

**Agroforestry Training at Postgraduate Level in Sub-Saharan  
Africa: Solutions to Challenges in Curriculum Delivery**

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## ACRONYMS

AAS	African Academy of Sciences
AF	Agroforestry
AHT	Africa Humid Tropics
ANAFE	African Network for Agriculture, Agroforestry and Natural Resources Education
ECA	East and Central Africa
GIS	Geographical Information Systems
HIV/AIDS	Human Immunodeficiency virus/Acquired Immunodeficiency syndrome
ICRAF	World Agroforestry Centre
ICT	Information and Communication Technologies
IDR	<i>Institut du Developpement Rural</i>
MENR	Ministry of Environment and Natural Resources
MoA	Ministry of Agriculture
MPhil	Master of Philosophy
MSc	Master of Science
NARO	National Agricultural Research Organisations
NGO	Non Governmental Organisation
NORAD	Norwegian agency for development cooperation
NRM	Natural Resources Management
PhD/DPhil	Doctor of Philosophy
SA	Southern Africa
SSA	Sub-Saharan Africa
UCAD	<i>Universite Cheick Anta Diop</i>

## EXECUTIVE SUMMARY

The African Network of Agriculture, Agroforestry and Natural Resources Education (ANAFE) in 2005, supported a survey of postgraduate programmes in Agroforestry (AF) at 21 selected universities in Sub-Saharan Africa. The objective of the survey was to assess the AF content and delivery challenges, and work out strategic solutions with the partner universities and other stakeholders. Five, seven, three and six institutions, respectively, were covered in Southern Africa, East and Central Africa, Sahel and Africa Humid Tropics. Data were collected through a questionnaire survey, analysis of available publications about the universities and interviews of education managers and lecturers. Following qualitative analysis, the general trends, lessons learned and recommendations on the way forward were drawn.

All MSc programmes offered last for 2 years. PhD programmes last 3 years. The degree programmes range from stand alone AF programmes (MSc or MPhil in AF) at six universities to AF courses incorporated into other degree programmes (for 15 universities) and AF as only a thesis research topic (four universities).

The capacity of the universities to enrol students and run AF programmes varies with an average annual enrolment of 8 students (range 2-30). The thesis research period varies from 4 to 16 months. The total number of theses written per year in the last five years has ranged from 2 to 51. Most teaching facilities such as laboratories, library, computer and Internet access, demonstration fields and access to farming communities are available to students. The overall quality of teaching was assessed as good, with a caveat regarding experience of academic staff, quality of academic materials and sufficiency of field practicum. In all the universities, there was a strong demand for improvement of learning materials. To fill the gap in lack of expertise, some Universities have started guest lecturers' programmes.

Student assessments are done through coursework, examinations, seminars, and thesis write-up. Overall, the examination process is sufficiently rigorous especially where it involves internal and external examiners as in most Anglophone universities. The topics the students have tackled have been mainly biophysical and socio-economic.

The demand for AF is rising. Students come from Ministries of Agriculture and Environment and Natural Resources, tea/coffee companies and Non-governmental organisations. The potential for expanding AF postgraduate education is good.

In the future, ANAFE should consider further support in the following areas: expanding options for experiential learning delivery method; in-depth review of curricula with the aim of establishing common standards, providing links to policy makers and research supporting institutions, supporting further training of faculty to upgrade their research skills through attachment fellowships with senior scientists at ICRAF; supporting the focus of product processing and marketing and further support to upgrade quality of and access to learning materials.

## INTRODUCTION

Since 1993, the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE) has been supporting the development and management of graduate education in Agroforestry (AF). The support has been in the form of developing curricula, training of lecturers in AF and thesis research fellowship to graduate students. Some universities have developed separate AF programmes, while others have incorporated AF into existing postgraduate programmes. A few universities have chosen to only allow thesis research in AF without any coursework in the subject-matter area. In all these arrangements, AF is growing as a science and an area of specialisation.

