



# **Forestry Education in Sub-Saharan Africa and Southeast Asia: Trends, myths and realities**

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**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**

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## Foreword

Since its inception, FAO has played an active role in forestry education and training. In 1956, a permanent group of experts in this field was established as a statutory body of the Organization, which from 1964 to 1997 was replaced by the FAO Advisory Committee on Forestry Education (ACFE). This Committee played an important role in the creation and strengthening of forestry education and training institutions in developing countries, and in fostering international cooperation in this field. Unfortunately, the Committee was abolished in 1997.

The Rabat expert consultation on forestry education (FAO, 2001) provided useful guidance in shaping the activities of FAO and member countries towards improving forestry education programmes and equipping foresters with the knowledge, abilities and attitudes necessary to ensure sustainable management of the world's forests for present and future generations. The consultation recognized the importance of regional networks of forestry education institutions and FAO decided to work together more closely with the existing networks. In this context, FAO invited the African Network for Agroforestry Education (ANAFE) and the Southeast Asian Network for Agroforestry Education (SEANAFE) to design and implement a survey on forestry education in Africa south of the Sahara and in Southeast Asia.

This document describes the trends in forestry education and training in Sub-Saharan Africa and South East Asia over the ten-year period from 1993 to 2002. The final chapters are dedicated to the lessons learned, recommendations and conclusions.

FAO is hoping that cooperation with regional and subregional networks will enhance the much needed exchanges of information and perspectives, and the discussion on global issues related to forestry education.

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## Acknowledgements

FAO wishes to thank both networks, ANAFE and SEANAFE, for carrying out the surveys and analyzing the results, while a special word of thanks is due to the writers of this document: August Temu, Per Rudebjer and James Kiyapi, as well as to all the persons who played key roles in the collection of data.

In Africa, the following persons collected country data for the survey:

- ❖ Essam Ibrahim Warrag and Abdelgadir Abdelazim, Sudan
- ❖ Sanogo Idrissa, Mangara Makan and N’Tio Niamaly, Mali
- ❖ Chantal Kabore-Zoungrana, Pizongo Jean Chrysostome and Jeanne Millogo-Rasolodimby, Burkina Faso
- ❖ Labode Popoola, Moses O. Adedire, Nigeria
- ❖ Gerrit van Wyk and Michael Underwood, South Africa
- ❖ Muchiri E.M., Makhoha DEric Koech, Mbai, and W. Muriithi, Kenya
- ❖ Gerald C. Monela and Ufoo Lema, Tanzania
- ❖ John Kaboggoza, and Gift Okojia, Uganda
- ❖ Mujuru A, Zimbabwe

FAO also wishes to acknowledge the following persons who collected and analyzed country data for the Southeast Asian survey:

- ❖ Iskandar Z. Siregar, Indonesia (who also assisted in the analysis of data)
- ❖ Bounthene Phasiboriboun, Lao PDR
- ❖ Roberto V. Dalmacio, the Philippines
- ❖ Damrong Pipatwattanakul, Thailand
- ❖ Tran Quoc Hung, Vietnam
- ❖ Aminuddin Mohamad, Malaysia

The support of all national institutions shown in Annex 1 is acknowledged and thanks are due to the World Agroforestry Centre (ICRAF) for taking interest and permitting two of its employees to use staff time to develop this synthesis document.

Pieter van Lierop, FAO Forestry Officer (Education), was responsible for the overall coordination of the two initial surveys and this final publication.

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## Acronyms

ACFE	<i>Advisory Commission on Forestry Education</i>
AFORNET	<i>African Forestry Research Network</i>
AFRENA	<i>Agroforestry Research Network for East and Central Africa</i>
ANAFE	<i>African Network for Agroforestry Education</i>
CIFOR	<i>Centre for International Forestry Research</i>
DFID	<i>Department for International Development</i>
FORNESSA	<i>Forestry Research Network for sub-Saharan Africa</i>
ICRAF	<i>World Agroforestry Centre</i>
IPFE	<i>International Partnership on Forestry Education</i>
IUFRO	<i>International Union of Forest Research Organizations</i>
NORAD	<i>Norwegian Agency for Development cooperation</i>
NRM	<i>Natural Resources Management</i>
NTFP	<i>Non Timber Forest Products</i>
SAP	<i>Structural Adjustment Programme</i>
SEANAFE	<i>South East Asian Network for Agroforestry Education</i>
UNDP	<i>United Nations Development Programme</i>
UNEP	<i>United Nations Environment Programme</i>

# 1 Introduction

The past decades have seen a range of international conventions and agreements taking effect, including Agenda 21, the Biodiversity Convention, the Kyoto Protocol and the Convention to Combat Desertification. They all have a strong impact on the forestry sector. Forests were once the foresters' traditional domain, but the range of forestry stakeholders is expanding fast. The scope of forestry-related activities is increasing, both inside and outside the forests. Foresters face an array of new professional challenges, and there is a perception that foresters do not, and even could not, deliver on the ever-expanding forestry agenda.

The forestry sector also reaches outside forest borders: trees are becoming increasingly important for benefits such as biodiversity conservation and use, watershed functions, carbon sequestration and for the livelihoods of millions of farmers. The forester who works only with technical aspects of growing, managing and harvesting trees within the forest domain is becoming something of the past. A 'new' forester is needed with a much wider set of skills and competencies.

Which additional competencies do foresters need? What kind of unlearning is necessary for foresters? Should forestry professionals of the future be different? The observable trend in the job market for foresters can be visualized as shown in Figure 1.

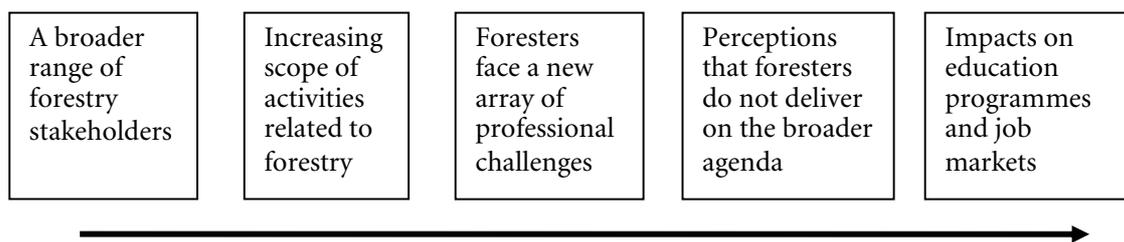


Figure 1. Foresters' professional challenges

At the country level, changes are also evident. There is pressure to devolve forest management to rural communities and local government units. Forestry departments in many countries are shrinking as a result of tight public finances or the transfer of forestry-related functions to other (often environmentally-oriented) ministries. For instance, the erstwhile forest department in Ethiopia has been reduced to just a single office in the ministry responsible for agriculture.

Employment patterns have changed too. The public sector is shrinking, affecting for example forestry extension, once a key employer of fresh graduates. The unemployment or under-employment of forestry graduates is high.

Nationally, as well as internationally, there is a declining financial support for forestry in favour of broader environment and development programmes. Poverty alleviation and improved livelihood are given more prominence and there is increasing interest in conditions outside the forests (Persson, 2003). Some donors support changes that take place in forestry institutions: introduction of social forestry, agroforestry, biodiversity, conservation and the formation of semi-autonomous forest services that are expected to function as profit-making organizations. Overall, forestry

institutions, including forestry education, face difficulties in mobilizing national and international resources.

Many forestry curricula are patchworks, because new areas of study such as biodiversity, social and community forestry, agroforestry, etc., are opportunistically added on to existing programmes without due consideration for the overall direction of forestry programmes.

In an environment of limited or declining resources for forestry education, forests in tropical developing countries are particularly vulnerable to these trends. Yet, these forests hold many of the world's biodiversity hot spots, and are valuable gene reservoirs for diversifying food, medicine and other products. Special knowledge is needed to manage the forests effectively and sustainably. The question is: are enough foresters being trained and are they being equipped with the right knowledge and skills to appreciate the growing role of forests?

Until 1997, the FAO Advisory Committee on Forestry Education (ACFE) used to monitor global trends in forestry and advise on forestry education issues. The collapse of the Committee has created an information and networking vacuum. Currently, the forestry education community lacks a joint international mechanism to guide the improvement of forestry education. Colleges and universities teaching forestry do change their programmes to keep up with new demands from society, but how well are they guided? The changes are usually *ad hoc*, as opposed to the result of conscious processes and interactions needed to produce robust forestry programmes.

FAO, in collaboration with two regional education networks, the African Network for Agroforestry Education (ANAFE) and the Southeast Asian Network for Agroforestry Education (SEANAFE) considered it necessary to initiate some work in remedying the above situation. They jointly considered it necessary to first establish the trends in forestry education and training in the ten-year period 1993-2002.

This survey, conducted through questionnaires, scrutiny of records and reports, and interviews, covered 55 universities and colleges in nine African and six Southeast Asian countries. Chapter 2 describes the study methodology further. Chapters 3 and 4 summarize the findings for Africa and Southeast Asia, respectively, in five key areas:

- ❖ Forestry enrolment and graduation 1993-2002
- ❖ Employment
- ❖ The changing role of foresters
- ❖ Resources, facilities and funding for forestry education
- ❖ Priority needs

In Chapter 5 the lessons learned and the recommendations aimed at the key target groups of this monograph are discussed: lecturers, leaders and students of universities and colleges; education policy makers in and beyond the forestry sector, including the fields of agriculture and natural resource management and a wide range of other actors in the forestry sector.

A better understanding of what is happening in the forestry education systems is just a starting point. More work is needed to articulate the forestry professional area and, in particular, to link it with social and economic development while creating synergy with all related sectors such as agriculture, environment and wildlife management. Follow-up studies are urgently needed regarding content and delivery mechanisms of forestry education. Areas such as teaching-learning approaches, the use of information and information technologies and participation of all stakeholder groups in defining forestry education needs require further analysis.

To facilitate better interpretation of the survey results, it is necessary to appreciate the education systems in use. Figure 2 captures the general sequence of formal education and how it links with forestry education. Forestry certificate holders are expected to serve as foremen (leaders of teams of workers) in forest operations. Diploma holders are sub-professional technicians, able to supervise several teams and be involved in planning operations. Increasingly, certificate and diploma holders would be expected to advise and support farmers in tree planting activities.

Degree holders are professionals, normally serving as planners and managers, responsible for all activities in a forest or several forests. Postgraduate education is not shown in the figure. An MSc normally takes two years after a first degree, and a PhD three years or more on top of an MSc degree. Understanding the distinctions in qualifications helps to identify weak areas in education planning. In the figure, solid lines show the main source of forestry students while dotted lines show limited sources.

