




Article

A Comparison of Forestry Continuing Education Academic Degree Programs

Wil de Jong ^{1,2} , Kebiao Huang ^{1,3,*} , Yufang Zhuo ¹, Michael Kleine ⁴, Guangyu Wang ⁵ , Wei Liu ¹ and Gongxin Xu ¹

- ¹ Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet), Beijing 100102, China; dejongwil@gmail.com (W.d.J.); zhuoyufang@apfnet.cn (Y.Z.); liuwei@apfnet.cn (W.L.); xugongxin@apfnet.cn (G.X.)
- ² Center for Southeast Asian and Integrated Area Studies, Kyoto University, Kyoto 6068501, Japan
- ³ Research Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry, Beijing 100091, China
- ⁴ International Union of Forest Research Organizations, Marxergasse 2, 1030 Vienna, Austria; kleine@iufro.org
- ⁵ Department of Forest Resource Management, University of British Columbia, Vancouver, BC V6T 1Z4, Canada; guangyu.wang@ubc.ca
- * Correspondence: huangkebiao@apfnet.cn

Abstract: Forestry professionals are expected to be well trained and skilled. This facilitates progress in multiple global efforts to ensure a synergistic contribution of forests and the forest sector to sustainability goals. In recent years, societal demands and expectations associated with forests and the forest sector have changed profoundly. Forests have traditionally been a key resource that contributes to people's livelihoods; however, this has only been fully embraced among forest professionals within the past 30 years as one of the responsibilities of the sector's role in society. Forests are the largest repository of carbon stocks and have been assigned a major role in global efforts related to climate change mitigation and adaptation. The changing role of the forest sector is resulting in changes in forestry higher education programs and curricula; however, these changes are occurring unevenly in different regions of the world. One major effort to ensure that forestry professionals have the requisite training and skills, and the ability to implement technical management, public administration, and knowledge creation, are post-graduate training and higher education programs for early career forestry professionals. These programs aim to update a professional's knowledge and skills to adjust to the changing societal demands on forests, and to address deficiencies in professionals' undergraduate education. This paper reviews and compares five programs that aim to update and improve knowledge and skills among forest professionals, with a special focus on the Asia Pacific region. After reviewing and comparing several programs, the paper reflects on trends and their possible implications.

Keywords: forestry higher education; competencies; continuing education; professional development; post graduate education



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1. Introduction

Forests are valued by societies because they provide multiple goods and services, including wood and timber, carbon storage, water regulation, biodiversity conservation, scenic beauty, and opportunity for leisure. Forests contribute to livelihood sustenance of millions of people, because these people work in a forestry-related industry, sell tradable commodities from privately held forests, or procure products or services from forests to meet daily needs. To ensure that modern societal demands are met without jeopardizing the needs of others, economies have established multiple public and private organizations and structures to provide adequate management and administration of publicly and privately held forests. These include forestry departments or similar agencies within

national or subnational governments, private sector companies or enterprises, and civil society organizations and networks, including forest user groups.

A common feature of these organizations is that they require the assistance of qualified personnel. These personnel require adequate education or training, which provide an understanding of the forest sector and its multiple dimensions. To prepare professionals that are required by organizations active in the forest sector or that desire to operate as entrepreneurs, multiple education and training facilities operate in economies where a need for such specialists exists. The higher echelon of forestry professionals is trained at universities that have a separate unit, college, department, or research groups, which specialize in forestry education and often research. This training is a bachelor–master–PhD structure of higher education.

The topic of higher forestry education, which responds to the demand for trained and well-prepared professionals in forestry-related organizations, is debated in the literature. A suite of themes is addressed in higher forestry education studies. A recurring point made by commentators is the need for higher forestry education to adapt to changing societal demands of forests and the forest sector [1–3]. A second topic of relevance for this paper are discussions on continuing education in forestry. Continuing education refers to education or training of actively working professionals who have completed their education, but who decide to, or are requested to, pursue education or training to update knowledge and skills or develop entirely new competencies [4–6]. Research notes that continuing education is a responsibility among forest professionals [6], and has examined how programs for forestry continuing education need to be designed and implemented [7,8].

This paper aims to contribute to the discussion regarding forestry higher education developments and the relevant place of continued education forestry within academic degree programs. It aims to signal new developments in forestry continuing education in which programs target forest professionals but turn to forestry higher education programs or institutions to oversee the learning component of the program. The programs are implemented by providing an academic degree opportunity to these professionals. This paper compares five programs to try to answer the following questions. 1. What are commonalities in forestry continuing education programs that try to connect mid-level forestry professionals with higher forestry education institutions to boost the latter's professionalism. 2. Do these programs represent a change in forestry continuing education from common practice until the present day? 3. Why did these programs emerge? 4. What are the implications for these programs for our understanding, and the planning and administration of forestry higher and continuing education?

In particular, the paper reports on an in-depth study of the program supported by the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) to boost knowledge and skills among early and mid-career forest professionals in the Asia Pacific region. The specific program, the APFNet Scholarship Program (ASP), provides financial support to such professionals to undertake M.Sc. or Ph.D. study at universities in China or Thailand. Analyzing this program has relevance for the discussion on continuing education for working forestry professionals and how the latter integrates with forestry higher education.

The paper is structured as follows. Section 2 provides a brief overview of the literature relating to higher and continuing education in forestry. Section 3 describes the research methods used to yield the empirical evidence for this paper. Section 4 presents the results. The first part of Section 4 compares five programs that link forestry professionals to university forestry programs. The second part of Section 4 focuses specifically on the results of the ASP analysis. Section 5 discusses the findings summarized in Section 4 and provides answers to the questions formulated above. Section 6 concludes.

2. The Forestry Higher Education and Forestry Continuing Education Debates

A recurring theme in studies on forestry higher education is the need to respond to changing demands or expectations placed on forestry professionals, in addition to

changes in higher education itself. A Scopus search on forestry higher education (see Section 3) indicates that papers in the academic literature on the topic began to increase in the 1980s. In one of three papers in the Scopus database for 1964, Laurie [9] observed that the Universities of Edinburgh and Oxford had recently given forestry education new impetus at their respective institutions. A year earlier, Dana and Johnson [10] published a volume on forestry higher education in the Americas, with the basic observation that forestry is a specialization still in development, and in need of improvement, rather than change.

The debate on higher forestry education is a more recent phenomenon. An early representative is Roche [11], who asks how forestry should be taught at universities, and identifies core subjects of a forestry degree. The first reference we found on competence-based education and training in forestry was by Nelson and Trevitt [12], who observed that discussions on competencies are gaining traction among higher education theorists, but not yet in forestry education. Broader reflections on forestry higher education began to proliferate during the 1990s. For instance, Kentish and Fawns [13] noted that forestry was changing from a “strict professionalism to an extended professionalism” (p. 110). Sample et al. [3] asked how well forestry higher education programs are preparing forestry professionals for the jobs for which they are being hired by employers. The latter paper was based on a survey of employers and recent graduates, which signals a trend to base forestry higher education discussions on empirical findings; this approach was also undertaken by Ramcilovic-Suominen et al. [14] and Park et al. [15], among others. A paper by Sample et al. [3] observes that a good dominion of technical forestry skills, including silvicultural systems and forest inventory and biometry, are indispensable. However, other competencies, such as communication, ethics, collaborative problem solving, and managerial leadership (p. 8), are equally important to be able to deal with challenges such as dispute resolution or community development.

