INTRODUCTION

The past two decades witnessed significant change in the forestry sector of many Asian countries. Mounting concerns over upland poverty and deforestation, indigenous people's rights, and empowerment of local communities have – in many instances – eclipsed the conventional focus on commercial wood production (FAO 1998). Parallel development has likewise occurred in the realm of forest administration and management. A new mode of governance has evolved from the traditional large scale, commercially-oriented mode of forest production controlled by the central government and business corporations, towards a small-scale, sustainability-oriented management by individuals and communities. This shift in forestry orientation in favor of people-oriented or participatory forest management has been described as the dawning of a new forestry paradigm (Gilmour and Fisher, 1991). The new paradigm ushered the development not only of new ways of doing forestry, but also more fundamentally, new ways of seeing and thinking about forestry (Rebugio, 1996).

The paradigmatic shift confronting the forestry sector poses new opportunities and threats to the forestry profession. If the profession is to be more responsive to the needs of the society, it must be able to anticipate and seize the challenges associated with this shift, as well as turn present and future threats into opportunities. A major requisite to achieve this is a better understanding and appreciation of the forestry profession – its recent trends, realities and needs.

This paper presents a general profile of the forestry profession in some Asian countries as viewed by the different concerned sectors. It highlights the results of a survey conducted by the authors involving five important stakeholders in the forestry profession: forestry undergraduates, forestry graduates, forestry educational institutions, forestry employers, and non-forestry graduates with certain association to foresters/forestry. General trends, realities and needs related to the profession are identified and analyzed based on the survey results and available secondary information. The major implications of the findings in terms of promoting a more responsive forestry education in Southeast Asia are also identified and discussed.
METHODS

A general framework was first developed by the authors to guide the conduct of the baseline study about the trends, realities and needs of the forestry profession. The framework includes four key topics: (1) profile of forestry students and graduates; (2) profile of forestry education institutions; (3) forestry graduates on-the-job; and (4) demand and opportunities for forestry graduates. Corresponding research questions were developed under each key topic which served as basis for formulating the survey instruments. Possible sources of information and methods of information gathering were also listed for each of the key topic.

Five sets of questionnaires were developed for five important stakeholders in the forestry profession, i.e., forestry undergraduates, forestry graduates, non-forestry graduates but with some forestry exposure or association, forestry educational institutions, and employers of forestry graduates. All the five sets include general information questions such as the respondent’s name, age, sex, nationality and contact address. In addition, the respondents were requested to suggest additional people who may be able to provide information on the employment demand and opportunities for forestry graduates and profile of forestry educational institutions in their country.

For forestry undergraduates, questions asked include primary motivation for choosing forestry, most influential person for taking forestry, what sector they hope to be employed after graduation, what they believe to be the three most important and three least important subjects, what they see as the main strengths and shortcomings of their forestry education, and their proposal to improve current forestry education. Respondents under this category include mostly the junior and senior students who have sufficient exposure, and hence are more knowledgeable about the forestry education situation in their school. In addition to the survey results, the output of two regional workshops/discussions about forestry education in Southeast Asia conducted by the ASEAN Forestry Students Association (AFSA) serves as an important basis in determining the student’s perspective of the profession. It may be worthy to note that the more recent among these workshops, conducted last year in Kasetsart University, Bangkok, made use of the same forestry undergraduate questionnaire developed by the authors as basis for discussion. This was made possible though the encouragement of one of the authors to the AFSA President for 1998-1999 who happened to be working with the University of the Philippines Los Baños College of Forestry and Natural Resources.

For forestry graduates, questions include background about their forestry degree, information about present employment and the nature of their work, assessment as to how well their forestry education prepared them to do their present work, what they considered as the three most important and three least important subjects in their forestry course. Other questions include the skills and competencies needed in their workplace not addressed in their forestry education, constraints and barriers they experience in practicing forestry, what they see as main shortcomings of their forestry education, and proposals to improve current forestry education.

Questions asked from non-forestry graduates are: institution where currently employed, respondent’s present position, nature of association with forestry/foresters, skills and competencies needed by foresters, perception whether forestry education is equipping foresters with the necessary skills and competencies, and proposal to improve current forestry education.

In the case of forestry educational institutions, the following information were asked: staff composition and development; teaching materials and methods; current curricular offerings and process of curriculum development; quality control of teaching, curricula and profession; admission, enrollment and graduation trends; physical facilities and equipment; research and extension activities; and national and international linkages.

For forestry employers, questions include: number of forestry graduates employed; positions and nature of job of the graduates; expectations of employers in terms of the graduate’s knowledge, skills and attitude; employer’s view whether forestry education is adequately preparing forestry/graduates for their workplace; employers involvement in shaping forestry education; and employer’s support to staff development of foresters.

The five sets of self-administered questionnaires were either directly handed to the respondents or sent through e-mail or by post. In the case of e-mail survey, a total of more than 500 e-mail addresses of people associated with forestry/foresters in Asia were collected and sent with the questionnaire. Moreover, the survey was also advertised through the Global Association of On-line Foresters (GAOF) which have more than 800 members around the world. In few occasions, direct interviews were also conducted especially among forestry students, graduates and employers in the Philippines. In addition to the survey, available materials relevant to the forestry profession were gathered to supplement the information provided by the respondents.
SURVEY RESULTS

Composition of the Respondents

A total of 551 respondents participated in the study. Of these, 167 (44%) are forestry graduates, 124 (32%) forestry undergraduates, 78 (20%) non-forestry graduates but with affiliation to forestry/forester, 8 (2%) forestry employers, and 7 (2%) educational institutions.

