

TRANSFORMING FOREST EDUCATION TO MEET THE CHANGING DEMANDS FOR PROFESSIONALS

Jegatheswaran RATNASINGAM*

Faculty of Forestry,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor,
MALAYSIA.
Tel: +603-89467175
Fax: +603-89432514
Email: jegaratnasingam@yahoo.com

Florin IORAS

Centre for Sustainability Studies,
Buckinghamshire New University,
1 Queen Alexandra Road, High Wycombe,
BUCKS HP 11 2JZ,
UNITED KINGDOM.

Hazirah ABDUL LATIB

Faculty of Forestry,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor,
MALAYSIA.

Shukri MOHAMED

Faculty of Forestry,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor,
MALAYSIA.

Abdul Latib SENIN

Faculty of Forestry,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor,
MALAYSIA.

**corresponding author*

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Abstract

The traditional forestry practice is under increasing pressure to transform driven primarily by the changes in the public's perception of sustainability and to developments in science, communications, and global markets. In this context, the existing forestry education model is poorly equipped to cope with the changes sweeping through the forestry sector linked to digitization and rapid development in the information technology sectors. Previous studies have shown that in preparing professionals to practice forestry today, some notable discrepancies between what potential employers want and what the forestry institutions provide is apparent. In response, when hiring graduates of professional forestry programs, forestry employers have changed the set of skills and competencies sought. A similar scenario is also observed in Southeast Asia, which despite its large tract of forest resources and robust forest industries, is also experiencing dwindling interests among young people and reducing enrollment in many of the forest institutions. The prevailing financial constraints and political pressures on higher education make it difficult for educators to close the gap between forestry education and forest practice, but a more concerted effort from all stakeholders to revise the existing forestry education model to incorporate new courses and skills to better prepare the foresters of the future appears to be the way forward.

Keywords: forestry, education, curriculum, conservation, information technology

1.0 INTRODUCTION

The forests of the world are complex ecosystems, where its biodiversity is both a strength and adversary, as forest produces (which includes timber, non-timber products and other services) are indiscriminately exploited by man for economic returns (Ratnasingam 2011). Despite considerable efforts by international agencies such as, the Food and Agriculture Organization (FAO) of the United Nations and the International Tropical Timber Organization (ITTO) to ensure sustainable management of the forest resources in many parts of the world, the success on the ground has been rather mixed. In reality, the successful practice of sustainable forest management (SFM) depends on the availability of competent human capital to manage the forest and its

resources (Ratnasingam et al. 2011), which in turn is the outcome of the existing forestry education system in place.

The radical changes in the forest sector in past decades have been driven primarily by emerging global trends in social, economic and environmental issues, such as globalization, political changes, climate change, economic instability, advent of new technologies including information technology (IT), fiber-based industry, energy industry, and geographic information systems (GIS), increasing demand for vocational education, aging societies worldwide, and the increasing call for greener economies (Innes 2015).

The inevitable pressure for change in the forestry and forest ecosystems are linked to all of these global trends, and require holistic and integrative approaches in response (Hetemäki & Mery 2010). However, the biggest anticipated changes in forestry education will be attributed to the increasing application of the information technology (IT), which will alter the ways people use forest services, and thereby alter supply chains and the business logics of these forest services.

Perhaps the fate of professional forestry education throughout the world would be affected by: (1) the increasing global population that will exert greater pressure on forest resources, while increasing the demand for clean water, food, space and agricultural land, and (2) the potential risk for higher biodiversity loss due to accelerating climate change and increasing waste production, both from the household and industry (Vanclay 1996).

Generally, students are exposed to the forest very early in their schooling days through the teaching of geography and biology, but the depth of coverage is often limited to the main produces of the forests and its contribution to the country's economic wealth (Attah et al. 2009; Ratnasingam et al. 2008; Ratnasingam et al. 2011). Yet, the focused approach to forestry as a professional study program is usually available at the college and university levels in many countries throughout the

world. Therefore, this paper attempts to examine the trends and challenges in forestry education worldwide to cope with the changing demands on the profession, with an emphasis on the Southeast Asian region.