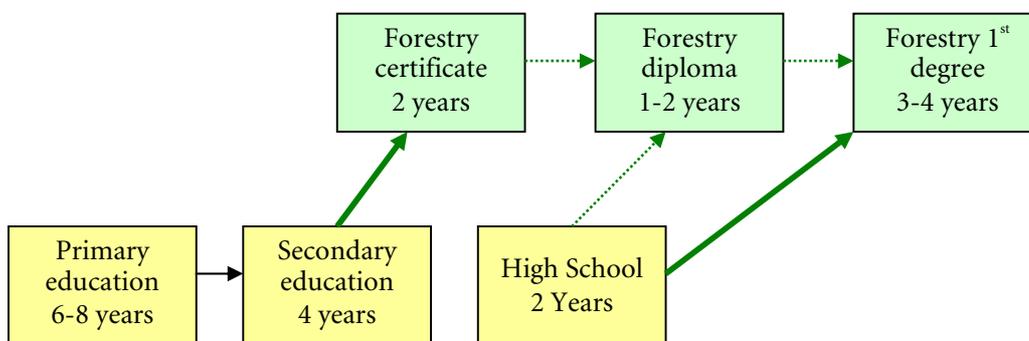


Figure 2. Flows from formal education to forestry education

## **2** Objectives and methods

The overarching objective of the surveys was to establish the trends in forestry education, in order to understand better how education systems are coping with the challenges of building human resource capacity for a changing forestry sector.

The specific objectives were to:

- ❖ Provide an overview on the number of forestry graduates in the two regions over the ten-year period 1993-2002.
- ❖ Understand the way educational institutions are responding to the changing roles of foresters, particularly through curricular development and review.
- ❖ Capture the funding environment for forestry education over the same period.
- ❖ Set and prioritize forestry education needs.
- ❖ Make appropriate recommendations.

Hopefully, the results will sensitize stakeholders to the need to undertake more extensive and deeper analyses of education and training needs, content and relevance of curricula, and forestry education delivery mechanisms.

The principal methodology used was a questionnaire survey. A sample questionnaire is included as Annex 2 to this report. For each participating country, a national coordinator was identified and made familiar with the questionnaire. Each of the participating institutions was contacted and requested to fill in the questionnaire. For Africa, respondents were requested to provide additional data available, especially in the form of reports, brochures, curricula and learning materials. Where needed, additional data and verifications were collected through interviews.

The survey targeted universities and colleges offering forestry programmes in sub-Saharan Africa and in Southeast Asia. Twenty institutions in Africa and 35 in Southeast Asia were included, representing a sample of key forestry institutions in the two regions. Initial data on institutions, available via records kept with the ANAFE and SEANAFE networks, were used to select the institutions. The list of institutions that participated in the survey is shown in Annex 1. Some institutions offered more than one forestry programme, bringing the total number of programmes sampled to 29 and 61, respectively, in Africa and Southeast Asia (Tables 1 and 2).

Data were analyzed using Excel software to facilitate easy presentation of trends by charts. The analyses were done separately for the two regions, to expose five key areas:

- ❖ Forestry graduation 1993–2002
- ❖ Employment of forestry graduates
- ❖ The changing roles of foresters
- ❖ Resources, facilities and funding
- ❖ Priority needs

It is important to note that the participating countries and institutions have large differences among them in terms of size, population, resources, history, etc. Regional averages may therefore be misleading as they could mask the huge gaps among countries. For the purpose of this analysis, specific national examples, whenever relevant, were provided.

The surveys were financially supported by the Food and Agriculture Organization of the United Nations (FAO), and implemented in December 2002 in Africa and in May and June 2003 in Southeast Asia, by the African Network for Agroforestry Education (ANAFE) the South East Asian Network for Agroforestry Education (SEANAFE), respectively.

Table 1: Institutions and programmes surveyed in Africa

Country	Number of institutions	Sample size (number of programmes)		
		Certificate/diploma	First degree	Postgraduate education
Burkina Faso	3	1	1	1
Kenya	2	1	1	0
Mali	3	1	1	2
Nigeria	2	2	2	1
South Africa	2	2	1	1
Sudan	3	0	3	1
Tanzania	2	1	1	1
Uganda	2	1	1	1
Zimbabwe	1	1	0	0
Total	20	10	11	8

Table 2: Institutions and programmes surveyed in SE Asia

Country	Number of institutions	Sample size (number of programmes)			
		Certificate	Diploma	First Degree	Postgraduate
Indonesia	11	2	5	7	3
Malaysia	3	3	0	1	2
Philippines	10	6	0	9	5
Thailand	1	0	0	1	2
Laos	5	4	1	1	0
Vietnam	5	0	1	5	3
Total	35	15	7	24	15

## 3 Forestry education trends in Africa

### Enrolment and graduation

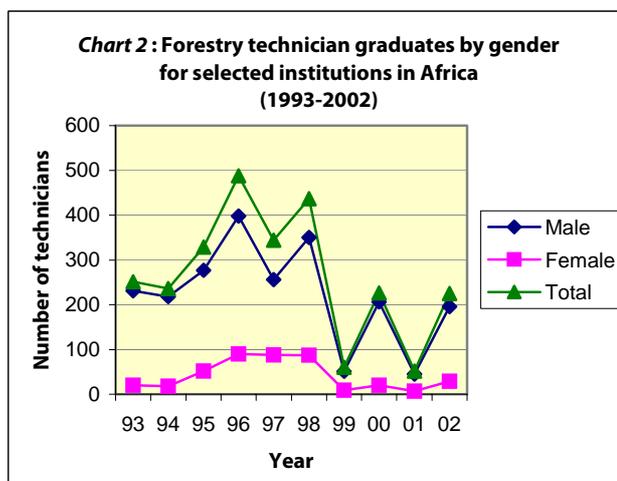
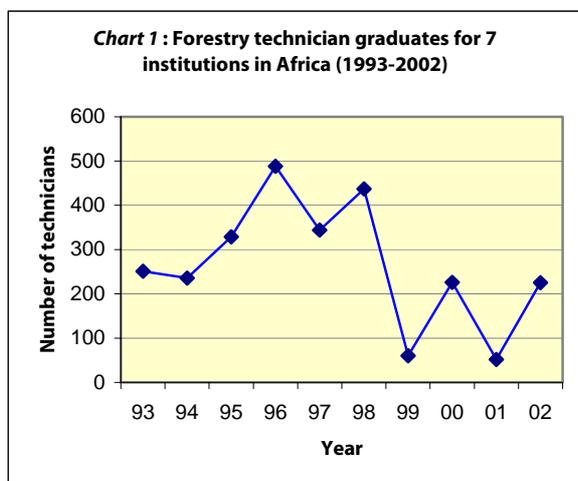
There were inordinate problems in capturing data on enrolment and relate them to graduation. The problems stem from the fact that public owned colleges and universities in Africa are opened and closed according to the level of tranquillity in civil society or the availability of funding. Where civil unrests are common, the colleges and universities often experience temporary closures or postponement of programmes, and this tends to affect enrolment as well as spawn student attrition from the programmes. In some cases, colleges close down for several years, and then they re-open and *crash manage* their programmes to adjust to funding limitations or critical personnel needs. Detailed data on these aspects were both scanty and considered politically sensitive to share outside the countries involved.

In presenting the survey results in this sub-section, the general trends in graduation are used to indicate the overall investment in human resource capacity for forestry. Special attention is given to gender analysis.

#### *Technician training (Certificate and Diploma in forestry)*

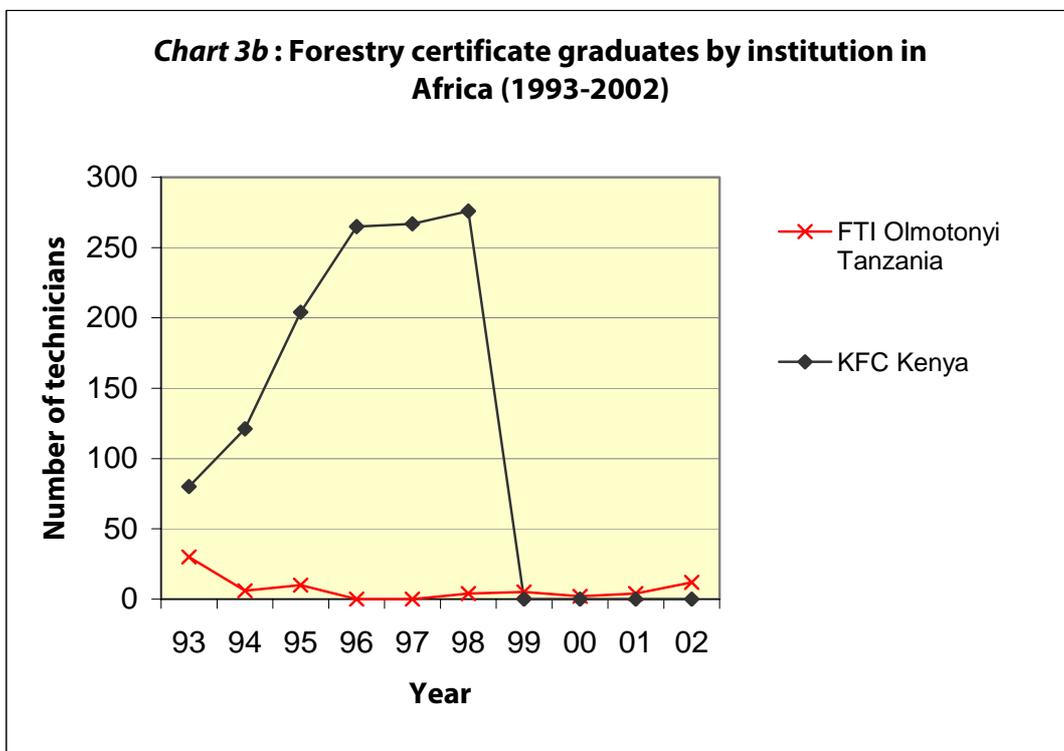
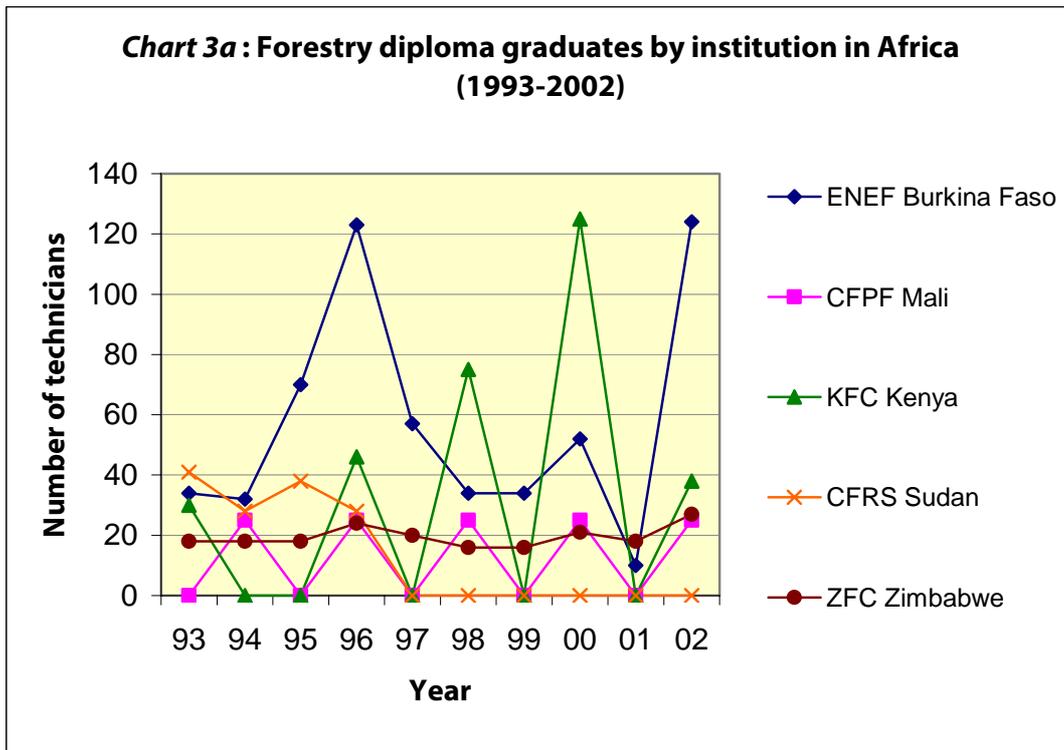
Graduation at forestry certificate level dropped drastically after 1995, mainly due to low enrolment (Charts 1 and 2) and to the closure of the certificate programmes (e.g. at Kenya Forestry College). But the technician cadre has been affected more seriously by the adoption of Structural Adjustment Programmes (SAPs) in many countries, where reduction in employment opportunities has discouraged government support for technician training in forestry and agriculture. Government actions have been either closure of certificate training programmes or drastic reductions in the number of students supported by public funds. The impact is seen directly in the quality and amount of technical services provided to forests, especially plantations. Many forest plantations are very poorly maintained, especially regarding survival, pruning, thinning and quality management of harvesting technologies and processes.