Forestry Undergraduates

Profile of Respondents

A total of 124 forestry undergraduates from six countries participated in the survey. Majority of the respondents are Filipinos (64.52%), followed by Vietnamese (21.77%), Indonesian (9.68%), Australian (2.42%), and Chinese and Thai (0.81% each). The students are currently enrolled in 8 forestry universities/colleges from the Philippines, 3 from Vietnam, 2 from Indonesia, and one each from Australia, China, and Thailand.

The undergraduate respondents have ages 18 to 33 with about 83% within the range of 18 to 23 years old. About 51% are male while 49% are female. Majority of the respondents are on their 3rd and 4th year in the course with 61.29% commencing their study in 1996 and 11.29% in 1997. Major sources of educational support are parents/personal (56.45%) and scholarship (37.90%).

Motivation for Pursuing Forestry

About one-fourth of the respondents (24.64%) mentioned the need to protect, conserve or manage the forest and other natural resources as their primarily motivation for undertaking forestry. Being a nature lover (21.54%) also serves as a major motivation for taking the course together with personal interest (10.77%), curiosity or desire to learn about nature and forest (7.69%), and potential for future employment (6.92%). Other sources of motivation include the alarming forest situation, the challenge offered by the profession, exposure to nature, encouragement from parents, relatives and friends, availability of scholarship, and the importance of forest.

Influential Person for Taking Forestry

Parents, other family members, and relatives (33.33%) – through their inspiration, encouragement or prompting – were the most influential persons for taking forestry. Friends and peers (14.89%) especially during high school were also influential including teachers (2.82%) and other people (5.67%) like neighbors and other acquaintances. A significant number (28.37%) also declared that their own "self" was the most influential person for taking forestry while a slightly over one-tenth of the respondents claimed that "nobody" (11.35%) really influenced them.

Future Employment

More than half (52.38%) of the respondents chose government as the sector they hope to be employed after graduation. Academic (17.69%) and private (18.37%) sectors are equally preferred as future employers by around 34% of the respondents. Non-government organizations are also seen by some (8.16%) as potential employers while the remaining 3.4% do not have specific preference, meaning they are willing to join any sector.

Regarding the type of work the students hope to be doing after graduation, around one-fifth (20.29%) identified office and/or fieldwork. Those who prefer fieldwork want to have deeper exposure into the realities of forestry. Around one-tenth (10.87%) are ready to take any forestry related work while almost the same number (10.14%) hope to serve as government employee. About 8% specifically mentioned socially forestry-related work such as community organizing and extension as their preferred job. The rest hope to be engage in other types of work/activities such as research, management or implementation of forestry projects, teaching, pursue graduate degree, join private sector, or venture on self-employment.

In ten years time, close to 50% expect to remain in their former job such as government employee, research work, office and/or fieldwork, social forestry-related work, teaching, working with the private sector and other forestry-related work. By this time, about 8% are optimistic they would have already occupied managerial or leadership position. All the rest anticipate they would by then have a more stable job, or pursuing graduate studies, engaged in personal business, consultancy and overseas work, or working with NGOs.
A little more one-third of the respondents (36.71%) hope to remain in their former work 20 years after graduation. Another one-third (32.34%) expect they would then be successful in their profession in terms of occupying leadership position, having more stable job, have their own logging company or plantation, completed graduate studies, advise government on environmental issues, or establish their own NGO. The rest are not certain what will happen 20 years after.

**Most Important and Least Important Subjects**

A total of 38 different forestry subjects were listed by all the respondents in response to the question as to what they believe are the three (3) most important subjects in their course. Social forestry (11.52%), silviculture (9.7%), and forest/timber management (8.48%) were identified as the three most important subjects in forestry. In addition to the three, the other 10 most important subjects (in decreasing number of frequency) are forest laws/policy/administration, forest taxonomy/dendrology, forest ecology, forest conservation/protection, forest inventory, planning and coordination, forest surveying, forest biology/bio-forestry, wood structure and identification, afforestation/rehabilitation, and forest botany/physiology and watershed management.

On the other hand, the identified three least important subjects are timber harvesting/ergonomics (6.99%), forest range management and cattle raising, and forest road construction/logging engineering (4.37%). Other than the three, the ten less important subjects (in decreasing number of frequency) are forest economics, forest production utilization, wildlife management/forest animals, forest dendrology/taxonomy/morphology, general zoology, technical drawing, aerial photogrammetry, forest ecology, forest laws/policies/administration, and forest machinery instruments, general microorganism and wood physics.

**Strengths of Forestry Education**

The forestry students believe that the current forestry education draws its strength from a combination of factors. These include the presence of highly qualified academic staff (11.59%), ability of the course to address present environmental problems (10.14%), promotes a holistic approach to education by combining theory and practice (7.25%), high teaching standard (7.25%), puts emphasis on field work (6.52%), promotes better understanding about forests and nature (4.35%), presence of updated curriculum and number of other factors. In general, the strengths of the current education are seen to depend on institutional capacity of the forestry school/university, responsive curriculum, good learning environment, and the ability of the course to provide employment. In addition, some believe that the strength of the forestry education is inherent to the course itself in terms of its "uniqueness" in promoting understanding about forest and nature and addressing environmental problems.