## OBJECTIVES OF THE EVALUATION

The major objective of the study was to assess the content of AF in postgraduate programmes offered in these institutions and evaluate its delivery. The specific objectives were to:

1. establish the current state of postgraduate AF education programmes at each institution and assess the effectiveness of its delivery
2. assess the teaching capacity and quality of teaching facilities in the institutions teaching postgraduate AF education in sub Saharan Africa.
3. document the current popularity/demand for post graduate AF programmes in order to project the future needs; and
4. make recommendations on future actions by concerned universities, ANAFE and other stakeholders.

## PROCESS

Twenty-one universities in Southern Africa (SA), East and Central Africa (ECA), Africa Humid Tropics (AHT) and Sahel having postgraduate AF and Natural Resource Management (NRM) content were selected for the study and surveyed between the beginning of July and end of August, 2005. The institutions surveyed are:

*SA:* Bunda College of Agriculture (University of Malawi); Chancellor College (University of Malawi); The University of Kwazulu-Natal, South Africa; The University of Zambia and University of Zimbabwe.

*ECA:* Egerton University, Kenya; Moi University, Kenya; Makerere University, Uganda; Kenyatta University, Kenya; Nairobi University, Kenya, Wondo Genet College of Forestry of Debu University, Ethiopia and Sokoine University in Tanzania.

*Sahel:* IDR (*Institut du Developpement Rural*) of Bobo-Dioulasso University, Burkina Faso; The UCAD (*Universite Cheikh Anta Diop*) of Dakar, Senegal and University of Niamey, Niger.

*AHT:* University of Abomey-Calavi, Benin; University of Yaoundé I, Cameroon; Federal University of Technology, Akure, Nigeria; University of Abeokuta, Nigeria; Kwame Nkrumah University of Science and Technology, Ghana; and University of Ghana, Legon.

## DATA COLLECTION

Data were collected on general information about the institution; AF curricula; teaching capacity and quality management measures; current popularity for AF and projected future needs.

The data were obtained through interviews of lecturers responsible for supervising postgraduate AF student projects; key administrators of the universities that are involved in strategic planning and policy development for the institutions and also from prospectuses and brochures. Students and potential employers of AF postgraduates were also interviewed.

## RESULTS

Results have been summarised to bring out a continental perspective and they are presented covering: 1. current state of AF post-graduate training, 2. human resource capacity, adequacy of teaching facilities and assessment and 3. objective of choosing AF, its popularity, current constraints and scope for expansion. Lessons were then distilled from these results and recommendations for the future derived.

### **Current state of Agroforestry postgraduate training**

Postgraduate education in AF is taught as MSc, MPhil and PhD programmes. Six of the surveyed universities have fully fledged MSc in AF programmes. In other universities it is taught as a subject or topic in another degree programme, i.e. MSc in NRM. In such cases, other postgraduate students in other departments within the institution like Animal Production and Agricultural Education and Extension departments are also offered AF as a taught course from the department of NRM. MPhil research is carried out in four of the universities surveyed.

The duration of the MSc programme is two years. In Sahel though, this ranges from 1-1.3 years. The research period varies between 4-16 months, with the mode being 12 months. On average 8 students per university are taken in yearly for MSc programmes while 6 PhD students are taken in those universities offering PhD programmes. Research is mostly carried out in collaboration with World Agroforestry Centre (ICRAF), Forestry Research Institutes and National Agricultural Research Organisations (NARO). The number of these completed in the last five years range from 5-51.

The curriculum contains core courses in different aspects of AF, namely: AF systems, practices and technologies; soil fertility and plant nutrition; eco-physiology and silviculture/agronomy; biometrics; AF business management; AF research methods and Tree Biotechnology. In addition, students take electives covering such topics as: Dryland AF; Community Forestry; Land Use planning and watershed management; Animal Production in AF; Tree/Crop Improvement; Gender issues in AF; AF resource management; AF education and extension and project planning and management.

Each course averages three hours of lecture and two hours of practicals per week. On average, the approach used for teaching is staff lectures (50 %). Practical work by students covers 20 %, field visits (18 %), student seminars (10 %) and guest lectures, about 2 %. Students have carried out thesis research studies on soil science, followed by tree science, social science, AF protection and lastly system analysis.