2.0 Traditional Forestry Education

Professional forestry education has a history of more than two centuries, when the importance of the forest and its resources were realized. Since then, forestry education system has been transformed to cope with the demands imposed by the market needs. By the late 19th century, forestry emerged as a preferred choice of professional career education due to its important socio-economic status in many forest-rich countries around the world. Through the years, forest education has evolved into four levels of participation as suggested by Vanclay (1996), with each level playing a particular role in ensuring the success of the overall forestry sector (Figure 1).

FIGURE 1

Generally, forestry education at the tertiary level is structured to produce professional foresters to meet the prevailing market needs. However, Leslie et al. (2006) stated that school-leavers who selected forestry academic programs at universities were usually driven by the opportunity to work outdoors, their interest in managing biodiversity of natural environment, creating and managing wood resource and potential to interact and work with the forest-based communities. Hence, the traditional forestry programs prepared students with a strong foundation in a number of core academic disciplines, and subsequently trained them in the professional context for the forestry sector (Brown 2003).

Further, it must be enunciated that forestry education in the Anglo-Saxon countries has generally remained with this traditional model, as introduced by the colonial masters (Ratnasingam et al. 2011), which unfortunately is ill-equipped to produce the necessary human capital to cope with the emanating challenges arising from the emerging global trends sweeping through the forest sector. It is therefore apparent that forestry education throughout the world is challenged and under growing pressure to restructure in order remain relevant as a professional career education.

3.0 Forestry Education in Conundrum

Despite the socio-economic significance of the forest and forest industries sectors in many countries throughout the world, forestry education throughout the world is currently suffering from serious drawbacks. Hence, it is no surprise that the future of forestry education in tertiary institutions has attracted overwhelming debates since the late 1990s (Arevalo et al. 2012). The core contention in these debates is whether forestry education is acceptable as university academic program or is sufficient as a technical subject of a non-university diploma level (Innes & Ward 2010).

The problems faced by forestry education have been primarily attributed to the reducing interest and enrollment in forestry academic programs in many countries, including Great Britain (Burley 2001), Canada (Innes 2005), Australia (Vanclay 2005), United States (Green 2006; Nyland 2008) and even in Africa (Temu et al. 2006). School-leavers have a tendency to choose careers with high salary, such as business, finance, engineering and computer and information technology (ICT), which potentially offers a grand life style which may not be achievable through a career in forestry (Nair 2004).

As a result of the falling enrollment in forestry programs in many parts on the world, some countries are resorting to hiring entry-level foresters from neighboring countries (Kanowski 2001). Based on the survey in the European Union (EU) countries in 2009 to evaluate the changing needs

of professional foresters, and the ensuing reforms that university-level forestry programs must undertake, it was found that employers and universities provided similar assessments regarding the importance of competencies and the gap between their achievements in training professional foresters and the market needs (Arevalo et al. 2010).

The growing mismatch between the existing forestry programs and the necessary skills demanded by the market was due to several factors: (1) the apparent shift towards the social, cultural and ecological values of the forests, (2) the globalization and internationalization processes which allows many multinational industries and environmental agencies/groups to operate easily across borders, (3) the growing competition from graduates from other nature, life and botany-related disciplines, and (4) the changing demands of employers with respect to the competencies and experiences that are sought from forestry graduates (Arevalo et al. 2012).

Despite the growing discontent, forestry programs in many parts of the world have not been restructured to meet the current market demands. In reality, there is ample evidence to suggest that many of the forestry programs still resemble the traditional Oxford syllabus, which is more than a century old (Vanclay 2007). This phenomenon reflects that academics, teachers and trainers have not embraced the global paradigm shift in the forestry sector (Guariguata & Evans 2010). In fact, the exercise of rebranding existing curriculum without any significant change in program content is futile because the graduate foresters will be ill-equipped to cope with the challenges in the market place (Temu et al. 2005).