**Shortcomings of Forestry Education**

Among the identified main shortcomings of the present forestry education include limited teaching facilities/modern equipment (22.52%), limited field exposure/practical application or contact with reality (13.92%), lack of teaching materials including local textbooks (8.61%), financial difficulties/low budget in the part of the educational institutions (5.3%), and limited emphasis of the existing curriculum on social forestry and extension (4.64%). Other identified shortcomings include poor teaching approach/methods, limited computer training, over supply of graduates, poor policy making, lack of qualified faculty, limited opportunity to learn foreign language especially English, limited exposure to other forestry aspects, limited opportunity for filed trip, political patronage in employment, and absence of specialization. In general, the main shortcomings of the forestry education relate to weak institutional capability in the areas of policy support, staff, facilities and equipment, and other logistic support; weak curricular program; and other factors external to the educational institution.

**Proposal to Improve Current Forestry Education**

Proposals to improve current forestry education directly address the different shortcomings identified earlier. The students recommend to refocus the curriculum to allow more field-work/practical application/hands-on experience (22.35%); provide modern teaching facilities/equipment (18.24%); improve teaching methods including more student participation in the class (9.41%); provide more teaching materials and up-to-date references (7.65%); and encourage students to engage in research and development activities (6.47%). In general, recommendations can be broadly classified in terms of building the capability of the educational institution in terms of faculty and physical resources, instituting a more dynamic and responsive curricular program, and strengthening educational support.

**Forestry Graduates**

**Profile of Respondents**
A total of 167 forestry graduates from 17 countries participated in the survey. About 89% of the respondents come from 7 Asian countries namely, China, Indonesia, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam. Majority of the respondents are Filipinos (64.67%), followed by Vietnamese (12.57%), Indonesians (9.68%), Americans (4.19%), Chinese and Nepali (2.4% each), Australian (1.8%), and Canadian (1.2%). The remaining 9 countries have only one respondent each.

The respondents have ages 21 to 65 with about 50% within the range of 20 to 30 years old. About 68% are male while 32% are female. The respondents graduated from 34 Asian and 17 non-Asian forestry degree-granting institutions. A little more than one-half of the respondents (53.89) are relatively young professionals who graduated from 1991 and 1999. Almost the same number (56.29%) have either completed or currently pursuing graduate studies.

**Motivation for Pursuing Forestry**

In general, forestry graduates have almost similar motivation for taking forestry course as that of the undergraduates. For instance, the top three factors that motivate them most, are exactly the same as that of the undergraduate. These are being nature lover/environmentalist (22.16%), interest on forest protection/management/rehabilitation (16.77%), and desire to learn more about nature/forests/biodiversity. Similarly, other factors such as employment, availability of scholarship/financial support, and inspiration from parents/friends and other people were important sources of motivation. Unlike the forestry undergraduates, however, about 9% of the graduate respondents admitted that they were in the forestry profession either by accident or without motivation at all. Some of them may have taken forestry either because they have no other option.

**Influential Person for Pursuing Forestry**

Similar to the undergraduate respondents, the groups that most influenced them to take forestry were family members and relatives (36.53%), self (19.16%), and friends (13.17%). Other people such as neighbors, and other acquaintances also influenced 8.98% of the respondents. Close to one-tenth of the respondents (11.98%) claimed nobody influenced them.

**Employment and Educational Preparation**

More than one-third (41.92%) of the respondents are employed in the university/college while close to one-third (31.34%) are working with the government agencies. The remaining one-third are distributed in NGOs, private organizations, international projects, while others are unemployed. The respondents occupy 13 different positions with around one-fourth having academic teaching positions from Instructor to Professor. About 50% serve as researcher/research assistant, (15.57%) forester/community forester (13.77%), senior program management/policy technical specialist (10.18%), forest ranger (3.59%). The rest serve as project manager, marketing person, extensionist, consultant, administrator, investigator and business owner. Seven people (4.19%) are unemployed.

The respondents’ main tasks vary depending on the nature of their work. At least 20% of their time is spent in two or more of the following activities: teaching, research, fieldwork, community level work, and administration. Other tasks include training/visits, consultancy, trips, attendance to seminars, writing, establishing linkages, coordination and supervisory work, policy work, and extension activities.

The respondents were asked to rate their degree of educational preparation to perform present tasks, into a scale of 1 to 10, a rate of 1 meaning minimal preparation and 10, maximum. Among the different tasks, respondents have minimal preparation on administration, community level work and teaching. Moreover, they are least prepared to do other jobs such as training and extension, computer works, policy development/analysis/implementation, and paper works like report writing. About 50% claimed to be more prepared in doing fieldwork and research.

**Most Important and Least Important Subjects**

The three most important subjects which the graduates find useful in their work are silviculture (13.56%), forest management and development (11.62%), and social/community forestry (11.14%). Except for the variation in the degree of preference, these are exactly the same subjects identified by the undergraduates to be most important. Other 10 most important subjects identified are forest law/policy and administration (5.81%), watershed management (4.12%), inventory/surveying/engineering (3.87%), forest dendrology (3.63%), forest mensuration (3.39%), environmental management/conservation/EIA (3.39%), agroforestry (3.39%), forest economics (3.15%), and forest products utilization/biotechnology (3.15%).
On the other hand, the identified three least important subjects all relate to the utilization aspect of forestry: timber harvesting (11.71%), forest engineering (11.22%), and wood science (8.73%). The other 10 least important subjects (in decreasing number of frequency) are wood science, aerial photography, logging plans and cost, technical drawing, forest products exploitation and processing, forest policies, rural sociology/anthropology, road construction, forest economics, biology/zoology, and humanities/ethics. Interestingly, nobody mentioned social forestry to be a least important subject.