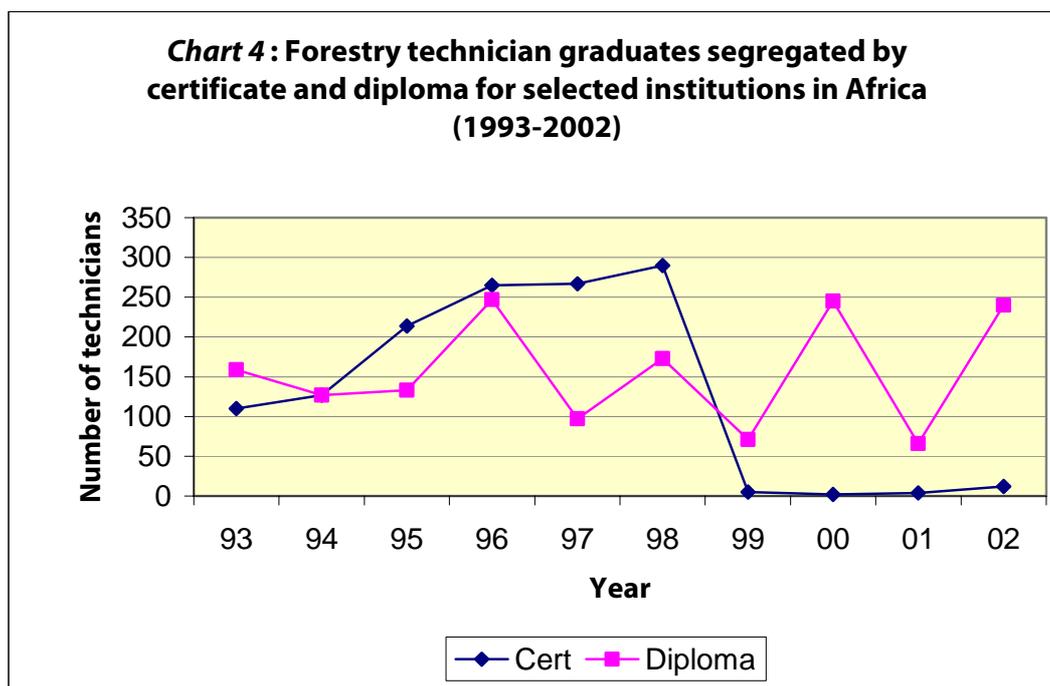
Another disturbing observation is the drop in the number of female students taking up forestry technician training. The female graduation seemed to take an upward trend starting in 1994 but suffered a serious fall from 1998 and has not been able to recover. Although the percentage of females graduating during the period did not change significantly, their number was quite small, so further reductions dealt a serious blow to efforts to attract more women into forestry. This is particularly bad news as we move towards greater participation of women in development activities, and especially tree planting by farmers. The clear conclusion from this analysis is that we are entering the third millennium with less technical capacity in forestry and drastically reduced female capacity. Yet tree planting is expected to be intensified and extended. The success of such ambitions will be strongly undermined by weaknesses in training policies and low investment in technician training.



It is very interesting to study the certificate and diploma graduations separately, as presented in Charts 3a, 3b and 4 below. In Charts 3a and 3b, the huge variations in graduation are symptomatic of inconsistencies in policies and funding of forestry technician training. They also reflect politically mediated college closures. Such interruptions discourage the best students from joining forestry programmes. They also disrupt the skilled labour supply to forestry and related industries.

From Chart 4 it is evident that since 1998, the number of certificate holders being trained is negligible. Interviewing some colleges, it became clear that, in some cases, certificate holders were registering for diploma courses to upgrade themselves for promotional reasons but, at the same time, no further enrolments were being made at certificate level. Job opportunities for certificate holders in forestry were diminishing especially in the public sector, but with no commensurate opportunities in the private sector. The long-term consequence of this is a very abnormal staff structure, with more professionals than technicians. Retrenchments and retirement of technicians is not compensated for by recruitment of young technicians. The trend has grievous consequences on sound management of forests irrespective of ownership. However, as many forests are still publicly owned, the damage may take many years to be acknowledged and repaired. Many public forests are very poorly maintained. This is also impacting adversely on forestry extension services, because technicians are the “foot soldiers” who help in disseminating proper management techniques and public policies to local communities.

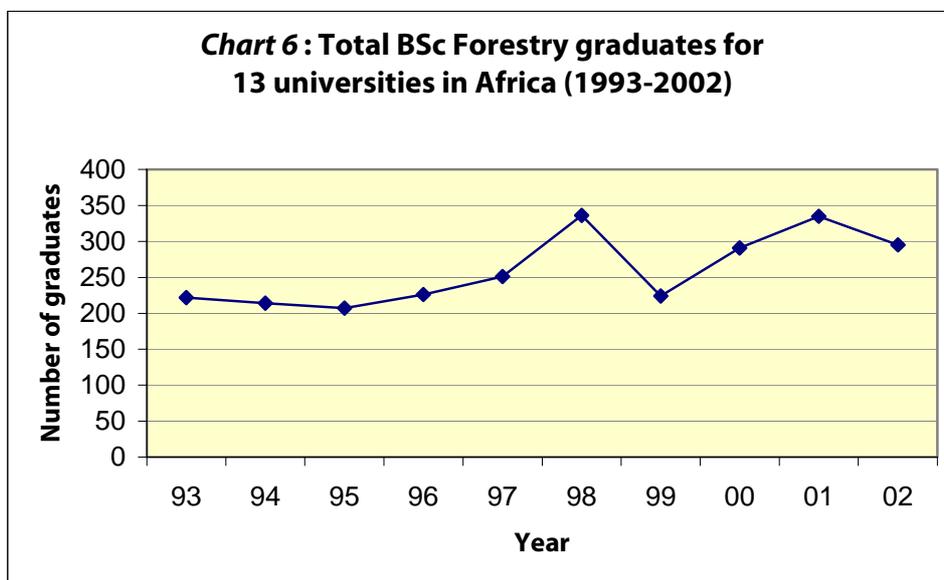
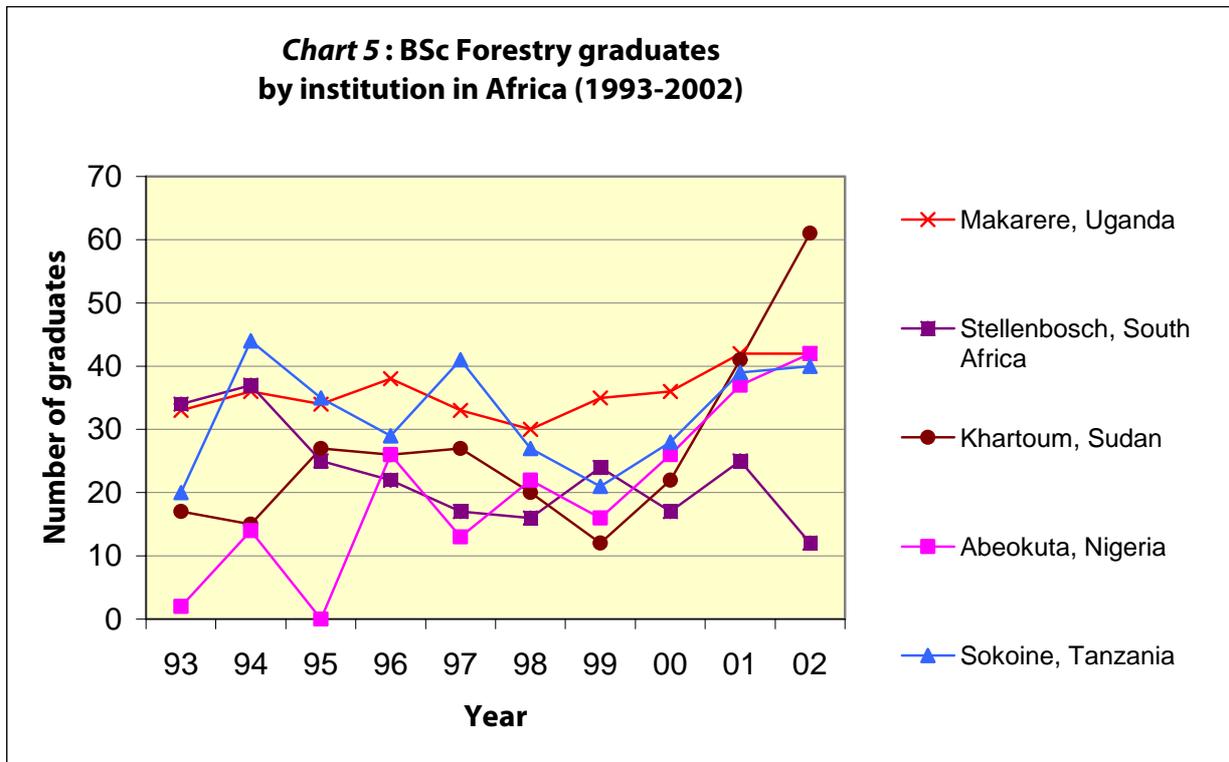