Consequently, employment opportunities in the public forestry sector is also dwindling. In the United Kingdom for instance, the private sector prefer to employ forestry degree holders but the Forestry Commission believes that forestry graduates are not necessary for management positions within the organization because graduates from other disciplines were also capable of

doing the tasks of foresters (Leslie et al. 2006). Sadly, despite the significant change in attitude towards the forests and the increasing effort to preserve its complex biodiversity, environment and the wildlife sanctuaries, no significant increase in employment opportunities for forestry graduates have been noted.

However it has been argued that professional foresters with some business acumen, marketing knowledge as well as the ability to work well with people were more employable (Miller 1992). It is therefore apparent that the needs of the market for professional foresters are rapidly changing. On the other hand, the fastest growing job opportunities for forestry graduates were in non-traditional sectors, such as non-governmental forestry, environmental-pressure groups, climate change advocacy groups and the conservation-based organizations, especially in countries where green economy has a strong foothold (Ratnasingam & Ioras 2006). Against this background, the apparent lack of job opportunities for forestry graduates is possibly the main reason for the reducing interest and enrollment in forestry program worldwide, even in the Southeast Asian region which has a large forestry sector.

4.0 Forest Resources and Forest Industry in Southeast Asia

The forestry sector commands an important socio-economic status in the Southeast Asian countries. Table 1 shows the extent of forest resource and forest industries in the various countries in the region, emphasizing its socio-economic importance. It is a well-known fact that the forest sector is often associated with rural economy development in many of the developing countries in the SEA region (Ratnasingam et al. 2011).

TABLE 1

On this account, an analysis of the prevailing forestry education programs in the Southeast Asian region may provide some insights into the necessary restructuring initiatives that must be undertaken in order to ensure the relevance of professional forestry in a socio-economically important sector.

5.0 Evolution of Forestry Practices and Forestry Education in Southeast Asia

The changing paradigm in forestry practices in the SEA region is increasingly apparent. As shown in Figure 2, forestry practices has evolved since the 1970s, moving away from purely economic activities to one that is focused on multiple-use of the forest resource as well as the forest ecosystem conservation (Ratnasingam & Ioras 2006).

FIGURE 2

Against this background, the survival of professional forestry in many parts of the world will depend on its ability to adapt to the new market reality as well as the ensuing restructuring of the existing forestry education system as a whole.

According to a report by the Southeast Asian Network for Agroforestry Education (SEANAFE) in 2015, there were 74 institutions in the region that were offering forestry-related programs (including forest management, wood science and technology, forest recreation and parks management, and wildlife management), at the bachelor's, master's or doctoral degrees levels. The report also revealed that the total student enrollment in forestry-related programs in the region was generally on the declining trend (Figures 3a & 3b). However, Indonesia, Vietnam and Laos have

registered increasing student interests in forestry-related programs have been attributed to the populist view of forest conservation aided by external funding as well as the increasing number of employment opportunities in domestically large forest industries (SEANAFE 2016). Nevertheless, it is rather too early to establish if this trend will continue in years to come as the global trends in forestry affects the domestic scenario.

FIGURE 3a & 3b

6.0 The New Reality for Forestry Education

One of the major drivers of changes in forestry education has been the increasing number of multidisciplinary study programs. More and more traditional forestry programs are being merged with other disciplines or even terminated at some institutions. Forest science content is frequently taught in programs where forest ecosystems are only one among others such as aquatic, wetland, range, mountain, and agricultural systems (Sample et al. 2015). In fact, it explains why professional forestry education is losing its appeal worldwide, and the forestry tasks are being taken over by graduates from other specialties.

A survey of forestry programs in Southeast Asia in 2016 suggested that the major changes in forestry education in recent years have been due to the: (1) consolidation of traditional forestry programs with other disciplines or termination of forestry programs, (2) multidisciplinary approach, (3) increasing demand for social aspects of forests and generic skills component, (4) E-learning and blended learning, and (5) internationalization (Nyland 2008).