A complicating challenge to adapt forestry higher education to demands placed on professionals are the changes in higher education itself. These changes have been recognized by Sample et al. [3], and Tombaugh [16] and Tilak [17], among others. Higher education is under stress in most countries. Its organization and funding have been changing since the last one or two decades of the 20th century. Previously, higher education was funded from government budgets. Institutions of higher education now need to independently mobilize an important proportion of financial resources, and full cost recovery has become the dominant business model. These changes have led to the exclusion of studies with lower market demand, including liberal arts, humanities, sciences, and social sciences [17]. They have also led the so-called internationalization of universities, which often means attracting international students who are charged above-cost fees.

The forestry higher education research field has taken different directions. An important proportion of the publications on the topic follow Tombaugh [16] and Sample et al. [3], who provide general overviews of forestry higher education, its future requirements, needs for adaptation, and future challenges. Numerous studies provide detailed reviews of the competencies that are to be included in forestry curricula, views on these competencies held by universities, students, and employers, and the needs to modify curricula accordingly (e.g., [1,18–21]). Since the early 21st century, studies have been published that use the major argument of these general reviews of forestry higher education, or analyze it in particular economies; examples are Ethiopia [22], Afghanistan [23], Malaysia [24,25], Philippines [26,27], Finland [28], and Laos [15]. Studies across economies focus on Europe [20,29], and Brazil, China, and Finland [30]. Recent literature addresses new topics, including online forestry education [31–33], students’ views on forestry education or participatory curricula development [30,34,35], internationalization of forestry education [2,36], social science in forestry education [37], declining enrolment in forestry education [38], women in forestry higher education [39], forestry higher education outcomes [40], and colonial legacies in forestry higher education [41].

A second concept that is relevant for the cases analyzed here is continuing education. We use de Boer et al.'s [42] definition of continuing education as: "... organized learning activities at the tertiary level that take place after initial [primary, secondary and on-campus tertiary] education, to obtain and improve knowledge, skills and competencies targeting adults in employment or having had working experiences." Continuing higher education has two main thrusts. One is to meet the demand for professionals to be current with regard to the latest advances in knowledge, skills, and competencies in their respective fields. The significant knowledge and technology advances in many professional fields require that professionals update their knowledge and skills constantly, which requires a process of continued learning. The aim of continuing higher education is to allow professionals to undertake this learning. The second thrust of modern continuing education is the pursuit of higher education without following the traditional trajectory of enrolling as full-time students at higher education institutes. In these cases, students learn the knowledge, skills, and competencies via self-designed programs that include multiple learning events.

In forestry, continuing education is a topic that has received less attention than on-campus higher education, as summarized above. In 1975, Ovington [43] argued that continuing education in forestry helps to avoid "professional obsolescence" and allows professionals to adapt to "changing social attitudes to forestry" (p. 49). Since the early 2000s, relevant research has intensified the discussion on continuing education in forestry. Coffin et al. [44] report on efforts to ensure that forestry practitioners can benefit from the latest advances in technology developments, in addition to the recognition of the need for interdisciplinary interactions in addressing contemporary forestry challenges. Gauthier et al. [45] extend the debate and highlight the responsibilities among (Canadian) forestry professionals to stay up to date in developments in their fields. They ask whether professional associations should make continuing education mandatory. A similar argument is made by Eliason et al. [46] on continuing education for forestry professionals in Minnesota, USA, and by Innes [47] for North America in general.

Calls for continuing education in forestry have also been repeated for India, e.g., by Bhat [48], who calls on renowned forestry higher education institutions to develop courses for forestry professionals, including research personnel, and by Razali [8] for Malaysia. The latter specifically signals that professionals pursue continuing education for many reasons but not to acquire an academic degree (p. 107). Discussions on forestry continuing education have made similar arguments as those made related to forestry higher education. Social science theories need to be understood by forestry professionals, and these need to be addressed in forestry continuing education, as they need to be included in university forestry curricula [49]. Dorozhkin et al. [50] developed a conceptual model to ensure that forestry continuing education incorporates all elements that are needed for forestry professionals to stay ahead of developments in their fields. Although continuing education in forestry receives modest academic attention, it is an ongoing research area in which alternative methodological approaches are also being explored [51,52].

The wider recognized relevance of forestry continuing education is also reflected in programs that have been developed, for instance at Laval University, e.g., [53] and (<https://www.sbf.ulaval.ca/les-etudes/formation-continue>, accessed on 8 March 2021). These programs are entirely provided online. They target professionals who aim to maintain high professional standards for which they need to become familiar with the latest science and knowledge developments. These programs also target forestry professionals who desire to achieve higher professional ranks. This is one model of established forestry continuing education, and others view it as facilitating specific but mostly short-term training events targeted at specific audiences, e.g., [54].

Evidence exists relating to students who have completed higher education and are professionally active, but who subsequently sought enrolment in on-campus higher forestry education [55]. However, to our knowledge, the topic has not been systematically analyzed. Nonetheless, a number of hybrid continuing and higher forestry education programs

are offered. In some cases, these specifically target forest professionals and aim to offer on-campus M.Sc. or Ph.D. education.

3. Methods

A literature search to inform Section 2 of the paper applied simple key-word searches in Scopus and Google Scholar. We used key words “forestry education” and “higher forestry education”, respectively, in the first search. The abstracts of the results of these searches were read, unless it was obvious the paper had no relevance to the study. If the abstract confirmed the relevance of the paper, it was marked to be saved in a list in Scopus. The same procedure was followed using the key word “forestry continuing education” and a few variations on these terms. The procedures yielded two lists of papers, which were identified online and skimmed for their content. Of papers that are cited in this paper, relevant content was read in detail.

We undertook detailed research on the ASP and compatible programs. Materials available with APFNet on the ASP were obtained and read, mostly comprising short reports prepared by APFNet or by the three universities that participated until 2020 in the program, i.e., Beijing Forestry University (BFU), Nanjing Forestry University (NFU), and Northwest A&F University (NWAUFU). Following this consultation, a research plan was developed that was shared with APFNet staff and discussed in an online meeting. Next, two surveys were designed, one for students who had received an ASP fellowship, and one for faculty at the three universities (BFU, NFU, NWAUFU) who taught ASP students or supervised students’ thesis work. Questions of the survey for students related to the following topics: characterization of students and lecturers, students preparedness for Chinese universities, challenges in applying to the program, factors that defined choices of universities and majors, content and quality of courses and teaching, the role of core competencies in curricula, students’ thesis work, off campus activities, APFNet support to students, students’ experiences of wellbeing at their host university and in China, integration with other students, and career developments following completion of the studies supported by ASP. The survey for faculty included questions on curricula, students’ thesis work, students’ capacities and challenges, and program implementation [56].

The two surveys were prepared in Survey Monkey. The student survey had 74 questions, which were answered by 60 of 157 students who, until 2020, had studied with the support of the ASP. This represents a 95% confidence level with a 10% margin of error. The survey for faculty had 43 questions, and it was completed by 21 of 76 faculty members who, according to a list provided by APFNet, had had engagement with ASP students at one of the three universities. This represents a 95% confidence level, with a margin of error of 20%.