Some examples are helpful in illustrating the trends indicated above: Certificate and diploma training at the Department of Forestry (Ibadan University) commenced in 1965/66 and was phased out in 1977/78. The Kenya Forestry College phased out certificate level training in 1998 and currently it sporadically admits diploma students, with high yearly fluctuations. However, there are some encouraging examples: Nyabyeya Forestry College in Uganda has steadily maintained training for a diploma in forestry and also added on a new diploma programme in agroforestry, with an intake of 40 students per year, most of them privately sponsored. This is an excellent innovation mentored by ANAFE. The Centre de formation pratique forestier (CFPF) in Mali consistently graduated 25 diploma holders every two years during the period of 1993 to 2002. CFPF (Mali) has recently encouraged and actively promoted the admission of female students by reserving five places for women (out of 25). Zimbabwe Forestry College consistently graduated an average of 20 technicians per year from 1993 to 2002. Temu *et al.* (2003) point out and decry the trend of diminishing technical staff that is in fact the field cornerstones for forestry practices. If these trends continue, the net effect is that soon the market of forestry professionals will be flooded without a matching backup of technical level staff, and this is extremely worrying for forestry and natural resource management in sub-Saharan Africa.

#### *Professional education (BSc Forestry)*

The number of degree programmes has increased, and along with that the number of graduates (e.g. Zambia and Malawi). There is a great need for forestry graduates (from the perspective of forest management), but there is a problem of job markets. This view is true for all countries surveyed except Sudan and Nigeria. A cursory look at countries not included in the survey tends to confirm this picture, with the situation being particularly bad in West Africa. Many universities indicated that government employment opportunities for forestry graduates have been diminishing. Some graduates are able to find employment in private institutions and NGOs, but the majority end up doing non-forestry jobs. Sudan and Nigeria have for some unclear reason been able to establish several forestry schools, despite the fact that they too face a serious problem of employment of forestry graduates.



In Charts 5 and 6, graduation by institution and the overall trend are presented. The institutional presentation clearly demonstrates the uncertainty under which professional programmes are managed. It is clear, therefore, that each institution suffers from major annual variations in student numbers. This has a devastating impact on planning and implementing programmes. The overall slightly upward trend shown in Chart 6 is an outcome of several random events rather than planned, and is largely driven by five countries: Kenya, Nigeria, Sudan, Tanzania and Mali. Considering that the capital investments (staff, classrooms, laboratories, equipment, field training facilities, etc.) have already been made, there is a case here of poor utilization of educational capacity and facilities as well. A visit to some of the universities revealed that some of them are closed for part of the year, and they only run when resources become available. In one case, to reduce the number of students jamming the university (due to frequent closures) courses were offered in staggered fashion, creating enormous stress on the teaching staff and compromising quality. This practice was observed at some technical colleges as well.

Professional forestry education is quite expensive, and in all the cases in this survey the costs are borne by the public. It is therefore necessary to have a very clear human resource plan that can guide the number of students the governments should support to study forestry. For instance, Roche (1975) carried out a survey, which produced pointers to forestry professional requirements for several countries in Africa. Three of the countries (Sudan, Kenya and Tanzania) included in the Roche survey are part of this survey as well. It was obvious that the estimates by Roche had not been revised, and yet there were large increases in graduation at the professional level. Most of the graduates do not find employment in the forestry sector. For example, from just three institutions offering BSc. forestry in the Sudan, and based on average number of graduates per year, at least 590 graduates were produced in 1993-2002 compared to a projected requirement of only 164 by the year 2000. The trend is the same for Kenya and Tanzania. Note that these figures would be much higher if those graduating in the 1980s were included in the survey.

*Postgraduate education*

Only a few universities have the capacity to deliver postgraduate education in forestry, and most of them can only take in small numbers of students at a time. Some universities have 'Sandwich programmes' with advanced universities in developed countries. In addition, Africa does have opportunities to send its students to foreign universities for this level of education, although scholarships for such programmes are increasingly limited. However, the foreign programmes may have limited relevance to Africa's needs, especially if thesis research is not done in an African or tropical environment.

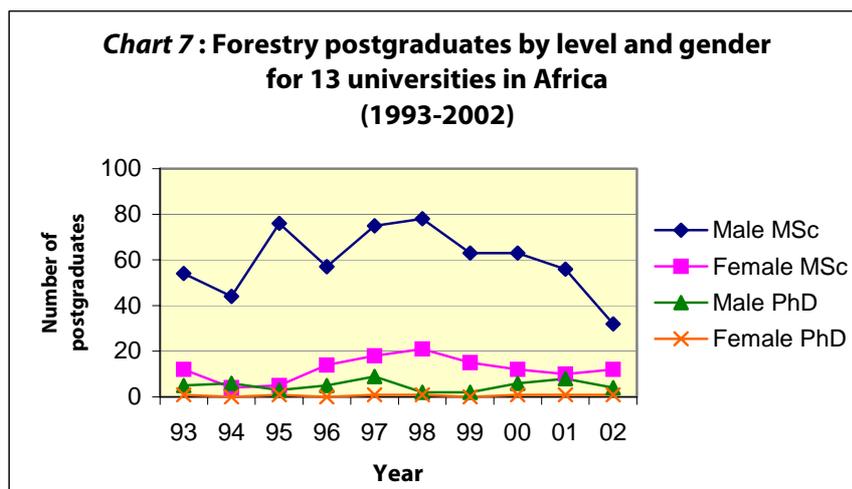
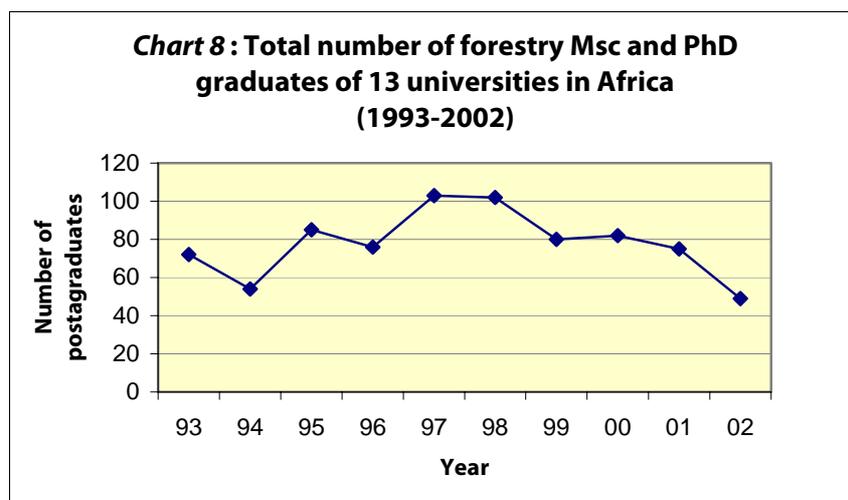


Chart 7 shows the postgraduates by level and gender. As expected, the number of MSc graduates exceeds that of PhDs. The gender balance is quite satisfactory, because it reflects a higher percentage of women than the commensurate proportion of women in the forestry sector. The relatively reasonable number of women in postgraduate education is a result of two strategies adopted by governments and donors:

- ⇒ Introduction of more social science into forestry: this has resulted in many more thesis research projects in the areas of social forestry, community forestry, gender aspects, etc; and many of them by women students; and
- ⇒ Affirmative actions in the award of scholarships: many organizations are increasingly implementing gender-balancing policies.

In Chart 8, the overall trend in postgraduate education clearly shows a dive since 1998. This is a very serious trend, given the demand for postgraduate competence in teaching and research institutions. This could explain why forest research output in Africa is weak.



### Resources and funding

In Annex 3, the responses received on the state of institutional resources (human, infrastructural and financial) are summarized. All institutions in the survey indicated that funding was intermittent, declining and largely from national resources. Donor funds are unpredictable, often depending on political environment, among other factors. It is fair to observe that despite the abundance of research money in research funding organizations, only two universities seemed to be adequately engaged with research funding organizations and reaping the benefits through graduate research.

It is important to note here that the experiences of forestry education institutions are not different from those of other educational programmes. The main differences are that forestry programmes, particularly at the professional level, are relatively young and were established in small departments in fairly large universities. Therefore, a proportional reduction of resources at university level would have more severe and visible impact on the already small forestry departments/faculties than the other disciplines.

### Job market and the changing role of foresters

Over the 1993-2002 period there have been major changes in policies and attitudes towards forestry as a whole and foresters in particular. Although a cause-effect relationship is hard to establish, it is apparent that these changes have influenced investment in forestry and subsequently in forestry education. The policy changes may be characterized as:

- ⇒ A renewed emphasis on livelihoods and agricultural production, necessitated by declining food and nutritional security. Foresters were caught unawares – not able to demonstrate how forestry is related to, and in fact part of, the food production chain.
- ⇒ Tree planting has moved very strongly from establishment of forest plantations to integration of trees on farmland, through out-grower schemes and other arrangements. This is relatively new to foresters, as their mandate stopped at the forest margin. They need to learn more about their new role and the accompanying technologies to plant trees on farmers' fields.
- ⇒ New forest policies emerged that put greater emphasis on the roles of communities in forest resource management. Again, foresters felt they were losing their control over forests, instead of developing their skills on how to assist local communities to

participate more effectively in forest management. Their inertia in all aspects of research and education in this area has cost them dearly at the professional level.

