private sector, government agencies, or non-government organizations belonging to the field of forest research. Through such work, they practiced designing research projects, seeking funds, collecting data, reporting findings in written or oral reports, attending conferences, and/or collaborating with other researchers who were sometimes located in an academic setting. None of those, however, reported being regularly involved in publishing articles in scholarly journals, and presenting at scholarly conferences seems to have been exceptional, although not entirely uncommon.

Work experiences also allowed the graduate students to accumulate some social capital through contacts with co-workers, clients, and collaborators. Some students seemed very mindful of the importance of such contacts and were keen to tell me the names and roles of many of the people they had been in touch with over the course of their career. Most, however, were somewhat reserved in the interview context with regards to their social network, and I usually did not probe them much on this topic to avoid being perceived as invasive. Whether or not such social capital proved relevant in the context of the students’ graduate research varied greatly. In one case, it was directly influential, as the student’s immediate superior in the workplace became a committee member in the Master’s program, while a past academic collaborator became his supervisor. Others, in particular those who worked in the field of forest research, maintained collaborative ties with former colleagues or collaborators as well, within academia and beyond. But in many cases the social capital previously acquired became dormant: while it would perhaps be activated later on when they would return to the job market, it did not appear to be on top of the students’ mind at the moment. In one case, the student had actually severed ties with former colleagues through her
decision to return to school, which left some at her former place of work bitter. As she promised herself never to return, she did not regret the loss.

Previous employment can also have allowed the student to accumulate economic capital, often a condition of possibility for returning to school. Only one student referred to the savings he has accumulated during his working years. Four students, on the other hand, maintained employment in a related field throughout their studies, which were directly tied to the subject of their thesis or dissertation; in three cases, they also maintained their full salary over the course of their studies. Jacob mentions that he might be one of the “best funded grad students in Canada” (Jacob, 183-184), which seems like a fair statement. In one case, however, financial difficulties caused the employer to curtail the funding arrangement that the student had initially been promised, putting him in a precarious and anxiety-generating situation that still lacked a solution at the time of the interview. The economic capital associated with previous employment, in one case, turned out to be more of a liability than an asset for one student. Having enjoyed a privileged lifestyle in a developing country thanks to an exceptional professional situation, the student initially suffered from the necessary lifestyle adjustment upon arrival in Canada. The drastic shrinkage of his purchasing power caused him much stress.

Did such previous experiences also bring symbolic capital? While this was not explicitly discussed in the interviews, one would think that having years of experience in the forest sector would add to one’s authority and credibility when researching a given issue. For example, students with many years of experience working with international NGOs might be taken more seriously when submitting a research proposal involving fieldwork in remote areas of developing countries. On the other hand, the transition from “professional” to
“researcher” is likely not to be seamless and could cause the students to occasionally feel “out of place” in the field of forest research.

Field training

Not all research work within the Faculty of Forestry involves wielding chainsaws and surviving in bear-populated, remote, and wet forest lands for days at a time; in fact, much of the work is lab- or desk-based. However, many projects require data collection in the forest, sometimes in an isolated area (the fabled “bush”), and university policy holds faculty members responsible for the safety of their students and assistants. Thus, for faculty members whose research program requires fieldwork, students who can be trusted with their own lives and that of their peers in less-than-urban contexts are valuable assets.

Throughout my research, I have not encountered very many students who were “field trained” prior to entering graduate school in Forestry. Those who were had been trained in an undergraduate forestry program or natural resources program in North America, or had many field experiences from working as field assistants in remote locations, volunteering in parks, or practicing backcountry sports. They were, in my study, all male, although I have met at least one female in the Faculty of Forestry with a similar background. They usually originated from the Pacific Northwest region. A male student with backcountry experience expressed how his lab mates, young females from foreign countries, were intimidated by some of the field tasks:

I can deal with fieldwork pretty easily. I worked with some of the other people and they were nervous about driving a truck. They’ve never driven a truck before, they don’t know how to drive on the logging roads. (Julio, 689-693)

My interviews and participant observation have demonstrated that women in Forestry graduate programs also undertake projects with significant fieldwork portions and drive
trucks on logging roads, with or without their supervisors in the passenger seat. Field experience, however, might be a form of cultural capital which remains primarily attributed to local men. Are the young women trained in Forestry not pursuing field-based graduate studies as often as their male counterparts? Are faculty members biased in their recruitment when looking for students to undertake field-based projects in the “bush”? Or has my limited recruitment simply fallen short? There is no way to tell based on the data I collected, but this topic would be worthy of future investigation.

Life experience

Students who traveled uninterrupted and seamlessly from high school to a Bachelor’s program to a graduate program are, in this study, the exception. As one can deduct from the preceding description of students’ academic, work, and field experiences, most of them are no longer in their early 20s and many are in fact seasoned life- and sometimes world-travelers. The majority were married, in a long-term relationship, or divorced, and a few had children before starting their graduate program. Some international students came to Vancouver with their spouse and/or with children, a courageous move in particular for those who also need to become fluent in spoken English.

It is difficult to analyze the contribution of maturity and life experience in terms of capital, especially without getting into potentially identifying details. What it does mean, however, is that graduate students are not blank slates on which a new habitus can be simply drawn through straightforward, textbook-like reproduction processes. For the most part, their habitus – resulting from layers of family, school, work, and organizational socialization – is likely to be already stable. On the other hand, the circumstances of a “crisis” may be united as one starts graduate school and undergoes drastic changes in life circumstances.
... or lack thereof

Only three of the students I interviewed did not report having significant prior university research experience or forest-specific experience, although one was trained in forestry, albeit in a program that the student describes as lacking hands-on training. In the latter case, the student was chosen by his supervisor primarily on the basis of his admission material, which showed he was highly successful academically. In the other two cases, the students were introduced to their Forestry supervisor through the workings of their social network, essentially thanks to family connections. The interview conversation did not reveal whether they were exceptional students during the course of their undergraduate degree. While it is an uncommon scenario, it does seem that under certain circumstances students without notable academic or forest-related experience can use social capital to gain access to graduate education in Forestry.

Taking position as researcher-in-training

Becoming a graduate student in the Faculty of Forestry does not happen randomly or overnight: it involves a number of administrative steps as well as decisions, which may or may not be taken following an explicitly strategy. In this section I will show how students take position as graduate students more generally and in the Faculty of Forestry.

Assuming the graduate-student position

At the point of entry into the Faculty of Forestry’s graduate program, graduate students-to-be divide themselves into two main categories as far as field dynamics are concerned: those who see the global social field, or at least the field’s reflection into its various effects, and those who don’t (or who do not reveal that they do).

Those who see the field and/or its effects are those who have somehow rubbed against it. They have experienced a disconnect between what they had come to expect and
what turned out to be objectively possible, and they are thinking strategically – in a more or less explicit fashion – to make the two meet again. In my study, they are individuals who have had significant experiences outside of the strict setting of undergraduate education and who have now decided to undertake a Master’s degree or, later, a Ph.D., and hoping that it will improve their position. Their experience outside of the familiar educational setting was not necessarily long, but it was sufficiently different from what the students thought would be “right” to make them attempt to change their trajectory.

Co-op placements, for example, might have left a lasting impression on those who undertook them. Matthew, who trained in a Forestry undergraduate program on top of previous work in the sector, experienced frustration and bitterness during his internship periods, a situation that did not improve when he took his first post-graduation job:

I applied for grad school, knowing that I didn’t really like what I was doing in forestry.

*In studying forestry?*

No, not the studying of forestry. The operational forestry, the harvesting. You’re just doing the basic. And I was more concerned with “why are we doing this?” and “are we doing it right?” Laying out harvest blocks and cutting trees down, it’s not... There were some tough decisions that were made out there, of course, but I was more into the bigger picture, that’s what I liked. (...) [After graduation, in my private forest company job.] I had good days but I was having trouble (...) I had finished my degree, I had more experience than people who were above me, and I kept getting knocked down to these smaller positions, doing these redundant jobs. (Matthew, 938-939; 945-952; 959-963)

Hitting such walls was not an uncommon experience among young, university-educated forest workers. Robert, another graduate-turned-graduate-student, was hit by the converging forces of a frustrating work environment and limited benefits after two years of forestry work in a consulting company:
My employers didn’t spend much time listening to any thoughts that I had, and since I came in, as they say, “green,” there are all these things I had to learn about being in the woods. I think that probably pigeon-holed me in the company, they would always treat me as this new kid. I would always be that person to them. Also, most of the guys I was working with (...) didn’t seem too concerned about how they were going to grow their company or what the future would look like, it was just day-to-day operations. I didn’t see my role in that company. (...) And the hours were super long and the pay was not very good. I asked for a raise and they never got back to me. (...) The whole landscape of the company started to change and I said: “Forget it.” I can’t see a future here, the industry is hurting, there are mills closing everywhere. (...) I thought: “now is the time to go back to school while the market’s really down.” (Robert, 946-976)

Christian, another student with undergraduate forestry credentials, noted that the work conditions of the occupations he trained for did not suit him: unwilling and unable to move away from the Lower Mainland, he could only string together temporary positions. He thought teaching – an activity he felt skilled at – could be a more manageable career, and undertook first a Master’s degree, and now a Ph.D. Two other students seeking a Master’s degree made similar observations while in the workforce: in their respective area, which are both located in the recreational sector, further education seemed like the only way to secure year-round, reasonably lucrative employment.

Melissa was turned off the daily work of foresters, even before she graduated from her undergraduate degree, but persevered nevertheless. After graduating, she accepted an opportunity to work on small-scale community forestry projects for a few years because of exceptional conditions, but knew that she did not see herself pursuing such a forest management career. She thoroughly researched her options with an eye on building on the knowledge she already had of forest products in order to turn toward a new professional field in which she could develop a unique expertise, distinguishing herself. Jacob, also feeling few affinities with the industrial forest management practices he was exposed to in his
undergraduate education, sought a way out by doing a Master’s degree in a related field more removed from daily operations and closer to decision-making in the forest sector. After working for a few years, he sought more education again:

Before starting the Ph.D., I was already doing research (...) and I was wondering: “When I measure this or that average, how well am I representing reality?” (...) I understood there was a gap between reality and what I was reporting, and I wanted to be able to increase the rigour with which I could make those numbers speak. (Jacob, 492-503)

He also hoped that adding the letters “Ph.D.” after his name would give him more latitude in the allocation of his time to various projects, perhaps avoiding those which were not in his area of expertise. Victor, who said it was his last degree every time he graduated, found himself in a doctoral program for similar reasons: at his work place, he says, “We have meetings, we work hard to make things happen, but at the end of the day sometimes nothing happens. So I say: I think I need to move up and get things done!” (Victor, 817-822) In other words, he hopes that the Ph.D. will give him some power to make changes in the organization where he hopes to return once he graduates.

For some students, there were simply no opportunities available after graduation that they considered worth their while; pursuing further education seemed like an obvious decision. “When I graduated, the market [in my field] was very bad, and I was getting paid as much to go to grad school as I would have in an [entry-level] job [in my field], so it was an easy choice,” says Hal (340-342). By starting a graduate program, not only could this student earn a modest living, but he also would earn a higher degree. Edwina, an international student, also faced bleak prospects due to a slow economic situation in her country. Despite her best efforts and excellent academic record, she could not find a job in her country:
It was a little bit of a shock because I was hoping that I would be able to get a job first. But about two-thirds of my class didn’t find a job. The economic situation in the country was not very good at the time, I was not the only one who wasn’t employed for some time. During that time, I decided to think about other options. That’s when I decided to apply for a Master’s abroad. (Edwina, 544-551)

For many graduate students, thus, it seems like disappointment with actual work experiences – or lack thereof – triggers or contributes to an explicit change in strategy. It is hoped, more or less consciously, that whatever capital is acquired in a graduate program will provide them with a distinctive advantage after they graduate. So equipped, they hope that they will be able to fulfill their expectations.

For these students, there is a clash between what they had come to expect based on prior socialization and their actual, objective opportunities. The gap between the two creates a space of crisis in which making a decision is problematized and strategic. Which step to take next is no longer clear or obvious, as it once was; scenarios that were taken for granted failed to materialize. What this also means is that, while these students may have incorporated some different ways of seeing and doing through their non-academic work experiences, the negative sanctions they have received as they failed to make an acceptable living create a problematic situation. They bring a habitus which was partly constructed through non-academic experiences, but the difficulties they experienced or foresaw opens a broad range of possibilities for reconstruction, making their actions and trajectories unpredictable.

The second group of students – those who do not seem to see the social field’s dynamics at play – simply follow a trajectory that makes sense to them, seizing the right opportunities as they come while letting others pass. Among the students I have interviewed, they tended to be on the younger side, having just obtained their undergraduate degree and
immediately seeking a graduate program to enter. They were also all students who came from
another city or another country, and unattached. When asked to tell me about their trajectory
prior to their current degree at UBC, their narrative closely intertwined the end of their
undergraduate education and the beginning of their Master’s degree, without dwelling on the
circumstances. Stanley, an international student who had already studied away from his home
country for his undergraduate degree, did not skip a beat:

    I finished my undergraduate degree, came back to [my country] and started
    applying for my Master’s program. I picked some universities from the
    United Kingdom and just one from Canada. Fortunately, I got offers from all
    universities. (Stanley, 27-31)

For another international student, Pearl, there was a short pause: after her
undergraduate degree in biology, she says she “didn’t know what to do” so she found a
position as a research assistant, which gave her access to a computer and to the Internet. But
very quickly she applied to UBC and everything just felt right again:

    So how did you decide to apply to UBC, how did you end up in the Faculty of
    Forestry?

    I don’t know! You know, it was my only option, I just applied to UBC. I
didn’t know exactly what I wanted to do. What I know is that I like plants, I
like ecology, and I like Canada.

    Had you been here before?

    No, but [someone I knew] had studied here. (...) I had this feeling that I
wanted to be here, so I just applied and I was accepted, and then I had a
scholarship so everything was perfect! (Pearl, 696-710)

Javier, who is Canadian, would have continued to work with the professor who was
already supervising him for undergraduate research work at another university, only there
was no funding available immediately. After his supervisor told him so, he returned home
and started searching for student positions in the same field elsewhere in Canada, emailing
departments and individual professors. His UBC connection yielded results straight away and, “really wanting to get going with [his] life at that moment” (Javier, 989-990) he promptly moved to Vancouver.

Elinor, an international student, was finishing her Master’s degree in her country and not liking academic life very much. Doing a doctorate was not in her plans, but she did not really know what to do either. Yet, when an opportunity presented itself immediately after she graduated from her Master’s, she just seized it:

There was a good chance in front of me, I could go abroad to continue my studies. (...) I changed so fast. To do a Ph.D. in a foreign country is a good experience, a great opportunity. Why not accept it? (Elinor, 549-554; 577-580)

For these students, being in school appears as the natural thing to do, the obvious pursuit they should commit themselves to, even if they did not really plan it. It is also relevant to mention that, while no systematic data was collected on the students’ families, those “academic naturals” often mentioned that their parents or some relatives were doctors – of medicine or of philosophy – or had social capital extending into the academic world through formal or informal networks.

Not all students neatly fall into one of these two categories. Some doctoral students from abroad, in particular, seemed to be on a different path. They already have accumulated academic capital of the social and cultural forms thanks to their many years of experience outside of academia, and they do not seem confronted with circumstances that contradict their aspirations. In fact, it might well be the other way around: while at least moderately successful in their work, they somehow gained more or less expected capital through social relations within or beyond their organization. Pursuing a research trajectory was perhaps not
something they planned, but they experienced positive sanctions that reinforced dispositions
they did not know they had.

**Why Forestry?**

For students whose undergraduate degree was in forestry, forest engineering, forest
ecology, or a related field, choosing to study at the Faculty of Forestry seemed to be an
obvious choice. They already had established social capital in the institution, and their
cultural capital – their degree, the knowledge they had acquired, their field training – were
guaranteed to be acknowledged by the institution that granted it, or which was at least
familiar with the granting institution. While I could not systematically question students
about whether they considered other options, I did learn from some of them that they thought
(or had experienced) that seeking admission in a non-forestry program would require them to
fulfill requirements which they did not consider reasonable. Forestry, on the other hand,
imposed them no special requirement.

For students coming from other fields, however, applying to Forestry was not so
automatic. Julio, from biology, recalls how he searched for possible supervisors on UBC’s
web site:

> I was looking around on the web page, I saw that there was a forestry
department but I paid no mind to it because I always thought of forestry as
being (...) the Registered Professional Foresters, basically the logging-type
things, logging with a degree. So I looked at botany and others, but I couldn’t
find [the faculty member I had heard about]. (Julio, 384-390)

Another student was also surprised to see a posting for a position in Forestry that
corresponded to his skills, as he came from biochemistry:
I was looking for a summer job [during my undergraduate degree] and there was a position posted for a summer student in [my would-be-supervisor’s] lab. I remember being very surprised that there was this kind of work done in Forestry. I was really intrigued because, through the undergraduate biochemistry program, all you learn about is life science applications of biochemistry. When I came here, a whole new world opened up: this whole other universe of applications to the stuff I was learning which is industry-based. (Michael, 869-881)

Two other students, also coming from different disciplinary areas, noted that their grades were not stellar but that Forestry gave them a chance that their original discipline would not have offered to them. Hal explains:

*What attracted you to [your industry-based project]? You could have done a project in [your field of origin] without such an applied focus...*

It’s just how I got into grad school. I didn’t have great marks in undergrad, so going in under this scheme got me into grad school. I don’t think I would have been accepted otherwise. That was the main reason. I started that and then I was happy with the project so I just stayed with it. (Hal, 329-338)

Compared to many other graduate programs, the admission requirements for Forestry graduate programs is somewhat low. Students who do not hail from a forestry undergraduate program are encouraged (but not required) to attend the *Forestry in British Columbia* course, which is, according to students I have spoken with and to my own experience in the course, far from excessively demanding. But they do not need to take on a set of undergraduate courses in forestry that would bring them up to speed on matters of forest management or science. Instead, just like other graduate student in the Faculty of Forestry, they design a course-taking plan that corresponds to their research project’s needs. Based on the limited data that I have collected on the topic, there also is no strict examination of the canon of forestry knowledge in the comprehensive examination process at the Ph.D. level, in which again the focus is on the areas of knowledge immediately useful to the research project. Last, but not least, students coming from other disciplines – perhaps especially from the life
sciences – may be benefiting from a profitable conversion rate for their cultural capital (knowledge of another discipline) into economic capital, compared to what they could have expected in their own discipline due to their lesser grades. In other words, the competition for “good” graduate student positions seemed less fierce in Forestry than in, say, biochemistry or botany.

In any case, not many students focused their choice on the Faculty of Forestry first: the primary locus of their choice was their supervisor and the combination of a project and funding that came with it. This is particularly the case for students who came to UBC Forestry because they had met one of its faculty members in the context of an international conference or because of prior connections among their social network. It does, however, apply to most students, although there are exceptions: one student really wanted to come to Vancouver for entirely non-academic reasons and then proceeded to find a program and a supervisor. For another one, also an international student, coming to Vancouver seemed like a better choice, in terms of his family’s quality of life, than going to the United States, Europe, or elsewhere in Canada; he still benefited from a former supervisor’s help in connecting with a potential supervisor in Forestry, but presumably his former supervisor could have mobilized other parts of his social network if the student had wanted to go elsewhere.