Following the surveys, three groups of people were interviewed in face-to-face online interviews. 1. Representatives of BFU, NFU, and NWAUFU (three interviews); experts on programs that have some similarity to the ASP (three interviews); and a selection of 10 students who had completed their studies at BFU, NFU, or NWAUFU, or who were still studying with ASP support and who had answered the survey. The students were selected to ensure that at least one student studying at each university and studying one of each major offered to ASP students at the universities was included. The aim of the interview was to achieve in-depth knowledge of some of the questions included in the student survey. A list of questions was prepared, one for each of the three groups prior to the interviews, and these were previously shared with the interviewees. The online surveys were undertaken from September until November 2020, and the interviews between October 2020 and January 2021, using the Zoom platform. They were recorded for subsequent transcription and analysis.

4. Comparing Programs of University-Based Continuing Forest Education

A selection of programs for training of forestry professionals, and following a higher education career program, are included in Table 1. The programs are the APFNet Scholar-

ship Program, which facilitated forestry professionals to undertake M.Sc. and Ph.D. studies at three universities in China, i.e., BFU, NFU, and NWAUFU. Since 2019, Chulalongkorn University has been included as a destination university for the program, but at the time of undertaking the study no related information was available. The Asian Forest Cooperation Organization's (AFOCO) Scholarship Program supports young professionals of ASEAN member economies to undertake either M.Sc. or Ph.D. study at South Korean universities. The third program is the Master's in Development Practice (MDP), a global program involving 32 universities that aims to train students in sustainable development practice. MDP does not focus exclusively on professionals nor forestry specialists. However, many professionals, including forestry professionals, choose the program as a continuing education option. This is also the case for the SUTROFOR program, which involves five European universities that provide an M.Sc. forestry curriculum in five majors. SUTROFOR is linked to Erasmus Mundi, which provides a Partner Country Scholarship exclusively for non-EU students. Applicants to this scholarship are required to have relevant work experience, in addition to academic qualifications. The last of the programs compared is the British Columbia University's Masters of International Forestry. This program specifically focuses on international forestry issues. It does not exclusively cater to forestry professionals, but a significant number of students have had professional working experience before attending the program (<https://forestry.ubc.ca/programs/graduate/professional-masters-degrees/master-of-international-forestry/current-students>, accessed on 14 June 2021).

Table 1. A comparison of five forestry continuing education programs.

	ASP	AFOCO	MDP	SUTROFOR	MIF
Target audience	Forest professionals in the Asia Pacific region	ASEAN government officials and other professionals	Current or past development practitioners	Students and professionals	Students and mid-level professionals
Studies supported	M.Sc. and Ph.D.	M.Sc. and Ph.D.	M.Sc.	M.Sc.	M.Sc.
Participating universities	BFU, NFU, NWAUFU, Chulalongkorn University	Universities in South Korea	32 universities or higher education institutions	Bangor, Copenhagen, Dresden, Montpellier, Padua	University of British Columbia
Number of students	±30/year, not fixed	5/year	??	??	±30/year, not fixed
Financing	APFNet (75%) and host universities (25%). No cost to students	Fully funded by AFOCO except contributions in-kind	Students need to identify funding	Erasmus Mundi Partner Country Scholarship, others	Students need to identify funding
Duration	Two years/Four years	Two years	Two years	Two years	One year
Program	One year courses, one year thesis	Courses, thesis and frequent excursions	Two years courses and field practicum during the summer break	One year at one university, second year at a different university	10 months courses, "field visits", including to policy makers, 6–12 weeks placement or guided specialized study

Table 1 compares the five programs, based on the information that was available for the comparison. All the programs offer the opportunity to pursue M.Sc. study. Two of the five programs also support a significantly lower number of Ph.D. students. The number of students is similar among four of the five programs. Only the AFOCO scholarship program supports a significantly lower number of students each year. Only two of the five programs exclusively target forest professionals (ASP and AFOCO), whereas the other

three accept career students, in addition to professionals who pursue continuing education. Thus, only two of the five programs (ASP and AFOCO) are unique in that they facilitate forestry professionals to pursue continuing education in the form of an academic degree. The other three programs are for both regular university students and professionals. The three programs, however, also specifically cater for professionals. We could not obtain estimates of the proportion of students of the MDP, SUTROFOR, and MIF who had work experience in their field before undertaking a M.Sc. study. Our impression is that the MDP receives the largest proportion of students who have working experience, but this number is lower than that for STRUFOR and MIF. About 5% of the students accepted at MDP Florida have a forestry background (from interviews).

Another relevant difference between the five programs is how they fit within the career development of professionals. For three of the five programs, i.e., ASP, AFOCO, and MIF, the expectation is that awardees return to the workplace at which they were stationed when they applied to the program, or at least continue in the forestry field, but as professionals who have improved their skills and capacities. Although this is not a hard rule, or a condition for candidates to be accepted into the three programs, the reality is that professionals in the majority of these three programs do return to their previous job. For instance, 52% of the ASP recipients returned to their old job after finishing their studies in China, whereas 25% of the students had moved to a new job [56]. The AFOCO program specifically aims to train forestry officials who are in ASEAN public forestry administration functions or in affiliated positions, and the program expects to contribute to skills and capacity improvements in this group of professionals.

The situation as explained above for ASP and AFOCO is somewhat different for MIF. MIF is, in principle, an open academic program to which anyone who has the required qualification can apply. UBC's Faculty of Forestry, however, which implements MIF, engages in intensive cooperation, especially with Asian forestry organizations, including APFNet [57]. A significant number of forestry professionals at MIF are admitted based on coordination between UBC's forestry program and the student's host organization. This also results in forest professional graduates at MIF returning either to their previous job, or to continue in the field in positions in which they have similar responsibilities as in their previous job.

This situation is different for both the MDP and SUTROFOR programs. These programs are primarily university driven. The participating universities established the programs, in the case of SUTROFOR, in coordination with government agencies in charge of facilitating higher education in the EU, which resulted in the support of Erasmus Mundi for the program. Professionals who apply for one of these two programs do so because they seek to pursue a career change or a career boost. Professionals who apply for MDP or SUTROFOR usually resign their employment and dedicate themselves to two years of academic study; then, they return to the job market in a new position, or, not uncommonly, decide to continue with Ph.D. study (from interviews).

A second key difference between the various programs relates to the financing mechanisms and opportunities. There are two contrasting mechanisms. Both ASP and AFOCO provide full support to students who apply for their studies, either in China or in South Korea. In the case of ASP, students enrolled in its early years may need to contribute a small amount of their own resources for the gap of living expense. This situation improved after APFNet raised stipends of the ASP awardees in 2018 [56]. In principle, ASP and AFOCO programs aim to cover the full costs for students. This also implies that the programs are highly competitive. This is not the case with MDP or MIF. Both programs expect students to cover costs in full for either the two-year (MDP) or the one-year (MIF) program. Because both programs are in the USA and Canada, these costs are substantial. Both MDP and MIF assist in identifying funding for promising students (from interviews). However, overall situation is that MDP and MIF students need to find the financial support to cover the tuition costs, the residence costs, and, in the case of MDP, the costs for their field practicum.

The SUTROFOR program has a costs/financing mechanism that lies between those of ASP-AFOCO and MDP-MIF. As mentioned previously, SUTROFOR is linked to the Erasmus Mundi program, which provides support to students via its Partner Country Scholarship facility. There are no enrolment costs for non-European students who aim to participate in the program, if they are supported by Erasmus Mundi, or any other of the SUTROFOR funding mechanisms. The Erasmus Mundi support covers living expenses for 24 months, travel expenses, and establishment expenses. The SUTROFOR program is, in principle, open to any student who meets the academic and work experience requirements. If, however, students apply independently to the SUTROFOR program, i.e., as self-financing students, they are required to pay an annual tuition, which, in the case of University of Copenhagen, for instance, is between EUR 10,000 and 17,000 per academic year.