Skills and competencies not addressed in forestry education

Based on the survey results, the forestry education over the last ten years seem to have adequately addressed the technical skills required of the profession. However, other important skills and competencies needed in the present work-place were noted to be wanting. Topping the list are skills and competencies in information technology/computers (36.43%), interpersonal relations/communications (21.43%), legal (17.50%), organizational management/administration (11.07%), participatory methodologies/community development, and research/data analysis and practical skills (4.64% each). Other skills identified by the respondents but with low frequency counts (maximum of 4 frequency count for each skill) are forest enterprise development, languages, management, current affairs (international), forest policy, environmental management, training, technology transfer, personality, and self-confidence. It should be noted that except for participatory methodologies, four of the top five needed skills are actually mentioned in the questionnaire as sample answer, hence may have provided the lead to the respondents. This may imply that skills on participatory methodologies may have rated much higher had it been mentioned as a sample answer in the questionnaire.

Major Constraints in Present Job

The top five major constraints in the present job confronting the forestry graduates are policy duplication/implementation/instability (23.47%), government bureaucracy (23.47%), corruption (17.84%), limited resources (8.45%), and political patronage/intervention (7.51%). Other identified constraints relate to culture, employment, poor public image of the profession, age and gender, technical limitations and poor leadership.

Main Shortcomings of Forestry Education

The graduates attribute the main shortcomings of the forestry education mainly to inadequate curriculum. Of the 25 identified shortcomings 18 relate to curricular matters. These include among others, insufficient on-the-job training, the need to cancel old courses and introduce new ones, overemphasis on technical skills, limited training on "people skills"/community work/teamwork, research and communication, and absence of specialization. Other shortcomings are lack of supporting resources (i.e., facilities, teaching materials and finances), poor staff competency, poor linkages, and poor image of the profession.

Proposal to Improve Current Forestry Education

To address the identified main shortcomings of the forestry education, proposals to improvement mainly relate to curriculum development. A major recommendation is to increase the practical/field exposure of the students through active instruction and applied problem-solving approach (18.60%). Other major proposals include the continuous updating of the curriculum (10.47%) as well as its revision to focus on community-based resource management (8.72%). Moreover, there is a need to introduce new courses on information technology (GIS, GPS, etc.), environmental management and those that enhance "people" skills such as communication and conflict resolution and management. New courses should also provide exposure on international forestry issues and reinforce moral and ethical values. In addition to curriculum improvement, important recommendations include the need to invest on facilities, equipment and teaching materials, more varied and creative teaching approach, strengthening institutional linkages, increasing the budget for forestry education, more intensive student screening, and maintaining minimum standards to forestry education. All these recommendations are consistent with those being proposed by the undergraduate respondents.

Non-Forestry Graduates

Profile of Respondents

A total 78 non-forestry graduates with some degree of association with foresters/forestry participated in the survey. The respondents come from 10 countries: 5 Asian, and 5 outside Asia. More than 80% of the respondents are Vietnamese (43.59%) and Filipinos (38.74%). The rest are Chinese, Indonesians, Americans, British, Dutch, French, Mexican, and Nepali.
The respondents have ages 21 to 54 with close to 50% (48.72) with an average of 20 to 30 years old. About 58% are male while 42% are female. In terms of employment, 83.34% are employed in universities/colleges (47.44%) and the government sector (35.90%). The rest are employed in international agencies/projects, NGOs and the private sector.

In terms of association, more than half of the respondents (52.57%) are directly associated with forestry/foresters in their present work in forestry department, university/college, or forestry project. Other associations are in terms of collaborative undertakings like research and information exchange, meetings, conduct of training/workshop and other extension/joint activities. The rest are associated with foresters/forestry people through friendly and business relations, graduate work or simply love of forestry.

**Skills and Competencies Needed by Foresters**

In terms of the required skills and competencies, around 15% of the non-forestry graduate respondents believe that technical forestry knowledge is of primary importance among foresters. In addition, forestry related knowledge is also needed based on response of 16.18% of the respondents. This include knowledge on environment/management, forestry extension/social forestry, forestry and related laws as well as rules of court, planning, monitoring and evaluation, and understanding socio-economic development. However, forestry knowledge should be complemented with basic knowledge on allied fields like agriculture, biology, marketing, anthropology, economics and other social sciences according to 12.5% of the survey participants.

More than knowledge, however, specific skills and competencies are accordingly needed by forestry graduates to effectively perform their job. These include abilities to protect and preserve the natural resources (8.82%), skills in community development, organizing and training (8.82%), communication skills (8.09%), writing and documentation (2.94), training skills (2.94%), GIS/RS analysis (2.94%), survey and computer skills (2.94%), research and other practical skills (1.48%).

Appropriate knowledge and skills, however, are necessary but not a sufficient condition for effective work performance. Forestry graduates should posses the right attitude towards work, strong determination, have good foresight, and should be honest and patient according to 9.56% of the respondents. Two respondents (1.47%) said, foresters should also be close to farmers and ethnic people while one (0.74%) noted good heath to be of primary importance.

Asked whether respondents believe forestry education is equipping foresters with the needed skills and competencies, 43.42% answered "Yes", 23.68% "Partly" or "Not Sufficient", while 14.47%, "No". The remaining 32.90% have either no idea, not sure of their answer, or simply did not respond to the question. This seems to indicate that in general, forestry education – and by implication the resulting graduates – may have low professional image as viewed by graduates from other fields.