- ⇒ Several global *fora* have produced resolutions that completely overhaul the role of foresters, from that of custodians of forest resources to that of facilitators of natural resource management by stakeholders. In many of these *fora*, African foresters have been very poorly represented, at best. Educators have been particularly left out of these processes. Many curricula therefore, do not reflect the new approaches, and serving foresters have not been re-trained to understand the implications of such resolutions in their work.
- ⇒ Investment in forest industries has slackened, reducing the demand for both logging expertise (in the traditional sense) and wood technology experts.

In addition to the above changes, African foresters have not taken full advantage of the advances in information and communication technologies. Because of their remote location, forestry institutions are particularly left behind. Many curricula are old and wanting in terms of new approaches such as community forestry, biodiversity, integrated natural resources management and agroforestry.

All these changes have resulted in declining employment opportunities in government, reduced government investment in forestry teaching and research capital (staff, facilities, equipment, publications) and subsequently declining enrolment in forestry programmes. Brain drain has also occurred, with able educators and researchers finding greener pastures outside forestry or in other countries. Some NGOs and the private sector have absorbed foresters in jobs that are (generally speaking) peripheral to mainstream forestry but nonetheless relevant.

#### **Priority needs in forestry education**

According to the survey, teaching and learning in forestry should be enhanced to include the following areas (this is not an exhaustive list):

- ❖ Tree and forest systems outside forests
- ❖ Developing capacities to apply knowledge in the larger field of natural resource management
- ❖ Capacity for information synthesis and evaluating complex situations
- ❖ Recognition that forests go beyond the domain of traditional timber management
- ❖ Basic understanding of ecological processes and functioning of tropical forest ecosystems and influencing socio-economic factors
- ❖ Participatory methodologies and interactive learning skills
- ❖ Driving forces of agrarian and natural resource production systems
- ❖ Enterprise education and communication skills
- ❖ Typology of tree formations (in-and-outside forests): agroforestry, farm forestry, etc.
- ❖ Collaborative management models and institutional analysis in NRM
- ❖ Gender equity, access to and natural resource benefit sharing
- ❖ HIV/AIDS impacts on natural resource management
- ❖ Resource and land tenure regimes
- ❖ Forest certification schemes and their potential impact on productivity and profitability
- ❖ Criteria and indicators for sustainable forest management, and
- ❖ Impacts of globalization, climate change, biotechnology on forest and tree management

#### **Discussion**

The inception of forestry education in sub-Saharan Africa was largely patterned and shaped after models that were already in place in Europe and North America. Shirley (1964) sketches

evolutionary development of forestry education from early organization in a global context. Much of the literature on the subject in the 1960s (e.g. FAO, 1962, Shirley, 1964, Sisam, 1964) underpinned forestry's contribution to enhancing societal and environmental values. Forestry and foresters were seen as having a direct role in reversing the degradation of world forest resources in the face of rising human population. Forestry was seeking to aid man to live successfully and sustainably with forests. As pressure on land increases, this goal becomes progressively more difficult to achieve.

It is a paradox that the increased demands on the forestry profession, have not resulted in an increase in job opportunities for forestry graduates. Instead, the opposite has occurred. Have foresters and forestry institutions squandered opportunities by failing to respond appropriately to expanding needs? The general public and especially NGOs seem to peddle the beliefs and perceptions that foresters are only trained to work in the public sector, and are fixated to forest management for timber production. Implicit in this presumption is the belief that foresters are not willing to change and respond to emerging societal needs. Ironically, the presumption is propelled by the fact that foresters have not shown their professional leadership by organizing the emerging societal needs in forestry into definable professional areas, that is providing them with an 'institutional home'. Thus, some NGOs are increasingly taking up the tasks they consider foresters inadequately prepared to implement, and in that position they are increasingly becoming the main drivers of change.

The difficulty is probably complicated by the fact that the new concepts in land management span various traditional disciplines (e.g. land use change, soil management, animal husbandry, tree planting intensification on farms, wildlife and range management, and aspects of sociology and anthropology) that require strong communication skills and rural development perspectives. From the foregoing, the key changes needed in forestry education and practice are:

- ❖ Resetting the objectives of forestry education to jibe with social and economic development, followed by an overhaul of curricula at all levels
- ❖ Retraining of forestry educators in current trends in forestry, livelihoods and environment, as well as in modern teaching and learning methods and tools
- ❖ Running refresher courses for serving foresters
- ❖ Linking forestry education, research and practice to closely related disciplines such as agriculture, wildlife management, animal husbandry, watershed management, environment and rural development
- ❖ Correcting the imbalance between technician training and professional education by increasing the former
- ❖ An overall upgrading of forestry teaching and learning facilities.

## 4 Forestry education trends in Southeast Asia

The Southeast Asian survey was restricted to only six countries, which allowed for country-level analyses. Furthermore, each country is unique in terms of language of instruction, population and land area, which influences the human resource needs in forestry.

### Enrolment and graduation

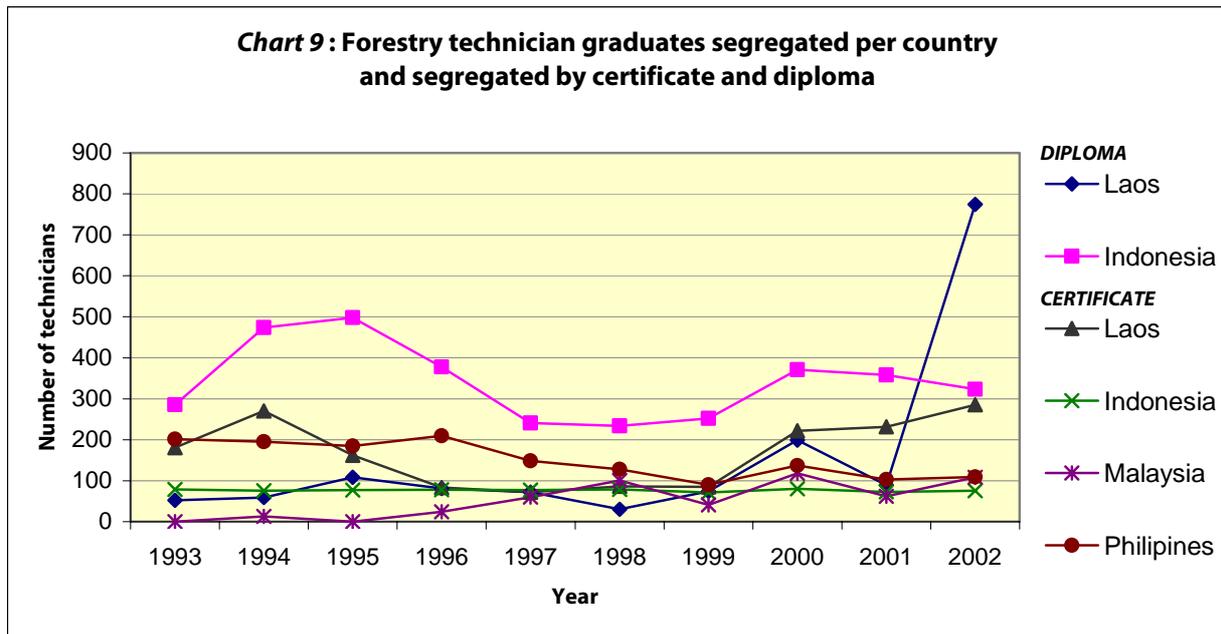
#### *Technical level*

Twenty-one certificate and diploma programmes were surveyed. Technical-level forestry education is organized differently among the countries. Some offer a certificate in forestry, others a diploma. Indonesia and Laos offer both. Thailand does not have a formal forestry programme at technical level (Chart 9). The following trends were captured:

- ❖ There is no regional pattern in Southeast Asia. The change takes different routes in different countries.
- ❖ In the Philippines, certificate graduation decreased sharply between 1993 and 2002, down from an average of 188 per year during 1993-97 to 113 during 1998-2002.
- ❖ Both certificate and diploma graduation in Laos has increased, the latter rather dramatically. The 2002 increase is explained by the output from one single institution, the National University of Laos. This, in turn, is a result of a national policy of increasing the number of students in colleges and universities.
- ❖ In Indonesia, certificate graduation remained stable, with an annual average of 77. Diploma graduation fluctuated over the period: a peak in 1994-95, followed by a decline and then again an increase in the last three years.
- ❖ Certificate graduation in Malaysia increased with the opening of new forestry programmes.
- ❖ Vietnam graduated one single batch of Forestry Diploma in 1999, after which the programme was abandoned.

#### Enrolment trends

- ❖ Enrolment in the Philippines is decreasing sharply.
- ❖ Vietnam also reported a decrease.
- ❖ There is a significant increased enrolment in Laos for both certificate and diploma.
- ❖ In Indonesia, there is a mixed picture, but most institutions reported increased enrolment.



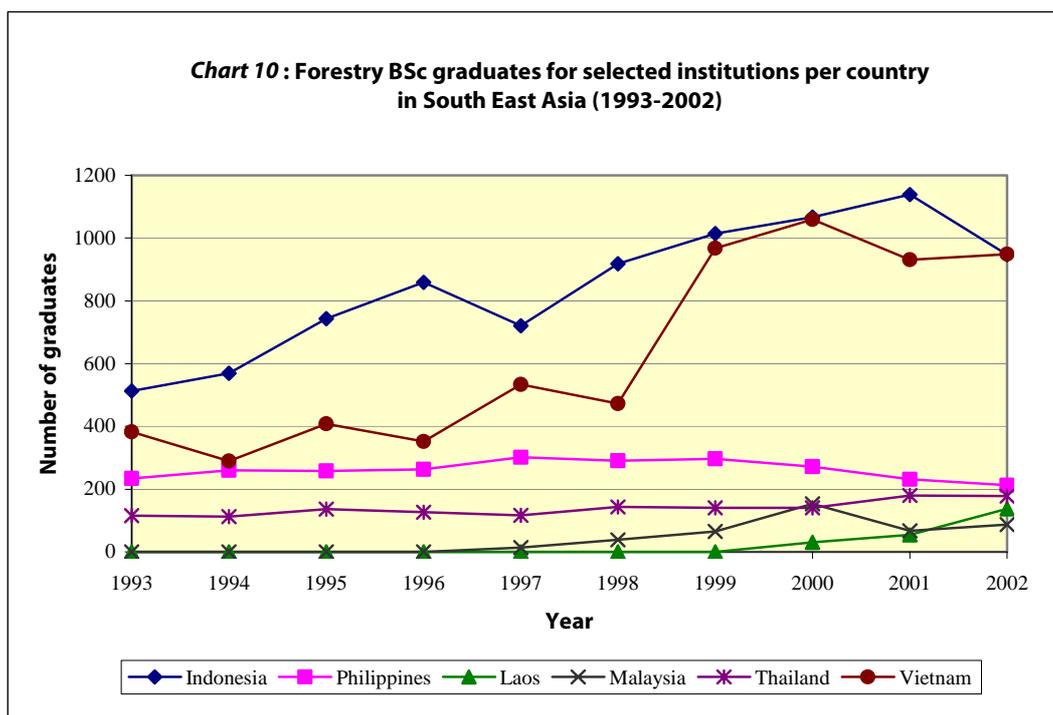
#### Professional level (BSc)

Twenty-five first-degree forestry programmes were surveyed, 17 of which were in Indonesia and the Philippines. In Thailand and Laos only one university, respectively, offers forestry education. Data for Malaysia are also based on one institution only. The following key trends in first-degree graduation were observed (Chart 10):

- ❖ The number of first-degree graduates roughly doubled between 1993 and 2002.
- ❖ All countries except the Philippines saw an increased output. Two countries, Indonesia and Vietnam, increased their annual graduation significantly.
- ❖ In Laos, the first batch of 31 BSc Forestry students graduated as recently as 2000, increasing to 137 in 2002.
- ❖ Philippines had a fairly stable output of graduates over the 10-year period, in average 262 per year.
- ❖ In Malaysia, a new programme graduated its first batch in 1997.