The final item to be compared between the five programs is the provided education. In this respect, profound differences exist between the five programs. In case of 2020, ASP facilitates the study of forest professionals at three universities, limited to a choice of six major subjects, as per the program website, i.e., Forest Economics and Management (BFU), Forestry (NFU), Forestry Engineering (NFU), Environmental Engineering (NFU), Forest Protection (NWAUFU), and Soil and Water Conservation and Desertification Control (NWAUFU) (<https://www.apfnet.cn/Capacitybuilding/ScholarshipProgram/part5/>, accessed on 14 June 2021). The AFOCO program is less constrained in terms of the majors that students can pursue, because the number of students is small, and students can select from a range of universities in South Korea. Similar to ASP, SUTROFOR allows the selection of handful of majors. These include: “Forests and livelihoods in developing countries”, “Agroforestry systems”, “Tropical forest management”, “Environmental management and policies for tropical forests”, and “Social and environmental responsibility in tropical forestry”. By comparison, ASP is largely focusing on traditional forestry programs, while the latter is more adapted to the identified change in societal expectations of forestry and forestry professionals.

The two other programs reviewed in Table 1 do not allow selection among multiple majors. Of the two programs, MIF has the more constrained curriculum, which is a unified program for all students. Students undertake a fixed program of courses, after which the opportunity exists for a 6–12 weeks placement, i.e., an internship experience or opportunity to undertake further study to deepen understanding on a topic of the student’s interest. MDP students also follow a circumscribed program, which must include sufficient credits in four areas: social sciences, natural sciences, health sciences, and management training. Students have opportunities to select their own course program provided it fits within the overall program requirements. MDP students, furthermore, must undertake a required field practicum and write a report on that experience that is defended in front of a committee of lecturers.

5. The Case of the APFNet Scholarship Program

The analysis in the previous section compared five university-based forestry continuing education programs and demonstrated significant variety in a number of key attributes. The relevance or importance of these differences depend ultimately on their outcomes. The relevant and important outcomes of education programs such as those reviewed here are complex. The most obvious outcome indicators are the increase in knowledge and skills among the students who graduate from the programs. However, programs such as ASP, AFOCO, MDP, SUTROFOR, and MIF pursue sustainable forest management as a contribution to wider societal goals that go beyond increasing knowledge and skills of a cadre of professionals.

An in-depth analysis of the outcomes of university-based forestry continuing education programs requires answering a wider range of questions, including: who are the candidates who apply to the programs and why, and which candidates are selected? What are the awardees’ backgrounds, motivations, and incentives to apply for the program?

What education or training do the students receive at the program, and how well does this meet their knowledge, skill, and competency needs? How have the programs affected their understanding of forestry issues and their work performance? How does the education they receive affect career developments?

Some of these questions are answered here with reference to the ASP case, which is the only one for which an in-depth analysis could be undertaken for this paper (see Section 3).

5.1. ASP Continuing Education Recipients

A continuing education program, such as ASP and the other programs reviewed above, aims to facilitate knowledge, capacity, and skills improvements of a targeted cadre of professionals. APFNet's Strategic Plan refers to forestry professionals and practitioners, young foresters, and students who have majored in forestry and other related fields as the target audience for its capacity building program [57]. APFNet specifies that the program targets: "applicants from APFNet member economies with relevant professional experience" (<https://www.apfnet.cn/Project-Brief-Introduction/>, accessed on 14 June 2021). ASP-related documentation provides evidence about the previous recipients of ASP scholarships, and how well these recipients overlap with the target audience [56].

The ASP program has been operating since 2010. Until the academic year of 2019/2020, a total of 157 students received an ASP scholarship and undertook M.Sc. studies at the three universities of BFU, NFU, NWAUFU. Figure 1 shows the distribution of nationality and gender of the ASP awardees. This suggests a skewed distribution in favor of a handful of APFNet member economies, i.e., Myanmar, Laos, Mongolia, and Nepal, who together received 57% of the available places. This bias is not the result of a targeted selection of candidates depending on their nationality, but likely results from more intense collaboration by APFNet in these economies and, as a result, a higher awareness of the program among forestry professionals in these economies. The gender balance of the ASP awardees was 61% male–39% female, or a nearly 2–1 male–female balance. Although this balance is highly in favor of male awardees, the selection reflects the dominance of males in the forestry professions in the Asia Pacific region [39].

A more structural bias of candidates is evident in the background of scholarship awardees. Among the ASP awardees, 53% were candidates who worked as foresters in government administrations. The second most common group, with a proportion of 26%, were candidates who were employed at universities, i.e., candidates who had a university lecturer or similar position (Figure 2). Of all the candidates, 55% were mid-career professionals [56]. These findings reflect institutional interests in primarily strengthening national forestry governance and administration in APFNet member economies, as a key strategy to achieve the organization's goals and mission [56]. This priority is similar, for instance, to that of the AFOCO Landmark Scholarship Program, which also targets young professionals with relevant work experience. In this respect, the APFNet and AFOCO programs differ from those of MDP, SUTROFOR, and MIF. The primary mission of APFNet and AFOCO is to foster sustainable forestry and enhance forestry contributions to sustainable development in the territory of their member economies. To achieve those goals, the two organizations established a continuing education program for forestry professionals who opt for M.Sc. or Ph.D. study. MDP, SUTROFOR, and MIF, by comparison, are driven primarily by education goals and objectives, while ensuring that the sustainable forestry and sustainable development outcomes of the education are relevant.

