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Implementation and accomplishment of the MSc Agrometeorology and Natural Risk Management Program at Harmaya University, Ethiopia

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Abstract

Africa is the most vulnerable region to climate change/variability/hazards. More than ever, improved understanding of early warning systems including weather and climate prediction and initiatives highlighting the effects of global warming are important educational priorities. In view of this, Haramaya University in collaboration with key stakeholders under the auspices of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) designed a unique academic program intended to offer a Masters of Science in Agrometeorology and Natural Risk management (AMNRM) . The first cohort of students (eleven) have been enrolled, five and six regional and national students, respectively in October 2013. The fact that the program attracted foreign students to be part of the first cohort is testimony for its relevance and well sought program. The curriculum was deemed relevant by several stakeholders including the Intra-ACP Mobility Programs which elected the course to be part of a regional programe that is promoting mobility of students. The focus of this maiden MSc program is to develop and strengthen the regional human resources and institutional capacity in impact-oriented training and research in AGMNRM as an entry point towards food self-sufficiency through sustainable use of resources and management of climatic and non-climatic hazards or risks in the Eastern, Central and Southern Africa region. The development and delivery of the program has been strategically implemented through stakeholder analysis, curriculum development, approval by the university Senate and rigorous selection process and enrollment. The expertise to facilitate student training and research is drawn from the region. The first group of students has so far been exposed to intensive theoretical and practical field and laboratory studies during the first year and thesis research work in the second year of the study program. It is anticipated the knowledge and skill that students in this study program gain will undoubtedly benefit them to be able to analyse and interpret climatic and natural risk based information and subsequently build regional and national capacity to champion processes of designing innovative solutions towards solving (and/or mitigating) problems related to climate change and natural risks.

Key words: Climate change, drought, food security, green economy, natural hazard

Résumé

L'Afrique est la région la plus vulnérable aux changements climatiques, à la variabilité et aux risques. Plus que jamais, une meilleure compréhension des systèmes d'alerte précoce, y compris les prévisions météorologiques et climatiques et les initiatives mettant en évidence les effets du réchauffement climatique sont des priorités éducatives importantes. Dans cette perspective, l'Université Haramaya en collaboration avec les principales parties prenantes, sous les auspices du Forum des Universités Régionales pour le Renforcement des Capacités dans l'Agriculture (RUFORUM) a conçu un programme d'enseignement unique, destiné à offrir une maîtrise ès sciences en agro-météorologie et à la gestion des risques naturels (AMNRM). La première cohorte d'étudiants (onze) ont été inscrits, cinq et six étudiants régionaux et nationaux, respectivement en Octobre 2013. Le fait que le programme a attiré des étudiants étrangers de faire partie de la première équipe est un témoignage de sa pertinence et de son programme très recherché. Le programme a été jugé pertinent par plusieurs intervenants, y compris les Programmes de Mobilité Intra-ACP qui ont choisi le cours, pour en faire une partie d'un programme régional qui encourage la mobilité des étudiants. L'objectif de ce programme de maîtrise de jeune fille est de développer et de renforcer les ressources humaines régionales et les capacités institutionnelles en matière de formation et de recherche orientée vers l'impact dans AGMNRM comme un point d'entrée vers l'autosuffisance alimentaire grâce à l'utilisation durable des ressources et de la gestion des conditions climatiques et non climatiques, des dangers et des risques dans les régions de l'Afrique centrale, orientale et australe. Le développement et l'exécution du programme a été mis en œuvre stratégiquement à travers l'analyse des parties prenantes, l'élaboration des programmes, l'approbation par le Sénat universitaire et un processus rigoureux de la sélection et d'inscription. L'expertise pour faciliter la formation et de la recherche étudiant est tiré de la région. Le premier groupe d'étudiants a jusqu'ici été exposé à des études de terrain théoriques et pratiques intensives et de laboratoire au cours de la première année, et les travaux de recherche de thèse dans la deuxième année du programme d'études. Il est prévu que la connaissance et les compétences que les étudiants vont gagner dans ce programme d'études seront sans doute à leurs bénéfices, et seront en mesure d'analyser et d'interpréter l'information fondée sur les risques climatiques et naturelles et par la suite de renforcer les capacités régionales et nationales aux maitrise des processus de la conception de solutions innovantes pour résoudre (et / ou atténuantes) les problèmes liés au changement climatique et aux risques naturels.

Mots clés: changement climatique, la sécheresse, la sécurité alimentaire, l'économie verte, les risques naturels

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Background and justification

Africa is the most vulnerable region to climate change/variability/hazards. The extreme poverty of many of its citizens coupled with frequent natural disasters such as drought and floods, and the high dependence on rainfall based agriculture (more than 95% of the continent's agriculture being rain-fed) makes Africa the most vulnerable continent for such climatic condition (IPCC, 2001). Particularly, the arid and semi arid regions that cover 13 million km^2

or 43% of the continent's land area and where 270 million people (40% of the continent's population) live UNDP,2007 (UNDP, 1997) are the most vulnerable areas.