The restructured forestry education curriculum in many instances, can be categorized as:

- 1) *Forest science (FS)* centered curricula based on and labeled with “forestry”, “forest sciences”, “forest management” or equivalent;
- 2) *Natural resources (NR)* study programs based on labeled with “natural resources management”, “environmental science” or equivalent.

Nevertheless, it is fair to say that scientific research on forest education has not been extensively conducted in the past (Sample et al. 2015). Most available reports have focused on the trends developing regionally rather than providing an in-depth analysis of curricula needs to suit market requirements (Rekola et al. 2017). A summary of the available reports revealed that the research undertaken fall into any of the following three categories of studies:

- *Pedagogical methods*, such as problem based learning, e-learning and life-long learning (LLL)
- *Gap analysis*, where competency needs in the forestry workplace have been compared with competencies provided by formal education
- *Student enrolment and graduate employability*, where the flows of incoming students and out coming graduates entering into the labor market have been monitored.

6.1 Employment

The reducing employment opportunities for forestry graduates have been attributed to 5 major factors, as described by Kanowski (2015). Among the factors are: (1) changing social values, (2) diversification of degree offerings beyond traditional forestry, (3) inflexible, science-based curricula associated with accreditation and certification, (4) a perceived lack of forestry jobs and low wages, and (5) limited attraction to forestry for women and minorities.

FIGURE 4

Nevertheless, the prevailing trend for employment in the forestry sector appears to be leaning towards the public sector in the SEA region, with reducing opportunities in the private sector as shown in Figure 4. Forestry graduates in the public sector are most often in positions which do not necessarily require knowledge and skills related to forestry, unless they are employed in the Forest Department or related agencies. On the other hand, increasing number of forestry graduates are moving into conservation-related career path. One notable exception is the employment of forestry graduates in the forest industries, which is grossly limited due to the preferences of employing foreign-contract workers.

6.2 Role of Foresters in Southeast Asia

The roles of foresters have also changed substantially in Southeast Asia over the last decades (Burley 2001). Almost in all SEA countries there is growing shift from traditional forestry towards social and community forestry, agro-forestry, plantation forestry, environmental conservation and green economy. These changes demand competence among foresters in dealing with human aspects of forestry and multidisciplinary and participatory approaches (Innes 2005). Most of the responses indicated that these changing roles will have to be included in the curricula offered, both through new courses and programs, and perhaps a thorough revision of the existing programs. New directions in forestry education include business, entrepreneurship, plant-optimization, plantation management, multi-resource management, as well as eco-park management and tourism. It is therefore undeniable that forestry education in the SEA region will have to cope with the changing trends in the market place and the human capital needs.

6.3 Resources, Facilities and Funding

One of the biggest hindrances to change in the existing forestry education systems in SEA region is the lack of funding, which impedes improvements in teaching and learning facilities in many of the forestry institutions in the region. Without the necessary funding to improve the facilities, changes in the curricula will be meaningless as the potential forestry graduates will be ill-equipped with the necessary hands-on skills required in job market place. In fact a survey by the employment agency, Kelly Services Inc. (2016) found that most employers were dissatisfied with the capability of the forestry graduates in terms of their hands-on skills, specific technical knowledge, communication skills, critical thinking skills and global issues.

7.0 Solutions for Human Capital Development for Forestry in the Future

Against the background of globalization, democratization of education, the rapid progress in science and technology and the growing environmental concern, it is undeniable that the higher education sector, which includes forestry education, will have to be transformed, in order to remain relevant (Andersen et al. 2002).

Due to importance of forestry, the traditional forestry education will have to shift towards social forestry, community forestry, and environmental conservation, with renewed emphasis on the social, economic and environmental aspects of the forest (Ratnasingam & Ioras 2006). Hence, a review of the forestry education curriculum is essential for the development of a restructured forestry program which is both relevant and of acceptable quality, to serve the public and private forestry sectors. Curriculum development for forestry education must be linked to natural resources development, potential business ventures and trade, environment in the community,

scientific research, and respective country's need for forestry training, research and innovation agenda (Nair 2004). Some experts argue that the forestry education for the future must move away from the industrial-based forestry education models towards a more holism forestry education that centers on multiple-use of the forest resource and the environmental conservation dimensions. Others recommended that foresters be re-trained in new approaches to forest management and review the objectives of forestry education in the light of future developments brought about by the revolution in information technology and digitization (Guariguata & Evans 2010).