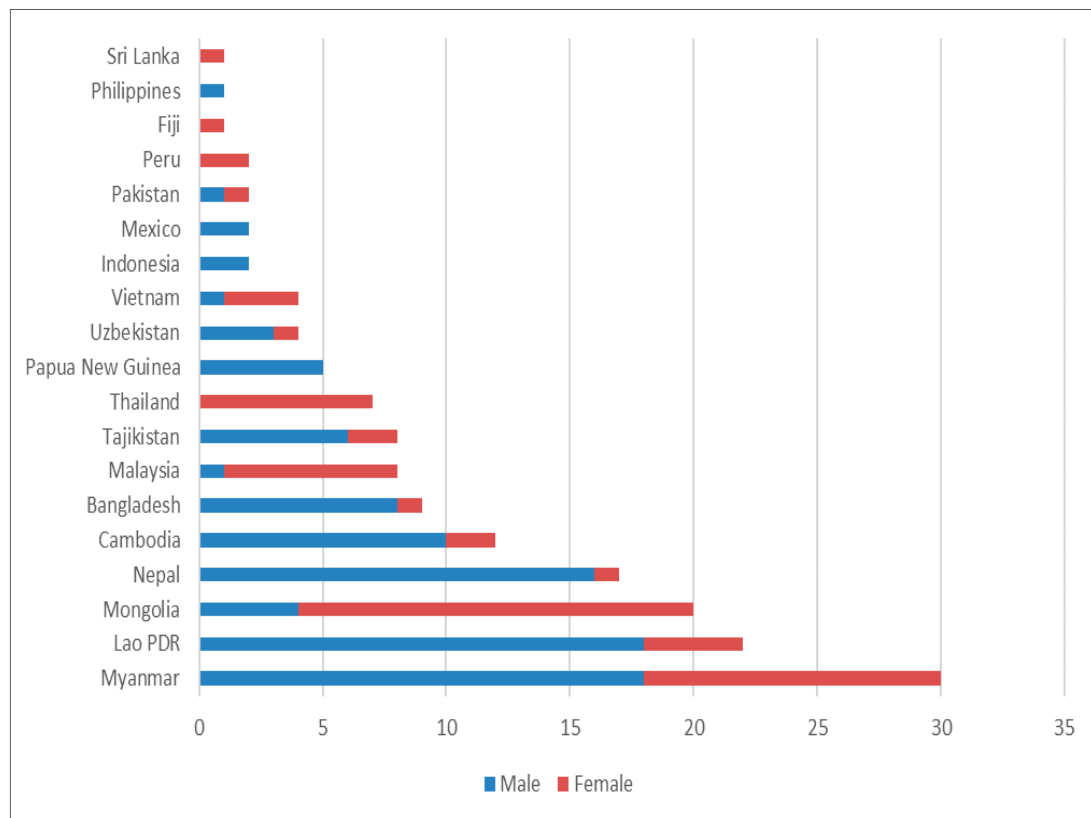


Figure 1. Nationality and gender of the APFNet Scholarship Program awardees 2010–2020 (number of students).

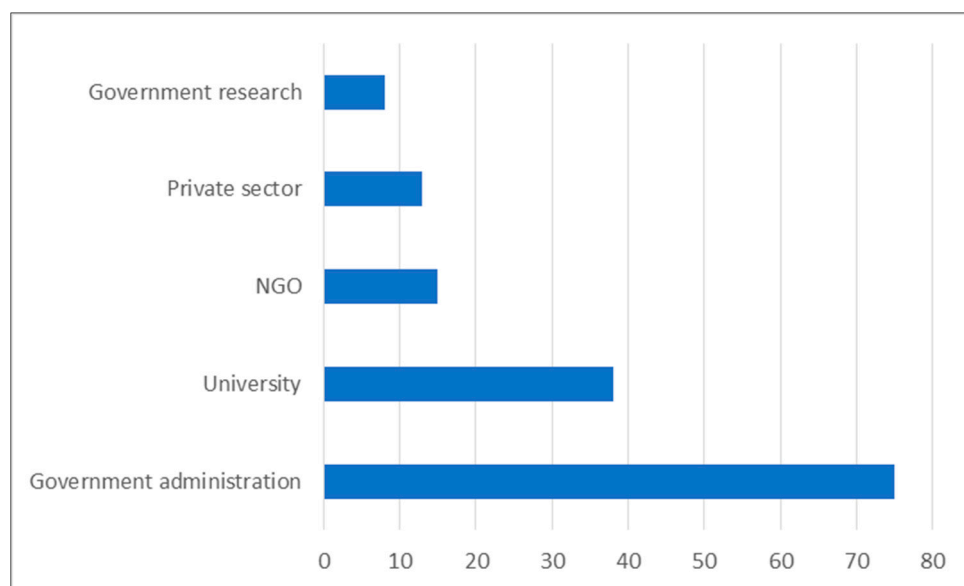


Figure 2. Professional background of APFNet Scholarship Program awardees (number of students). NGO—Non-governmental organization.

5.2. Education and Training of ASP Awardees

Researchers on continuing education argue that its purpose is to update knowledge and skills, or to develop entirely new competencies, of forestry professionals, for instance, to meet changing societal demands on forests and forestry [5,6,58]. The extent to which the programs reviewed here comply with those stipulations depends primarily on the

education and training received by students during their studies, i.e., which subjects are addressed in the courses, the quality of education, and how much competencies are improved.

Students who completed M.Sc. study supported by APFNet choose, as per their own reporting, one of 10 majors (<https://www.apfnet.cn/Project-Activities/>, accessed on 14 June 2021). The most popular majors are two traditional forestry majors: Forestry, and Forestry Economics and Management (Figure 3). Students, furthermore, had the opportunity to specialize to a limited degree when completing their course programs [56]. All ASP universities adopt a two-year M.Sc. structure, with the first year fully designated to course work, and the second year reserved for undertaking a M.Sc. thesis project. Students were limited to a defined course program during the first semester, which included non-major specific courses, such as Chinese language training and a general introduction to Chinese forestry. The aim is to allow students to better adapt to the learning environment in China and understand the development of Chinese forestry. During the second semester, students had opportunity to compose their own curriculum of courses. This opportunity, however, was constrained by the availability of subjects, and by limitations imposed by thesis supervisors, who were appointed by universities and had their own preferences for topics in which students should specialize (Table 2).

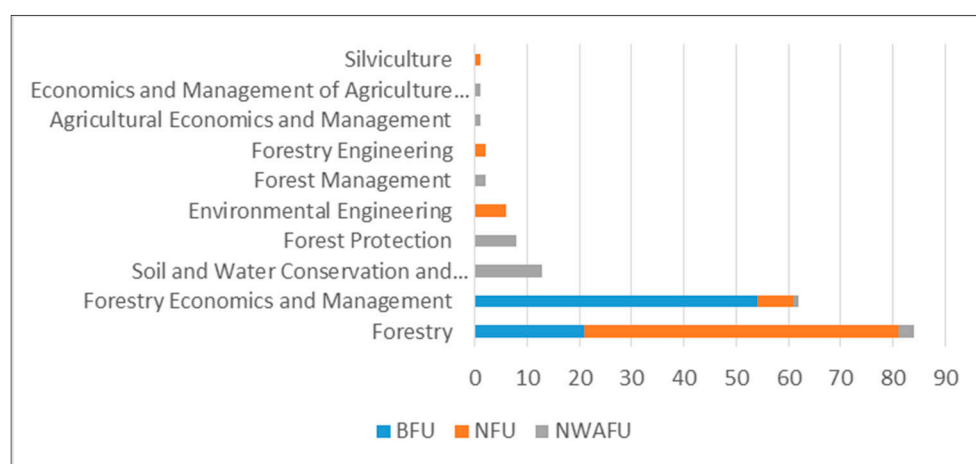


Figure 3. Major choices of APFNet Scholarship Program students (number of students).

Table 2. Responses to questions regarding options and preference for more flexibility in choices of subjects in curricula.

	Options for Selections of Subjects		Preference for More Flexibility?	
	Fixed Program	With Options to Select	Yes	No
BFU	17	5	15	7
NFU	16	14	27	3
NWAFU	4	4	8	0
	37	23	50	10

An overall assessment of the majors, and the course curriculums linked to these majors, found that higher education studies have yet to fully emphasize the new societal demands on forests and the forest sector. The implications of this for the skills and competencies of students could not be assessed.

A representative sampling of all students who were previous ASP awardees inquired about three different dimensions of their curricula: whether the subjects of their curriculum were relevant, the quality of the content, and the quality of the teaching. The results

indicate that the three attributes of the curricula were well evaluated by the majority of students. Of the three attributes, most students awarded a score of 4. However, for the content and quality of teaching attributes, a significant number of students awarded a lower score of 3 (Table 3). An assessment by course instructors, furthermore, indicates the degree to which the courses received by ASP students related to the contemporary global sustainability challenges that are closely related to forestry issues. Table 4 indicates that instructors believed that the majors and courses received by ASP students were generally linked well to issues such as forestry and climate change, the SDGs, ecosystem services, forest restoration, and forests and livelihoods (Table 4). Within the ASP program, however, development of core competencies is not receiving major attention, which is a broader concern among higher education institutions in Asia [56,58,59].