#### Enrolment trends

- ❖ First degree enrolment decreased in the Philippines.
- ❖ A mixed picture appeared in Indonesia. Some institutions reported decreasing or stagnant enrolment, others an increase.
- ❖ Lao PDR, Malaysia, Thailand and Vietnam all reported increased enrolment.



*Postgraduate level (MSc, PhD)*

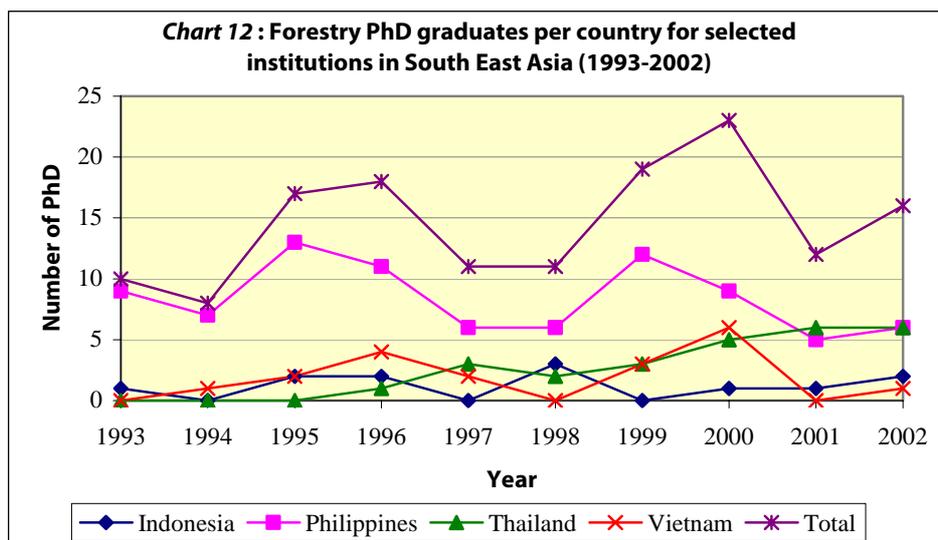
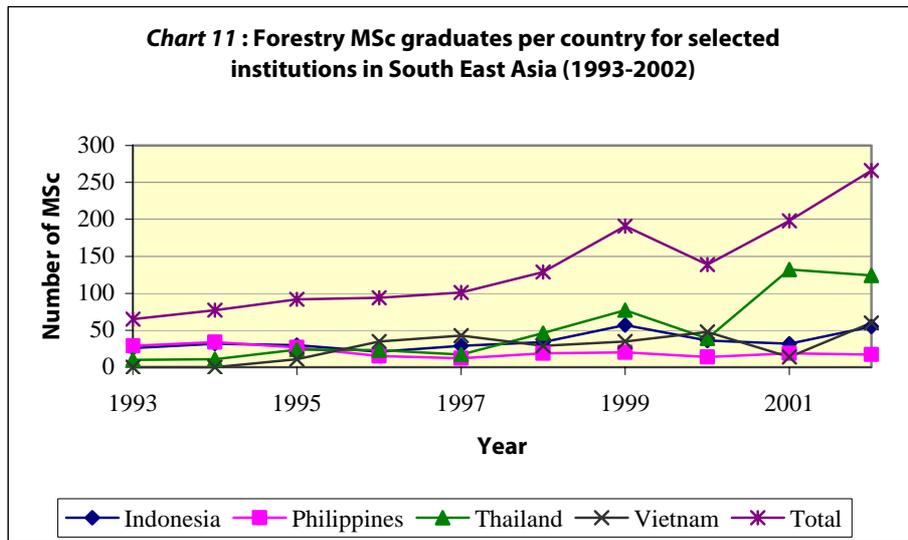
Data on MSc and PhD graduation are influenced by movement of students between countries in the region and many get their postgraduate degree overseas, making it harder to capture national trends. But a few general observations could be of interest. At MSc level the following trends were captured (Chart 11):

- ❖ MSc graduation increased by a factor of three from 1993 to 2002. All countries except the Philippines increased their output of MSc graduates
- ❖ Kasetsart University, Thailand, accounted for a large proportion of this increased MSc graduation: up from around 20 graduates per year to some 120 per year in 2001 and 2002. That is about 50 per cent of the total output among the 35 sample institutions.
- ❖ MSc and PhD in forestry are not offered in Laos
- ❖ The first MSc forestry students in Vietnam among the responding institutions graduated in 1995.

Considering the large number of BSc graduates in Indonesia and the Philippines, the number of MSc graduates in those two countries was small. In 2002, for example, Indonesia had 947 BSc and 55 MSc graduates.

Regarding PhD graduation, noteworthy observations (Chart 12) were that:

- ❖ Overall, there was an increased PhD graduation although there were big fluctuations from year to year. Only Thailand showed a clear upward trend.
- ❖ Among the sample institutions, 145 PhDs graduated from five universities during the 10-year period, 60 per cent of them in the Philippines.
- ❖ Only 12 PhD students graduated during the studied period from the Indonesian universities covered in this survey: all from one single institution. Many PhD seem to be trained outside Indonesia, but given Indonesia's very significant forestry sector and serious environmental issues, it is worrisome that few PhD students seem to be trained at the national institutions.



*Gender*

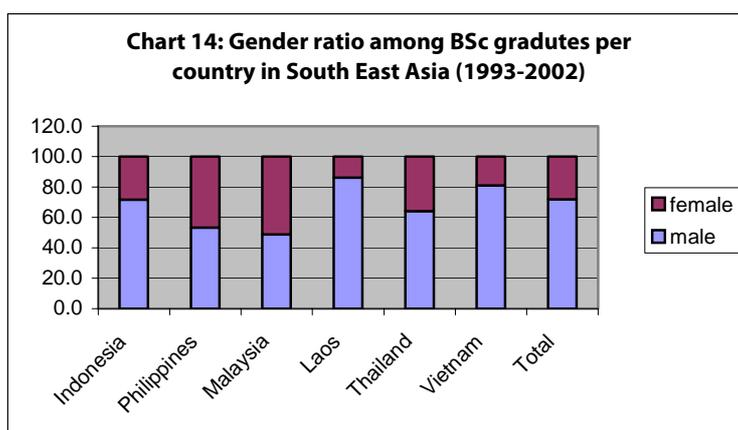
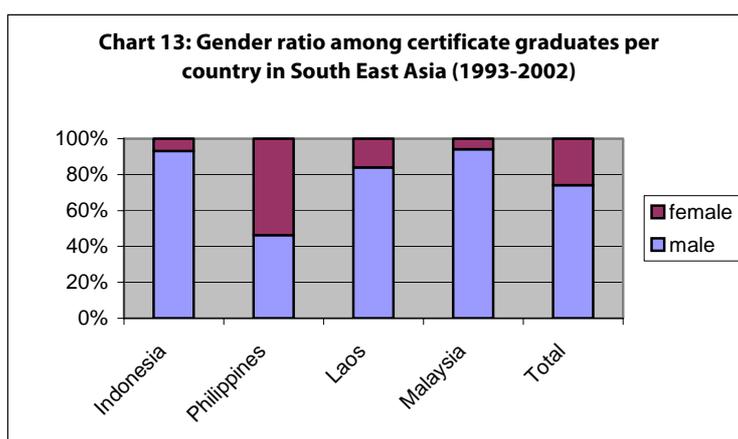
The male and female ratio of graduates varied little between the levels of education. Regionally the study showed between 21.9 per cent and 28.2 per cent of female graduates at the various levels (Table 3).

Table 3: Graduates by gender

	No of graduates 1993-2002	Male, %	Female, %
Certificate	4477	74.1	25.9
Diploma	4992	78.1	21.9
First degree	20359	71.8	28.2
Master	1352	74.5	25.5
PhD	145	77.2	22.8

However, the variation between countries was very significant. The Philippines had an almost 50/50 ratio of male and female graduates at certificate and BSc levels. Malaysia also had a fairly equal number of male and female BSc graduates. Laos and Vietnam had a low ratio of female graduates across all programmes. Charts 13 and 14 show the situation for certificate and BSc levels, respectively.

At Master and PhD levels, the differences among countries were smaller, Malaysia being the exception with an all-male MSc graduation during the sample period.



## **Employment**

The public sector is the most important employer of forestry graduates in all countries, especially in Laos and Vietnam. Traditional forestry management positions seem to dominate: ministries of forestry/natural resources; state forest companies; national agriculture and forestry extension, etc. Employment at province/district level either in local government units or in line agencies is common.

A second employment group is forest industries and enterprises, either state-owned (Vietnam) or private (Indonesia, Thailand, Malaysia, Laos).

Academic institutions - educational institutions and research centres - were mentioned as important employers in Philippines, Laos and Vietnam.

NGOs were ranked as the second most important employer in the Philippines. Also Indonesia and Vietnam reported NGO employment. Employment in national parks and natural conservation zones was reported in Vietnam. Environmental department jobs were listed in Laos and Thailand. Self-employment was only reported in the Philippines.

Although traditional jobs seem to dominate, non-traditional duties are important too: environmental positions, national parks management, community development, agroforestry, etc. In the Philippines, jobs as community organizers were frequently reported.

The education level is important for employability. For example, diploma graduates in Laos have difficulties in accessing jobs because employing agencies prefer graduates with higher education.