Most of those who believe that forestry education is equipping foresters with the required skills and competencies cited the good or improving curriculum and employment opportunities as main reasons for their favorable assessment. Those who answered "partly", mentioned the need to include more social forestry subjects, lack of knowledge on related fields, and limited field practice as the main limitations of the current forestry education. Majority of those who answered "No" mentioned that forestry is still "traditional or biased to timber extraction. They also cited the lack of training on computer and communication skills, limited knowledge on recent development in forestry education and on global issues, involvement in government anomalies, and lack of extension subjects among the limitations of current forestry education.

**Proposal to Improve Current Forestry Education**

Consistent with the proposals of the forestry undergraduates and graduates, one of major recommendations of non-forestry graduates relate to improving the current curriculum. These include among others the general review/revision of the existing curriculum (3.94%), inclusion of more field work/practical application/hands-on experience (21.26%), offering of more relevant courses like social forestry and agroforestry (5.51%), computer and its forestry applications like GIS (2.36%), biodiversity conservation (1.57%) and ethics (2.36%), and equipping students with communication skills (3.94%). In addition, they recommend for the offering of field courses that interact with forest communities (4.72%), incorporate social science/integrate forestry with other disciplines (3.94%), include research and extension program as part of the curriculum (2.36%), include discussion on recent global forestry issues (2.36%), provide short training courses to students on relevant topics (2.36%), offering forestry specialization (1.57%) and look into the possibility of developing a five-year forestry program (1.57%), and conduct student exchange program (0.79%).

Other suggestions include: staff development and hiring of competent faculty members (7.09), improvement of
the current teaching methods to be more participatory and interactive (7.89%), more access to quality teaching materials (4.72%), and provision of adequate facilities and equipment (1.57%). Moreover, forestry institutions are encouraged to promote the forestry profession (1.57%), conduct continuing professional education (1.57%), establish strong institutional linkages (0.79%), and seek for more government support for forestry education (0.79%).

**Forestry Institutions**

*Profile of Respondents*

Seven forestry degree-granting institutions – five from the Philippines and one each from Nepal, Thailand and Vietnam – participated in the study. In general, the respondents occupy a relatively high position in their universities/colleges, hence are in a better position to answer the different questions. Three of the seven respondents are College Dean, one is Department Head, one was a former Campus Chief, while the other two did not indicate their position.

*Staff Composition and Development Program*

The total number of faculty members of the participating institutions ranges from 9 to 38. Four of the institutions have 9 to 13 faculty members while the other two have 38. One did not provide any information.

There is a total of 12 different staff specialization in the seven institutions. Social forestry and silviculture are common fields of specialization in five of the seven institutions. Four institutions have staff specialized in watershed management, three institutions in forest management, and two institutions each in rural development, forest biological sciences, environmental science, and forest products engineering and utilization. Other fields of specialization unique to each of the seven institutions are agroforestry, forest economics, pest management, education administration, education administration, extension, tree physiology, vegetation science, public administration, forest pathology, agriculture, computer science, wildlife, park recreation, and forest ecology.

Six institutions send their staff on post-graduate studies while one has stopped its formal staff development program with the termination of a foreign assisted project. In addition to staff development, five institutions also provide opportunities to their staff to attend in trainings, seminars and conferences to update and broaden their knowledge in their respective fields. One institution also provides its staff a special computer training to enable them to be computer literate.

*Curricular Offerings*

The seven institutions offer seven curricular programs ranging from a two-year Forest Ranger Certificate to graduate programs in forestry. Five institutions offer a 4-year B.S. Forestry while one offer B.S. Forestry, major in Agroforestry. Two institutions offer Forest Ranger Certificate. The rest of the curricular offerings are B.S. Agroforestry, Diploma in Agroforestry, Master in Forestry, and Master of Science in Forestry. None of the 7 institutions have yet the capability to offer a Ph.D. program.

*Admission, Enrollment and Graduation Trends*

The enrollment trend over the last five to ten years of four (4) institutions are increasing. One has decreasing enrollment trend while the other two did not provide any information.

Three institutions have foreign students admitted in their programs while the other two have none. Again, two institutions did not provide any information.

Regarding the trend in the number of graduates, four of the five institutions that provided information have increasing number of graduates over the last five to ten years. One forestry school from the Philippines had experienced a steady decline in the number of graduates from 99 graduates in 1996 to 54 in 1999. This is mainly explained by the reduction in its student enrollment during the same period. As of last graduation, number of graduates ranges from 49 to 100 for the five educational institutions.

The educational institutions themselves are the main source of scholarships and related student support. Five of the six institutions that provided information grant scholarships and related support to their students. Other sources of support come from the government and the privates sectors.
Physical Facilities and Equipment

Six of the seven forestry institutions have sufficient school buildings. Four institutions noted the existence of laboratories and libraries while three noted that these facilities need improvement. Five of seven institutions have sufficient classrooms while one need additional classrooms to hold their classes. Five institutions need to replace, upgrade or procure additional equipment and facilities to service the teaching requirements of their students.

Teaching Materials and Methods

The teaching materials commonly used are course syllabi, handouts, books, articles, and research reports. Others use visual aids/specimens, videotapes and other teaching aids. In terms of other teaching resources, five institutions laboratory instruments and samples, surveying and forest mensuration equipment and computers. Overhead and slide projectors are also commonly used while some also made use of television, video cassette recorder and video camera.

Among the new teaching methods/approaches identified and employed by the institutions are: more field exposure and on-site lecture (21.74%), use of more hand-out/teaching guides/lab manuals (17.39), more emphasis on discussion (13.04%). Two institutions also noted the use of internet and other modern computer-based facilities while mentioned the use of on-farm laboratories. One university in Vietnam mentioned the employment of learner-centered teaching method in social forestry subject.

All the seven institutions claimed to have access to demonstration sites.