Table 3. Student scores of the relevance, content, and quality of teaching of subjects (no. of students).

Score Range 1 = Lowest, 5 = Highest	1	2	3	4	5	
Relevance	1	3	6	33	17	60
Content	1	2	18	26	13	60
Quality of teaching	2	1	14	30	13	60

Table 4. Ranking of the extent to which issues on international agendas linked to forestry are addressed in classes provided by ASP lecturers (no. of students).

1= Lowest; 5 = Highest	1	2	3	4	5
Forest and climate	3	2	4	3	9
Bioeconomy	2	2	8	6	3
Bioenergy	5	3	6	4	3
Nature based solutions	4	1	5	7	3
SDG	4	0	2	7	8
Ecosystem services	3	1	2	7	8
Bonn Challenges	1	4	7	6	1
Forest restoration	2	4	2	6	7
Forest and rural livelihoods	2	4	3	2	10

5.3. Student Career Developments

University career-based continuing education programs are intended to enhance students' knowledge, skills, and competencies. It can be assumed that this has happened when students complete these programs, thus allowing the students to either improve their performance or advance their career by pursuing more demanding and awarding employment. The programs reviewed here can be expected to result in more dramatic changes for forestry professionals, compared to the pursuit of "typical" continuing education, such as short courses or similar events. It can be expected that the dedication by forestry professionals to spend two years to complete an M.Sc. program will more often result in career advancement to a more senior position at the institute at which they worked when starting the program, or employment in a new more ambitious and awarding position. These, however, are assumptions that should be verified in additional research on the ASP and similar programs.

Evidence of how the ASP program affected career trajectories is presented in Figure 4. The survey results suggest that half of the scholarship grantees continued at their previous jobs, and that only slightly more than 10% moved to an entirely different job.

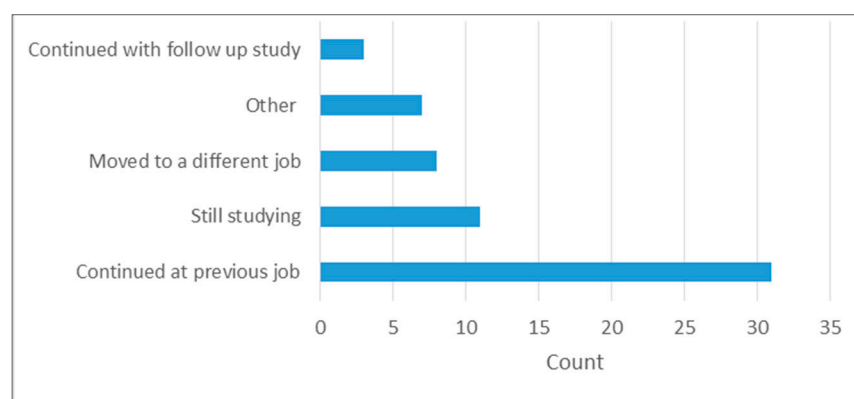


Figure 4. Occupation of APFNet Scholarship Program awardees after completing studies (number of students).

In addition, however, all interviewees reported that their studies contributed to professional growth and improved their work performance [56]. The in-depth study of the ASP program revealed that students expected to benefit professionally from their M.Sc. training in the long run. It appears that, because the ASP support studies implied significant host organizational support, ASP awardees felt an obligation to continue at their previous job, or were expected to do so, such that the host organizations benefited from the professional improvements. Many of those who completed their M.Sc. study not only improved their professionalism, but also their personal ambitions (from interviews).

6. Discussion

Forestry higher education is a topic of regular debate in the academic literature. Major issues are concerns regarding the declining interest in the field [38] and the need to adapt forestry curricula to changing societal demands on forests and forestry professionals [3,47]. Forestry continuing education is less frequently discussed in the literature, which some commentators recognize as a regrettable lack of attention that needs to be remedied [45,51]. As is the case with debates regarding forestry higher education, there is evidence that forestry continuing education is gradually receiving more attention outside the traditional forestry higher education hubs of Europe and North America [44,48,53].

The phenomenon of continuing forestry education via academic M.Sc. or Ph.D. study is relatively new, and is little discussed in the literature. This paper reviewed and compared a handful of such programs. As a common feature, the programs compared are supported by an organizational structure that enables students to pursue their academia-based continuing education.

With the exception of these commonalities, the five programs reviewed here are highly diverse. Only two target forest professionals exclusively; these include early career professionals in academia, but the majority are professionals who hold administration or management positions in an organization that is part of government. The differences between the five programs are explained by the curricula that host universities define for the major chosen by the students, or, as in the case of ASP students, the curricula that the host universities design specifically for ASP students, which differs slightly from those offered to regular M.Sc. students [56].

The large differences between the programs are a result of differences in the overarching design of the respective forestry M.Sc. or Ph.D. programs. In the case of ASP, until 2020 students pursued their education at three universities, at which they could choose 6–10 majors. Most of these majors can be recognized as “traditional” forestry curricula [56]. By comparison, forestry professionals who join SUTROFOR can choose from five majors, which are more in line with forestry education that is adapted to modern day societal demands on forests and forestry professionals, as considered necessary by forestry education experts [5,6,47,58]. Forestry professionals who pursue their continuing education

with AFOCO and MDP have more flexibility to specify their own curriculum that fits their personal interests and needs. In the case of AFOCO, students have a wider range of universities from which they can choose. MDP has a well-defined overall design curriculum, which provides students with significant opportunity to specify their own program of courses to best meet their needs. The curriculum of MIF is highly circumscribed but, like the SUTROFOR program, more attuned to modern social demands on forests and forestry professionals. MIF explicitly aims to provide critical thinking and social skills for future practitioners of global forest sustainable management, and also coordinates intensively with partners who facilitate forestry continuing education of professionals at the UBC.

A relevant question relates to how continuing education programs, such as those reviewed here, compare to other forestry continuing education programs. This question can also be posed as whether programs such as those reviewed here should be considered as forestry continuing education. The argument in favor of identifying these programs as such is that, at least in the case of ASP and AFOCO, these programs specifically aim to improve the knowledge, skills, and competencies of a cadre of forestry professionals. The programs are based on the understanding that a well-trained body of forestry professionals is necessary to achieve a suite of goals and objectives, including those pursued by APFNet and AFOCO. The programs assume that the knowledge, skill, and competency levels of forestry professionals who work in APFNet or ASEAN member economies are deficient. As recognized by APFNet [57], this is a result of deficiencies in the education received by many forestry professionals. The latter, in turn, is a result of an overall poor quality of higher education in forest-rich but relatively low PC-GDP economies, a fact that is also recognized by APFNet [57] and Tilak [17].

Continuing this argument, the question arises of whether university career-based continuing education, as provided by ASP, AFOCO, MDP, SUTROFOR, and MIF, is an appropriate strategy to boost knowledge, skills, and competencies of forestry professionals, to foster sustainable forest management, such that the forest sector can meet societal needs and contribute to relevant sustainable development goals [60]. This question has no straightforward answer. Organizations such as APFNet and AFOCO, in addition to multiple other organizations, undertake and support the more “typical” forestry continuing education as part of their programs, i.e., focused, short-term training for forest professionals, often on specific subjects. These efforts also intend to enhance knowledge and skills, although perhaps with less focus on competencies.