This survey did not capture quantitative data on employment. Tracer studies of forestry graduates are needed.

## **The changing roles of foresters**

A shift from 'traditional forestry' towards social forestry, community forestry, environmental conservation, etc., was reported in all countries. Globalization, decentralization and devolution and national reform are part of this broader picture.

All countries except Malaysia specifically mentioned the socio-economic roles of foresters, such as understanding social problems and local culture; community/upland development; facilitation, extension and work with rural communities; human dimensions in the management of natural resources and national parks.

The multiple roles of foresters were frequently mentioned: There is a change from foresters to environmentalists, from specialists to generalists. Multidisciplinary approaches are a new trend. Foresters today are expected to be able to deal with forestry, agroforestry and community development, as well as environmental issues using multidisciplinary and participatory approaches.

Other new directions in forestry education include economics and entrepreneurship, wood technology and wood industries, ecotourism, etc. Table 4 summarizes the key changes reported.

Table 4: Changes in the roles of foresters, by country

Country	Changes in the roles of foresters
Indonesia	<ul style="list-style-type: none"> <li>• From forestry conglomerates to community based forest management. Foresters must understand social and environmental problems, including local culture</li> <li>• From forest exploitation to forest conservation.</li> <li>• Economics and entrepreneurship, leadership and communication skills, and a good understanding of the code of ethics of forestry</li> <li>• Globalization, decentralization and devolution and national reform</li> </ul>
Laos	<ul style="list-style-type: none"> <li>• From logging to sustainable management and biodiversity conservation</li> <li>• From 'forester' to 'developer or extensionist' in tree plantation, forest rehabilitation and wildlife conservation</li> <li>• Ecotourism and NTFP management</li> <li>• Environmental impact assessment</li> </ul>
Malaysia	<ul style="list-style-type: none"> <li>• Towards plantations</li> <li>• Towards agroforestry</li> </ul>
Philippines	<ul style="list-style-type: none"> <li>• From foresters to environmentalists; from specialists to generalists</li> <li>• From traditional foresters to sustainable forest management specialists</li> <li>• Research and development orientation</li> <li>• Conservationist, biodiversity, natural resource experts</li> <li>• Entrepreneurship</li> <li>• Agroforestry</li> <li>• Extension, community/upland development/ rural planners</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>• Multiple uses of forests, and know-how about how to combine with agricultural components in forest areas</li> <li>• Awareness about the human dimension in the management of natural resources and national parks</li> <li>• Multidisciplinary approaches is a new trend</li> <li>• Ecotourism</li> <li>• Foresters in wood industrial sector need more knowledge about wood technology</li> </ul>
Vietnam	<ul style="list-style-type: none"> <li>• Facilitators, extensionists and work with rural communities</li> <li>• Multiple roles of foresters</li> <li>• From forestry sector to conservation and biodiversity</li> </ul>

The national studies reported that these needs have been incorporated in curricula, by offering new programmes and new courses, or by revising existing courses.

### Resources, facilities and funding

The availability of resources, facilities and funding varied greatly between countries in Southeast Asia. Institutions in Laos consistently reported inadequate resources. In contrast, Malaysia reported adequate resources in most aspects of the teaching infrastructure (Table 5).

Libraries are poorly equipped and teaching materials and books are in short supply in practically every institution surveyed. Transport facilities are inadequate too. The financial situation is dire for most forestry institutions: all countries reported inadequate national funding (no data for Malaysia). Only Vietnam reported adequate donor support to forestry education.

On a positive note, most countries have adequate teaching and support staff. Lecture rooms and communication facilities and field training sites are generally available, Laos being the prime exception.

*Table 5: Resources and funding*

	Indonesia	Laos	Malaysia	Philippines	Thailand	Vietnam
Teaching staff	***	*	***	***	***	*
Support staff	***	*	***	*	***	***
Lecture rooms	***	*	***	***	***	***
Library, teaching materials, books	*	*	*	*	*	*
Current publications	*	*	***	*	*	*
Laboratories, equipment	*	*	*	*	*	*
Teaching aids	***	*	***	*	***	*
Field training sites	***	*	*	***	***	***
Transport for staff and students	*	*	*	*	*	*
Financial supports (national)	*	*	-	*	*	*
Donor support	*	*	-	*	*	***
Communication facilities	***	*	***	***	***	*

\*\*\*=Adequate; \* = Inadequate

### Priority needs

The priority needs most frequently reported in Southeast Asian institutions were:

1. Curriculum development
2. Improvement of teaching and support staff
3. Improvement of facilities
4. Budget improvement

Priority needs by country are shown in Table 6.

Table 6: Priority needs, by country

Country	Identified priority needs
Indonesia	Needs differ among institutions and are therefore difficult to summarize. Frequently mentioned priority needs were: <ul style="list-style-type: none"> <li>• Field practicum equipment, laboratories and equipment</li> <li>• Literature (textbooks, journals)</li> <li>• Teacher training</li> <li>• Creating income-generating activities to support the academic process</li> <li>• Communication and information facilities</li> <li>• Curriculum development</li> <li>• Networking with national and international forestry departments</li> <li>• Financial support for research activities</li> </ul>
Laos	<ul style="list-style-type: none"> <li>• Upgrading of lecturers to MSc and PhD, and increase in the number of lecturers; academic exchange</li> <li>• Improve infrastructure; new buildings for classrooms</li> <li>• Computers and communication systems</li> <li>• Develop teaching materials for Certificate, BSc and Higher Diploma programmes; translation of forestry literature (books, scientific papers);</li> <li>• New library; develop library facilities</li> <li>• Improve laboratories, equipment and students' practical activities</li> <li>• Improve transport facilities</li> <li>• International support</li> </ul>
Malaysia	<ul style="list-style-type: none"> <li>• Transportation facilities</li> <li>• Hostels / accommodation facilities</li> <li>• Teaching staff</li> <li>• Laboratories</li> </ul>
Philippines	<ul style="list-style-type: none"> <li>• Additional budget for references/books and facilities</li> <li>• Links with national and international academic, research and funding institutions</li> <li>• Upgrading of teaching staff and additional faculty members</li> <li>• Transport facilities for staff and students</li> <li>• Curriculum reviews to address the paradigm shift from traditional to sustainable forestry</li> <li>• Field training sites</li> <li>• Effective and efficient instructional process and methodologies</li> <li>• Job placement for graduates</li> <li>• Strengthening research and extension capabilities and linkages with NGOs, public organizations and government organizations</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>• Curriculum development for BSc (business and marketing) and MSc level (urban forestry, wetland ecology, biotechnology, agroforestry and farm forestry). Integrated approaches and problem-oriented education needs to be emphasized</li> <li>• Staff development: giving young lecturers experience from abroad; improving their teaching process; team teaching</li> <li>• Resource person development to prepare for the new system with autonomous universities</li> <li>• Student development: to assist in organizing student activities relating to the current situation of natural resources and the environment</li> </ul>
Vietnam	<ul style="list-style-type: none"> <li>• Develop human resources, including upgrading staff to higher academic level</li> <li>• Teaching materials and equipment, including books, publications and facilities for practicum/field work</li> <li>• Curriculum development</li> <li>• Enhancing the quality of students' enrolment</li> <li>• Promote exchange and collaboration, including links with research inside and outside the country</li> </ul>

## **5** Lessons learned and recommendations

### **On technician education in Africa**

1. Governments need to review their decisions regarding support for training technicians in forestry. It is necessary in this consideration to link such a review with decisions on technician training in agriculture, so that a broader strategy for natural resources management on farm and in forestry areas can be articulated. It is considered that technician training in these areas should be integrated and coordinated to clearly define the role of agricultural and natural resource technicians in rural development, as well as natural resource conservation and utilization.
2. Considering that women contribute enormously to farming productivity in Africa, it is necessary to take a pro-active step by training more female technicians.
3. The role of NGOs and the private sector in technician training should be identified and encouraged.
4. There is a need to develop policies that will help to control the ratio of professionals to technicians to avoid the trend developing now, where the number of professionals is going to be disproportionately high.

### **On professional education in Africa**

1. Forestry education needs are not properly identified, and therefore forestry education plans are poorly articulated. Much is left to the teaching institutions to lobby with their governments and operate according to resources obtained. There is a need to improve forestry education planning. Forestry authorities, the private sector and schools of forestry should engage in a multi-partner dialogue towards this end. International institutions like FAO, CIFOR, ICRAF, UNEP and IUFRO should assist in this effort. Networks such as AFORNET, ANAFE and FORNESSA should be involved.
2. A strategic plan is needed to make better use of forestry training capacity already available in some countries. The rush to have national schools of forestry needs to be controlled. A regional and subregional approach to forestry education is essential.
3. There is a need to evaluate and help to standardize forestry curricula in Africa. There is a tremendous variation in the content and depth of coverage among the schools. There may also be a need to develop an accreditation system for forestry education. This would help to establish and maintain minimum teaching and learning standards.
4. There is a need to establish the graduate training needs, especially the requirements of research institutes, universities and colleges, the private sector and NGOs, as well as policy-making bodies. From this it would be possible to develop a strategy for meeting the needs from both regional and extra-regional resources.
5. It is necessary to monitor the content and quality of postgraduate education in Africa, with a view to improving the capacity to deliver it and opportunities for regional collaboration.

### **On forestry education in Southeast Asia**

1. The roles of foresters are changing in all countries in the region, and these changes are being incorporated in curricula, but often this is done on an *ad hoc* basis, as new areas are squeezed into an already cramped curriculum. Therefore, curriculum development remains the highest priority among surveyed institutions, and needs further support from governments, other investors and education specialists.
2. Forestry education institutions in both Africa and Southeast Asia have insufficient teaching materials and resources such as transport facilities and funding. These deficiencies affect the quality of the teaching and learning process negatively. A common example is that classroom work is replacing field-level learning. Students do not get sufficient practice in using participatory tools and methods at farm/community level. Government and donor support, as well as national, regional and international collaboration could help mitigate these problems, by providing materials, resources and supporting on-the-job training (both re-learning and de-learning).
3. In a situation where the forest cover in the region continues to decrease, all countries except the Philippines reported increasing graduation and enrolment at first degree and master degrees. There is a need to evaluate job opportunities for forestry graduates, especially given that forestry is strongly dominated by the public sector, which is facing tight fiscal realities. There are indications that unemployment and under-employment of forestry graduates is significant. There is urgent need to carry out further studies on job markets for forestry graduates, including the extent to which they enter non-traditional forestry jobs.
4. Technical level forestry education is decreasing in most countries (Laos being an exception). As in the African survey, this raises two concerns: first, about future availability of personnel for field-level work in the forestry sector; and, second, about the competence related to new job demands among those who graduate. Further studies are needed.
5. The sharply increased enrolment in higher education in Laos seriously affects education quality. It puts great pressure on already limited educational resources. The institutions are not equipped for, nor have the staff to handle, the influx of new students. Stakeholders should take note and assist the development of forestry education in Laos.
6. There seems to be an un-tapped potential to increase the presence of foresters in the non-traditional sectors of society, where competence in natural resource management is an advantage. This could be private as well as public. Such development would also help bridge a perceived gap between foresters and society at large. This survey suggested increased focus on wood processing, ecotourism and entrepreneurship, among others. Other possible non-traditional areas include the financial sector, and media and environmental impact assessment, to mention a few. Concerted efforts should be made to lobby for a broadening of the 'forestry' profession.