It should also be noted that some international students, especially those from Asia, noted that UBC is perceived as a prestigious university in their home country and that this played a significant role in orienting their efforts to gain admission in a graduate program:

UBC is really famous in China. So Chinese students know UBC very well, it has a very high reputation. So in Canada, basically, we know three schools: Toronto, McGill, and UBC. That was one of my considerations: I wanted to go to a highly-reputed school. And, of course, I searched the Internet for faculty members that had labs. (Lance, 690-696)
I didn’t have any contact with Canadian universities or professors or scientists. I just searched the web and... normally you will attempt to find some prestigious university, right? So I found the University of Toronto and UBC and... I even tried the University of Alberta. (Clayton, 432-438)

I got offers from all those universities, but I also got a letter from UBC. Everybody said, “Yeah, UBC is good.” I’ve also heard a lot about UBC, about the world ranking and everything, you can just see it on the web. So I decided: “Let’s go with this one!” (Stanley, 464-469)

While UBC’s reputation certainly is not a sufficient condition to attract graduate students, it is a necessary condition to grab the attention of some, especially international students, or could have been a deciding factor for those having to choose between different institutions. By choosing a prestigious university, those graduate students can also display that they have been chosen by such a university.

**Discussion**

One of the characteristics of autonomous fields is the homogenous character of their agents. The diversity of the faculty and graduate student bodies of the UBC Faculty of Forestry clearly support the thesis of a heteronomous field of forest research.

The greatest diversity can be observed in the faculty members’ research specialties, which span a wide range of disciplines from biology to the social sciences (including business studies), as well as chemistry, various branches of engineering, planning, and, of course, silviculture, ecology, and other forest-specific areas of knowledge. The academic backgrounds of graduate students are equally diversified and only a minority have actually trained in Forestry before. The result is a varied intellectual climate in which it is taken for granted that the people in the next office or laboratory are going to be conducting research structured by different disciplinary, theoretical and methodological frameworks that one may or may not understand very well. I encountered a number of cases where the specialties of the
faculty members and graduate students within a given group were different, and so the supervisor was able to offer only limited guidance in some areas of the student’s project.

Whereas I expected that research in the social sciences such as my own would be the target of some criticism or resistance, I encountered no such thing. Those who first brought policy, business, and social research to the Faculty of Forestry perhaps encountered such resistance to their work, but if such criticisms still occur they have slipped under my radar. In fact, there might even be a certain pride in the extensions of Forestry’s research into the social area: when I introduced myself as a sociologist, faculty members and administrators were often prompt to reply that they had one on staff (David Tindall, who is jointly appointed with the Department of Sociology). Many forest problems are understood to be at least partly “people problems” and thus “people experts” are also seen as relevant in the Faculty of Forestry.

The diversity of forms of scientific capital (or, by proxy, academic capital, in the case of inexperienced students) held by faculty members and graduate students ties them to a broad range of scientific fields and to the corresponding networks of peers. When applying for general purpose, non-targeted funding, for example, Forestry faculty members are likely to see their proposals ranked by committees formed not of other forest researchers but rather of experts in the disciplinary area of the project. The same goes for graduate students seeking prestigious NSERC or SSHRC scholarships. While technically this can be called peer-review, it remains that the “peers” evaluating Forestry’s contributions to research from a scientific standpoint are often located outside of the field of forest research, in fields over which forest researchers do not have much control. There are a number of forest-specific journals which are controlled more closely by researchers of the forest sector, but they only collect about a third of Forestry’s publication output. On the other hand, as I have shown in chapter 4, there
is also a wide range of funding sources that support forest research specifically. Those, however, are usually targeted to certain research priorities, and in that case part of the control over the distribution of resources is into the hands of forest sector agents.

Nevertheless, Forestry faculty members and graduate students have indisputably accumulated significant volumes of specifically scientific capital. They also, for the most part, have accumulated capital specific to the forest sector, having learned about the culture of the forest sector, including its norms and practices, through prior experience working in private or public organizations. A surprisingly high number of faculty members have had non-academic employment prior to taking their faculty position at UBC, working for at least three years in a government agency, in the private sector, or as consultants. Among those I interviewed, I found some individuals who, although not employed in universities, were already active in the field of forest research, for example as researchers in a government agency. By the time they joined UBC, they had accumulated significant scientific capital in the form of peer-reviewed publications and simultaneously gained a closer sense of the forest sector’s research needs. Other faculty members were previously involved in the operational aspects of the forest sector rather than in research, however such involvement came before they started their doctorate. I am unaware of a faculty member who would have gone straight from the operational side of forestry to a faculty position without transiting through research and/or a doctoral degree program. Thus the faculty members are all seem to be at least one step removed from the core activities of the forest sector.

In a similar way, many Forestry graduate students have participated in the culture of the forest sector, spending a few months to over ten years in operational or research contexts. If somehow they found themselves involved in research, they are now coming back to a graduate program in order to increase their scientific capital and thus their autonomy within
the field of forest research, hopefully allowing them to gain more control over their work. Others have had more operational work experience but, for a number of reasons, it often resulted in frustrations or perceived limitations. While these students have also acquired, to some degree, the culture of the forest sector, their rapport to that culture is problematic. Undertaking further training is hoped to bring their expectations and opportunities back in line. I believe, based on interviews with faculty members, that the latter’s trajectory might have been similar to the course followed by some of their students.

On top of their forest-sector capital, there are students who have already accumulated scientific capital in the form of knowledge, publications, social relations, and even funding, which as we will see they will be able to trade for increased autonomy in their programs. However, the rich trajectory of many Forestry graduate students should not make us lose sight of the fact that a number of students from each entering cohort have almost exclusively accumulated academic capital that stands as a proxy for scientific capital: an undergraduate degree that gives them some scientific knowledge in one discipline or another. As we will see in the next chapter, these students are unlikely to wield much autonomy in the field of forest research, at least at first. But from the students’ standpoint the returns on their academic investments may be higher in the Faculty of Forestry than they would be in their field of origin. The knowledge and skills they have built through their initial disciplinary training may be particularly valued in Forestry because of their scarcity, as by definition the Faculty does not train students in disciplinary fields at the undergraduate level.

Applying the lens of Bourdieu’s theory of fields on the reality of individual agents in the Faculty of Forestry, I come to a few observations. First, the admission fee of the field of forest research is indeterminate and possibly low by disciplinary standards. I have encountered no compelling evidence of a struggle to impose a definition of what belongs to
the field of forest research, and the diversity heralded as an asset by the Faculty of Forestry as an organizational entity is reflected and, as far as I can tell, endorsed (at least passively) by its members and graduate students. Second, and as a corollary to the first observation, the structures that generated the habitus of Forestry faculty members and graduate students are very diverse. What the resulting habitus have in common, however, is that for the most part they have been formed by a combination of socializing experiences in the scientific field and in the forest sector. I have shown in chapter 4 how the conjuncture in which those individuals find themselves – the Faculty of Forestry – is exposed to forces from those two social spaces, and values capital from both. In the next chapter, I will be able to show in greater depth how the two dimensions of the habitus of established and training forest researchers interact with the conjuncture to generate a number of typical positions and position-takings.

A dimension in which Forestry – and the field of forest research in general – is not so diverse, however, is gender. There are very few women on faculty – the lowest proportion for a top-level unit at UBC – and not many more among graduate students. The limited scope and resources of this study has not allowed me to tackle this complex issue. Faculty members and administrators are well aware of the situation, which many spontaneously explain by the strong association between work in the woods – and even work with wood – and manliness. Women scientists are few to begin with (Xie & Shauman, 2005), and it is no surprise that there would be even less of them in a field that was historically connected to engineering.

As the field of forest research evolved to include more and more biology and ecology, and proportionally less engineering, the proportion of women has increased, and the department which has the highest proportion of women in the Faculty of Forestry – Forest Sciences – is also the most active in biology and related disciplines. At the same time, there are many reasons to believe that new developments in the field of forest research could attract
increasing numbers of women: research on the social aspects of forestry is on the rise, as are the approaches tied to biotechnologies. In previous research on undergraduate students (Gemme, Lalonde, & Taillefer, 2000), I observed that young women in basic scientific fields like physics and mathematics were attracted to what they perceived as meaningful and relevant applications of their knowledge rather than to basic research. This insight was supported by Margolis & Fisher (2003) in their study of the computer science program at Carnegie Mellon University, which dramatically increased its proportion of women by transforming the curriculum and showcasing the socially meaningful applications of the discipline. A field like forest research, with its connections to life sciences and its wide range of possible applications to human life, could in theory attract larger numbers of women. However, there may be long-standing cultural and structural factors preventing Forestry from seeing its population of women students and faculty members increase in the near future, and I am unaware of attempts to specifically and systematically identify and address those at UBC at the moment.

Women are not the only under-represented group in the Faculty of Forestry. Ronald Trosper recently became the first Aboriginal faculty member of Forestry, and there are some attempts to increase the number of First Nations graduate students. At the moment, Aboriginal graduate students can be counted on the fingers of one hand. In the forest sector, First Nations and aboriginal groups play an increasingly important role, which may transform the dynamics of the forest sector. As such, they also have become involved in various research initiatives, and just like the provincial government and forest companies they can be seen as a heteronomous force. The current transformations of the forest sector as an organizational field, in a context of crisis, will further alter the relationship between many of
its agents, including First Nations, and thus their relationship to forest research as well. This topic would make a fascinating dissertation in its own right.
CHAPTER 6
CONVERGENCE OF CAPITALS AND STUDENT POSITIONS

“Student salaries are the last thing I will cut,” said Professor Rhoda to his group of students. It was April 2009 and I was attending the Rhoda group meeting for the first time in a few months. He announced that his research budget in the coming year would probably be about a third of what it was this year. Changes that were still unclear but most likely devastating were being made to the Forest Science Program by the provincial government, although no official announcement was made due to the upcoming election. The faculty members who held FSP funding, or had applied for some, were still in the dark.

My presence was timely: I had come to present some of my research findings, and I had just explained how I found the Faculty of Forestry to be perched high in the field of forest research, where it relied on resources from the scientific field and from the forest sector. Such a position was advantageous in many ways, but it required Forestry researchers to adapt quickly to the changing conjuncture. The situation described by Prof. Rhoda was just one more example of such a turn of situation. In an informal interview, a senior faculty member noted that those who had been in the Faculty for longer were not particularly surprised by the FSP affair. To them, she said, it was “2001 all over again,” a replay of the downfall of the Forest Renewal B.C. program.

As of May 2009, after Forestry administrators and others pressured government officials behind the scenes, faculty members holding multi-year FSP awards were informally guaranteed that their funds would be released. Those who had applied for funding for the coming year, however, simply could not count on it anymore, and a number of other sources of provincial funding were placed on hold until the end of the summer. Forest research funding, especially of provincial source, just cannot be taken for granted. What can be
expected, however, is that the number of graduate students admitted to Forestry will be lower next year in the face of funding uncertainties.

For forest research training to carry on, there needs to be a convergence of many factors: faculty members, graduate students, funding, often partners from outside the university, and, of critical importance, a research topic. Normally, those factors are gathered prior to the start of a given project, and hopefully there are no drastic changes over its course. I will examine how these factors come together in the first part of this chapter. Then, in the second part, I will shift to the perspective of graduate students and examine how they are located within or in relation to the field of forest research. I will then be able to discuss how the circumstances of research training influence the formation of the students’ habitus, and whether they opt into the field of forest research, or not. I will particularly examine the future perspectives and actual opportunities open to newly-trained forest researchers.

**Professors’ work: aligning research and resources**

The tightness of fit between research topics and the resources required to simultaneously conduct the work and train graduate students varies along the fuzzy line that runs from the so-called “hard” sciences to the “soft” ones (Becher & Trowler, 2001). In the natural sciences, it is generally understood that it is the supervisor’s responsibility to provide students with both a topic and funding, while in the social sciences and humanities students are usually given more latitude in the definition of their research projects, but must come up with their own funding or work to support themselves (W. G. Bowen & Rudenstine, 1992; Delamont et al., 2000; Ridding, 1996).

As we have seen in the previous chapter’s description of the diversity of research specialties among the faculty body, natural sciences and social sciences research are both represented in the Faculty of Forestry. Consequently, there is not a single model applied to all
students. However, with regards to funding, there is a shared ideal that all students should be guaranteed funding for two or four years depending on their degree program. The statement on Forestry’s web page dedicated to financial support for graduate students is a fair description of what I have observed in the five sampled groups, as long as one pays close attention to the caveats:

All graduate students in the Faculty of Forestry receive financial support during the first 2 years of a thesis-based Masters or the first 4 years of a PhD program, unless otherwise agreed upon at the outset of their program. This does not apply to students taking course-based Masters degrees, and may not be possible for students in the social sciences. (Faculty of Forestry, UBC, 2008)

Indeed, as I will soon describe, I observed a number of cases that differed from the guaranteed-funding ideal. But even those researchers whose work was entirely on social, political, and economic aspects of forests were inclined to say that no student should be admitted without funding. The impact of the funding norm is to limit the range of topics which are likely to be researched by students to those that can possibly be funded, placing the field of forest research under the influence of forces from the scientific field and the forest sector.

The faculty members that I interviewed used a combination of approaches with regard to the packaging of topics and funding which depended on the habitus they had developed in their training and on the conjuncture of their research career at this point. At one end of the spectrum, in research groups closest to the “Big Science” model of multi-year projects involving large grants, expensive equipment, and many researchers, students were really integrated into their supervisor’s research program. Those students relied on their supervisors’ resources for their livelihood and for research expenses. At the other end of the spectrum, I met students who were working alone on a topic of their own, and gathered their
own resources. There were many situations in between, and different scenarios often co-existed within a single group.

In her world of biological research, Professor Kuss felt that she had few degrees of liberty in the recruitment of graduate students:

It’s simple: [prospective students] come and see me, I say, “We have funding for three years in this project, this or that aspect could constitute a good topic.” I don’t have the freedom... If they want money, it has to be aligned with the grant. There might be some flexibility within a given grant, but it’s still oriented somehow. I can’t tell the students that they can just work on whatever they want, it’s impossible. If the project interests them, then we can agree and move forward. (Prof. Tamika Kuss, 1090-1101)

Another faculty member, in a field which is less competitive but also involves multi-year experiments, has a similar approach: students are expected to contribute to the preparation of the “deliverables” that were promised in the project’s proposal. He mentions, however, that he also likes the students to take their thesis or dissertation further than the project’s boundaries:

I have something ongoing, and we bring [the students] on it and sort of grow it from there. There is a dialogue with the students, you tell them what projects you have, you tell them which ones you think might suit their abilities, they tell you whether they’d be interested in doing that, and away you go. Once they have agreed to come, I make it pretty clear to them that the funding I have for them means that they have to help me produce some of the deliverables on the project. That doesn’t mean that their thesis has to be entirely focused on that project: they can grow it in various ways, and I have other resources (technicians) I can use to help them in a project. They are not just carrying the thing themselves, so it gives them a little bit of latitude. But they have to recognize that it is the project that is producing the funding and that there is a timeline and that it has to be covered by some of their research work. (Prof. Nick Rhoda, 632-649)

The striking similarly of this third faculty member’s words on the same issue shows that there is probably a shared perspective among Forestry faculty members to some degree:
Right up front, when they first apply, I always write to them and tell them about money. “If you have something that you really want to do, and it doesn’t fit the funding proposals, you are on your own. You are going to have to find the money yourself to cover your costs. I will be able to give you a student salary as a research assistant, but only if you are working on a project that I give you.” And I also say: “The ideal situation is when we can find a project that fits your interests that someone else is going to cover in terms of funding.” But in many cases you will not get an exact fit, and some students are having difficulty with that. (...) They know what they want to do and they feel that someone should cover their costs to do so. It doesn’t work like that anymore. There is no more discretionary funding. A few people manage to get it but, so far, I haven’t. If I had an NSERC or $70,000 a year support grant (...) I could do that. I could fund good students. But the majority of students are working on individual proposals that were funded by the Forest Science Program or things like that, and it’s very clear what has to be done, and they have to stick within that. (...) [The partner] is putting money into it, and [the partner] wants this or that. There are deliverables. I’ve said to them: “If you want any of that money, you must deliver the deliverables.” (Prof. Shane Deland, 1307-1334)

For groups such as Prof. Deland’s that are involved in interdisciplinary areas like forest management, tensions may emerge from the combination of two ways of seeing. On one hand, the habitus of the lead researcher and the structure of the field of forest research are anchored in the natural sciences, a more hierarchical and positional system. On the other hand, the expectations of students interested in working on the increasingly social research objects of forest management may more closely resemble those typical of a personal system where one’s interests drive the research process. I have noted in the previous chapter that very few students among those that I interviewed had a social sciences background; however I expect that as social sciences research takes more room in the Faculty of Forestry this tension is likely to emerge more often.

The dominant approach in the Faculty of Forestry is more typical of scientific projects which require large amounts of funding and other resources not only to financially support the students but also to buy or rent equipment (including vehicles) and supplies,
access land, secure technical support, etc. A student who brings his or her own funding, from a scholarship for instance, will have some measure of freedom in the focus of the thesis or dissertation, but this freedom is relative to the ratio between the student’s stipend and total research costs. For example, research involving genetic sequencing can cost hundreds of thousands of dollars, making the student stipend (roughly $15,000 to $25,000) a relatively small item of the overall budget. Such projects are designed ahead of time by faculty members, who then recruit students to conduct the research. In other cases, funding may not be an issue as much as time. Because trees grow so slowly, data series have to be built over the years in long-term experiments and can sit for a while without anyone to analyze them. A student coming along with a scholarship but without a specific project in mind may be offered the opportunity to use the data. In such cases, there might be less pressure to produce immediate results, but the student also cannot entirely change the design of the project which was established long before he or she came around, as the data incorporates a large amount of capital invested over the years.

Research in the social sciences does not rest on the same kind of large investments and students wishing to explore political, economic, and/or social questions in their thesis or dissertation often face a different situation when they approach a supervisor. It happens that faculty members have funds attached to a specific project but no pre-determined student to work on it. However, the funding conditions seldom allow that:

Each student will be (hopefully!) funded by a unique project. It would be great to be able to [have a major grant and to recruit students for it] but I haven’t figured out how to do it. Well, with SSHRC, you just can’t get that much money. NSERC, maybe, if you had an NSERC Strategic grant maybe you could. Possibly you could do it with SSHRC but I have never seen anyone do that. (Prof. Kurt Loughran, 460-466)
In this case, as the other faculty member said earlier, the students are “on their own.” But, in the two cases, it does not mean that the students are totally left to fend for themselves. I interviewed students (supervised by these two faculty members) who wanted to work on specific topics but started their program without guaranteed funding. They reported that they were grateful for their supervisors’ efforts in helping them find funding sources and write proposals to support themselves and their work. But research proposals take some time to be reviewed and adjudicated, which leaves Prof. Loughran – and doubtlessly others as well – uneasy:

I’m not entirely comfortable with the situation [of a specific student who insisted on starting his program right away] so much as I want all of my grad students to have funding, either through their employment or through me. Currently [this student] doesn’t have funding, and I don’t like that. (Prof. Kurt Loughran, 576-580)

Faculty members are right to be nervous, as proposals do not always succeed, and some sources of research funding can be inconsistent. If no project-specific funding could be secured, and if the faculty member otherwise had funds, the students were employed as research assistants, sometimes bending their initial research interests to make them converge with the research conducted as a paid assistant. I also observed two cases where the student sought work off campus after failing to secure project-specific funding. They may also be employed, for a time, by their supervisor but outside of the university to work on a consulting mandate, an uncommon but nonetheless real possibility. Others, perhaps, simply never started their program, but I did not encounter them in the context of my study due to the design I adopted.