Research and Extension Activities

Four institutions have on-going and completed researches in 11 different research areas. These include silviculture, agroforestry, social forestry, forest management, non-conventional energy systems, watershed management, geographic information system, biodiversity, biological science, wood science, and economics.

For funding support six institutions have minimal budget from the government to conduct their research and extension activities. In addition, they depend on other funding agencies, local and international, to augment their financial needs. In terms of linkages, all but one claimed to have local and international linkages although the extent of these linkages cannot be determined.

Only two institutions offer local and international short-training courses.

Forestry Employers

Profile of Respondents and Employers

A total of eight employers of forestry graduates from three countries participated in the survey. Five of the respondents come from Indonesia, two the Philippines, and one from The Netherlands but based in Indonesia. All are male with ages 32 to 50, and an average of 45 years old.

In terms of categories, seven are government employers including forestry department, research institutions and technical cooperation project. The other employer from Indonesia is classified as "state-owned company". Positions occupied by forestry graduates and their tasks highly vary depending on the nature of their employers. In general, employers engaged the forestry graduates to a multiple tasks ranging from research, management/planning, forest inventory, certification, training, social forestry, rehabilitation, economics, silviculture, information technology, and as one respondent noted, "too many to mention".

Expectations from Recent Forestry Graduates

In terms of expectations, around 40.91% of the employers respondents believe that the right attitude is of primary importance among forestry graduates. Special skills are also needed by forestry graduates based on response of 38.64% of the respondents. These include good communication (both oral and written), computer skills including knowledge in GIS and development of data base, Environmental Impact Assessment, integrative skills, skills in problem analysis and solution and "people" skills like human relation and community organizing. These conform with the skills identified needed skills by the forestry graduates to effectively perform their current jobs.
Forestry graduates according to the response of 20.45% of the respondents also need basic technical forestry and other relevant knowledge. These include basic knowledge on forest ecology, silviculture, and forest management as well as socio-economic dimensions of forestry. Knowledge in experimental and social research design, and in current forestry development, issues and problems. However, forestry knowledge should also be complemented with basic knowledge on allied field like sociology, anthropology, public relation, agricultural, policy making and some technically updated/up-to-date recent development in science and technology.

Asked whether respondents believe forestry education is equipping recent forestry graduates with the knowledge, skills and attitude, 58% answered "No", 33.33% "Partly" or "Not Sufficient", while 8.33% "Yes". This result seems to validate the earlier observation, that in general, forestry graduates, may have relatively low professional image in the eyes of their employers.

Majority of those who answered "No" cited the limitations of forestry education to provide the needed skills and competencies and the right attitude for graduates to better perform their jobs. These include weak skills in report writing, lack of skills in community organizing and valuation techniques, limited knowledge on the environment and social dimension of forestry, negative attitude towards work, and being a "traditional" forester.

Those who answered "No" echoed the suggestions of the forestry and non-forestry graduates in terms of the changes forestry education should undertake to prepare the forestry graduates for their workplace. These include the provision of on-the-job training/practical application in the fieldwork/apprenticeship, communication skills, creative teaching approach, emphasis on social consciousness, community-orientation, global competitiveness, awareness on global policies and agreements, access to global information and improvement of forestry curriculum. In countries like the Philippines characterized by the proliferation of regional forestry schools, the establishment of center of excellence per region is also suggested to ensure high quality forestry education.

Those who answered "partly" also mentioned the lack of practical application and the need to improve forestry curriculum. One also cited the educational variation from one educational institution to another meaning that few high standard forestry schools are able to meet the required competencies but majority do not. The lone respondent who answered "Yes" cited the positive attitude forestry graduates towards work particularly those working in his institution.

**Involvement in Shaping Forestry Education**

Five of the eight employers claimed they have been involved directly or indirectly in shaping forestry education. Their involvement vary from personal volition, participation in survey, serving as lecturer to a more direct involvement like participation in curriculum development workshop.

**Support to Staff Development**

All the employers declared to have their share in supporting staff development of foresters. These are in forms of sending their staff to short and long-term trainings in forestry, providing scholarship support to graduate students, training sponsorship and organization, institutional capability building, and funding of forestry researches. One employer also act as a part-time lecturer in a local forestry college and serve as adviser to forestry students.

**ANALYSIS OF RESULTS**

This section summarizes some of the important trends, realities and needs of the forestry profession based on the survey results. Specifically, it attempts to answer some of the key questions in the research framework designed to guide the conduct of the present study.

**Profile of the Forestry Students and Graduates**

What sort of people become foresters? In terms of gender mix, there has been an increasing number of female joining the forestry profession as can be gleaned from the increase in the percentage of female respondents from 32% for forestry graduates to 49% in the undergraduates. This is consistent with the experience of the oldest forestry school in the Philippines, the University of the Philippines Los Baños College of Forestry which started with 20 male students when it first offered a two-year forest ranger course in 1910. At present, the number of female has far more exceeded the male. Of the present 597 student population, 369 are female...
(61.81%) while only 228 (38.19) are male. The increasing number of women and their role in the changing context of the forestry profession should be looked into an interesting topic for research.

The interview schedule does not probe into the socio-economic background of the respondents. However, previous study in the Philippines indicate that forestry alumni, in general, came from low-income families (CFERDAP Trunk Line, 1981). The fact that around 40% of the student respondents in the present study are under scholarship or student assistanship/working student, may provide support to this claim. This was also validated during the actual interviews conducted among some of the forestry graduates who noted that they could not have chosen forestry as a profession had their families’ financial resources been sufficient to support their taking of other courses. This implies the need to attract more students from the middle and upper socio-economic strata who normally have better educational preparation, to improve the quality of forestry students.