It appears that the programs reviewed here assume that opportunities should be made available for a selected group of early career professionals to improve themselves professionally, because this will contribute to the overarching goals, similar to the “typical” continuing education efforts. Although hard evidence of whether these outcomes are achieved is not easy to find, the evidence we presented in the previous section indicates that this is the case. All students of the ASP program reported in the survey that their studies in China improved their knowledge and understanding of the forestry field, and improved their work performance [56]. These observations were nuanced somewhat in face-to-face interviews, at which time respondents indicated that, although they experienced significant personal growth, the conditions at their host organization did not always allow them to fully utilize these improvements. Although the reasons behind this are complicated, interviewees recognized this as a disappointing experience that also diminished the value of the investments made by the host organization and those international organizations [56].

7. Conclusions

The paper analyzed a new type of continuing education in forestry, i.e., programs that facilitate M.Sc. or Ph.D. study at universities by early or mid-career forestry professionals. These programs are becoming more common as a third type of education for forest professionals, in addition to regular higher and continuing education in forestry. The five continuing education academic degree programs in forestry compared in this paper showed similarities, in addition to considerable differences. These differences are the result

of differences in the curricula determined by the universities attended by the students. Forestry continuing education academic degree programs may complement the value of regular continuing education programs in improving the preparedness of forestry professionals, which is widely recognized as being needed in many economies with significant forest cover. Options should be explored to expand similar programs more widely and make them available to forest professionals from all regions in which it is a challenge for forestry higher education to meet quality standards. Value also exists in attempting to better understand how different programs compare to each other: do they complement each other; do they overlap; or do they perhaps even compete with one other? Further research should clarify the needs of forestry sector staff, and the impact on professionalism of the type of programs reviewed here, the means by which these programs can be boosted, the types of support that could be provided, and the sources of this support.

Author Contributions: W.d.J. and K.H. conceptualized the study and designed the methodology. W.d.J. led the implementation of the data and information collection, with assistance of K.H., Y.Z., M.K. and G.W., K.H., Y.Z., W.L. and G.X. collected data and information sources located at APFNet and universities. K.H. and Y.Z. were responsible for administrative support throughout the study. W.d.J. prepared a first draft of the paper and all authors added to the draft and reviewed and edited subsequent versions. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: Data are available at APFNet and contained in [56]. They can be provided on demand.

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References

1. Brown, N. A Critical review of forestry education. *Biosci. Educ.* **2003**, *1*, 1–9. [\[CrossRef\]](#)
2. Kanowski, P.J. Multilateral forestry research and tertiary forestry education for development: Reflections on progress since the 1970s. *Int. For. Rev.* **2020**, *22*, 113–128. [\[CrossRef\]](#)
3. Sample, A.; Ringgold, P.C.; Block, N.E.; Giltmier, J.W. Forestry education: Adapting to a changing demand. *J. For.* **1999**, *97*, 4–10.
4. Coleman, W.J.R.D.; Moorhead, D.J.; Coder, K.D. An advanced forestry continuing education program for area county extension agents. *J. High. Educ. Outreach Engagem.* **2001**, *6*, 41.
5. Johnson, C.; Tilt, J.H.; Ries, P.D.; Shindler, B. Continuing professional education for green infrastructure: Fostering collaboration through interdisciplinary trainings. *Urban. For. Urban. Green.* **2019**, *41*, 283–291. [\[CrossRef\]](#)
6. Kelly, W.T. Continuing education—A professional responsibility. *For. Chron.* **2011**, *87*, 321–322. [\[CrossRef\]](#)
7. Lynch, K.A.; McLain, R.J.; Jones, E.T. *Nontimber Forest Products Curriculum Development Project*; National Commission on Science for Sustainable Forestry: Portland, OR, USA, 2005.
8. Razali, W.W.M. Professionalism and continuing professional education in forestry. *J. Trop. For. Sci.* **2011**, *23*, 107–109.
9. Laurie, M.V. Forestry education in America. *Forestry* **1964**, *37*, 137–144. [\[CrossRef\]](#)
10. Dana, S.T.; Johnson, E.W. *Forestry Education in America—Today and Tomorrow*; Society of American Foresters: Washington, DC, USA, 1963.
11. Roche, L. The profession of forestry now and in the year 2000. *Commonw. For. Rev.* **1992**, *71*, 13–19.
12. Nelson, R.A.; Trevitt, A.C.F. Competency-based education and training: A basis for the Australian forestry profession? *Aust. For.* **1993**, *56*, 226–236. [\[CrossRef\]](#)
13. Kentish, B.; Fawns, R. The changing professional identity of foresters. *Aust. For.* **1995**, *58*, 110–117. [\[CrossRef\]](#)
14. Ramcilovic-Suominen, S.; Puentes Rodriguez, Y.; Kirongo, B.; Pitkänen, S. Higher forestry education in Kenya: Bridging the gap between educational training and job market competencies. *Int. For. Rev.* **2016**, *18*, 56–67. [\[CrossRef\]](#)
15. Park, M.S.; Youn, S.; Youn, Y.C.; Donsavanh, B.; Phetlumphan, B. Needs assessment of forestry education in Laos: The case of Souphanouvong University. *J. For. Res.* **2019**, *24*, 201–211. [\[CrossRef\]](#)
16. Tombaugh, L.W. The forces of change driving forestry education. *J. For.* **1998**, *96*, 4–7.