In both the natural and the social sides of research in Forestry, there were a small number of graduate students who came not only with their own funding but also with their
own project and resources to conduct it. For busy faculty members, such opportunities were welcome:

One student came out of the blue with her own NSERC scholarship and said: “I want to work on [her specific project], I have my own project, do you want to supervise me?” That was a no-brainer: yes! (Prof. Maribel Nocera, 653-656)

Now, in [this student’s] case, he had a well-formulated idea that I could see as being a logical application of some of the techniques we are using. It was really his idea and his project, he had been working on it for a number of years, and he was already working with [the major research partner in the project]. (Prof. Nick Rhoda, 625-630)

Some students came as employees of an organization from the field of forest research, bringing along a project which they have previously negotiated with their employer. A similar scenario concerns students who arrange an “industrial scholarship” for themselves, recruiting a partner organization, developing the proposal themselves, and securing the required resources without much support from the university. While uncommon, such students are also welcomed by faculty members as requiring relatively very little supervision and efforts from them.

Faculty members’ total volume of capital also impacts their capacity to make topics, funding, and students meet. For faculty members who begin their careers in academia as junior researchers with little of the cultural and social capital that can easily turn into necessary research funding, timing is everything:
It’s a funny game because sometimes you take a student just because they applied at the right time: they applied, they met your basic criteria, they look like they are capable of doing the work you had in mind and they applied when you finally got approval of the grant and you need to get somebody on the job. The timing of our grants is extremely poor when it comes to accept grad students. We don’t find out about most of our grants until [the spring] and we have to make decisions on admissions in January-February. We need to be recruiting in October-November. I have lost many good applicants [because of that]: they would have been excellent for projects but I can’t make a commitment until March. Well of course they are not going to wait around. That’s why it’s nice to have NSERC money (...) so you can take a chance, have somebody come in even though you’re not sure about grant funding being approved. I guess, like a lot of things, with time, you just learn to develop a certain feeling of security, so you’ll bring a certain number of students, you’ll make arrangements to have students start in the Fall on the assumption that you’ll have some money in place, that some of your current students will graduate, and things will be fine, but in the early part of your career you literally have to wait until you have money. (Prof. Nick Rhoda, 450-473)

Once faculty members are established, they can juggle multiple sources of funding, part of which transits through the precious “slush” funds, to “bridge” graduate students at the beginning or end of their program. Ironically, research contracts – which are accessible to faculty members with a network outside of potential partners in the forest sector – are a way for faculty members to carve out some freedom in a way that NSERC grants does not allow. Two faculty members who are not close or otherwise work together made almost the same statement:

[Contracts] allow me to transfer some of the research results to operationally useful products, and I usually charge an amount for my time and I feed it into a general research slush fund, so it helps me to bridge grad students and pay for stuff. And it’s easy money compared to applying for NSERC-type grants which take months to get an NSERC for $20,000 whereas I can make a phone call and get $50,000 and charge a $10,000 fee for the principal researcher. So I probably do more than I perhaps should, it’s one of these things that make me multitask, but it gives me some more flexibility. (Prof. Nick Rhoda, 476-485)
A good thing about [strategic] funding is that they allow you to apply for decent sums of money. With NSERC support for example, why would I spend two or three weeks writing a $15,000 proposal while I can phone up people and get a $50,000 grant with reasonable chances? (Prof. Shane Deland, 749-753)

In sum, regular faculty members, to be in a position to participate to the reproduction of the field of forest research, need to have sufficient accumulated capital which allows them to offer projects and funding to their students. These resources can come from the scientific field, from the forest sector, or from a combination of both. In some research areas, another possibility is to attract students with their own projects and funding. Some faculty members note that, in ideal circumstances, their students – while they may at first receive a stipend from them as a research assistant on a project – will attract their own funding: “NSERC supplies funding for graduate studies in the form of scholarship; I do try to get students that do end up getting those scholarships.” (Prof. Maribel Nocera, 257-260) But, as we have seen in chapter 5, Forestry graduate students are not necessarily the stellar students – from a strictly academic standpoint – who are likely to earn such scholarships.

For the faculty members that I interviewed, it seemed to be taken-for-granted that organizations and/or individual researchers from outside of the academic sphere would be involved in at least a number of their projects, including those conducted by graduate students. When I say that they took such involvement for granted, I do not mean that they were always satisfied with such arrangements, but rather that they did not question their very existence and relevance. Two faculty members pointed out that they specifically avoided partnerships with some organizations (specifically the federal government in one case and private companies in the other) and two others noted that they chose collaborators with whom they got along well, emphasizing the personal aspect of such partnerships. But none formulated a blanket rejection of collaboration, partnership, or funding involving non-
academics. In fact, they actively sought such relationships, and not just in order to gain access to funding.

For faculty members who conduct field-based research, the in-kind contribution of forest-sector organizations can be critical to the project. In some cases, what is provided is more technical in nature:

Since much of our research takes place in the forest, we really need logistical support, maps, data, often safety equipment, you know, radios and things from the companies or the Forest Service. We're naturally working pretty closely with the partners and we have to tell them when we're coming up and the students have to do download sessions and communicate the results. (Prof. Nick Rhoda, 295-300)

As Prof. Rhoda indicates, research students also participate in the relationship, although he noted, at a different point in the interview, that the students received little meaningful mentorship from some of the forest-sector collaborators because their perspective was too directed by short-term concerns to be useful to students. On the other hand, if qualified individuals (holding at least a Master’s degree) from industry or government are involved in the joint research project, then they might join the student’s supervisory committee.

For others, like Prof. Nocera, in-kind contributions are also essential, and her career could not progress without them. The collaboration, however, is more than technical:

The only way I can carry out research in this province is by collaborating with these guys from [government organizations] because they have access to long-term experiments, which I don't have. UBC doesn't have any piece of land where I can put that, and even if there is – there are some research forests and all of that – I have no technicians, I have no manpower. I rely not just on the existence of these long-term experiments from these other organizations but also manpower, like technical support that they have and that they are willing to share with me when we go jointly into endeavours. And so far every single project that I had was collaboration with somebody. (Prof. Maribel Nocera, 324-335)
In this case, the collaborators in government are also considered as scientific colleagues, and as such they interact with students. While closer to the forest sector, the collaborating agents are also grounded in the field of forest research. In Prof. Nocera’s view, everyone gains from such arrangements: she gets access to the land, the researchers gain access to students who “bring enthusiasm and initiative and those bright eyes that would like to discover something” (348-350), and everybody gets to publish articles which otherwise may not have happened for lack of resources and/or time. If the partnerships constrained her ability to visit sites or to publish articles, she would be “turned off and go away” (383-384), but she has only enjoyed positive experiences so far.

A third faculty member gave me the impression that he actually craved direct involvement with non-academic partners, but the relationship seemed different: rather than collaborating with non-academics to produce new knowledge, he and his students are providing expertise to public and private organizations of the forest sector. The non-academics provide the problem, and he decides how to go about solving it. Such collaborations are often funded through priority-based funding such as the Forest Science Project and NSERC’s Strategic program, and he admits that he has seldom been successful when applying for general, curiosity-driven grants. Having had previous experience working in a government research organization, he felt perfectly fine being given guidance on the topics that needed research. In fact, it’s the opposite – total freedom in establishing research priorities – he felt uneasy with:
If you worked in government, you’re used to being told what to work on and having less freedom to just follow your curiosity. (...) So these funding agencies [that I apply for] like to tell you what to work on. To me, that is absolutely not a problem, because I understand that they have an idea, they think something is important, but I have the freedom to work out how to do it. (...) A lot of people here find that really difficult, I find that really easy. I find it difficult to come up with a completely out-of-the-blue research project. I like to have applied problems that let me say: this is a problem, we need to look at this, we need to develop a way of dealing with it.

What is it, in that, that you like better than starting from scratch?

I think it’s that you know that the area you are going to apply in has a chance of being funded, or will be funded. Therefore, your competition is against the others who are applying for that same money, as opposed to applying for a pot of money where you may be the best applicant but because the area isn’t of particular interest to the committee you don’t have a chance. (Prof. Shane Deland, 715-717, 720-724, 726-731, 735-744)

For the other two faculty members who were group leaders in my study, it seemed like getting funding from non-university organizations, and occasionally collaborating with individuals attached to them, was a routine way to secure the resources to keep projects going, but I did not feel the same kind of satisfaction from them than in the three above-discussed cases. Yet, sometimes the circumstances were right and fruitful projects were conducted, either because the purpose of the project was unequivocally noble or because the collaborating organization had trained researchers on staff who had the capacity to actually interact with the academics about the research. Otherwise, in Prof. Kuss’ opinion, many financial contributions of private companies to university research resulted in few interactions, as the companies primarily sought tax credits and the prestige associated with university research, and did not have the knowledge base to absorb the new research findings. As the forest-sector crisis hit those companies, the funding was reduced to a trickle. Prof. Loughran, despite willingly dealing with stakeholders in nearly all of his research projects, has given up entirely on seeking funding from private companies: the strings attached were
“too much, it was too complicated for me and the students” (Prof. Kurt Loughran, 953-954).

He appreciated the importance of doing applied research that would benefit society as a whole, which sometimes meant working in collaboration with industry somehow. But university researchers should not, in his view, work for the benefit of individual companies:

I just don't see the bigger-picture benefit to society of giving a company a competitive advantage when it should be their job to figure out what their competitive advantage is. We're just not interested in doing that. (...) I think it’s just a waste of our time to do something like that. (Prof. Kurt Loughran, 947-951, 968-969)

To make sense of the various faculty members’ perspective on the matter of ties with non-university organizations and individuals, and on their impact on student training, it is best to divide such ties in two groups: those involving forest-sector organizations participating in the field of forest research, and those with forest-sector organizations not active in forest research. As far as I can tell, there are faculty members who have only one or the other type of ties, although among the faculty members I interviewed there seemed to be a pattern of using both forms.

In the first case, the relationship resembles collaborative research with faculty members from other universities. The collaboration is supported by some form of strategic grant in which both the faculty member and the researchers from the outside organization are listed as investigators, and the outside organization provides at least formal support and in-kind contributions, as well as financial contributions in some cases. The collaborators are often university-trained researchers and as such they are also likely to become a member of supervisory committees if students are involved. There are also smaller-scale collaborations: I have also observed cases where the student was in fact an employee of the outside organization, and the student’s superior in the organization could be a co-supervisor. In other cases, an adjunct professor in industry co-supervised a student who obtained an industrial
scholarship. Those were usually not one-off collaborations, but rather one of many collaborative projects between the involved faculty members and the researchers from the outside organization.

In the second case, where the outside organization is not participating in the field of forest research, the faculty members and/or their students take on a role that is closer to that of an expert consultant than to that of a collaborator. The forest-sector organization, whether it is a company or a government agency, may provide funds or resources, but no certified researchers, thus limiting its input to the stage of problem-definition. Based on what they said to me, the faculty members, while welcoming some input, would resist an outside organization’s attempts to influence the course of the research further, although I have not been able to observe this first hand. The results will be communicated in the form of a report or other “deliverable,” which can be based on a student’s thesis. However, representatives of the organization would not be invited to sit on the student’s supervisory committee. In one such case, the partnership was initiated by a student who sought an industrial scholarship to research a problem that emerged in his workplace, but the interest and input from the student’s employer were minimal.

The examples above do not exhaust the range of situations in which Forestry faculty members include non-university organizations and/or their representatives in their research program. The extent of faculty members’ social network into the field of forest research and the forest sector more generally is often such that collaboration occurs informally on a regular basis. Generally speaking, however, I believe that the ties of Forestry researchers with non-academic organizations and individuals cannot be analyzed as a single phenomenon. Collaborating with trained and established researchers – even if they are employed in a
company, government, or a NGO – is certainly different from conducting a research mandate and preparing a report for an outside stakeholder.

Faculty members conduct most, although not all, of the coordination work required in order to make researchers, resources, and research converge. Those coordination tasks take a significant amount of the time that they dedicate to research. Two faculty members even volunteered to say that they were not so much doing research anymore but rather organizing and managing the research that their students and occasionally their research associates do. While the stakes can be high for the students who are trying to establish themselves as fledgling researchers, faculty members are also going to be sanctioned – positively and negatively – for the results (or lack thereof) of their research program. As long as the projects remain within the field of forest research, some flexibility is allowed: trained researchers know that it can be hard to predict the outcomes of fieldwork or experiments, and that students can be unpredictable. Projects located closer to the scientific side of the field of forest research have more elastic timelines and offer more flexible expectations as far as outputs are concerned. Projects that take Forestry faculty members into the forest sector can be more delicate, as their “deliverables” are more specific and much less flexible. Two faculty members who are regularly involved in such ventures – and who use the resources of such projects to fund graduate students – noted that they required at the same time tactful management of the sponsors’ expectations and a close watch on student progress. Prof. Deland noted that sometimes students make inappropriate promises, and Prof. Rhoda that there was always a risk that a student could disappear with the data before the work was completed. In both cases, the faculty member would be considered responsible, and as a result compromise his reputation in the forest sector.
To support the large number of graduate students engaged in research training in the Faculty of Forestry, and to generally conduct such an extensive research program, its faculty members leverage both their specifically scientific capital and their connections with the forest sector. In the next section, I will explain how, at a smaller scale, the graduate students do the same.

**The determinants of student autonomy**

As they negotiate entry into their graduate program in the Faculty of Forestry, graduate students have to make a number of choices which must align with each other: they choose an area of research, they choose a supervisor, and they choose a topic, which usually also implies funding, or lack thereof. This choice is a position-taking that reflects and signals the value and volume of the students’ accumulated capital and anticipates their position in the field of forest research, or in relation to it. With very few exceptions, research students are not entirely autonomous agents in the field. Instead, they are legitimate peripheral participants (Lave & Wenger, 1991) who are allowed to partake in the field’s activities but under the supervision of one or more of the field’s established members. In the field of forest research, such formal supervisory roles are reserved to Forestry faculty members. As we have seen in chapter 5, there are a number of the field’s researchers who are non-academics but nonetheless authorized to supervise students and become committee members, but even then they must be endorsed by a regular faculty member. In my study, I was unable to interview any graduate student who was primarily supervised by a non-academic, thus the following discussion will examine the more mainstream ways in which graduate students become affiliated to certain faculty members. I will then examine how much autonomy students held in determining what they would work on and how they would go about doing it.
Affiliating with a supervisor

The vast majority of the Forestry graduate students that I interviewed had established a relationship with a prospective supervisor prior to formally applying to the program. I am in fact aware of only one student who applied to the Faculty of Forestry through the administrative channel only. The others either knew Forestry faculty members because of previous academic and/or research experiences, contacted one or more faculty members to inquire about research-training opportunities, or were personally recommended by a previous supervisor who happened to know a Forestry faculty member. For “local” students, who graduated from Forestry or worked there before, the contacts are made differently than for those located remotely.

Individuals with established contacts with Forestry faculty members resulting from their undergraduate studies in the Faculty or research assistant positions they took in the past tended to gravitate toward faculty members they already knew when seeking admission to a Forestry graduate program. They approached faculty members they were comfortable with and with whom they shared affinities, both in terms of research interests and personally. For example, students with a previous degree from Forestry, and who had worked outside of academia for a few years before deciding to return for a graduate degree, would start by contacting one or more faculty members they knew to inquire about possible projects, sometimes long before actually committing to apply. The relationship may not turn into a project opportunity immediately. If, for some reason, the student starts to think that it is urgent to return to school, different faculty members in Forestry may be contacted until an appropriate combination of a project and funding comes up.
Initially I thought I might be working with [two other professors], they do a lot of [research in an area that interests me], it sounded like really interesting work. And in the end, this project that they were trying to get funded didn’t. Or it was just slow, they were not able to do it at a time when I was ready. I had applied already and they said, “We have this application in [for funding],” and it was slow going through or whatever. So I think [one of them] forwarded my name and application to [the faculty member who became my supervisor], who happened to have a funding for this project and needed a grad students to do [the experiment]. That’s how I initially hooked up with him. Of course I knew him as an undergrad. (Christian, 953-968)

Christian’s social network from his undergraduate years was thus mobilized to find a supervisor, a project, and funding, and the process was facilitated by the fact that he had kept in touch with some professors while working professionally as a forester. Other students, on the other hand, are already on premises. For example, for students who were research assistants for a Forestry faculty member before, the idea of pursuing a graduate degree may come from the supervisor. In that case, the student will not have explored other possibilities: the supervisor offered a project and funding, and the student accepted. I asked Michael if he considered doing a Master’s degree with a different supervisor:

Well, I got to know [my supervisor] and the people here, and when the time came she offered it to me. We talked about projects that we could do, different things we could look at, and I accepted it. It was a good fit for me at the time. (Michael, 891-895)

Thus, for students who are already in the Vancouver area, there seems to be some degree of inertia in the choice of a supervisor: the students I have spoken with generally affiliated with supervisors that they already knew and sometimes even had worked with already. Although there probably are students who have graduated from UBC or Simon Fraser University and then approach a Forestry faculty member that they have never taken a class with or worked for, I encountered none. Familiarity and convenience might be
important factors in the choice of a supervisor for students who are unwilling or unable to change geographic location between their undergraduate and graduate years.

However, for students who were in a remote location, “cold” contacts through email were often the first approach to UBC Forestry. Some could afford the trip to Vancouver and introduced themselves in person to faculty members they had first identified through the Internet, inquiring about potential projects and exploring what was available. Sometimes, they visited or approached other faculty members at other universities as well, repeating the process until they found what seemed like the best package: an appropriate combination of a research area they were interested in and sufficient funding, as well as a supervisor that seemed like a nice person. Howard visited three universities of the Pacific Northwest in search of a good fit, meeting prospective supervisors and talking to them about his research interests – which Howard says were “vague” – and past work experiences. A faculty member he knew at another university directed him to a first UBC Forestry professor. When they talked, this professor recommended that Howard meet with a second professor, whose work he thought would be along the lines of his interests. His story is typical of students who “shop” in person for a program:

He sent me to see him and he happened to be in his office. (...) [The faculty member who became my supervisor] just gave me a kind of long story about what was going on in [his research] and said that he didn’t have anything now – which is a pretty typical answer – but he thought there would be some money coming in possibly later. (...) “We’ll see,” basically. So he said I just needed to send him my rough GRE scores and an unofficial transcript, so I just typed that up and sent it to him. At the end of that week, he said that there would be funding available for me. I said: “I’m definitely in!” (Howard, 587-599)

Alternatively, some students met their prospective supervisor at an international conference, and later pursued the connection through email. The same process could be
conducted through email only, especially if the student was in another country. Some faculty
members, however, told me that they receive many messages from prospective students and
are unlikely to respond unless the message shows that the student is genuinely interested in
their research area. In only one case did the student respond to an advertisement posted by a
Forestry professor to recruit a graduate student, although two students of the same group
started as research assistants after responding to a job posting. Besides, I am aware of only
one case where the student was admitted on the sole base of his admission material. His
excellent academic standing must have impressed his supervisor, who happened to have
funding but no student to conduct the research. After a brief email exchange, they were
matched. An email from a prospective student may be easily ignored; an email from a
colleague may carry more weight.