The desire to contribute in forest protection, management and rehabilitation, and being nature lover/environmentalist are the major sources of motivation among both the forestry students and graduates. Since interest in nature/environment and its protection are normally developed in the primary and secondary levels, forestry education should start at this level. The need to incorporate forestry education in the school curricula of the primary and secondary levels is therefore of paramount importance.

Moreover, parents and other family members are the most influential people for taking forestry, for both the undergraduates and forestry graduates. Yet, this important sector is not usually consulted in curricular and related matters pertaining to the profession. Appropriate mechanisms for active involvement of parents in curriculum development and in improving the forestry education and the profession in general, should be instituted.

Profile of the Forestry Education Institutions

While the survey result is more reflective of the forestry education situation in the Philippines since four out of seven respondents are from this country, the following observations may also hold in other Southeast Asian educational institutions.

- With the growing recognition of the importance of social forestry there is an increasing effort among the forestry educational institutions to incorporate to existing forestry curricula to complement the traditional forestry courses such as silviculture, forest management, etc., as can be learned from the increasing number of faculty members specializing in this field. However, there is a need to ensure the quality of these staff by proving them the appropriate trainings and exposures relevant to their specialization.
- All of the institutional respondents offered a four-year B.S. Forestry course. Considering the multiple skills and competencies required of foresters, the issue of whether B.S. Forestry should be a four-year or a five-year course should be looked into. Also, there is a need to study the advantages and disadvantages of providing specialization in the undergraduate level.
- While the student enrollment, and consequently the number of graduates, are generally increasing, the quality of students/graduates should be looked into. This is specially considering that a significant number of non-forestry professionals and employers are in doubt whether forestry graduates are adequately prepared to tackle their jobs.
- In general, teaching facilities and equipment such as laboratories, libraries, teaching materials and other teaching equipment are not sufficient to cater to the needs of the students.
- Faculty’s attendance to teaching seminars/workshops and use of student evaluation are common approaches to ensure quality control of teaching, thus, need to be promoted among other forestry educational institutions. Best teacher/academic awards, institutional recognition, and related incentives should also be encouraged to promote quality performance among faculty members.
- Most of the schools claimed to have access to demonstration areas and practicum sites. Whether these sites are effectively used to enhance the acquisition of the needed skills and competencies of the students is not clear at this time.
- While scholarships and other related assistance are provided by almost all educational institutions they are limited in number and usually not sufficient to answer the financial needs of the students.
- A combination of technical and social forestry researches are being conducted by most institutions. However, research and extension activities are generally weak due to limited funding support. National and international linkages are being established but need to be strengthened.

Forestry Graduates-on-the-Job

Forestry graduates are expected to perform multiple tasks ranging from teaching, research, community level work/extension, administration, computer works, policy development/implementation, etc. These demand multiple skills and competencies not adequately provided during their four years of forestry education in college. On the other hand, forestry graduates find some of the courses especially those oriented to forest
exploitation like timber harvesting, forest engineering, and wood science, to be least relevant. These suggests that existing curricula of most forestry schools have to be significantly revised to meet the skills and competencies needed in the work place.

Except for limited resources, the five major constraints confronting the forestry graduates relates to the "politics" of forestry. To better prepare the students in this area, courses on forest policy and administration, and forest institutions should be developed and/or strengthened.

**Demand and Opportunities for Graduates**

The government — including the forestry departments, research agencies, and degree-granting universities/colleges, remain to be the major employer of forestry graduates. Except in timber rich countries like Indonesia, employment in the private sector, particularly in the Philippines has continue decrease through time. Recently, however, other non-traditional sources of employment have emerged like the Non-Government Organizations and Local Government Units as in the case of the Philippines. These institutions have the potential to absorb some forestry graduates, hence should also be involved in curriculum development.

In general, the employers' expectations of forestry graduates in terms of knowledge, skills and attitude are not being met. This posed a major challenge to educational institutions in terms of providing the necessary training to adequately prepare their graduates to effectively and efficiently handle their jobs. It also suggests the need for more involvement of the employer sector in shaping the forestry education especially in the area of curriculum development.

**Other Observations**

There is congruence in the different stakeholders' views of the trends and needs in the forestry profession. In addition to those already mentioned, other observations that can be gleaned from the survey, include:

- Increasing appreciation of the importance of social dimension of forestry management among the different forestry stakeholders. This requires going beyond the technical competencies provided to forestry students such as those embodied in the traditional forestry disciplines like silviculture, forest management, forest biological sciences, and wood utilization. Of paramount importance is the integration of social dimension in all aspects of forest management and necessity to put more weight on social forestry and forest extension subjects than what is currently provided for in most forestry schools. Corollary to this is the need to equip students with "people" skills like communication (both oral and written), conflict resolution, and other cognitive and interpersonal skills. This supports earlier studies in forestry education in the United States (Brown and Lassoie 1998, and Sample, Ringgold, Block and Giltmier, 1999), but also studies on general education (Hersh, 1997). Such skills have to be complemented with the right attitude and appreciation about the role of rural people in forest management and development.
- The realization that the current forestry education is too "theoretical" and not grounded on real word forestry situation. This requires not only reorienting the present curricula by providing more time for field exposures and laboratory activities, but also coming up with innovative ways where students can maximize their learning opportunities by engaging them thoroughly on analyzing and providing solutions to real problems on the ground.
- The need to take advantage of the rapid development in computer technology to advance the forestry profession. This requires including computer courses in the present forestry curriculum from simple word processing to the more sophisticated techniques like GIS, GPS, and remote sensing
- Job competition is increasingly becoming stiff among forestry graduates primarily due to economic recession in Southeast Asia and the inability of the private sector to absorb more forestry graduates due to the significant decline in the timber resources. As a result, there is now stiffer job competition that require multiple skills and competencies among forestry graduates. Few forestry graduates, however, are able to engage on the private practice of their profession such as establishing their own tree plantations or forest-based enterprises, or organize their own NGOs. There is thus the need to develop the entrepreneurial capability of forestry students to widen their employment options after graduation.