The majority of students are self-sponsored while few students get sponsorship from government ministries especially Ministry of Environment and Natural Resources (MENR) and Ministry of Agriculture (MoA). Universities have received support for post-graduate fellowships, library equipment supplies, short training courses, data analysis, curriculum development, manual preparation and field demonstration. Supporting agencies include ANAFE, Rockefeller Foundation,

Legume Research Network, Norwegian agency for development cooperation (NORAD) and the African Academy of Sciences (AAS).

### **Human resource capacity, adequacy of teaching facilities and assessment**

Agroforestry is closely associated with the Faculty of Agriculture. In addition, existing collaboration with research and development organisations enriches the programme through lectures, sharing of field facilities and supervision of field research. Few members of staff have PhD qualifications in AF. At some institutions it was noted that MSc holders were teaching and supervising AF postgraduate students.

Most teaching and learning facilities such as soil and plant laboratories, library, computer access, internet access, demonstration field and access to farming communities are available. These facilities are shared among departments and remain inadequate. Some facilities such as food analysis, germplasm laboratories and GIS facilities are virtually lacking.

Student assessment is through coursework, seminars and thesis write-up. Continuous assessment tests, assignments, projects/practical and theory examination constitute coursework assessment. Seminar assessment is through oral and written presentation plus question and answer session. Theses are assessed through written and oral defence comprising questions and answers. Students must pass their thesis defence before the degree is awarded.

### **Objectives of choosing Agroforestry, its popularity, current constraints and scope for expansion**

Agroforestry was seen generally as an important subject to finding solutions to food security in SSA and for entrepreneurship development. The demand for AF is currently overwhelming, a perspective shared by Academic staff and Employers.

Students come into AF graduate programme from the graduating students and also workers from MoA, MENR, Forestry research institutes; ICRAF; Tea companies; NGOs and private individuals. The major challenges faced include low scholarship support and limited laboratory facilities.

It was recognised that there is substantial potential for expansion of AF programmes. The main challenge is financial support which limits field visits and access to farming communities, inadequate facilities for teaching and funds for research and lack of adequate staff in the field of AF to teach postgraduate students. The current teaching and support of AF is made up of people who were not originally trained as Agroforesters. They therefore lack some basic concepts and techniques of AF teaching and application.

## **LESSONS LEARNT**

### **Current state of Agroforestry in postgraduate education programmes**

Besides the MSc training, very few of the universities were offering PhD studies. There is a need to develop AF at this level. MPhil studies were being offered in some institutions by research alone. It is felt that this is inadequate. Very few universities have developed fulltime MSc courses in AF. In the case where a Masters in AF is offered fulltime, lecturers are able to sufficiently cover AF concepts and practices. It might be important that those universities with full-fledged MSc in AF share their experiences in launching a full-fledged AF MSc programme with the other institutions in SSA. Sharing can involve the use of guest lecturers, staff exchange

programmes, sharing equipment and facilities, student exchange programmes and sharing of learning resources. These aspects need coordination.

Currently, what is missing in the postgraduate curricula is “experiential learning” with communities by students. Institutions should reach out to encompass working with communities to the extent this is possible.

Across the four regions, the numbers of students opting for AF specialised courses was still limited. This could be a reflection of University systems not adequately recognising the role AF plays in integrating land use disciplines. There is a need for more policy advocacy to promote the AF concept in the whole region.

The major focus of student thesis has been on biophysical aspects of AF technologies. Students have generally not ventured into innovative aspects of the use of AF to advance the science. Probably PhD programmes might give the students the opportunity to venture into these areas.

A number of foundations, bilateral aid agencies and International research institutions have been supporting post-graduate AF education. The enthusiasm might be indicative of the potential role these aid agencies envisage as what AF could play in agricultural development production in SSA. Funding has been directed towards scholarships, research funds and equipment. The region needed to continue working with interested donors to expand AF programmes.