The other typical way in which remotely located graduate students become
acquainted with their supervisor is through their second-degree social network. These
students had worked – more or less formally – with researchers in their home country, and so
when they announced that they wanted to pursue graduate education abroad their supervisor
put them in touch with a Forestry faculty member they knew. Such students may be far away
from the Faculty of Forestry, but they are close thanks to their social capital and their stories
also reveal some level of inertia: once they were in touch with their home supervisor’s
colleague at UBC, they usually did not seek further opportunities.

In sum, there are many ways in which graduate students become associated with their
supervisors and beside the difference between local (geographically or socially) or remote
students I could not find strong factors that would explain the matching process. In the case
of local students, common affinities and dispositions are clearly at play, and getting along
with the supervisor – or getting along with someone who gets along with the supervisor – is
probably key, as long as there is at least rough agreement on the research area and solid prospects of available funding. For remote students, common affinities must be perceptible through email or in the context of a single in-person meeting, and timing is probably more critical: while faculty members will most likely not make particular efforts to accommodate a student they do now know, a student who sends a message at the right time might grab the attention of a faculty member with unclaimed resources to assign. Students who bring their own resources – such as a scholarship – will also be more likely to be successful when approaching a prospective supervisor that way.

**Student autonomy**

Student researchers are not autonomous players in the field of forest research, but some definitely have much more autonomy than others. Their autonomy can be estimated based on the ratio between the forms and volume of capital they bring to the project and the forms and volume of capital that are needed to actually conduct the research. It is generally assumed that students in the sciences are much less likely to define their own research problem and kept in a relatively subordinate position for longer, mainly because research areas have become increasingly specialized and complex, and require vast resources. The number of years that junior biomedical researchers spent in post-doctoral fellow positions is a prime example of this trend. The situation of forest research, however, will nuance conventional wisdom on this issue. I will now analyze the students’ position by dividing them into three categories: students with an assigned research topic, students who develop their topic within their supervisor’s research program, and finally students who join the Faculty of Forestry to conduct research on their own topic.

Many students work on topics that have been assigned to them. I found that they represented approximately a third of the students I interviewed, or about ten students. Almost
all were Master’s students and, except for one, their research area is always in the natural sciences, such as ecology, chemistry, or molecular biology. The few who were Ph.D. students were from abroad, and reported some difficulties in overcoming language barriers, which might have impeded their capacity to work autonomously in the field. These students were recruited to work on a project that their supervisor had conceived sometimes long before they arrived, and opportunities for input at the design stage were limited, sometimes because they only were in charge of a little part of a much bigger project, or because the data was collected before they became involved.

[My project] is part of a really big project that has been going on for many, many years. It’s a long-term project and different students pop-in and do different parts. I’m just doing a small part of a big project. (Nina, 239-242)

This project is part of a huge project, which is also focused on other aspects of the [same ecosystem]. My project is more about [one dimension of the ecosystem] but there are other studies [of other dimensions of the same ecosystem]. The last chapter of my thesis will include results from the other projects. (Pearl, 258-265)

These students bring with them the scientific baggage from their undergraduate education, and sometimes from a few months of work as research assistants, but they are rather inexperienced overall. Also, none of them comes from the Faculty of Forestry, and only one had formal training in forestry. The others came from one or another area of the natural sciences corresponding to the type of research projects they were to undertake, and so could transfer some of the knowledge and skills they had acquired in that other field. At least initially, they seemed to welcome the research project they were assigned, as they were not particularly swayed to work on a topic they had thought of themselves. In a number of cases, the topic even changed between the moment when they were accepted in the Master’s program and the time at which they actually started the research, but it did not bother the students at all.
Interestingly, the students working on assigned research projects sometimes were not clear about where the funding that supported them came from.

Are there any connections with industry or government or whoever in the work that you are doing right now?

Hummmm... Government, I think. It doesn’t have anything to do with industry.

So the funding comes from... NSERC? Or...?

A part of it is NSERC, the larger part is... I actually don’t know. I think it’s just, like, government. (Mallory, 242-248)

Do you know what money he was using to pay you?

I have no idea!

[Brigitte laughs] It must come from the trees!

You know, when it comes to money, I don’t feel very comfortable. I know that I am a student, right, but he’s helping me. I don’t want to ask questions like: “How much are you going to give me anymore?” or “Where is your money from?” I just respect that part (...) he knows how to do it. (Pearl, 428-438)

Nevertheless, from what I could gather, and based on the information from interviews with the supervisors, these students are for the most part working on projects that involve non-academic partners, if only on an in-kind basis. The relationships with those partners, however, pre-existed the arrival of the student, and most of the interaction is handled by the supervisor. At most, the students occasionally seek information from non-academic collaborators or orally present research findings to them. There are, however, exceptions: two of the students with assigned projects held scholarships that were partially funded by an industrial organization, and were supposed to be interacting with their industrial partner for a
significant portion of their time. In reality, the input of the student in the scholarship proposal had been minimal, since the project was already designed when they started.

Students with an assigned research topic may exert some autonomy on a daily basis as they conduct experiments or interact with project partners, but over all they are dependent upon their supervisor. They are, to a large extent, part of their supervisor’s scientific capital, and their work helps the latter meet the objectives of his or her research program. The situation is not devoid of risk for the supervisor, especially if the student does not develop a sense of ownership of the project. As it was mentioned to me, informally, more than once: “You can’t fire a student,” although students can disappear without notice. They also may become withdrawn in their work:

My project is actually just a small component of a much larger project. (...) There’s a whole lot of other components to it, I’m not even clear on what they all are. (...) When I know that something is six months in the future, sometimes I just learn it in six months. It’s more like a take-it-as-it-comes kind of thing, because... I can try to understand the general concepts, but there is no point in knowing the specifics of how to do something unless I need to do it. (Julio, 76-77, 83-85, 183-188)

Not all students with assigned topics, however, feel so, and even those who do may turn themselves around at some point. As they gain more capital, students may also gain more autonomy and seek to pursue projects in a more autonomous fashion, at the Ph.D. level for example.

This leads us into the second category of students, those who have combined their topic within another within the boundaries of their supervisors’ research programs. Many times, this came as a compromise: the student wanted to work on a topic, but lacked the funding and resources, so the supervisor offered them to work on one of his or her existing grants as a research assistant. Instead of limiting themselves to the supervisor’s project, the
students try to combine it with their own interests. Victor told me of his project’s first part, and then blurted out: “Actually, this is not my interest.” Startled, I asked him what he meant by that, and he proceeded to explain to me that he was really interested in was a different aspect, which constitutes the second part of his thesis. “But how come are you working on the other thing, then?” I asked, and he said: “I have to get funded for this project!” (Victor, 148-152) I encountered other students in a similar situation, and most of them had decided to conduct comparative projects to combine their interests and those of their supervisors. I also encountered students who, despite having their own funding, tweaked their research project to align it with their supervisor’s interests. For example, Todd, a Ph.D. student, had a research project that he cared deeply about and he had been reading about for many years as he worked in other research areas as an assistant. He approached a Forestry faculty member who offered him to work on a related project that would build on the knowledge he had already acquired, but go in different, more applied directions, for which there was funding and different deliverables than those envisioned by the student.

The students who compromised on their topic of choice and/or combined it to other areas of investigation in order to secure research resources were usually international students. They often had many years of work experience, sometimes even in research, but they could not convert them into a sufficient volume of valued capital, either because they were not quite fluent in English, because they came from a developing country where research resources were limited, or because they had started and abandoned graduate programs before, raising doubts about their capacity to complete a graduate program. Those students were finding themselves with large projects, which made me wonder about their prospects of timely completion.
The projects they were involved in all included at least one non-university organization, which was not primarily research-oriented. This situation created the emphasis on the deliverables that I have discussed above, and thus the constraints for the supervisors and students. Here again, the supervisors found themselves in a situation potentially more precarious than if their students had been assigned their topics: their supervisees all had competing research interests and there was a greater perceived risk that they would drift towards them without delivering the project’s promised deliverables, or leave altogether. Supervisors and students alike found themselves in a delicate balance, whether they recognized it or not.

Other students also occupied an intermediary position between being assigned a topic and working on their own: they developed a topic within their supervisor’s general research program. They were doctoral students or Master’s students who arrived with significant prior work experience. All of them had work experience, either in a Canadian research laboratory (if they were in a “hard” scientific area) or in the forest sector (if they undertook policy or business studies). Allan, for example, was very interested in a certain type of research and started working with his supervisor as a research assistant. He crafted his research proposal closely along the lines of his supervisor’s existing grant:

I picked things to do in my research which are very relevant to what [my supervisor] was doing, mainly because of the way funding works. I made sure that my work fits very much in line with her research agenda and that way I always know that I have her complete support for whatever I’m doing. That’s really important, and it has given me the opportunity to do many interesting things. (Allan, 346-353)

Javier came to UBC because he wanted to work in an area that few Canadian researchers work on. During his undergraduate years, he had acquired scientific research experience in an uncommon sub-specialization that was of great interest to his Forestry
supervisor, and when he contacted her she quickly accepted him even though there was no
immediate project for him to work on. Based on a casual suggestion by his supervisor, Javier
started collecting some data and conducted an experiment which turned out disappointing. As
a result, he lost a lot of time and also, for a while, confidence – his own and that of his
supervisor – in his capacity to be a researcher. The expectations had been set very high in the
light of his prior experience, but his research assistant work did not prepare him to craft
excellent experiments on his own right away. He turned out to be a successful Master’s
student in the end, but his case exemplifies how a “good topic” that has been crafted ahead of
time by the supervisor can be a crucial resource for graduate students. Edwina, another
student who was given similar latitude with the crafting of her research proposal, wrote
several versions – “each one of them quite different from the other” – before hitting the right
note. “It was way more difficult than I thought it would be,” she admits (Edwina, 265-267).

For the students who developed their research projects, there were sometimes (but not
always) partnerships established with outside organizations, but when this was the case the
terms of collaboration were defined at the same time as the research project itself, and the
students had a role to play in the arrangement. In one case, it’s a Master’s student who seized
an opportunity to establish a collaborative relationship with community stakeholders that his
would-be supervisor was probably not going to pursue for lack of time:

[My supervisor] was busy writing [other proposals] and he thought he would
not have the time to apply for [another one], so we kind of put it aside. And
then I started talking to [another faculty member] about my project and I said
that we didn’t have funding, and that the [application process] was quite
involved. He said: “No, it’s not, you should write something.” And so I went
and had a short meeting with [my supervisor] and I realized what it actually
took and I started writing it. We had a one-hour meeting. I took notes on what
he wanted the proposal to say, but in essence he was happy [with what I did].
(Robert, 405-416)
The student was empowered to develop further the project he thought would be most beneficial to him as a career development opportunity, and the application process in itself was a learning experience. Robert’s supervisor was willing to go ahead with him in the application process, but some students have to negotiate harder. Matthew was a Master’s student and after a term, having found his stride, he had an idea he thought would make a great Ph.D. research project:

I asked [my supervisor] if I could switch to a Ph.D. and he said, “No, you’re not ready.” (...) It was heartbreaking. But I said, fine, I’ll just finish my Master’s and then I’ll do a Ph.D. if there is a good-enough project. I kept in mind what I had proposed to him [as a Ph.D. topic] and I was working towards that. Then [my supervisor] went to [another country] and came back with a book he had found that was pretty much what I had been talking about doing. They had written a whole book about it! (...) So he asked me if I was still interested in doing a Ph.D. and switching over and I said, “Yeah!” (Matthew, 998-1010)

The student’s understanding of what mattered in his research area had been validated by others in the field of forest research, and he was given the chance to develop his idea.

One final interesting case in this category is that of Neil, who initially accepted to work on a topic that came with assorted funding for his doctorate. After working for a few years towards it, he was increasingly uncomfortable with it, but did not speak up until he obtained his own funding through a scholarship. He then approached his committee members to change his study’s design and build on the knowledge and skills he had acquired during his Master’s degree research.

I ended up making my own money, let’s call it, and then I decided that since I was pretty much in control now I’d suggest some changes. “No problem,” they said. (...) After talking to them, it was no problem at all! It was my project anyway, I could have changed it since the first day. I guess I am not used to dealing with this kind of politics, I didn’t know how much power I had. I have lots of power, I guess. (Neil, 179-186)
Neil raises the interesting question of how much power students effectively have over the course of their research projects even when they are assigned. In his case, there were outside stakeholders, but no required deliverables, and overall the project was firmly anchored in the field of forest research. This probably explains how understanding and flexible his supervisor was about making the changes. If the supervisor had committed to delivering findings on specific aspects, however, Neil’s power would most likely have been much lesser, although of course it might be better for a supervisor to have slightly different types of results to deliver than nothing at all.

At the other end of the spectrum, there are students who come to Forestry with their own project. I encountered only five such students, all of whom having previously acquired a number of years of work experience. They are also, among the students I encountered, those who were the most integrated with organizations outside of the UBC Faculty of Forestry. In three of the cases, they maintained their position throughout the duration of their graduate studies, while the other two had close ties with at least one organization that offered them important resources needed to conduct their research project. In some cases, an industrial scholarship was used to fund at least part of the students’ salaries. As far as I know, the supervisors of those students provided only a small proportion of the resources required by the projects. The students were the ones playing the primary coordination role, arranging funding and access, as well as designing the projects themselves. Despite the closeness of the partnership with outside organizations, the supervisors’ reputations would not have been at stake if the students failed to deliver findings, as the onus of the project was really on the student, not the supervisor. I was surprised to find three projects from the natural sciences in this category, but they were field- rather than lab-based. In sum, the students who brought their own projects and resources were only looking for a supervisor able to guide them as
they needed it, and for a credential-granting authority that would certify and legitimate the process with a degree in the end.

While those students did not rule out that their projects could have a positive impact for the partner – which was often their employer – and were striving to make a contribution in general, the process was primarily about personal and professional development. Melissa, for example, used her project as an opportunity to acquire new knowledge and new contacts that would make her an expert in a new niche, increasing her chances to turn her career and away from a part of the forest industry she did not enjoy much. On the other hand, Jimmy, who works in a government agency’s research department, did not act on a new career plan. He candidly admits that his ego drove his decision to undertake a Master’s degree after his supervisor at work informed him that he wanted to recruit a student to pursue a project Jimmy had started:

[My boss] suggested to me, one Friday evening, that he would like to (...) open up a position for a Master’s student (...) to study my invention. (...) I had no intention of going back to school, or to pursue any kind of Master’s or anything like that. (...) I had other irons in the fire in my life and going back to university definitely wasn’t one of them, (...) it was very costly and it just wasn’t a priority for me. But my ego sort of goaded me into it! [He laughs] I went home that evening and I was irritated.

That someone would follow up on your own invention?

Yeah, that’s right. (...) I ended up phoning [my boss] on a Saturday evening and proposed to him that I would do it. And his reply was; “You’d want to do that?” It never occurred to him that I would want to do that. So I said, “Yes,” sort of hesitantly, because I realized that my ego would dictate that I would have to complete this. So I said: “Yeaaaah.” (Jimmy, 67-90)

Max, like Melissa, had a more strategic agenda and also wanted to pursue further education to improve his career prospects. His eyes were set on the bottom line, but the goal was to improve his own situation as he sought a better position in his industry:
I [needed] to go down the route that would impact the [company] the most. How can I save an owner, or a manager, money, so that he likes me? If you save somebody a lot of money, they are going to think you’re really, really smart, and worth paying. If I could take half of the revenue that we saved [in my new job] as a bonus, [he chuckles] I’d be quickly rich! (Max, 727-733)

While Max would possibly create important savings for his employer if his research turned out as expected, the risks implied by what would have been “the perfect experiment” were deemed too high by the employer. Thus, the Master’s student had to limit his design in order to fit, for the most part, within established company practices. He nonetheless published his study’s findings in a leading journal of his field, implying that the study still met scientific standards. Another student found himself to design his project to fit within his employer’s constraints, and juggled what he described as a tension between two contexts of justification to make his project acceptable to the academic world and to his industrial world:

I did not want to do a doctorate on top of my job, doing my job 9 to 5 and then the doctorate from 5 to midnight, for personal reasons. I have children and I did not want them to suffer from my professional or personal choice to get into the Ph.D. So for me it was important that the doctoral project be a part of my job. So I worked to get the project accepted as part of my employer’s research activities. (...) Consequently, I am not only delivering the results to UBC or to a peer-reviewed journal, but also to [my organization’s] stakeholders. (Jacob, 160-172; 175-177)

If these students’ work can possibly benefit the organization they work with, they also have value for faculty members. Such students, as I have already pointed out, are welcome by faculty members and accepting them is, in the words of Prof. Nocera, “a no-brainer,” as long as the general research area matches their own. According to supervisors, such independent, professional, and resourceful students do not require much attention to successfully complete their degree, and faculty member are rewarded for their supervisory activities. But there can be more to it. In Richard’s case, the supervisor benefited from a definitive influx of cultural, social, and probably also symbolic capital by accepting to supervise this student. Indeed,
Richard shared his knowledge of a different but related ecosystem and his contacts within research organizations in different countries, allowing the supervisor to expand his research program into new but related areas and to apply his previously developed research instruments to a parallel field.

Those five students who came to UBC Forestry with their own research project and resources do not fit the traditional portrait of the graduate student. They have created an unusual position for themselves through the combination of their own knowledge and skills with the resources of organizations outside of the specifically scientific world. The university setting provides a legitimate context for them to conduct their research activities, and also provides a range of resources including (but not limited to) (sometimes loose) supervision by a more experienced and established researcher. These students have more autonomy as agents in the field of forest research than most of their peers.

**Is the forest research game worth playing?**

All students, of course, are located institutionally within the Faculty of Forestry. However, they simultaneously hold positions somewhere in the social space, and their primary affiliation may or may not be within the field of forest research. Very few, if any, students can be seen as autonomous agents at the time of their registration in a graduate degree program. However, many start embracing a given field’s illusio – the belief that the field’s game is worth playing, that learning its rules and tricks is desirable – thus fulfilling a necessary (but not sufficient) condition to progress toward becoming members of the field. The amount and quality of the capital they have accumulated prior to and during their graduate program will determine their capacity to eventually become recognized as autonomous agents.
The students’ positions in the social space during their studies can be divided into three broad categories. Some students can be seen as affiliates or legitimate peripheral members of the field of forest research, in which they may already have accumulated some capital even before starting their degree. Others explicitly adopt a strategy that they hope will take them outside of research and into the forest sector directly, or in another sector of professional practice where cultural production in the form of research is not a core activity. Others, finally, do not seem to follow either trajectory, occupying a still indeterminate position.

Buying into forest research

Most of the doctoral students, and a few of those at the Master’s level, can be located within the field of forest research, albeit as minor or dominated agents with little of their own capital. There are four possible positions within this group.

Some graduate students were participants in the field of forest research prior to their admission to the graduate program, but their lack of specifically scientific capital – signalled by the Ph.D. or, to a lesser extent, by the M.Sc. – put them in a dominated position. They either worked on established researchers’ projects as assistants or, when they worked independently, lacked freedom in the choice of their research topics or the resources to conduct them. These students believe that research is an important activity and also that sharing one’s findings with the broader research community through articles and conference presentations is important. However, until now, they have had only limited capability to do so. During their graduate program, these students strive to work on their own research topics. However, those who do not bring their own funding or who lack an understanding employer to support them have had to adapt their proposal to include some of their supervisor’s objectives in order to get funded as a research assistant. In every case, the research project
involves some level of collaboration with non-academic organizations and the student regularly interacts with outside partners for the purposes of the project.

