ANNOUNCEMENT: FOUR PHD SCHOLARSHIPS ON COFFEE AGROFORESTRY IN UGANDA

Climate changes – higher temperatures, droughts and changes in rainfall patterns - are threatening the lives of coffee communities across the globe, including in Uganda. The use of agroforestry (AF) practices, i.e. planting of shade trees on coffee farms, is a nature-based strategy against climate change. However, despite the widely known benefits of AF, only a small share of the world's coffee production comes from this kind of shaded production systems. Why is this? This paradox is central in the research project "The Agroforestry Paradox - Climate Clever Coffee" (APCCO), which looks to uncover the biophysical interactions, local ecological knowledge and socioeconomics behind on-farm decisions relating to coffee-AFS and climate change. The project focuses on Robusta coffee, which is the commercially most important coffee species in Uganda, but has been partly neglected in coffee research.

The APCCO project is financed by Danish International Development Agency (DANIDA) and comprises a strong group of partners, incl. Makerere University (MAK)-Uganda, the University of Copenhagen, National Coffee Research Institute Uganda (NaCORI), Mukono Zonal Agricultural Research and Development Institute (MuZARD), CURAD Incubator, Peter Larsen Kaffe, NewForsight, and Regen Farmer. Through interdisciplinary efforts, APCCO will collect data among coffee farmers and on coffee farms, and funnel new knowledge into digitalized farm simulators (so-called 'digital twins') of local coffee AF systems. These digital tools enable the modelling of different scenarios for agroforestry development specific to the Ugandan environment. Ecosystems services, such as carbon sequestration and production of coffee and tree crops, will also be modelled, optimized and used to fine-tune current AF practices. Supplemented with assessments of farmers' livelihoods, we aim to document and improve the living income of farmers. Using a 'living lab', where actors in the Uganda coffee sector will co-create and test new business models, APCCO will also develop integrated business models for coffee and ecosystem services.

As part of the capacity-building component, the APCCO project hereby announces four attractive PhD scholarships for Ugandan nationals. The students will be enrolled at Makerere University, Uganda, with co-supervision, study stays and possibly co-enrolment at University of Copenhagen, Denmark. The students will work in close collaboration with a team of national and international experts, and will have the opportunity to engage in dialogue with central actors in the coffee research and business networks in Uganda and internationally.

RESEARCH TOPIC 1: AGRONOMY AND ECO-PHYSIOLOGY OF COFFEE AGROFORESTRY SYSTEMS
As shade is one of the most variable features of a coffee AF system, the PhD project will investigate how the quantity and quality of shade in UG coffee AFS affects the coffee plant. Research objectives will be centered around coffee crop – shade tree interactions including agronomic and eco-physiological themes such as microclimate environments, effects on nutrient balances, crop resistance to climatic hazards, such as drought, increased temperatures, and pest and disease severity. The research will be carried out on farms located in several of Uganda's robusta coffee regions, including measurements in farmers' fields as well as on trials set up in controlled environments on station. A broad range of techniques will be applied, including assessments of microclimate, coffee physiology, agronomic performance, occurrence of biotic stressors, and carbon sequestration.

The PhD study will address the following questions:
1. How does shade affect the physiology and agronomy of robusta coffee?
2. Does shade compensate for negative effects of drought on robusta coffee?
3. Do shade tree species vary in their impact on robusta coffee?

The successful candidate will have an MSc in Agroforestry, Biology, Agricultural or Environmental sciences, or similar fields from a recognized university. Robust research (including statistics) and scientific writing skills are required. Knowledge about plant physiology is an advantage, especially if coupled with previous experience in plant measurements such as photosynthesis, water-use, or tree anatomy. The successful candidate should be willing to spend extended time in the field, conducting critical plant measurements.

RESEARCH TOPIC 2: FARMERS' ADOPTION AND KNOWLEDGE OF COFFEE AGROFORESTRY SYSTEMS

The PhD project aims at understanding farmers' adoption of coffee AF systems, their management practices and knowledge of shade trees, and the socio-economic importance of ecosystem services from coffee AF.

The PhD study will address the following questions:
1. How diverse are Ugandan Robusta (AF) coffee smallholder farms in terms of shade tree species?
2. What are the cultural and socio-economic reasons for (non)adoption of Robusta AF systems, including perceived ecosystem services and disservices of shade trees?
3. What are the management practices under the Robusta coffee AFS?
4. How do shade trees contribute to the household economy (income, food security, social and cultural, and environmental benefits)?

The successful candidate will have an MSc/MA/MBA in ethnobotany, (agro)forestry, agricultural development, environmental anthropology, or similar fields from a recognized university. Good qualitative and quantitative research and scientific writing skills are required. Knowledge about the Q-methodology is an advantage. Previous experience in on-farm tree inventory and species identification methods and computation of tree diversity indices is desired. The successful candidate should be willing to spend time in the field, doing plant inventories and interviewing farmers.