**IMPLICATIONS TO FORESTRY EDUCATION**

In the views of the different stakeholders, the present state of the forestry profession leaves much to be desired. There are discrepancies between what the employers want (including the expectations from the other relevant sectors) and what the schools provide. This appears to be true not only in Southeast Asia but also in
the United States as recent studies have shown (Sample, Ringgold, Block, and Giltmier, 1999; Towns and Johnson, 1999). The forestry education has to adapt to the changing demand of the professionals if it is to maintain its relevance and significantly contribute to the advancement of the societal welfare as a whole.

Expectations from the forestry professionals in Southeast Asia has gone far more beyond a thorough grounding on technical forestry skills although this is valuable and should remain as a major hallmark of the profession. Equally important, however, is the need for foresters to have a thorough grounding on socioeconomic and political realities of the profession since they need to deal with multiple publics from higher government officials in the forestry bureaus, down the grassroots-level in community forestry projects. In the process, they have to employ a combination of high technology-based decision making tools like GIS and the more grassroots-oriented techniques like participatory rural appraisal and related methodologies. Competency in communication (both oral and written), problem solving, and ethics are also highly important. The required skills and competencies needed from the forestry professionals are therefore broader and more integrative than in the past.

The clamor for new ways of seeing, thinking and doing forestry in response to the changing times, begs for an urgent reform in the forestry education. Based on the wealth of insights gleaned from the present study, a five-pronged approach towards a more responsive forestry education are outlined below. The intention here is not to be prescriptive but to stir up discussions and come up with consensus among various stakeholders on how the process of reform can be effectively and efficiently pursued.

**Capability Building of Educational Institution**

Being the key stakeholder in forestry education, building the capability of the education institutions should serve as the main driving force for the reform. This should include among others:

- A comprehensive and strategic staff development program
- Staff training on innovative approaches to teaching and learning like learner-centered, participatory methodologies and and problem-oriented approach
- Improving the teaching facilities and equipment, and providing up-to-date teaching materials including text-books authored by ASEAN professionals
- Strengthening research and extension program and integrating them to curriculum

**Responsive and Dynamic Curriculum Development**

Curriculum is the said to be the backbone of the type and quality of education (FAO, 1989), hence should be the main object of reform. A more responsive and dynamic curriculum is urgently needed that should encompass the following:

- Promoting a more participatory approach to curriculum development by ensuring the involvement of the various stakeholders including the parents of forestry students
- Balancing theory and practice through more field exposure, thorough grounding of students on field realities, and adapting a problem-oriented approach to teaching and learning
- Strengthening the social dimension of the curriculum by putting emphasis on social forestry, forest extension courses and the politics of forest administration and management
- Maintaining technical competencies and skills but also putting emphasis on other important competencies such as oral and written communication and other “people” skills
- Incorporation of new subjects like computer skills and its application in forestry (e.g. GIS, GPS and remote sensing)
- Imbibing the culture of entrepreneurship among students by offering a course on forest-entrepreneurship and through appropriate teaching-learning approach
- Removing obsolete courses such those which highly focused on forest exploitation and development of more relevant courses as mentioned above
- Institutionalizing dynamism in curriculum development through regular curricular review and revision and participatory curriculum development

**Promotion and Student Recruitment**

As the more important input in the forestry education production process, the quality of students should likewise be enhanced. This would require:

- The active promotion of the forestry profession to improve its public image
- Innovative and aggressive approach to student recruitment
Networking with primary and secondary schools and working for the incorporation of forestry in their curricula.

**Continuing Professional Education**

Recognizing the fact that education is a life-long process, and considering the rapidly changing demands of the forestry profession, a continuing professional education should be encouraged. This may be pursued through:

- Instituting mechanism so professional regulatory commission/board can require foresters to undergo continuing professional education as a requirement for the renewal of their license. This has been tried and found to be effective in the Philippines.
- Forestry schools offering short training courses should collaborate with forestry employers and design short training courses to upgrade the skills and competencies of their employees.

**Strengthening Educational Support**

Strengthening the educational support systems is necessary to help realize the above-mentioned approaches. This would require:

- Fund sourcing through creative collaboration and networking among concerned institutions supportive of the cause of forestry education
- Imbibing in the forestry schools the spirit of entrepreneurship (i.e., implementation of income-generating activities like offering of short training courses, provision of technical services, etc.) to be able to support its forestry education programs
- Lobbying with the appropriate bodies to increase budget in forestry education
- Strengthening alumni association and professional groups and tapping their assistance to improve the standard of forestry education
- Securing job-placement for forestry graduates by establishing creative partnership between the forestry schools and employers of forestry graduates

**REFERENCES**


Guillermo, I. Q. (2000). "Forestry Education in Southeast Asia: Student’s Perspective". Unpublished paper based on the outputs of two workshop on forestry education in Southeast Asia conducted by the ASEAN Forestry Students Association on 1998 and 1999 in the Philippines and Thailand, respectively.