A second possible position is occupied by students who have had some experience working in the forest sector and some research experience through the completion of a Master’s degree. For various reasons, these individuals’ investments in the operational side of forestry were not satisfying, which led them to explicitly change strategy and return to school. By coming to Forestry, they could maintain at least some of the value of their previous investments in the forest sector, however they now need to build up the research-specific capital that will allow them to earn positions of their own in the field of forest research. These students did not bring their own topics. In fact, initially, at the Master’s level, they worked primarily in an area assigned to them by their supervisor. They were more involved in defining their doctoral research topic, which they built on the continuation of their previous research, with the same supervisor. They could have done something else after the Master’s degree, however they say they wanted to push their curiosity further. I asked Christian if he has considered doing anything else instead of starting a Ph.D. after he completed his Master’s thesis:

I could probably have started looking for a job. I was really interested in the potential for [what I had developed during my Master’s], I felt like I had only half-done it. Even though [my supervisor] said, “This is almost a Ph.D., just a little bit more and it would be a Ph.D. thesis.” When he said that, it got me thinking, well... And there really was so much more that I wanted to do with that Master’s. (Christian, 1120-1129)

As others in his position, Christian was increasingly “buying into” the research illusion and wanting to push the matter further. They are just starting to share their work with their peers through publications and conference presentations – not always a pleasant experience at first – or are anticipating it. Another aspect that these students have in common is that their
research topics are also of interest to non-academic organizations, which may have provided some funding, information, or direct collaboration. Throughout their program, however, those students remained anchored in the university environment.

Students who have some scientific experience but no prior experience in the forest sector or connections to the field of forest research outside of academia are in a slightly different position. All of their investments so far have been in the university sphere, and they are more preoccupied with the scientific impact of their work, mentioning “good publications” in “good journals” as something to strive for. At the same time, they are also concerned with the implications of their work outside of a strictly scientific context. One mentions that she hopes to find ways to transfer her research results to companies to help them improve their practices, while two who work in the biosciences mention the importance of creating knowledge with possible economic impacts on top of the necessary scientific contribution.

Some Master’s students are in position which is related to the field of forest research, but their link is still limited to the level of the illusion. They have finished their Bachelor’s degree very recently and while they might have had some laboratory and/or field experience, they are in many ways still far from being independent graduate students. At the time of their admission into their program, they express a strong commitment to doing research and even to make original contributions to knowledge. Their research problem is either assigned to them by their supervisor, or developed closely within the bounds of the supervisor’s research program. There are no direct collaborative ties with non-academics, although the project might have some relevance to a social and/or economic problem and benefit from some form of strategic funding, which the student does not necessarily know a lot about.
Sometimes, however, this commitment is recalled retrospectively: “When I came here, I was gung-ho to do a Ph.D., I was going to become a doctor, a professor, do research for life, and stay in the field. Keep doing scientific research,” says Javier (1003-1005). Such an impulse might have been fuelled by family traditions or social connections with academics, but as we will see in the next section it did not last when exposed to the realities of academic life.

Aiming outside of the field

Five of the students I interviewed expressed no intention to become members of the field of forest research, instead using their graduate degree program as a stepping stone to improve their prospects in the forest sector or in a related area. All Master’s students who did not intend on doing a Ph.D. (at least not in the near future), they had a few years of professional experience and the explicit intention of returning to the job market after graduation, albeit in a better position than previously thanks to their newly acquired knowledge and skills. Prior to entering their program, they had either experienced frustrations in their work, or had seen that the positions available to them without a Master’s degree were limited. Research, for them, is a mean to an end, not what they want to spend their entire life doing. They definitely do not share the scientific illusio.

A striking similarity between these students is the fact that they all have an active (or planned, in the case of those just starting) partnership with an outside organization in which they (will) play a direct role, or at least an immediate prospect for the application of their research work. The exact shape of the partnership agreement varies, and it was not necessarily initiated by the student, but the prospects of applying one’s work to a “real life” problem is seen as an important benefit by all. Their relationship to context of application of their research makes them an expert-in-training on their research topic. As students, they are
– or hope to become – a vehicle for knowledge transfer between the academic environment and other areas of the social space. They will not passively convey the results of previous work but instead do some research of their own to respond to a specific need of the outside organization or context of application. They hope to learn skills that will have a direct translation in terms of job prospects after graduation. In other words, their newly developed qualifications will allow them to distinguish themselves on the non-academic job market.

**Indeterminate positions**

There are students who can hardly be located in a position of their own in the field of forest research or in any other organizational field. As far as the academic world is concerned, they seem to be primarily part of the capital of their supervisor rather than an agent of their own. These students mostly came for the Master’s degree program and followed a linear course, applying to a graduate program at the end of their Bachelor’s degree. Most of them are assigned a project to work on, or choose one among those offered by prospective supervisors; if they develop their own, it remains located within the boundaries of the supervisor’s research program and makes use of pre-existing resources in the supervisor’s group.

These students may have accumulated some academic capital in the form of undergraduate success, but not necessarily. Some of those students came from other fields and started in Forestry as research assistants; their work was satisfactory enough for their supervisors to suggest that they pursue a graduate degree. When they started their Master’s degree, they were integrated to their supervisors’ existing research programs, and all of them worked on a project with ramifications extending beyond their own degree. Two students, for example, inherited data which had been collected for a number of years prior to their arrival, which they had to complete and analyze for their own thesis. Others were given a piece of a
much larger project. It is difficult to find out retrospectively how much agency the students effectively had in the choice of their topic, but I have observed some of these students showing only mild interest, and in some cases outright displeasure, with their topic, which they were not always capable of locating in the bigger picture. While some took the situation in stride, others experienced stress or worried that the project was more work than they could accomplish. That graduate students experience self-doubt is by no means a novel finding; however, it was interesting that, in the context of my study, the students who complained of isolation or reported bouts of malaise or even depression were all students who struggled to adapt to a topic they did not seem to possess as their own.

Of the students in this category, two held scholarships designed to get them involved closely with a non-academic partner, but it did not seem like they had written the proposal for that project themselves. Instead, they stepped into a pre-existing collaborative agreement of which the scholarship was just one component. Others mentioned that there might be outside organizations involved with their supervisor or supporting the project, but such partnerships did not concern them directly and, while they might come across non-academics while doing fieldwork, they had little to no personal interaction with non-academics about their research. These students are not necessarily passive in the conduct of their research, but they do not actively seek to push their findings forward or to examine further the implications of their work either.

Of all the graduate student positions I have described, this one is the most dominated, but it is also transitory. A few of the students who now are peripheral members of the field of forest research started their graduate student trajectory in the same way, and eventually gained more autonomy as they progressed to the doctoral level. Others, as we will see, envisioned taking other turns after graduation.
Possible futures

This study’s focus was on the trajectory of forest-researchers-in-training prior to the start of their graduate program and on their position during the program. Thus, most of the perspective I can offer about the professional prospects of trained forest researchers is through the eyes of those still in training. I did, however, interview some former students, and also discussed the matter with faculty members who, at one time, were graduate students themselves. I also analyzed partial data that was shared with me by the Dean’s Office about the actual outcomes of Master’s and doctoral degree program graduates. This section will briefly review what is known about the location of former Forestry graduate students on the job market and then explore the discourse of faculty members and current graduate students on the matter. I will show that university positions hold a special, privileged place in the representation of many professional opportunities for forest researchers-in-training, but that there are many more positions available within the field of forest research or in relation to it.

A tentative survey of possible outcomes

I rely on two main sources of evidence to discuss the actual outcomes of former Forestry graduate student on the job market, in the field of forest research and in relation to it: a database compiled by a research assistant working for the Dean’s Office in 2004 and interviews I conducted with former students. Both offer insight into the actual opportunities available to research-trained professionals in the field of forest research and beyond. I will integrate the results from the interviews in the next section, hereby presenting a quantitative overview of the situation of Forestry graduates.

In the summer of 2004, a student of the Faculty of Forestry, Lesley Brown, was hired by the Dean’s Office to create “a database of all past graduate students to document the success of the Faculty of Forestry in producing highly qualified personnel” (L. Brown, 2004).
Based on an output of the university’s database of graduates, she sought to identify the place of work and position of former students, primarily by using previously collected data, searching the web, and asking the former students’ supervisors. She also consulted the database of the Association of British Columbia Forest Professionals and the directory of the Ministry of Forests.

Brown was moderately successful in obtaining information about the position and place of employment of the alumni population she was working with, collecting data for 246 individuals out of 1,110. The database was lacking information about the degree program of a large number of listed individuals, and no employment data is available for them. For many other students, outcomes are simply missing. My study’s design and confidentiality issues prevented me from filling the gaps in the database. Unfortunately, the methods of data collection used by Brown induce an important bias in the database, as those who remained active in Canada and in government positions, especially in the forest sector, are much more likely to be represented than their peers who either went abroad or undertook a career in the private sector. Academics are also most likely over-represented, as they would be more likely to be found through web searches. Thus, the findings have to be handled with extreme care, and cannot be considered to statistically represent the population of former Forestry graduate students. I present them here as a fragment that could be used as a base for future research. Brown’s data separates M.F., M.A.Sc., and M.Sc. students, which I have aggregated in a single category. It was only very recently that the M.F. degree became a course-based Master’s degree. Prior to that, it was awarded to those who had previously earned a Bachelor of Forestry.

There is a clear difference in outcomes between Master’s and Ph.D. graduates, as shown in Table 24. For graduates of Master’s degrees, government and private sector
employment was most common, whereas the modal category for Ph.D. graduates was higher education. Almost all of those employed in higher education were faculty members at one rank or another, exception made for very few lecturers, administrators, or staff members. On the other hand, positions in government, the private sector, and non-government organizations were much more diverse, but included a majority of “researchers,” “scientists,” and “analysts,” as well as many managers and executives, especially in the private sector.

Brown’s limited data supports my hypothesis that many research-trained Forestry graduates remain active in the field of forest research, or use their skills in a scientific context. It also shows that individuals with higher degrees have also penetrated the decision-making sphere of the forest sector to a point. Unfortunately, the fact that data is missing for a large number of graduates and the skewed data collection do not allow me to further generalize based on Brown’s results.

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**Professors’ views**

I had the opportunity to briefly discuss with the faculty members I interviewed what they thought was the best thing that could happen to their graduate students after they completed their thesis or dissertation. Their responses were quite diverse, and reflected the
diversity of their own careers. They also had a broad definition of success. Prof. Tamika Kuss, for example, first told me about one of her former Ph.D. student who was about to obtain a faculty position in a research area related to what he did for his dissertation. However, she said she was happy as long as her graduates were happy: they could be teachers, stay-at-home parents, or entrepreneurs, as long as they “figured out what they wanted to do in life” (1385-1386) it was all success to her. Prof. Rhoda reacted to the question in a similar way:

To be honest, I don't care if they go goat farming. The thing is, hopefully they've had a good educational experience here, they've had opportunities open up for them, which wouldn't have otherwise opened up, and it's up to them to choose which of these opportunities make sense for them. (Prof. Nick Rhoda, 823-827)

He added that if they changed career, he would be happy to support them with a reference letter if needed. While he did not offer specific examples of successful students, he did say that he encouraged students to go into research, consulting, or professional practice:

“I’m quite happy if they go out and work in consulting and change the way practices are carried out on the ground,” (Prof. Rhoda, 822-823). Prof. Loughran also was open-minded in his definition of “desirable future” for graduates:

Doing whatever interests them. If they decide they don’t want to do this anymore, that’s fine, I just hope that they have enough skills that they can transpose elsewhere. (Prof. Kurt Loughran, 1008-1011)

This being said, professors Rhoda and Loughran both saw Ph.D. students a little differently:

It depends whether you’re doing a Ph.D. or a Master’s... I haven’t graduated many Ph.D.s, but the two that I have are both professors, so that’s good. That’s what I would want for them, I think that’s the best-case scenario for someone with a Ph.D. (Prof. Kurt Loughran, 1013-1018)
Ph.D. students, of course, you really want them to go on and get a good and interesting research position. It’s good for you, it’s good for them, it’s good for your future students, because it establishes networks. I’m now able to see how that works for me. I suspect that to some degree it feeds back on who you recruit. If your goal really is to get people at a stellar future academic career, you’re going to have to be looking at a very tiny pool of people as recruits. I can pretty much say that they are going to come here with big scholarship money. And to get the people with big scholarship money you need to have developed a bit of a reputation and a network of your own to recruit those people. The real stars, usually they start shining pretty early, and people are always on the lookout for stars. (Prof. Nick Rhoda, 827-839)

They both refer to the advantage, for faculty members, of seeing their Ph.D. graduates move into faculty positions as well, as it extends a professor’s social capital to have former students become professors in turn.

The Forestry faculty members I interviewed view their graduates as possibly active in many different areas, but – without surprise – they seem to identify more closely with their Ph.D. students. Because so many of them have had a non-linear career trajectory, they can also project different and unusual definitions of success onto their students. This is visible in the description that Prof. Deland, who worked in government prior to accepting his current faculty position, makes of a successful graduate of his group:

What does it mean to be successful in your book?

To get a job, a good job afterwards.

What’s a good job?

[A former Ph.D. student] became a policy advisor [to government about forest-related topics] and is now a professor [at a university]. Which to me is a good job. (...) He managed to do it in such a way that if he wants to give up [his faculty position] he can go back to his position [in government]. To me he’s the epitome of a successful student. (Prof. Shane Deland, 1568-1579)

It is hard to imagine that a caring supervisor would demean the professional outcomes of one of their former students, thus it is hard to take the statement that “whatever makes
them happy is a success” at face value. As Prof. Rhoda’s lucid quote above explains, there are strategic implications for faculty members in the job placement of their Ph.D. graduates in particular. Seeing them pursue research careers and/or be recognized as experts in a university position, but possibly also in government, is an advantage. What I have not been able to discuss with them in greater depth – and what they did not volunteer comments on – is the range of perspectives open to Master’s degree program graduates.

**Projected and actual trajectories post-graduation**

By definition, graduate education is only a phase in one’s life, even if it can be an extended one. “What are you going to do with that degree?” is a common question that graduate students get asked and ask themselves a lot. Among the participants to my study that I interviewed primarily as graduate students, only five had completed all the requirements for their degree program at the time of our first interview. The others lived with a varying level of uncertainty about their future. Discussing the future positions of agents before they occupy them is a tricky endeavour, as the agents in fact do not necessarily formulate explicit projects; confronted with an interviewer’s question, they might make an effort to come up with an answer, but the meaning of such findings should not be exaggerated. However, as I have discussed earlier, many graduate students find themselves in a gap between what they had expected as appropriate conditions and the actual opportunities open to them; this state of hysteresis, whether it is mild or acute, may trigger the formulation of more explicit strategies which would allow those individuals to bring their situation in alignment with their expectations. This section will examine the actual and potential trajectories of respectively former and current graduate students based on their position at the time of their studies in the Faculty of Forestry (as described in the previous section).
A future in the field of forest research

The students who are already located as minor or peripheral agents in the field of forest research, unsurprisingly, all envision or embrace (for those who have already graduated) research careers. Exactly what kind of research career varies along the lines of the four types of positions described in the previous section.

For students who are already employed in the field of forest research, continuing to work for the same organization was the preferred scenario, even if they were not necessarily obligated by a contract to do so. For those students, obtaining a degree is not linked to a promotion or to material benefits, although some hoped that it would improve their position or status within the organization. Jacob, who is already a researcher, thought that adding the letters “Ph.D.” next to his name would give him more autonomy over his work agenda and allow him to focus his work on his actual areas of expertise while declining to work on areas outside of it. Students also mentioned that they hoped that they would be able to collaborate with academics more in the context of their work in the future. On this topic, Jacob added that he has been approached by a university he already had connections with to discuss a possible adjunct professor position, and hoped that his Ph.D. would allow him to teach more and eventually supervise doctoral students. That way, he would maintain his employee position in the non-academic research organization but also keep his academic network active.

Unlike Jacob, most students, during the course of their program, had no guarantees of future employment, and their plans for finding work after graduation were vague at best. Two students said that they currently focused on publishing articles in the best journals they could, and a few considered applying for post-doctoral fellowships as a possibility. The supervisor was occasionally cited as a source of leads for future positions. As most of these graduate
students had partners with careers of their own and/or children, the complexity of finding an appropriate occupation following graduation could seem daunting, and some told me outright that they would prefer not to have to think about the problem for the moment.

For most graduate students wanting to pursue a research career, whether it was realistic to become a professional and autonomous researcher was still up in the air. Among those who had graduated, research remained the primary activity, but some uncertainty remained. Lance, after a post-doctoral fellowship at an academic institution, now holds a position in a government research organization which he finds very satisfying and fulfilling at the moment. He recently was approached to become an adjunct professor at a university, and entertains the possibility of leaving his government position to take a full-time academic position one day if the conditions are right. That way, he could have his own lab and develop his research program further. Matthew, after graduation, pieced together several contracts, including work as a post-doctoral fellow. While he hoped to find himself a professor in 20 years, the current instability of his professional situation was stressful and hardly sustainable. Consequently, if a government research position corresponding to his area of expertise came along, he might be inclined to apply for it, without ruling an eventual return to academia, as being a professor was truly his dream.

Among research careers, university positions retained a particular power of attraction. Not all were keen to say that they would want to become university professors, either because they are aware of the difficulties they might encounter to find a post or because they found teaching not to be their forte. Even Christian, who loved to teach and hoped to pursue research, phrased it carefully:
I wouldn’t be averse to... entertaining any sort of... tenure-track position or teaching position at a university... anywhere in North America, for that matter. (...) If I got an opportunity that was just really interesting, something that I couldn’t refuse, then I would be willing to. (Christian, 1326-1328; 1331-1333)

Matthew was exceptionally forthright:

I love teaching, I love research, and I would love to be a professor. I’d love to have my own students and I would love to have research programs harmonized and having my own goals. Doing the research I am doing now, but bigger, and better, and having students, so in that sense teaching as well. (Matthew, 1314-1321)

Academic positions were undeniably attractive, and government research positions were usually mentioned as an acceptable alternative. Work in the private sector, however, was often considered at once a last resort and something they were not qualified for by those who hoped to remain in the field of forest research. When asked why he said that his first choice was to work in a university, then for a government organization, and last for a company, Clayton said:

Companies focus more on some kind of products or outcomes. What I have done for my PhD study is very useful but I don’t think I can just transform my study into some commercial product. There is very little chance. It’s just theory. (...) What I have done will be very suitable for the decision-making process, which means mostly for government, not for companies. (Clayton, 703-710)

Edwina, who considered corporate jobs to be her last resort, also did not think she had what it takes, but assumed she could and would work in the private sector if necessary:

I feel confident enough now to be sure that I will be able to find something to do, and it comes to a very difficult situation where I can’t find anything I want to do, in my area, I would happily take a job in industry or something a little bit different. I am not concerned about that. (...) I don’t think I’m the type of person that has a profile for the private sector, working in a corporate environment... it’s not my style, but I would do it. (Edwina, 693-702)
Only one student who held a strong research illusion also expressed interest for the private sector. In fact, he has been involved in putting together a business plan for a science-based commercial endeavour, but the project remains at a very early stage and in the meantime he will probably pursue more traditional career options. Two other students, at the early stage of their Ph.D. program, are considering pursuing work in the non-governmental sector.