17. Tilak, J.B.G. Higher education in south Asia: Crisis and challenges. *Soc. Sci.* **2015**, *43*, 43–59.
18. Vancly, J. The future of forestry education. *Inst. For. Aust. Newsl.* **1996**, *37*, 2–6.
19. Temu, A.B.; Rudebjer, P.G.; Kiyiapi, J.; Van Lierop, P. *Forestry Education in Sub-Saharan Africa and Southeast Asia: Trends, Myths and Realities*; Food and Agricultural Organization: Rome, Italy, 2005.
20. Arevalo, J.; Pitäknen, S.; Gritten, D.; Tahvanainen, L. Market-relevant competencies for professional foresters in European graduate education. *Int. For. Rev.* **2010**, *12*, 200–208. [\[CrossRef\]](#)
21. Innes, J.L. *Professional Education in Forestry*; Commonwealth Forestry Association: Shropshire, UK, 2010; pp. 76–93.
22. Dessie, G.; Tadesse, M. Rethinking forestry and natural resources higher education in Ethiopia: An education for sustainable development perspective. *South. Afr. J. Environ. Educ.* **2012**, *29*, 216–244.
23. Groninger, J.W. Forestry and forestry education in Afghanistan. *J. For.* **2006**, *104*, 426–430.
24. Kammesheidt, L.; Idrus, R.M.; Trockenbrodt, M.; Hann-Schilling, B. Linking academic forestry education with employers' demands: A case study from Malaysia. *Int. For. Rev.* **2007**, *9*, 661–669. [\[CrossRef\]](#)
25. Ratnasingam, J.; Florin, I.; Hazirah, A.L.; Shukri, M.; Abdul Latib, S. Transforming forest education to meet the changing demands for professionals. *Not. Bot. Horti. Agrob.* **2013**, *41*, 12–20. [\[CrossRef\]](#)
26. Cruz, R.V.O.; Bantayan, R.B.; Landicho, L.D.; Bantayan, N.C. Reformulating agriculture and forestry education in the Philippines: Issues and concerns. *J. Dev. Sustain. Agric.* **2013**, *8*, 49–62.
27. Rebugio, L.L.; Camacho, L.D. Reorienting forestry education to sustainable forest management: The case of the university of the Philippines Los Banos, College of forestry and natural resources. *For. Sci. Technol.* **2005**, *1*, 193–198. [\[CrossRef\]](#)
28. Schuck, A. Perspectives and limitations of Finnish higher forestry education in a unifying Europe. *Diss. For.* **2009**, *78*, 124. [\[CrossRef\]](#)
29. Schmidt, P.; Lewark, S.; Aravanopoulos, F.A. Development of Forest Sciences Curricula in Europe. In Proceedings of the SILVA Network Conference held at the Faculty of Forestry and Natural Environment Aristotle University of Thessaloniki, Thessaloniki, Greece, 3–8 November 2009.
30. Arevalo, J.; Mola-Yudego, B.; Pelkonen, P.; Qu, M. Students' views on forestry education: A cross-national comparison across three universities in Brazil, China and Finland. *For. Policy Econ.* **2012**, *25*, 123–131. [\[CrossRef\]](#)
31. Broussard, A.; Shorna, P.; Smallidge, J. An educational evaluation of web-based forestry education. *J. Ext.* **2010**, *48*, 6FEA2.
32. Längin, D.W.; Ackerman, P.A.; Lewark, S. Internet-based learning in higher forestry education. *Unasylva* **2004**, *55*, 39–44.
33. Standiford, R.B. Distance education and new models for forestry education. *J. For.* **2015**, *113*, 557–560. [\[CrossRef\]](#)
34. Kostilainen, A. A perspective of the students of higher forestry education. *For. Sci. Technol.* **2005**, *1*, 224–227. [\[CrossRef\]](#)
35. Leth, S.; Hjorts, N.; Sriskandarajah, N. Making the move: A case study in participatory curriculum development in Danish forestry education. *J. Agric. Educ. Ext.* **2002**, *8*, 63–73. [\[CrossRef\]](#)
36. Kanowski, P.J. Internationalizing forestry education. *J. For.* **2015**, *113*, 574–578. [\[CrossRef\]](#)
37. Villarraga-Flórez, L.F.; Rodríguez-Piñeros, S.; Martínez-Cortés, O.G. Social science in forestry curricula: A case study of Colombia forestry programs. *Sustainability* **2016**, *8*, 36. [\[CrossRef\]](#)
38. Nyland, R.D. The decline in forestry education enrolment: Some observations and opinions. *Bosque* **2008**, *29*, 105–108. [\[CrossRef\]](#)
39. Follo, G. A hero's journey: Young women among males in forestry education. *J. Rural Stud.* **2002**, *18*, 293–306. [\[CrossRef\]](#)
40. Sample, V.A.; Bixler, R.P.; McDonough, M.H.; Bullard, S.H.; Snieckus, M.M. The promise and performance of forestry. Education in the United States: Results of a survey of forestry employers, graduates, and educators. *J. For.* **2015**, *113*, 528–537. [\[CrossRef\]](#)
41. Sungusia, E.; Lund, J.F.; Ngaga, Y. Décolonisation de la foresterie: Dépasser la violence symbolique de l'enseignement de la foresterie en Tanzanie. *Crit. Afr. Stud.* **2020**, *12*, 354–371. [\[CrossRef\]](#)
42. Boer, D.H.F.; Epping, E.; Faber, M.; Kaiser, F.; Weyer, E. *Continuing Higher Education*; International Higher Education Monitor Center for Higher Education Policy Studies: Twente, The Netherlands, 2013.
43. Ovington, J.D. Continuing education in forestry for a world environment of rapid technological, economic and social change. *Aust. For.* **1975**, *38*, 49–58. [\[CrossRef\]](#)
44. Coffin, B.A.; Yount, L.; Laursen, S.D. Sustainable forests education cooperative: An experiment in collaborative continuing education. *J. For.* **2001**, *99*, 26–30.
45. Gauthier, J.; Parsons, C.; Comeau, R. Are forest practitioners in Canada keeping up-to-date with forestry continuing education? *For. Chron.* **2002**, *78*, 226–230. [\[CrossRef\]](#)
46. Eliason, S.K.; Blinn, C.R.; Perry, J.A. Natural resource professional continuing education needs in Minnesota: Focus on forest management guidelines. *North. J. Appl. For.* **2003**, *20*, 71–78. [\[CrossRef\]](#)
47. Innes, J.L. Challenges facing forest educators in North America. *For. Sci. Technol.* **2005**, *1*, 127–134. [\[CrossRef\]](#)
48. Bhat, K.M. Forest education and research in India: Country report. *For. Sci. Technol.* **2005**, *1*, 185–192. [\[CrossRef\]](#)
49. Stummann, C.B.; Gamborg, C. Reconsidering social science theories in natural resource management continuing professional education. *Environ. Educ. Res.* **2014**, *20*, 496–525. [\[CrossRef\]](#)
50. Dorozhkin, E.M.; Saltseva, S.V.; Steinberg, V.E. Conceptual model of continuing professional education based on social-and-academic approach. *Int. J. Environ. Sci. Educ.* **2016**, *11*, 9348–9361.
51. Harper, R.W.; Huff, E.S.; Bloniarz, D.V.; DeStefano, S.; Nicolson, C.R.; Davidsohn, M. Employing qualitative research interviews to understand urban forestry stakeholder continuing education needs. *Arboric. J.* **2020**, *42*, 65–75. [\[CrossRef\]](#)

-
52. Ries, P.D. Organizational outcomes and impacts of employee attendance at the municipal forestry institute leadership course. *Urban For. Urban Green.* **2020**, *53*, 126725. [[CrossRef](#)]
 53. Nolan, J.; Moores, L.; Macnaughton, R.; Duffy, P. La formation continue en foresterie. *For. Chron.* **2005**, *81*, 273.
 54. Pineau, J. New national collaborative alliance for sustainable forest management continuing education and professional development. *For. Chron.* **2004**, *80*, 315.
 55. Arevalo, J.; Tahvanainen, L.; Pitkänen, S.; Enkenberg, J. Motivation of foreign students seeking a multi-institutional forestry master's degree in Europe. *J. For.* **2011**, *109*, 69–73.
 56. De Jong, W. *An Evaluation of the APFNet Scholarship Program*; APFNet: Beijing, China, 2021.
 57. APFNet. *Growing Higher Forestry Education in a Changing World. Analysis of Higher Forestry Education in the Asia Pacific Region*; China Forestry Publishing House: Beijing, China, 2018.
 58. FAO. *Asia-Pacific Forests and Forestry to 2020*; FAO: Rome, Italy, 2020.
 59. Pulhin, J.M.; Freeman, J.; Brevia, L.A.; Tapia, M.A. Assessment of forestry education in Southeast Asia. In Proceedings of the the XII World Forestry Congress, Quebec, QC, Canada, 21–28 September 2003.
 60. Katila, P.; Colfer, C.J.P.; Jong, W.D.; Galloway, G.; Pacheco, P.; Winkel, G. (Eds.) *Sustainable Development Goals: Their Impacts on Forests and People*; Cambridge University Press: Cambridge, UK, 2019.