### **Teaching capacity and quality management measures**

The majority of lecturers in the surveyed institutions have PhDs. While this might imply that there is adequate capacity in SSA region to handle various aspects of AF it was not clear, how many of them actually had PhDs in AF. A definite deficit however exists as many of the universities have resorted to inviting guest lecturers to help out. In some Universities though, lecturers from other departments where AF is not hosted do not participate in its teaching further worsening the staff shortage. Coordinators of AF teaching in the various institutions need to reach out to different departments to participate in the teaching of AF as well.

In some universities, lecturers with MSc qualifications were teaching postgraduate courses in AF and supervising students undertaking research at MSc level. While it is appreciated that in certain instances staff is limiting, this should only be allowed in exceptional cases where these lecturers have relevant experience.

There seems to be uniformity in thesis examination of students, involving internal and external examiners and an oral exam. This should help to maintain standards across Universities. External examiners are largely from a different country. It would therefore make more sense if the curriculum in the region is standardised. Qualifications obtaining will therefore have a regional and international acceptance.

Most of the institutions have satisfactory soil and plant analysis laboratories. Germplasm laboratories and Food analysis laboratories need revamping. A few of the institutions are quite advanced though and possess such facilities as mist tunnels, greenhouses, tissue culture, plant protection and general analytical laboratories. This is an area where if a database is compiled of facilities available at institutions in the region, would leverage use of the resources available regionally.

While library facilities are available, students should be enabled to access current literature through e-journals. There is a need to boost computer and internet access and availability of relevant literature by students.

Demonstration fields are available and farming communities are within reach of most of these institutions. Conditions are therefore favourable for the conduct of

reasonable research. Research has however, concentrated on the biophysical and socio-economic aspects with very little being done on AF tree product development and marketing. In the latter cases, food processing industries, for example dairy processing and marketing, juice making, jam making, hotel industry, and those offering AF utilities such as therapeutics and pharmaceutical products can contribute as guest lecturers to enrich the students learning experience.

### **Current popularity/demand for Agroforestry programmes and projected future needs**

The demand for postgraduate AF training is there and should continue to be so into the future. The employers felt that they needed a graduate with a holistic view of issues rather than one who is too academic particularly for the NGO sector. However, the demand was also high in research and extension systems, where opportunities existed for students with MSc qualifications to tackle research in AF.

The academic staff were generally agreed that the important issue in Africa is to find solutions to food security. AF training provided students with this view. The students valued the importance of fruit processing and the potential it created for establishing enterprises.

In terms of challenges for the development of AF, the academics cited lack of scholarships and the general slow adoption of the technology as hindrances. Equipment was limited and there was massive internal and external brain drain. Potential employers felt that the major challenge was to have AF featuring in the national policy framework.

### **RECOMMENDATIONS FOR FUTURE ACTION**

The recommendations for future action for SSA included the following:

1. The general feeling was that we should be going through a taught component of the MSc programme. For institutions offering MPhil by research only, students needed to take taught MSc courses particularly in Biostatistics.
2. There was a general need to offer staff development fellowships to students to pursue PhD studies in specific areas of AF and mechanisms should be put in place on how to retain the trained personnel in the Universities.
3. The student-based “experiential learning” method is ideal and Institutions needed to explore ways of integrating this methodology.
4. Curriculum review was important periodically to ensure that what was being taught remained relevant and there was a need for a regional standard.
5. Students needed to tackle other innovative research topics including: AF tree product development and marketing; Organic farming; Carbon sequestration and use of AF species in remedying heavy metal and pesticide pollution.
6. There was a need to raise the national profile of AF through effecting policy changes to appreciate AF benefits.
7. Policies needed to be drawn on appropriate qualifications for staff to handle MSc studies. Exceptional cases can be handled on merit.
8. Efforts should be made to explore the contribution of Information and communication technology (ICT) in supporting higher AF and natural resource sciences education in developing countries.
9. There is a need to develop a database on resources available in the different institutions to enable leveraging on limiting resources.