For the students whose participation to the field of forest research hinged solely on their illusion and who were just starting their program, the outcomes remained particularly uncertain, although like others they hoped to find an academic or government position after their Ph.D. The ones who were more advanced in their program, however, had profoundly changed their aspirations in the meantime and, after being exposed to the faculty lifestyle, decided that it was too demanding and unbalanced.

**At the gate of another field**

The students who strategically positioned themselves to enter another field than the field of forest research were very clear in their intentions: they did not plan to remain in school after finishing their Master’s degrees. They would rather seek positions in their new field of choice. For some, this meant some level of management, while others saw themselves as expert contributors to an area of professional practice. They had one clear preference, although when prompted could usually come up with “plans B and C” which they would consider if “plan A” failed to materialize. Their project never included doing a Ph.D., although one student said “maybe,” but in the very distant future.

For these students, the explicitness of the strategy made it so that their future was totally in their present. The only student in this category who had already completed his program had done exactly as he hoped, although it took him more than a year to convert his
newly earned capital – in the form of a Master’s degree – in the kind of work responsibilities and management position he wished to reach.

**Indeterminate locations**

The students who did not clearly affiliate to a field at the time of their graduate program had the most diverse projects, including plans to work in the private or public sector, or to undertake a new graduate program leading to a different career outside of forest research. None intended to pursue an academic career or to start a Ph.D. (although one of those students is currently in a Ph.D. program).

As they progressed through their program, those students made discoveries about themselves and about the structure of research work that transformed their perspective. For example, Julio had started a Master’s degree immediately after his Bachelor’s said that, at the beginning of her program, he thought he would naturally move to a Ph.D. and eventually become a professor. Halfway, however, his perspective had changed and he now rejected the professorial lifestyle in favour of a more balanced life which would allow him to pursue other interests outside of the profession. “Professors work too much,” he concluded (604), a sacrifice he was not willing to make. What exactly he would do next was not certain, but a Ph.D. was not out of the question. Others, for various reasons, had similar changes of mind and some actually made decisions that would lead them to change field after finishing their Master’s degree.

Almost all of the students in this category had significant university research experience prior to starting their Master’s (or Ph.D.) degree, which brought them to take more steps in the research path. They were, in fact, good examples of agents following their habitus without question; however, those who encountered unexpected or contradictory situations started looking for a change of strategy. Some of those students have, as of yet, not
encountered frustrations and might simply continue to follow their habitus as a guide in choosing their next move.

**Discussion**

In chapter 5, I showed how the habitus of supervisors and graduate students’ were formed in a variety of contexts that combined layers of socialization in the scientific field (or, by proxy, in undergraduate education) and in the forest sector. There is little homogeneity in individuals’ backgrounds, yet they seem oddly united by their diversity, their common object of research, and their concern for practical problems. In chapter 4, I described the conjuncture in which the Faculty of Forestry and the individual agents within it live their lives. This conjuncture is characterized by the positive value placed on both scientific production and social, economic, and environmental relevance, but also by unstable sources of funding. This conjuncture interacts with the diverse structures that formed forest researchers’ habitus, generating the practices through which faculty members and graduate students both labour at aligning people and projects with the proper resources needed to conduct research.

The primary role of coordination is played by faculty members, who are most commonly in charge of assembling the parts needed for successful research projects. Graduate students, in their role as junior researchers, effectively conduct much of the research in their supervisors’ program, and thus the commitments of the latter will trickle down to the former. This practice, combined with the norm according to which all graduate students must be funded, leads to a containment of students’ research within the bounds of topics that can be funded. As we have seen in chapter 4, the rules and priorities applied to forest research funding are, for the most part, decided outside of the field of forest research. Thus, the reproduction of the field is significantly influenced by the logic of the scientific field and of the forest sector. This also applies to the students who come to the Faculty of
Forestry with their own research topic, who play the coordination role themselves but tend to mobilize resources of a similar type as their supervisors. In so doing, the dual habitus of forest researchers is reproduced: researchers, including researchers-in-training, are rewarded for their capacity to mobilize resources from the scientific field and from the forest sector, and for producing results that are meaningful to both. This system of capital distribution is not imposed upon Forestry researchers who, as we have seen, embrace both scientific and forest-sector norms, to some extent at least.

A majority of the graduate students I have spoken with adhere to the illusio of the field of forest research, and believe that is a worthy task to pursue the resolution of forest-sector problems with the tools of the sciences. Many of them hope to take positions in the field of forest research once they complete their training. While university positions – which dominate the field of forest research – are perceived as particularly desirable by doctoral students, faculty members, and some Master’s degree students, research positions in government or NGOs are also considered as positive outcomes for one’s training. And such positions are objectively accessible to trained forest researchers, as I have observed in interviews with former students and in quantitative data collected by the Faculty of Forestry.

There are, however, students who are not developing the illusio of forest research. They may very well believe that research is important, but they are not interested in pursuing a research career of their own. These students are not researchers-in-training but rather training themselves through research, and they are approaching the task with a strategic eye. Those students seek or embrace partnerships with actual consumers of research and, in the course of their degree, develop an expertise and also directly applicable knowledge that they hope will vouch for their aptitude once they return to the forest sector or to another professional field. The structure through which the field of forest research is reproduced is
not purposefully encouraging this approach, but it makes the levers that those students operate in their strategic trajectory available.

The situation of the students who come to Forestry to work on an assigned project and who neither identify to the field of forest research nor to the forest sector or to another professional field remains puzzling to me. I have come to believe that these students are really primarily driven by an academic habitus rather than by a budding scientific or professional illusio. Having encountered no resistance or frustrations, they pursue schooling. Their lack of autonomy places them in a dominated position in the field of forest research which seems to trigger, with experience, a change in perspective that either makes them reject or embrace forest research. A true longitudinal design, which would follow a sample of graduate students from the start of their Master’s degree throughout their program and into the first few years of their career, would shed more light on such students’ trajectories than my design allowed.
CHAPTER 7
CONCLUSION

Whoe’ver aspires unweariedly
Is not beyond redeeming
(Goethe, 1882, p. 308)

On the first day of fieldwork, I became envious of the agreeable building in which forest researchers work and train. Many other days after that, I envied their sense of purpose, their apparent conviction that something could be done, should be done, perhaps even would be done. About what, in a sense, is unimportant. Re-stocking Douglas fir forests, making forest operations safer for loggers, conserving the diversity of forest genes, protecting salmon habitat in streams, reducing the costs of manufacturing furniture, empowering First Nations as they take over the management of their ancestral lands, transforming the millions of square kilometres of dead beetle-killed trees into fuel, visualizing the effects of climate change on coastal communities, reforming the forest tenure regime. Different stakeholders will have different opinions about the relative value of each of these goals, but one thing is certain: there will be stakeholders, near or far.

Meanwhile, on most days of the past four years, I went to my office in the Educational Studies building whose structure was built as temporary 30 years ago. There were no stakeholders waiting for my findings, and I never fooled myself into believing that needs other than my own curiosity would be fulfilled by this study. I was granted near-total autonomy in the conduct of my project, and benefited from generous support as well. Such autonomy made me uncomfortable. I found an echo to my thoughts in a piece in which Michael Schudson reflects on the autonomy of the journalistic field, titled “Autonomy from What?” (Schudson, 2005). Schudson points out that although excessive influence from
government and commercial entities needs to be avoided, the intellectual conformity that arises in fully autonomous groups is also a serious problem. This is especially true for fields that have a role to play in the public interest. Pressures from their sources in the political field and from the public keep journalism “alive, changing and growing” (Schudson, 2005, p. 219). Thus, according to Schudson, “A democrat should not want journalism to be as self-enclosed and separated from outside pressures as mathematics or poetry” (Schudson, 2005, p. 220). The autonomy of basic mathematics as a field is rather unproblematic for many reasons, but I remain undecided about my own intellectual production, as I do about forest research. Is the deep, and sometimes unacknowledged, connection that I observed between forest researchers and the forest sector detrimental to the contribution that forest research could potentially bring as part of the scientific field? Or is the dependence of forest researchers on the scientific field for authority and some of their resources substantially limiting the contribution they could bring to the forest sector and which could, in the end, benefit society as a whole if forest researchers were the only judges of their cultural production?

I concede that this study has left me with more questions than answers. Nevertheless, in this final chapter, I will give the reader an opportunity to review the evidence I have collected through this ethnographic case study and the answers to the research questions I asked. I will also point to some of the study’s limitations and to the research opportunities arising from those limitations. Finally, I will reflect on the implications of research training in heteronomous fields for graduate education and for science more generally.
Summary of the study

This original idea behind this study was to observe, first hand, how graduate students are trained in a context where university-industry-government partnerships have been an enduring feature of research for as long as the field existed. Prior research on the topic of student involvement in research partnerships – my own and that of others – had excessively relied on questionnaires as data collection instruments, and the explanatory potential of the findings was limited. Unfortunately, surveys could not encompass the broad range of individual trajectories in the educational and professional world, and hardly take into account the impact of time, as research training is a protracted process during which students are likely to evolve and change. When I first visited the University of British Columbia’s Faculty of Forestry, and caught a glimpse of its close relationship with organizations located outside of academia, including government and private companies, I knew I had found the right site for my study. Further research, as I will discuss in a moment, proved me right.

An important driver of this research effort was to explore the potential of Pierre Bourdieu’s theory of fields to make sense of the dynamics at play in applied and less obviously autonomous areas of university research. In his discussions of the specificity of the scientific field (Bourdieu, 1975a, 1976, 1997, 2001, 2004), Bourdieu offered a compelling representation of how the agents of autonomous scientific fields struggle to advance their position through topic choice, publication, and a number of other social, cultural, material and symbolic strategies which were most often unacknowledged as such, since scientists had an interest in disinterestedness. As I looked around me in the university, however, I could see few really autonomous fields, observing instead how many academics, in their role as researchers, were enrolled in research that was not so clearly disinterested. While it is true that sometimes what was at stake was financial profit, measurable in hard currency, it much
more often seemed to me that entire areas of research were mobilized to solve human problems that were not exclusively scientific: health research comes to mind, as well as many knowledge-production endeavours driven by the desire to improve education, serve justice, or conserve the environment. Could we extend the theory of fields to heteronomous fields to examine the autonomy of research areas beyond fundamental physics and biology?

Competing – and popular – sociologies of science, which are also more specialized compared to Bourdieu’s all-encompassing model, have been used to study applied research areas. Michel Callon’s study of “the domestication of the scallops and the fishermen of St. Brieuc Bay” (Callon, 1986) and the actor-network theory he developed with Bruno Latour (Latour, 1987) come to mind, especially since Callon applied it to fisheries, a field one could see as parallel to forestry. In a lecture about the craft of the researcher, Latour (1995) used a compass-rose model (borrowed from Callon) that describes scientists’ work as the linkage – with concepts and theories – of four other “horizons:” world-mobilization devices (instruments, fieldwork, etc.), professional autonomy (through institutions such as universities and peer-review), alliances (with the State, industry, and others), and performance (public relations, ideology, beliefs, etc.). I could see how such a model could guide a description of specific events at the micro-scale in an applied field, but I was uneasy with the ANT’s neglect of macro-scale power relations and its heavy reliance on semiotics. The high stakes associated with forests in a province like British Columbia required a theoretical model that fully considered the unequal distribution of forces and the struggle between, first and foremost, the human individuals and organizations concerned with knowledge about trees, forests, and wood. I also hoped that by using the parsimonious concepts of Bourdieu’s theory – which apply not only to scientific fields but to other fields and to the global social space as well – I could eventually gain a better grasp of the
articulations of forest research with other aspects of society. One cost of such an approach might be the lesser attention paid to the scientific knowledge itself, in other words to the content of the research being conducted by the agents I would study. I will return to this limitation in a later part of this chapter.

Having chosen to use the theory of fields as a conceptual and methodological framework, I offered in chapter 2 detailed explanations about Bourdieu’s concepts and examined the corresponding methodological approach. In order to localize a field in relation to the field of power, to map its structure of positions (based on the volume and nature of the agents’ capital), and to identify the habitus of its agents, Bourdieu and his collaborators used diverse research methods. Usually, more qualitative approaches (document analysis and interviews for the most part), combined with a study of key quantitative sources, served to establish the list of efficient agents and of the latter’s efficient characteristics, which allowed them to act within a given field. In a second phase, the efficient agents and their characteristics were quantified in order to be represented formally, usually through correspondence analysis. For feasibility reasons, this dissertation is an account of only the first part of this approach. I entered the Faculty of Forestry with the concepts of field, capital, and habitus, assuming that there was a field of forest research primarily based in the university, but that it was a heteronomous field – a field partially governed from the outside – due to its close ties with and dependence on government agencies and private companies in particular. I wanted to see what forms of capital were exchanged within the field of forest research and between the latter and other fields. I was also looking for the traits of a habitus that would be specific to the field of forest research and reproduced through research training in Master’s and doctoral degree programs. Through the analysis of documents and statistical data, participant observation, and interviews, I came to identify which agents are efficient in
the field of forest research, and what characteristics make them efficient. Future research, which I will discuss towards the end of this chapter, could build on my findings in order to effectively map the field of forest research.

The theoretical and methodological tools I have just briefly discussed were meant to help me shed some light on what can be described as “new” modes of research training, which I thought in fact had existed for a long time in fields like forest research. In chapter 3, I contrasted the so-called “traditional” mode of research training, which one would expect to be dominant in autonomous scientific fields, with some of the “new” contexts for research training which are meant to be a conduit for heteronomous forces. After breaking down the traditional mode of research training into supervision, acquisition of new knowledge, creation of new knowledge, and outcomes, I examined the mounting body of research documenting the impact of new training arrangements that directly or indirectly involve graduate students with non-university agents, either individuals or organizations. What emerged from this overview is that when heteronomous forces only indirectly influence the training of graduate students, as in cases where supervisors are engaged in strategic research or when students are located in cooperative research centres, the socialization of new researchers does not significantly depart from the traditional model. However, students who are directly involved with non-university organizations, such as those receiving scholarships meant to encourage partnerships with such organizations, have often been found to significantly differ from their peers. While they remain committed to scientific values and practices, they often play a more active role in their research project, and may have professional ambitions geared toward a broader range of positions. Unfortunately, however, too little attention has so far been given to the baggage that graduate students bring with them when they start training to become researchers. Thus, for instance, it is difficult to know if the “new” modes of research training
are really transforming the socialization of students or if they are in fact attracting individuals with different aspirations. Previous research has also consistently framed direct and indirect programs supporting the involvement of graduate students in research partnerships with non-university organizations as initiatives emerging from outside of the university environment. In so doing, it has ignored that support for graduate student involvement in university-industry research partnerships also comes from inside the university.

As I analyzed the data collected and wrote successive versions of the findings chapters of this dissertation, I realized that to make sense of the field of forest research I had to see it as located not strictly within the Faculty of Forestry but rather spanning a broader range of organizations. Furthermore, I had to adopt a more symmetrical view and consider the forces emanating from the forest sector, understood as an organizational field (DiMaggio & Powell, 1991) and from the scientific field as sources of heteronomy. The field of forest research is located at the intersection of these two fields. It is a field of cultural production where knowledge about the forest and its products, and about their management, conservation, and utilization, is created by individual agents affiliated to a number of organizations including, but not limited to, universities. Researchers from the public and private sector, as well as freelancing consultants, also participate in knowledge production. As a field of cultural production, it is in a dominated position of the social space relative to the field of economic production, which includes the dominant forces of the forest sector. In the latter, government and private sector agents simultaneously cooperate and struggle to earn financial and other benefits from the exploitation of forests as a natural resource. Yet, and despite its dominated status, the field of forest research is granted a relative measure of autonomy because of the forest sector’s interest in the economic implications of research results. The field of forest research is also dominated, to some degree, by the scientific field
more generally, because it depends on knowledge transmission and development occurring in other, often more basic scientific disciplines. Yet, forest research also created a relatively autonomous space for itself with a set of forest-specific journals and associations controlled by forest researchers. This relative autonomy is the result of a struggle and cannot be taken for granted; rather, it must be assessed empirically for specific moments in history.

The structure and direction of the field of forest research are to a large extent influenced by both the scientific field and the forest sector. For this reason, it can indeed be said that the field of forest research is a heteronomous field, meaning that it is governed not from within (as would a fully autonomous field) but from the outside. I must insist here and point out that because, to some extent, I see forest research as separate from the scientific field; scientific forces are thus considered equally external to the field of forest research as are the forces from the forest sector. This goes against the implicit assumption underlining most studies on university-industry-government collaborations, which position the scientific logic as the logic of autonomy. The specificity of the field of forest research is that agents within it are competing for a stake that is distinct from the stake of the scientific field and from the stake of the forest sector. They seek to improve their position by simultaneously and inseparably identifying the problems which are of the greatest importance to the forest sector and the best scientific pathway to the resolution of those problems. The agents who dominate the field of forest research are those who can cumulate the most capital from the two fields, and conduct their work in a manner that is legitimate for the dominating class of each. They have formulated a problem which is of concern to the broadest possible range of stakeholders within the dominant agents of the forest sector and mobilized the most sophisticated scientific methodologies in their attempt to offer probable prospective solutions. The dominated agents of the field of forest research, conversely, conduct research which
addresses problems of the dominated agents of the forest sector and use methodologies less highly considered within the scientific field. Agents who exclusively wield capital from either the scientific field or the forest sector without integrating the two are unlikely to become more than marginal players in the field of forest research (although they may be important players of other fields).

The reproduction of the field of forest research is largely entrusted to those agents who are faculty members in universities, although outsiders may also earn reproduction rights under certain conditions. Thus, an organization such as the University of British Columbia’s Faculty of Forestry occupies a dominant position within the field of forest research: it has, to some degree, imprinted its ways of perceiving and doing onto a large number of the agents within the field of forest research at large, constituting its social network. It is also in a dominant position because of its capacity to pull scientific resources which are practically inaccessible to other organizations active in forest research, such as curiosity-driven research funding, endowed chairs for professors, and tenured professor positions for its researchers. Such resources allow forest researchers within the university to enjoy a greater degree of autonomy in the choice of their research objects, but this autonomy is not unlimited: it is bound by the judgement of their peers in the scientific field, who are not necessarily active in forest research specifically and may not share forest researchers’ views on what are the most important problems to research. The dual heteronomy of the field of forest research – relative to the scientific field and to the forest sector – is a challenge to the agents within the field, but one can think of ways in which it could be used strategically by those forest researchers who practice within the UBC Faculty of Forestry. On the one hand, compared to researchers affiliated to organizations of the public or private sector, university researchers can be perceived as more disinterested, which may increase their authority when debating contested
issues in the forest sector. On the other hand, within the university, they can play the “relevance card” to justify their existence and the resources they need, asserting that they offer a direct service to society.

It is only after more than a year of fieldwork and many months of analysis that I changed my perspective and started seeing the Faculty of Forestry as one organization within the field of forest research, recognizing that heteronomy in forest research came from both the scientific field and the forest sector. It was thus too late to radically alter my study’s design to fully incorporate agents affiliated to the field of forest research but located outside of the Faculty of Forestry. I will discuss later in this chapter how future research could overcome this limitation of my work. However, as I remained primarily interested in the reproduction of the field, it made sense to keep the focus of this study on UBC’s Faculty of Forestry, it plays the primary role in that regard as far as the province of British Columbia is concerned.