## **Conclusion**

The survey results provide an early warning signal of serious weaknesses in forestry education. There is a compelling need for intensive studies on, among others, the following main topics: 1) Tracer studies for forestry graduates; 2) Curriculum analysis, addressing especially the fragmentation of curricula; and 3) Delivery mechanisms, especially how contextualized learning is approached. Some studies on how forestry education deals with multidisciplinary would also be interesting because they would help to pinpoint the causes of cross-sectoral problems. These studies would best be done at regional and subregional levels, but country and institutional studies would also be necessary because, eventually, the changes have to occur at the country and institutional levels.

At the international level there is more than ever a need to exchange information, share views and monitor global trends in forestry and advice on forestry education. Many discussions are now taking place at regional and subregional levels through networks on forestry education. The recently established International Partnership for Forestry Education (IPFE) needs to be strengthened. Good cooperation between the regional and subregional networks, FAO and IPFE can fill the information and network vacuum created by the abolition of the Advisory Commission on Forestry Education (ACFE) in 1997.

## References

- FAO, 1962. Education and training of foresters. *Unasylva*, Vol. 16(1), No. 64.
- FAO, 1998. FAO Advisory Committee on Forestry Education. Proceedings of the eighteenth session. Santiago, Chile, November 1996
- FAO, 2001. Expert consultation on forestry education, 17-19 October 2001. Rabat, Morocco.
- Persson, R. 2003. Assistance to forestry. Experiences and potential for improvement. Bogor: CIFOR.
- Roche, L. 1975. The new look of African education. *Unasylva*, Vol. 27(3), No. 109.
- Shirley, H. L. 1964. Professional education in forestry. *Unasylva*, Vol. 18 (4), No. 75.
- Sisam, J. W. B. 1964. Teaching forestry and utilization. *Unasylva*, Vol. 18 (4), No. 75.
- Temu, A., Mwanje, I. & Mogotsi, K. 2003. Improving agriculture and natural resources education in Africa: a stitch in time. World Agroforestry Centre, Nairobi.

## Annex 1: Institutions surveyed

### Africa south of Sahara

#### *Burkina Faso*

Ecole nationale des eaux et forêts (ENEF)

Institut du développement rural (IDR), Université Polytechnique de Bobo Dioulasso

UFR/SVT (Sciences de la vie et de la terre), Université du Ouagadougou

#### *Kenya*

Department of Forestry, Moi University

Kenya Forestry College, Londiani

#### *Mali*

Centre de formation pratique forestier (CFPF)

Institut polytechnique rural (IPR)

#### *Nigeria*

Department of Forest Resources Management, University of Ibadan

University of Agriculture, Abeokuta

#### *South Africa*

Department of Forest Science, University of Stellenbosch

Forestry Programme, University of Natal

#### *Sudan*

College of Natural Resources and Environmental Studies, University of Juba

College of Forestry and Range Science, Sudan University of Science and Technology

Faculty of Forestry, University of Khartoum

Faculty of Forestry and Range Science, Upper Nile University

Faculty of Natural Resources and Environmental Studies, University of Kordofan

#### *Tanzania*

Faculty of Forestry and Nature Conservation, Sokoine University of Agriculture

Forest Training Institute, Olmotonyi

#### *Uganda*

Faculty of Forestry and Nature Conservation, Makerere University, Uganda

#### *Zimbabwe*

Zimbabwe Forestry College, Zimbabwe

### Southeast Asia

#### *Indonesia*

SKMA Pekanbaru, Sumatra

SKMA Kadipaten, Java

North Sumatra University

Nusa Bangsa University

Bogor Agricultural University

Padjajaran University

Winaya Mukti University

Gadjah Mada University

Lambung Mangkurat University

Tanjungpura University

Mulawarman University

*Laos PDR*

National University of Laos, Faculty of Forestry  
Northern Technical School of Forestry, Xieng Ngeun  
Southern Technical School of Forestry, Sepone  
Technical School of Forestry, Muang Mai  
Technical school of Agriculture and Forestry, Dongkhamxang

*Malaysia*

Forestry Training School, Kepong, Kuala Lumpur  
Sabah Institute of Forestry, Sandakan, Malaysia  
School of International Tropical Forestry, UMS, KK, Sabah

*Philippines*

Isabela State University (ISU)  
Benguet State University (BSU)  
Pampanga Agricultural College (PAC)  
Tarlac College of Agriculture (TCA)  
Don Mariano Marcos Memorial State University (DMMMSU)  
Mariano Marcos State University (MMSU)  
Mindanao State University (MSU)  
Leyte State University  
University of the Philippines, Los Baños (UPLB)  
University of Rizal System (URS)

*Thailand*

Kasetsart University, Faculty of Forestry, Bangkok

*Vietnam*

Xuan Mai Forestry University  
Thai Nguyen University of Agriculture and Forestry, Faculty of Forestry  
Hue University of Agriculture and Forestry, Faculty of Forestry  
Thu Duc University of Agriculture and Forestry, HCMC, Faculty of Forestry  
Tay Nguyen University, Faculty of Agriculture and Forestry

## Annex 2: Questionnaire

### SURVEY OF FORESTRY EDUCATION IN AFRICA and SOUTH EAST ASIA

This survey is jointly undertaken by ANAFE, SEANAFE and FAO. The purpose is to develop a good understanding of issues that impact on quality, volume and relevance of forestry education, so stakeholders can be sensitized appropriately. Kindly respond to all questions as best you can and return the form to the undersigned.

Name of institution \_\_\_\_\_

Address \_\_\_\_\_

Name of respondent \_\_\_\_\_

#### 1. Number of forestry graduates in the last 10 years

Year of establishment of a forestry programme \_\_\_\_\_

Acad. Year ending	Certificate		Diploma		First Degree		Masters		PhD or equiv.	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000										
2001										
2002										
Totals										

Attach any records you consider important

#### 2. Enrolment

Please indicate below whether enrolment has been increasing or decreasing, and why

Program	Change (Delete as applicable)	Reasons, explanations
Certificate	Increasing/Decreasing	
Diploma	Increasing/Decreasing	
Degree	Increasing/Decreasing	
Masters	Increasing/Decreasing	
PhD	Increasing/Decreasing	

Please add any information that may be useful in interpreting the data in this table. If necessary, attach additional documents

**3. Employment**

What organizations are the main employers of graduates in your country? Identify the 10 most important

Employer	Brief description of type of work assigned to forestry graduates (identify category e.g. certificate, first degree etc)

Comment on employment conditions

**4. The roles of foresters**

The roles of foresters have changed considerably over the last ten years. List the changes that have occurred in your country and indicate whether or not this has changed the curricula

Changes in the roles of foresters	Incorporated in curricula? Yes/No	If Yes, how? If No, why not

**5. Comments on resources, facilities and funding for the institution**

Aspect	Adequate/inadequate	Comments
Teaching staff		
Support staff		
Lecture rooms		
Library and teaching materials – Books		
Current publications		
Laboratories and lab equipment		
Teaching aids (computers, projectors etc)		
Field training sites		
Transport facilities for staff and students		
Financial support (national)		
Donor support (please qualify)		
Communication facilities (email, phone, fax)		
Other (specify)		

**6. Priority needs**

If you had the choice what are the five most important needs for the institution? Please list and explain. (table will expand automatically as text is filled in)

Identified priority needs	Explanation
1	
2	
3	
4	
5	

Date \_\_\_\_\_

Please attach any other useful information and return the filled in questionnaire to ANAFE/SEANAFE

## Annex 3: Institutional resources and funding of programmes in Africa

Name of Institution	Year Started	Resources (*** =Adequate * =Inadequate)			
		National Support	Teaching Staff	Infra-structure	Donor funding
Faculty of Natural Resources and Environmental Values, University of Kordofan, SUDAN	1990	*	*	*	Nil since 1990
Faculty of Forestry, Univ. of Khartoum, SUDAN	1975	*	*	*	Nil since 1985
College of Forestry and Range Science, Sudan Univ. of Science and Technology SUDAN	1946	*	***	*	Nil since 1990
College of Natural Resources and Environment Values, SUDAN	1977	*	*	*	Limited ANAFE
Faculty of Forestry and Range Science, Upper Nile University, SUDAN	1993	*	*	*	Nil
Centre de formation pratique forestier (CFPF), MALI	1982	*	***	*	Limited
Institut polytechnique rural (IPR), MALI	1965	*	***	*	NIL
Institut du développement rural (IDR), Burkina Faso	1973	*	*	*	Limited
Ecole nationale des eaux et forêts (ENEF), BURKINA FASO	N/A	*	*	*	Limited AFRENA
UFR/SVT (Sciences de la vie et de la terre) BURKINA FASO	1988	*	*	*	Limited Joint Res. Projects
Department of Forest Resources Management, University of Ibadan, NIGERIA	1963	*	***	Fair	Limited (Earlier FAO, UNDP)
University of Agriculture, Abeokuta, NIGERIA	1989	*	***	*	Nil
Department of Forest Science, University of Stellenbosch, SOUTH AFRICA	1932	*	*	Fair	Limited Industry
Kenya Forestry College, Londiani, KENYA	N/A	*	*	*	Nil (In past)
Department of Forestry, Moi University, KENYA	1977	*	*	*	Limited ANAFE (↑Past)
Faculty of Forestry and Nature Conservation, SUA, TANZANIA	1973	*	*	*	NORAD Ended
Forestry Training Institute, Olmotonyi Tanzania	1949	*	**	**	Intermittent
Forestry Programme, University of Natal, SOUTH AFRICA	N/A	***	***	***	Some DFID support
Faculty of Forestry and Nature Conservation, Makerere University, UGANDA	1970	*	*	*	Some NORAD
Zimbabwe Forestry College ZIMBABWE	N/A	*	*	*	Limited ANAFE