With the steady growth in community-based forestry and private-forest ownership throughout the world, on-line forestry education may be a serious alternative mode of education to serve a wider audience in an innovative and efficient manner. This concept has been practiced in Cornell University's Forest-Connect program called as "webinar series". The outcome from the web survey showed very positive response from the participants, who were encouraged to seek additional information as a result of viewing the webinar (Allred & Smallidge 2010). This is a clear testament of the effect of information technology and its wide spread influence on the democratization of forestry education to the masses.

The forestry sector is a hands-on industry, requiring human capital with a good command of basic concepts as well as essentials-skills to carry out the tasks in the forest and forest industries. Critical thinking skills, competent knowledge of forestry practices, good appreciation of the global forestry issues and sound presentation as well as communication skills are pre-requisites for success as a professional forester in the present and the future. In this context, relevant forestry education systems must incorporate fundamental concepts and basic forestry skills, apart from the other enhancing knowledge and skills in the curricula to ensure that the graduates forester are able to perform their tasks effectively and competently in the changing job market place (Ratnasingham

& Ioras 2006). Many forestry institutions in the world are under the illusion that changing the name or title of the existing forestry programs, without any major restructuring of the contents will be sufficient to increase student enrollment. This perception is grossly flawed because potential employers are dissatisfied with the quality of forestry graduates due to their inadequacy to perform effectively in the job environment. It may also be inferred that such marketing strategies also accounts for the growing trend of discontent among potential forestry employers, who are looking elsewhere for graduates from other disciplines to fill up the positions available (Attah et al. 2009).

Although the social, economic and environmental realms of forestry practices throughout the world are comparable, differences to meet local demands are very apparent in almost all countries. Therefore, the forestry graduates must demonstrate flexibility and be resourceful in terms of knowledge and skills to remain relevant in the ever-changing job environment. The same is also applicable to academics, teachers and trainers in forestry institutions, who must adopt life-long-learning (LLL) of the many knowledge and skills which must be imparted to the forestry graduates of the future (Rekola et al. 2017). Perhaps it is even more important for the academics, teachers and trainers to acquire the skill to learn continuously in order to remain relevant in the forestry sector at large (Figure 5). Under such circumstances, it may be possible to boost the waning interests among the younger generation to choose forestry education as the preferred choice of further education, and eventually gaining employment as a professional forester.

FIGURE 5

Another concern is the relevancy of research undertakings in many of the forestry institutions throughout the world, in which the research outcomes have minimal applications and

limited opportunities for commercialization success. Perhaps the research themes should be driven in collaboration with the forestry industry, rather than solely dictated by the whims and fancy of the policy makers or the forestry institutions itself. The successful forestry education and research model practiced in Germany is worthwhile emulating (Ratnasingam 2011). In other words, there is an urgent need to address the issues related to quality and relevance of the research rather than its quantity. In education one should not equate accomplishment with activity, and similarly in the forestry education gaining relevant knowledge and skills is far more desirable to ensure employment in suitable position relevant to the qualification and expertise of the forestry graduates.

9.0 CONCLUSIONS

The global forestry education is in transition, and efforts must be taken to renew interests in forestry programs worldwide which would translate into higher student enrolments. The need to restructure the traditional forestry curricula with a higher degree of flexibility, allowing graduates to adapt to the changing work-environment and market needs is increasingly apparent. The need for specialized skills among forestry graduates to cope with forest resources playing multiple roles must be realized and incorporated into the education curricula. Such forestry education programs will gain in relevance, viability and wider acceptance in the forestry sector and the society at large.

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