In chapter 4, I showed how UBC Forestry as an organization takes position in the field of forest research, simultaneously displaying forms of capital that are specific to the scientific field and to the forest sector. The very initiation of Forestry teaching and research at the fledgling University of British Columbia, 90 years ago, was the result of pressing political and economic needs at a time when forests were becoming a major source of wealth in the province. Today, the building occupied by the Faculty of Forestry is explicitly dedicated to forest sciences and also embodies the interest of governments and other stakeholders from the forest sector in the pursuit of research. This dual commitment is also reflected in the web site, publications, and events of the Faculty of Forestry, which repeatedly showcase how Forestry researchers are seeking science-based solutions to problems that matter beyond the gates of campus. As an organization, UBC Forestry values and proudly
displays its ties to the forest sector, but not at the expense of its scientific contributions.
Scientific awards and achievements such as publications are also heralded, and signal that
Forestry researchers are active in biology, engineering, and a number of other fields,
including the social sciences. Such diversity is also a source of pride for the Faculty. In fact, I
never encountered signs that forest researchers were trying to fence off their area of expertise.
Instead of boundary-building efforts such as those discovered by Fisher in the early days of
the social sciences (D. Fisher, 1993), I observed only efforts to extend the range of
participants and problems pertaining – although not exclusively so – to the field of forest
research. This open approach seems to benefit the Faculty of Forestry as far as extramural
funding is concerned, as its researchers muster resources from a formidable diversity of
programs and agencies. Moreover, within UBC, the volume of such resources (per capita) is
only surpassed by the Faculty of Medicine. While Forestry has undoubtedly improved its
performance in curiosity-driven funding competitions over the years, its funding base is
above all characterized by its success at obtaining priority-driven, strategic, and targeted
research funding from public and private sources. Such sources, while collectively providing
Forestry with generous research support, are individually unpredictable as they fluctuate from
year-to-year depending on economic circumstances and political priorities.

If chapter 4 described the scene of forest research at UBC Forestry, then chapter 5
described the actors. In particular, I focused on those directly engaged in the reproduction of
the field of forest research: faculty members, adjunct professors, and graduate students in
research-based Master’s and doctoral degree programs. Among faculty members, I found a
similar combination of capital as I observed in the Faculty of Forestry as a whole, although
there is not a single “right” ratio of scientific and forest-sector capital. All faculty members
had at least a baseline of scientific capital, in the form of a Ph.D., at the time when they
became assistant professors, but their actual scientific production greatly varied: some were hired as “promising” researchers while others had an established record of productivity in forest research. Faculty members also belong to a broad range of fields, a fact that is reflected in the unusually high proportion of faculty members jointly appointed with other departments at UBC. But perhaps the most interesting trait of Forestry’s faculty body is the prevalence of work experience outside of academia in the career trajectories of faculty members, as more than 60 per cent of them have worked for at least three years in a non-university organizations prior to undertaking their career at UBC. They thus integrated cultures other than that of university research in their habitus. Based on the evidence I could gather in interviews with faculty members, however, it appeared that this non-academic experience either preceded the doctorate, or was acquired in the context of a position in the field of forest research (but outside academia). In other words, the forest-sector experience of Forestry faculty members is buffered by years of involvement in research. There are, however, other agents involved in student supervision who are a step closer to the forest sector: adjunct professors. I could only gather limited data about their career trajectory and about the exact nature of their involvement in research training. I could nonetheless observe that they are forest researchers employed outside of the university who also combine scientific capital and forest-sector involvement, and that their supervisory activities – most often at the Master’s level – seem to be an extension of their own scientific habitus rather than an attempt to increase the relevance of students’ research for the organization that employs them. By interacting with Forestry’s graduate students, they show researchers-in-training how forest research is not exclusively bound to the university context, and broaden the scope of potential futures for newly trained forest researchers.
The diversity of the graduate student population of the Faculty of Forestry is even greater than that of the faculty body, including adjunct professors, and can hardly be summarized. If only one observation about graduate students should be kept in mind by observers and practitioners of research training in this field, it would be that the students cannot be considered as blank slates, mouldable individuals ready to incorporate the traits of the field of forest research through the supervisory process. The vast majority of the students I have interviewed and observed over the course of my fieldwork period have had significant experiences in the scientific field and in the forest sector or a related area, and some had a career of their own in the field of forest research even before coming to the Faculty of Forestry for a graduate program. Their experiences within and outside of the university, however, were seldom unproblematic. Some students with training in a more fundamental scientific discipline found themselves less academically successful than their peers and thus less competitive for graduate-student positions in their field of origin. Their knowledge and skills, however, are scarcer in forest research and thus earn them better conditions for research. Others, more often trained in forestry or another applied field, experienced or anticipated limitations or frustrations on the job market that drove them to return to school to seek further credentials, hoping to improve their position. They have incorporated some of the traits, norms, and practices of the forest sector, but wish to go beyond them through training in forest research. There are, however, some students who did not experience, so far, such a problematic rapport to either science or to the forest sector. The bottom line, as far as the actors of forest research training are concerned, is that what Bourdieu calls the “admission fee,” or in other words the volume and nature of the capital required to enter a given field, is best described as “indeterminate” in the field of forest research: there are few, if any, set requirements, and an individual lacking in a given form of capital may gain admission to the field based on another form.
In chapter 6, I have shown how people and resources converge to make both research and research training possible. An important condition of possibility for research training in the Faculty of Forestry is that students be funded. Even if, in practice, there are exceptions to the norm, notably in research groups conducting social science research, it remains an important form of control: the research that can be done is the research that can be funded.

It is primarily faculty members’ role to assemble the conditions of possibility of research activities, which often include, as a matter of fact, non-academic agents, in part due to the heavy weight of strategic, targeted, and otherwise priority-driven funding described in chapter 4. Often, the non-academics involved also belong to the field of forest research, and their participation does not create a research environment that radically departs from the traditional model of research and research training, except for the fact that the research problems are anchored in the needs of the forest sector. In other cases, however, the role of UBC Forestry researchers – and their students – will more closely resemble that of a consulting expert to outside organizations uninvolved in research, in which case there will be more defined and less flexible “deliverables” to produce. The role taken by graduate students in the research projects, regardless of the type of arrangement, depends on the ratio between the volume of capital brought by the student and the total capital required for the conduct of the project. I was surprised to observe a number of cases where students brought their own topic and resources, which included a non-academic partner. This situation reflects the degree of maturity and the accumulated capital of some Forestry graduate students. In the majority of cases, however, the supervisor kept the coordination role, and the degree of autonomy of the student in the orientation of the study varied from very little, in the case of students who arrived with only the scientific capital acquired through their undergraduate degree and who were assigned to work on a specific project, to greater autonomy for students whose prior
scientific and/or forest-sector experiences allowed to develop their own project within the boundaries of their supervisors’ research program. The degree to which interactions with non-academic partners of the research project, in particular if the project was of the consulting expertise type, would be delegated to the students varied along the same lines.

An important outcome of forest research in the Faculty of Forestry is indeed to reproduce the field. A few students come to the Faculty of Forestry already established as minor agents of the field of forest research seeking to improve their position and their degree of autonomy. Many others, however, develop the illusion of the field of forest research – the belief that one should look for scientific pathways to the solution of important forest-sector problem – as they train in the Faculty of Forestry. These two categories of students are preparing themselves, more or less explicitly or strategically, to occupy positions in the field of forest research. Students at the Ph.D. level particularly value university positions, a belief that reflects the vision of Forestry faculty members. Other positions are nonetheless considered acceptable for trained forest researchers, mainly in government and in some private organizations. Companies, on the other hand, are not perceived as a likely work environment for forest researchers. Meanwhile, there are some students who do not align with the field of forest research. Rather than training for research, they are training by research. I found these students to be exceptionally explicit about their training strategy and planned career, and all of them were involved with non-academic partners, noting that they hoped that the knowledge they would acquire and create, as well as the social network they would develop, would improve their position on the job market and distinguish them from other candidates.

At the onset of this study, I asked: how are researchers trained in the heteronomous field of forest research? I hereby conclude that they are trained to develop scientific
approaches to the solution of forest-related problems by simultaneously drawing together a combination of forms of capital specific to the scientific field and to the forest sector in a single setting such at the UBC Faculty of Forestry. Those forms of capital are incorporated in the individuals who supervise them, in the funding, equipment, and field sites that they use, in the physical and cultural space of the Faculty of Forestry, and in the graduate students themselves. As they develop the habitus of forest researchers, recruits to the field are rewarded for successfully combining scientific and practical relevance, and integrate the dual set of values of the field of forest research. Thus, what would conventionally be considered to be “outside” of the Faculty of Forestry is in fact “within,” incorporated in the habitus of individual agents and in the culture of the organization. Students who “buy into” the field of forest research and develop its illusio and habitus will entertain the project of pursuing some kind of a research career in which systematic inquiry will be used to tackle practical problems. There are, however, students who do not identify with the field of forest research. Instead, those particularly strategic individuals intend to use the capital they acquired in the field of forest research to distinguish themselves in the forest sector or another professional field. In their new position outside of forest research but in the forest sector, they may become allies of the Faculty of Forestry.

Limitations and opportunities for further research

When I started this study of the field of forest research, I assumed that it would be mainly populated by academic agents: researchers practicing their trade as faculty members, staff, and graduate students located in universities. I thought that these academic agents would be engaged in partnerships with non-academic organizations such as government agencies, private organizations, companies, and non-governmental organizations. What I did not anticipate clearly was the degree to which forest researchers in universities embrace
problems emerging outside in the forest sector, and the degree to which some agents located in non-academic settings embrace the logic of the scientific field. As I became more familiar with the culture of forest research, I started to realize that it is in fact a social space that spans the university/industry divide, and that it is located in the space where the scientific field and the forest sector meet. Depending on their position in the field of forest research, individual agents have more ties to the scientific field, or more ties to the forest sector, but each of them has at least some of both. As I discussed above, university forest researchers occupy a dominating position within the field of forest research, but by no means are they alone in it.

Unfortunately, I apparently needed to conduct the study as planned – focusing on the research and training occurring in the university sector – to come to this realization. Now that I have a better grasp of the actual composition of the field of forest research, I can only acknowledge that the study whose findings are presented in this dissertation only accounts for the field of forest research through the perspective of one of its organization: the UBC Faculty of Forestry. Interviews with adjunct professors and other sources of data have just offered me a glimpse of the research activities conducted in government agencies and private organizations. Such a partial perspective constitutes the primary limitation of this study, but it also generates exciting avenues for future research.

If, following Bourdieu’s approach, one was now to formally map the field of forest research, this new understanding of its location in the global social space and relative to other fields – in particular the scientific field and the forest sector – would guide the identification of the efficient agents and of the efficient characteristics that give the field its shape and structure. Based on my study of the reproduction of the field of forest research, I volunteer that, to be a recognized agent in the field of forest research, one needs to hold a certain volume of scientific capital, as embodied in the Ph.D. (although a Master’s degree is perhaps
sufficient) and a position in an organization, or a department of an organization, that is dedicated to forest research. In the current state of the situation in British Columbia, the core group of such organizations would include the universities (especially UBC Forestry), the research branch of the provincial Ministry of Forests, the Canadian Forest Service, and FPInnovations. To understand how the field is structured, one would need to consider the forces emanating from the scientific field and the forest sector, as well as the exchange of specific forms of capital associated with each. On the scientific side, for example, valued forms of capital include scientific publications, relationships with scientific peers, and awards from disciplinary associations, while contacts in the forest sector, operational experience, and consulting contracts are all valuable forms of capital specific to the forest sector.

Furthermore, it would be necessary to take steps away from forest research and toward each of the parent fields to capture the dynamics at play. As only one of many examples, the processes by which research priorities are identified by large funding organizations such as NSERC, the National Research Council, and even the Forest Science Program, have a deep influence on the content and practices of forest research, yet they are steps removed from the field. Lionel Vécrin, in his Master’s thesis, examined the allocation of funding in a priority-driven program of Quebec’s research council (Vécrin, 2003), and the method he used could guide future studies of priority-setting in agencies whose programs are used by forest researchers. Unlike autonomous fields, which can be studied from an internal perspective, heteronomous fields such as forest research must be examined in the light of the dynamics of multiple other fields, adding to the complexity of an eventual attempt to map it.

As far as the reproduction of the field of forest research is concerned, my study was limited by the difficulties I encountered in gaining direct access to some of the most meaningful interactions between graduate students, their supervisors, adjunct professors, and
other individual agents involved in the training process. I relied to a large extent on interview material, which is itself limited to what interviewees are willing or able to talk about, and lacks contextual information (Becker & Geer, 1957). Future research could be specifically designed to address this challenge, possibly by reducing the scale of the study to a single group of researchers which would be observed over a prolonged period, and/or by directly involving supervisors and graduate students as researchers of their own experience. Such research on the interactional aspects of the reproduction process would most likely raise significant ethical challenges as well, but would yield precious insight on the formation of new researchers’ habitus.

Finally, I did not examine the actual content – the black box – of the knowledge produced by forest researchers and their students, as I tried instead to grasp the conditions which made the production of that knowledge possible. Frank Poupeau’s study of the sociology of education in France (Poupeau, 2003) provides a template which could be used in the case of forest research, for example in its systematic examination of the framing of research problems by French educational sociologists. A similar design could reveal whether forest researchers distance themselves from the problems formulated by policy makers, industry leaders, and community stakeholders by translating such problems into scientific terms. Conversely, one could measure how problems that emerge in the realm of science are translated by forest researchers into arguments meant to convince agents in the forest sector to change their practices.

**Implications**

As they train to become researchers, graduate students are “suspended between two stools” (Delamont et al., 1994) while those who supervise them are “creating a delicate balance” (Delamont, Parry, & Atkinson, 1998). Researchers-in-training are at once
“researchers” and “in-training,” and the point of the process in which they are engaged is to make them increasingly autonomous through the practice of research. For faculty members, there is “a perceived tension: between the need to guide and structure doctoral work on the one hand, and the desire to preserve the doctoral student’s autonomy on the other” (Delamont et al., 1998, p. 170). The tension, albeit often unacknowledged, is no less present in a heteronomous field such as forest research. A contribution of the present study, beyond the identification of the field of forest research and of its location in the social space, is the light it sheds on the mechanisms by which individual graduate students become associated with certain research topic. I have shown the importance of the ratio between the volume of capital brought by the student and the total capital required to conduct the research project. In other words, assuming that their project requires the same level of resources, research trainees with more capital can benefit from more autonomy in the choice and design of their research project than their counterparts with less capital. In forest research, the tension can be exacerbated by the importance for faculty members and graduates students alike to maintain and improve their relationship with agents located outside of the university setting by managing expectations and delivering satisfactory outputs. No faculty member rejoices when one of his or her supervisees quits, but for faculty members who are committed to delivering research results intended to address the problems of an external stakeholder, the departure of a student mid-project can have long-lasting effects and jeopardize future research opportunities. Similarly, students who undertake a Master’s or doctoral degree program with the support of their employer – or of a potential employer – and commit to work on a problem encountered by their organization may compromise their professional reputation if they fail to complete the project in a satisfactory manner. The stakes, as they spread outside of the scientific field and of academic degree programs, are higher.
From the perspective of graduate student success and in the context of massified graduate education, such higher stakes are perhaps a good thing. Indeed, one way to increase the graduation rate at the Master’s and Ph.D. levels is to increase the integration of students, providing them with more opportunities to develop, in Lovitts’s terms, the “cognitive map” of their field (Lovitts, 2001). Furthermore, in a heteronomous field such as forest research, desirable outcomes for graduates are not limited to faculty careers, and thus students who are not attracted to the academic lifestyle may continue to perceive their training as meaningful in the light of other, more diverse professional prospects. I am not, however, claiming that this would be universally true for UBC Forestry graduate students, as I have observed students who were assigned to work on a problem and struggled to perceive its relevance despite the fact that it was supported by non-academic stakeholders. The way in which the “delicate balance” is negotiated at the intersection of the scientific field and of organizational fields such as the forest sector needs to be further examined through a close analysis of students’ research projects, outcomes in the program, and outcomes on the job market. Such close examination could lead to improvements in the educational experience of graduate students and eventually to an enhancement of their contribution to society over time.

Beyond the experience of graduate students, one may wonder about how the value of scientific work is affected by some researchers’ concerns for practical problems such as those tackled by forest researchers. Bourdieu, as he contemplated the struggles that characterize relatively autonomous fields of cultural production, was hopeful: somehow, he thought, the battle of particular interests in autonomous fields would lead the way toward greater universality. He thought it was necessary for intellectuals to politically organize and fight in what he called a “corporatism of the universal” (Bourdieu, 1996) to “defend (...) the institutional bases of intellectual activity” (Bourdieu, 1998a, pp. 139-140) which, in his view,
had to be autonomous. Yet, I wonder if anything can be expected of heteronomous fields such as forest research which are only partially driven by the scientific disposition toward disinterestedness?

Certainly, one may be concerned about the vulnerability of academic forest research to the whims of strategic and priority-driven funding, and about the further constraints that can be imposed on forest researchers employed by government agencies and private organizations. The risk is not so much in the direct intervention of political powers that would seek to alter findings, although of course it is necessary to remain vigilant in that regard. Rather, I would point to the constant need to reformulate research problems along the lines of frequently reassessed priorities, which consumes considerable amounts of forest researchers’ energy and creativity. Furthermore, researchers and researchers-in-training may be, over time, incorporating a narrow perspective about the range of possible problems and possible solutions that pertain to their field, focusing their work on what they perceive to have the greatest currency in the eyes of research-funding agencies and programs controlled by the dominant strata of the forest sector.

Nevertheless, while Bourdieu was hopeful that universality might progress upward, I am tempted to hope that it can also progress sideways. Trained forest researchers who are employed in government agencies and private organizations do not suddenly lose the scientific traits of their habitus, and may become involved in their organizations’ inner struggles. As a result, shards of universality may penetrate such organizations despite their otherwise particularistic motives. At the risk of appearing like a hopelessly naïve believer in the project of modernity, I can see how even small steps could expand the realm of reason beyond the boundaries of the scientific field.
To assess whether there is any ground supporting my hopes, further research should be conducted and forest researchers should be followed into their careers within the field and into other fields as well. There is a definite fascination, on the part of academics, for the study of academics. A sorry, and unintended, consequence of this fascination is the shadow it casts over the trajectories of the most obvious product of universities, their graduates, most of whom never enter the academic profession. In particular, future studies must be dedicated to the ways in which the habitus that researchers-in-training formed over the course of their graduate years generates practices in the different conjunctures in which the habitus is enacted.

Earlier, I noted how Michael Schudson’s questions regarding the appropriate level of autonomy that the journalistic field should enjoy echoed my own questions about the autonomy which should be granted to the scientific field. In a democratic society, Schudson noted, journalism should not be completely self-enclosed. I will not volunteer that, in a democratic society, the scientific field should not be autonomous. However, I could see how it can be in the general interest to maintain social spaces where the scientific field overlaps with other organizational fields. Such spaces, inevitably, will be fields of struggle. Alexis De Tocqueville, in his study of democracy in America, noted that science in democratic societies differed from science in aristocratic regimes. In democracies, he thought, “sciences are less great, and ignorance more scarce” (De Tocqueville, 1835, p. 12). Such a compromise is perhaps a Faustian bargain, and whether reason progresses as a result may never be guaranteed. But in the end what matters is to strive.
BIBLIOGRAPHY


the Congrès de l'Association internationale des sociologues de langue française, Istanbul, Turkey.