RESEARCH TOPIC 3: DIGITAL TOOLS FOR MODELLING AND SUPPORTING COFFEE AGROFORESTRY SYSTEMS

The PhD project will assess the use of digital tools in the design and adoption of hyper-local Agroforestry Systems (AFSs) and living income gap in Uganda. This involves assessment of process-based models concerning feasibility, data availability and accuracy requirements for modelling Robusta AFSs. The most suitable models will be calibrated with data on system performance and integrated with Regen Farmers agroforestry software, creating 'Digital twins' in collaboration with local agricultural extensionists and farmers. The most favourable AF transition scenarios will be selected for implementation. A novel living income (LI) methodology will be used to create new insights on AFS' role in living income gap closure.

The PhD student will address the following questions:
1. To what extent can existing biophysical models for ecological and economic modelling be calibrated to accurately model Robusta AFS in Uganda?
2. How can hyper-local, scenario-based digital support tools increase AFS adoption?
3. How can Robusta FS/AFS be designed (using the model) to enhance farmers' ability to earn a living income?
4. What are the potentials of ecosystem services-based Robusta AF farming on living income gap reductions (scenario-based modelling)?

The successful PhD candidate will have an MSc in Computer Science, Biostatistics,

Agroforestry, Forestry/Community Forestry, Agriculture and/or Environmental Science with practical comprehensive knowledge on modelling and quantitative data collection techniques, and experience with research in the field of Agricultural Extension and Digital Technologies.

RESEARCH Topic 4: FARMERS AND COFFEE ECOSYSTEM BASED BUSINESS MODELS

This PhD project aims at understanding farmers' adoption decisions as well as their willingness to engage in ecosystem service-based business models. The project also aims to map and analyze the coffee business ecosystem and investigate down-stream value chain actors' perceptions of new ecosystem service-based business models' feasibility and viability. Based on this knowledge, learning labs will be used to co-design new business models together with value chain actors.

The PhD student will address the following questions:
1. Which specific demand-side and local supply-side conditions need to be considered in the design of integrated AF-based coffee business models?
2. Which types of local support/services are needed to introduce, scale and sustain a climate-smart coffee business model in UG?
3. How can innovative market platforms and agribusiness incubators support and drive implementation of ecosystem service-based (e.g., carbon) coffee business models?

The successful candidate should have an MSc/MA/MBA in agriculture or agroforestry, agribusiness, anthropology, rural/community development, business administration, entrepreneurship, innovation management, marketing or similar fields from a recognized university. Good qualitative and quantitative research and scientific writing skills are required. Previous experience with scientific work, innovation management, coffee production and/or the coffee sector is an advantage.

ASSESSMENT OF CANDIDATES:

The assessment committee will be composed of the supervisory team for this study, including representatives of Makerere University; University of Copenhagen, and possibly other participating organizations. Based on applicants' qualifications as outlined in the application, a number of applicants will be shortlisted and invited for a written test with subsequent interviews. Interviews are expected to take place from **31st July, 2023 – 4th August, 2023** after which applicants will be informed of the outcome of their application.

Key criteria for the assessment of candidates include a master's degree related to the subject area of the project, the grade point average achieved, professional qualifications relevant to the PhD programme, previous publications, relevant work experience, other professional activities, language skills and interpersonal skills.

After recruitment, the candidate will follow a procedure of formal enrolment at Makerere University and potentially a double-enrolment at University of Copenhagen. A part of this is to prepare a final PhD project description in collaboration with the supervisory team and a selected doctoral committee as a requirement of Directorate of Graduate Training and Research, Makerere University.

PhD Scholarship DESCRIPTION

Your key tasks as a PhD fellow will be to manage and carry through your research project, complete relevant PhD courses, write scientific articles as part of the PhD thesis, participate in project meetings,

and teach and disseminate your research. The PhD fellow will also complete two research stays at the University of Copenhagen.

The following experiences and skills will be an added advantage:

- Familiarity with Ugandan farming systems.
- Scientific publications within climate smart agricultural technologies or related subjects.
- Have an analytical and academic approach to research questions.
- Have good collaborative/social skills.
- Have a keen interest in spending prolonged work periods.

APPLICATION

The following documents must be attached to the application (in English):

1. A motivational letter
2. A concept note describing your proposed research activities of the PhD study (1 page).
3. A full CV including references
4. Copies of Exam certificates with exam results (certified copies of academic certificates and transcripts)
5. Copies of any scientific publications

- Applicants are invited to send their applications as one combined pdf file by email to Dr. Jenipher Bisikwa using email: bisikwa@gmail.com; jenipher.bisikwa@mak.ac.ug with a copy to Ms Monica Kigambo; monicakigambo@gmail.com; Department of Agricultural Production, College of Agricultural and Environmental Sciences (CAES), Makerere University. PO Box 7062, Kampala Uganda.
- All applications should be delivered by **30th June, 2023** to the above email addresses.
- Applicants invited for an interview are expected to present original certificates and transcripts.

FOR MORE INFORMATION:

- For more information regarding the APCCO project, please visit: http://drp.dfcentre.com/project/the-agroforestry-paradox-climate-clever-coffee-apcco/ or contact Dr. Jenipher Bisikwa using email: bisikwa@gmail.com or Phone: +256 782 682334; +256 700 884107 (WhatsApp). Information regarding PhD programs at Makerere University is available at: [http://caes.mak.ac.ug/].