Stratégies: pas seulement pour les stratèges. (n.d.).


APPENDICES
Appendix 1
Certificate of Approval
**CERTIFICATE OF APPROVAL - FULL BOARD**

<table>
<thead>
<tr>
<th>PRINCIPAL INVESTIGATOR:</th>
<th>INSTITUTION / DEPARTMENT:</th>
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<tr>
<td>Amy Metcalfe</td>
<td>UBC/Education/Educational Studies</td>
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**INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:**
- **Institution:**
- **Site:**
  - UBC
  - Vancouver (excludes UBC Hospital)

Other locations where the research will be conducted:
The UBC Faculty of Forestry is the main location where observations will be conducted. The main location for observation will be that university's buildings (including classrooms, conference rooms, public spaces, libraries, laboratories, cafeterias, etc.). Observations may extend to that university's experimental forests or to other locations where that university's researchers and graduate students conduct their own fieldwork. Potential locations of observation include: other forests, government offices or laboratories, industrial offices and laboratories, and not-for-profit organization offices and laboratories.

**CO-INVESTIGATOR(S):**
- Brigitte Gemme
- Donald Fisher

**SPONSORING AGENCIES:**
- N/A

**PROJECT TITLE:**
Training in the Field of Forest Research: An Ethnographic Case Study

**REB MEETING DATE:**
October 11, 2007

**CERTIFICATE EXPIRY DATE:**
October 11, 2008

**DOCUMENTS INCLUDED IN THIS APPROVAL:**

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The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:
Appendix 2
Authorization form for lab head (faculty member)

Printed on department letterhead paper

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver, B.C. Canada V6T 1Z4

Tel: 604-822-5374
Fax: 604-822-4244
http://www.edst.educ.ubc.ca

Authorization Form – Access (Lab Head)

Training in the Field of Forest Research: An Ethnographic Case Study

Principal Investigator: Amy Metcalfe, Assistant Professor, department of Educational Studies, University of British Columbia. Telephone: 604-822-5331. E-mail: amy.metcalfe@ubc.ca.

Co-Investigator: Brigitte Gemme, Ph.D. candidate, department of Educational Studies, University of British Columbia. This research is part of Brigitte Gemme’s doctoral dissertation. Telephone: 604-822-1213. E-mail: gemme@interchange.ubc.ca. Office in the Forest Science Centre: FSC 2621.

Purpose: The proposed study will describe the training of researchers through Master’s and Ph.D. programs in the field of forest research, more specifically at UBC’s Faculty of Forestry. Three interrelated areas will be explored: the context of research training, the processes of research training, and the student researchers.

Study Procedure: The researcher will spend between two weeks and two months in your lab, at the rate of 2 to 5 days a week. The exact duration of the researcher’s presence will be determined jointly with you, based on the number of graduate students in your team, on the nature of the research performed by team members, and on the location of your research activities. The researcher will interview and shadow volunteer graduate students, and interview other volunteer current and recent members of your team.

Safety: As the head of your research team, it is your responsibility to insure that the researcher is informed of potential safety hazards, if any, as they relate to the research undertaken by your team members, and that you provide her with training if necessary, as you would with other members of your team. The
researcher will observe those safety rules and be safety-conscious in all activities. This procedure will contribute to the safety of your team's research environment.

Confidentiality: No personal information about you, your students, or your staff members will be shared with Faculty administrators, your peers, or others. The only persons who will have access to interview transcripts or observation notes are the co-investigator and her academic supervisors. In published reports of the research, pseudonyms will be used to mask your identity, and all efforts will be made to avoid your identification and those of your students and staff members.

Potential Risks: Despite all precautions, it cannot be absolutely guaranteed that eventual readers will not identify (or attempt to identify) you, your students or your staff members, which could result in social or academic difficulties.

Potential Benefits: The results of the project may contribute to the improvement of research education and professional prospects of graduates in the long term.

Contact for information about the study: For information about this study, you may contact Amy Metcalfe, Assistant Professor, department of Educational Studies, UBC, at 604-822-5331 or amy.metcalfe@ubc.ca.

Contact for concerns about the rights of research subjects: If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

Consent: Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your status at the Faculty of Forestry and/or at the University of British Columbia.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

___________________  ___________________ ___________________
Participant Name  Participant Signature  Date
Appendix 3
Consent Form – Observation (All Lab Members)

Printed on department letterhead.

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver, B.C. Canada V6T 1Z4

Tel: 604-822-5374
Fax: 604-822-4244
http://www.edst.educ.ubc.ca

Consent Form – Observation (All Lab Members)

TRAINING IN THE FIELD OF FOREST RESEARCH: AN ETHNOGRAPHIC CASE STUDY

Principal Investigator: Amy Metcalfe, Assistant Professor, department of Educational Studies, University of British Columbia. Telephone: 604-822-5331. E-mail: amy.metcalfe@ubc.ca.

Co-Investigator: Brigitte Gemme, Ph.D. candidate, department of Educational Studies, University of British Columbia. This research is part of Brigitte Gemme’s doctoral dissertation. Telephone: 604-822-1213. E-mail: gemme@interchange.ubc.ca. Office in the Forest Science Centre: FSC 2621.

Purpose: The proposed study will describe the training of researchers through Master’s and Ph.D. programs in the field of forest research, more specifically at UBC’s Faculty of Forestry. Three interrelated areas will be explored: the context of research training, the processes of research training, and the student researchers.

Study Procedure: As a member of the lab of _____, faculty member in the department of Forest Science of UBC’s Faculty of Forestry, you will be observed during your daily activities, in as much as they relate to the training of Master’s and Ph.D. students. The researcher will be accompanying graduate students during their daily activities, and thus may come into contact with you. The researcher will spend between two weeks and two months in your lab, at the rate of 2 to 5 days a week. You may decline to be observed and/or ask the researcher to leave at any time. The researcher may ask you for the permission to take photographs of your surroundings, which you may decline.

Confidentiality: No personal information about you will be shared with Faculty administrators, your advisor, your peers, or others. The only persons who will have access to interview transcripts or observation notes are the co-investigator and her academic supervisors. In published reports of the research, pseudonyms will
be used to mask your identity, and all efforts will be made to avoid your identification.

**Potential Risks:** Despite all precautions, it cannot be absolutely guaranteed that eventual readers will not identify (or attempt to identify) you, which could result in social or academic difficulties.

**Potential Benefits:** You may find it enjoyable and useful to talk about your research to an attentive observer. The results of the project may contribute to the improvement of research education and professional prospects of graduates in the long term.

**Contact for information about the study:** For information about this study, you may contact Amy Metcalfe, Assistant Professor, department of Educational Studies, UBC, at 604-822-5331 or amy.metcalfe@ubc.ca.

**Contact for concerns about the rights of research subjects:** If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

**Consent:** Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your status at the Faculty of Forestry and/or at the University of British Columbia.
If you REFUSE to grant the researcher permission to conduct observations within the lab where you work, please check this box and return this consent form in a sealed envelope WITHOUT indicating or signing your name at the bottom.

I REFUSE.  

If you ACCEPT to grant the researcher permission to conduct observations within the lab where you work, please check this box and return this consent form in a sealed envelope WITH your name and signature at the bottom.

I ACCEPT.  

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

___________________  ___________________  ___________________
Participant Name  Participant Signature  Date

EMAIL OR PHONE (if interested in interviews): ________________________________
Appendix 4

Consent form – Interview and shadowing (Graduate Students)

Printed on department letterhead paper

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: 604-822-5374
Fax: 604-822-4244
http://www.edst.educ.ubc.ca

Consent Form – Interviews and Shadowing (Graduate Students)

Training in the Field of Forest Research: An Ethnographic Case Study

Principal Investigator: Amy Metcalfe, Assistant Professor, department of Educational Studies, University of British Columbia. Telephone: 604-822-5331. E-mail: amy.metcalfe@ubc.ca.

Co-Investigator: Brigitte Gemme, Ph.D. candidate, department of Educational Studies, University of British Columbia. This research is part of Brigitte Gemme’s doctoral dissertation. Telephone: 604-822-1213. E-mail: gemme@interchange.ubc.ca. Office in the Forest Science Centre: FSC 2621.

Purpose: The proposed study will describe the training of researchers through Master’s and Ph.D. programs in the field of forest research, more specifically at UBC’s Faculty of Forestry. Three interrelated areas will be explored: the context of research training, the processes of research training, and the student researchers.

Study Procedure:

Interviews: You will participate to at least one 45-to-90-minute interview which will be recorded (audio). You may be invited to participate to more interviews (formal or informal) in the future, at which point you can decline to participate. All formal interviews will be transcribed, and you will receive a transcript which you will be free to edit. The topics of the interview(s) will be:

- Current activities within forest research (nature of the research, disciplinary or other affiliations, potential applications of the research, team, partnerships (with outside organizations), collaboration (with peers or others), sources of funding, supervisory arrangements, facilities used, etc.);
- Previous activities: Previous schooling, higher education, vocational training, professional experience, participation to social movements and activism, volunteering, etc.;
• Projects and aspirations for the future: Professional preferences, research projects, representations of success and failure, other commitments, work-family balance, etc.;
• Other contexts of life, in as much as they are related to your training or to your forest research activities (family, leisure, community engagement, etc.);
• Opinions, attitudes, and position-taking on current forest issues;
• Experience as international student (if relevant);
• Other topics you may find relevant to your experience as a forest researcher-in-training.

Shadowing: You will be shadowed by the researcher, who will follow your activities closely for a period lasting between three hours and one week. During shadowing periods, the researcher will accompany you in your training activities, such as: going to class; working at the bench, in the field, at the library, or at the computer; meeting with your supervisor, labmates, or research partners; attending seminars or conferences; attending Faculty of Forestry or lab social events. The exact dates, times, and locations of the shadowing sessions will be jointly determined between the researcher and you, ahead of time. You may decline to be shadowed and/or ask the researcher to leave at any time. During shadowing sessions, the researcher may ask you the permission to take photographs of your surroundings, which permission you may decline.

Confidentiality: No personal information about you will be shared with Faculty administrators, your advisor, your peers, or others. The only persons who will have access to interview transcripts or observation notes are the co-investigator and her academic supervisors. In published reports of the research, pseudonyms will be used to mask your identity, and all efforts will be made to avoid your identification.

Potential Risks: Despite all precautions, it cannot be absolutely guaranteed that eventual readers will not identify (or attempt to identify) you, which could result in social or academic difficulties.

Potential Benefits: You may find it enjoyable and useful to talk about your research to an attentive observer. The results of the project may contribute to the improvement of research education and professional prospects of graduates in the long term.

Contact for information about the study: For information about this study, you may contact Amy Metcalfe, Assistant Professor, department of Educational Studies, UBC, at 604-822-5331 or amy.metcalfe@ubc.ca.
Contact for concerns about the rights of research subjects: If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

Consent: Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your status at the Faculty of Forestry and/or at the University of British Columbia.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

___________________  ___________________ ___ ________________
Participant Name    Participant Signature    Date
Appendix 5
Consent form - Interviews (Non-Students)

Printed on department letterhead paper

Consent form - Interviews (Non-Students)

TRAINING IN THE FIELD OF FOREST RESEARCH: AN ETHNOGRAPHIC CASE STUDY

Principal Investigator: Amy Metcalfe, Assistant Professor, department of Educational Studies, University of British Columbia. Telephone: 604-822-5331. E-mail: amy.metcalfe@ubc.ca.

Co-Investigator: Brigitte Gemme, Ph.D. candidate, department of Educational Studies, University of British Columbia. This research is part of Brigitte Gemme’s doctoral dissertation. Telephone: 604-822-1213. E-mail: gemme@interchange.ubc.ca. Office in the Forest Science Centre: FSC 2621.

Purpose: The proposed study will describe the training of researchers through Master’s and Ph.D. programs in the field of forest research, more specifically at UBC’s Faculty of Forestry. Three interrelated areas will be explored: the context of research training, the processes of research training, and the student researchers.

Study Procedure: You will participate to at least one 45-to-90-minute interview which will be recorded (audio). You may be invited to participate to more interviews (formal or informal) in the future, at which point you can decline to participate. All formal interviews will be transcribed, and you will receive a transcript which you will be free to edit. The topics of the interview(s) will be:

- Current activities within forest research (nature of the research, disciplinary or other affiliations, potential applications of the research, team, partnerships (with outside organizations), collaboration (with peers or others), sources of funding, supervisory arrangements, facilities used, etc.);
- Previous activities: Higher education, vocational training, professional experience, participation to social movements and activism, volunteering, etc.;
- Experiences and opinions related to research training or to graduate students in forest research: Your role in research training, possible improvements, important knowledge and skills, employment of forest researchers.
• Other topics you may find relevant to your experience as it relates to forest researchers training.

**Confidentiality:** No personal information about you will be shared with Faculty administrators, your advisor, your peers, or others. The only persons who will have access to interview transcripts or observation notes are the co-investigator and her academic supervisors. In published reports of the research, pseudonyms will be used to mask your identity, and all efforts will be made to avoid your identification.

**Potential Risks:** Despite all precautions, it cannot be absolutely guaranteed that eventual readers will not identify (or attempt to identify) you, which could result in social or academic difficulties.

**Potential Benefits:** You may find it enjoyable and useful to talk about your research to an attentive observer. The results of the project may contribute to the improvement of research education and professional prospects of graduates in the long term.

**Contact for information about the study:** For information about this study, you may contact Amy Metcalfe, Assistant Professor, department of Educational Studies, UBC, at 604-822-5331 or amy.metcalfe@ubc.ca.

**Contact for concerns about the rights of research subjects:** If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

**Consent:** Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your status at the Faculty of Forestry and/or at the University of British Columbia.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

_________________  ___________________ ___________________
Participant Name  Participant Signature  Date
Appendix 6
Interview grid – Graduate students within sampled labs

1. Current activities within forest research: Tell me about what you are doing right now within UBC’s Faculty of Forestry.
   Probes:
   a. What exactly is your research project?
   b. How does it fit within past research in your field or other fields?
   c. How did you decide to work on this project?
   d. How did you choose your supervisor?
   e. How did you choose to study within UBC’s Faculty of Forestry?
   f. Are there applications of the research? Describe them.
   g. Who else works with you on this project? What are the affiliations of the people you work with?
   h. Are there organizations or people outside of the Faculty of Forestry that are interested in that project? In what ways?
   i. What are the sources of funding for your research?
   j. What does your supervisor bring to your research project? Are there other people involved? What do they bring?
   k. Where do you perform your research? Who provides you with the necessary facilities/equipment?
   l. How do you feel about the conditions of your training? How could your experience be improved?
   m. How important is your Master’s/Ph.D. in your life?
   n. Are there other aspects of your experience as a graduate student at UBC’s Faculty of Forestry that you would like to talk about?

2. Anterior Trajectory: We have discussed your current studies and research in detail. Now I would like to know what you did in the past, prior to your current degree.
   Probes:
   a. What previous degrees and/or diplomas did you do? What was your area of study? At which institution(s) did you study? Who was your supervisor? (If applicable.)
   b. Have you had jobs before you came to study forest research at UBC? Please tell me about those jobs. Have you learned something from that/these jobs that are useful to you in your studies/research currently?
   c. Have you been involved in other activities or organizations that you see as related to your current studies/research? Have you learned something from that/these activities/organizations that is useful to you in your studies/research currently?
   d. Are there other aspects of what you did before coming to UBC’s Faculty of Forestry that you feel are relevant to your current experience as a student researcher?
3. **Projects and aspirations for the future:** How do you see yourself in the next few years, after graduation?
   Probes:
   a. Do you intend on pursuing further studies (a Ph.D.) or undertaking a post-doctoral fellowship?
   b. What type of organization would you like to work for?
   c. In the long term, would you prefer employment in a university, in government, in industry, in civil-society organizations, or another type of organization?
   d. How do you see yourself using the research skills you are acquiring during your Master's/Ph.D. program?
   e. Describe what you see as the best possible outcome for your career.
   f. Describe what you see as the least interesting outcome for your career.
   g. Describe what you feel is a likely outcome for your career.
   h. Tell me about the other commitments you see yourself having in the future, and how you think they may impact your career.
   i. How important do you perceive your career to be in relation to those other commitments?

4. **Opinions, attitudes and position-taking on current forest and other issues:** What do you think are important policy issues related to your area of research currently?
   Probes:
   a. How is your research related to these issues?
   b. How do you think this issue is being addressed currently by the organizations in charge?
   c. If you were to advise policy-makers on that issue, what would you tell them to do?

5. **Experience as an international student:** If the interviewee has come to Canada to study forest research, ask: Do you feel that your status as an international student has made a difference in your experience as a graduate student at UBC?
   Probes:
   a. Do you feel treated differently by your supervisor, faculty staff, your peers, because you are an international student?
   b. Have you experienced difficulties resulting from your status?
   c. Are there benefits associated to your status?
   d. What advice would you give to another student from your country who would be interested in studying at UBC’s Faculty of Forestry?

6. **Other topics deemed relevant by the interviewee:** Before we conclude the interview, are there other topics you would like to talk about that you feel are relevant to your experience as a person who’s training to become a forest researcher?
Appendix 7

Interview grid – Non-graduate students

1. **Current activities within forest research**: Tell me about what you are doing right now in relation to UBC’s Faculty of Forestry and its graduate students.
   Probes:
   a. What exactly is the research project you are involved in?
   b. Are there expected applications of this research? Describe them.
   c. Are there graduate students involved in this research? In what ways?
   d. Are there other team members and/or partners for this research?
   e. How important is your involvement in research in relation to your other professional activities?

2. **Anterior trajectory**: Now that you have explained to me what your involvement in research is, I would like you to tell me more about your background and how it lead to your involvement in the research you have just described.
   Probes:
   a. What degrees and/or diplomas did you do? What was your area of study? At which institution(s) did you study? Who was your supervisor? (If applicable.)
   b. What have been your professional activities so far? How are they related to the research project you are involved in?
   c. Have you been involved in other activities or organizations that you see as related to this research project?
   d. If the interviewee has been a graduate student in the past, and if relevant: How do you think your experience as a graduate student compares to that of the graduate students you meet today?
   e. Are there other aspects relating to your studies and profession that you feel are relevant to understand your current experience in forest research?

3. **Experiences and opinions related to research training or to graduate students in forest research**: Tell me what you think about how forest researchers are trained today.
   Probes:
   a. Tell me about your personal experience with graduate students in forest research. What is your role in relation to the graduate students? How do they contribute to the research you are involved in? In your opinion, how does the research contribute to their training? How could the experience be improved for the students? And for yourself?
   b. What knowledge or skills do you consider essential to a good forest researcher?
   c. What do you think is positive about the training of forest researchers?
   d. What do you think should be improved about the training of forest researchers?
   e. What is the best place for a forest researcher to be employed?

4. **Other topics deemed relevant by the interviewee**: Before we conclude the interview, are there other topics you would like to talk about that you feel are relevant to the training of forest researchers?