It is clear that Africa is the continent which contributes least to global emissions of greenhouse gases and yet it is the most vulnerable to its effects, particularly due to its high dependence on rain-fed agriculture, widespread poverty and weak capacity (APFSU, 2007; Eriksen *et al*., 2008). The effects of climate change, such as reduced agricultural production, worsening food security, increased flooding and drought, spreading diseases and an increased risk of conflict over scarce and degraded land and water resources are already evident. It is, therefore, essential for the communities in Africa to prepare themselves for coping with or, adapting to such adverse impacts and to ensure that such coping mechanisms and adaptation measures and policies are built-in to their existing national and sectoral development activities. The focus of efforts in Africa now should be geared towards mainstreaming adaptation in national planning and marshalling supports for climate and other natural risk management strategies.

It is evident that farming particularly rain-fed one is a very weather sensitive occupation and where the agricultural system has enough flexibility, the agricultural industry can be highly responsive to weather and climate variables. In relatively low external input agriculture, which is the case for most African nations, farm management strategy has to be adapted to what climate, soil and topology allow. Microclimate and topoclimate management and manipulation, within the farming system selected - be it often with limited options - is part of that management strategy. Traditional as well as scientific knowledge on these matters are in high demand for successful farm operations (Olufayo *et al.*, 1998).

More than ever, improved understanding of early warning systems including weather and climate prediction and initiatives highlighting the effects of global warming are important educational priorities. In view of this strengthening Agrometeorology and Natural Risk Management is critical under the conditions of the increasing trend of climate hazards, variability and change. It has much to contribute to sustainable solutions for the serious problems encountered in agricultural production and environmental protection in Ethiopia in particular and Africa in general. Capacity building in Agrometeorology and NRM training and research in Africa must grow jointly with a general increase of the application of physical sciences to agriculture and to the environment. Thus, building capacity for Agrometeorology and Natural Risk Management (AMNRM) in the Ethiopian and African context will aid efforts to address the emerging challenges of climate change and variability and other natural risks. Unless this knowledge is combined with other pertinent sustainable land management scenarios, as well as operational agrometeorological information, the future of African agriculture will be bleak Cognizant of this and as parts of its mandate, Haramaya University (HU), as one of the pioneer Agricultural Universities, had taken the initiatives and developed curriculum for MSc program in AMNRM and has officially launched this regional program in October 2013.

Strategies used to develop the MSc. AGNRM Program

An inception workshop was conducted at Haramaya University in April 2011 to create awareness to the academic and teaching staff on climate variability and change challenging agricultural productivity and food security and the need to develop curriculum to launch MSc. program in Agrometeorology and Natural Risk Management. Haramaya University officials and various professionals/experts from different Colleges/Schools/Departments in the University were invited to participate and contribute to the best of their capacity towards developing the MSc curriculum in AMNRM Program. A total of 35 professionals of diverse fields have participated in the workshop, In this workshop it was noted that currently there are changes of concern triggered by anthropogenic activities-affecting our environment and impacting on the use of the natural resources. These changes caused land-use/ land cover changes which results in environmental change and subsequently decline in agricultural productivity. Furthermore, these phenomena have caused serious threat on the land and carbon budget of the earth. Most participants remarked that they witness provoking changes that negatively affected sustainable agriculture and natural resources and said that day-to-day activities are highly influenced by the changes that have occurred over time and space. Acoordingly, it was stressed that Africa is the prime concern in this regard where crop production and security of settlements have been affected with less and less production. According to the participants, improved technologies are required to tackle the problems of changes in the environment (land system)., Thus, the presence of professionals in Agrometeorology and Natural Risk Management is very crucial and this is the principal reason for initiating to launch the MSc AMNRM program. The participants were invited to suggest courses to be offered in this program and in-depth deliberations were made on the modalities of curriculum development in view of regional and national context,

Cognizant of this, the School of Natural Resources Management and Environmental Sciences in collaboration with the School of Graduate Studies of Haramaya University conducted a needs assessment study within Ethiopia to develop curriculum and launch MSc AMNRM Program, Information was gatherd using semi-structured questionnaire, focus group discussion,and key stakeholder's interview from federal ministries, regional bureaus and offices, higher learning and research institutions, nongovernment organizations and professional associations. According to the needs assment study and stakeholder's analysis 100 per cent of the respondants and stake holders supported the development of need oriented curriculum and launching of the MSc AMNRM Program. They pointed out that currently there is acute shortage of professionals and skilled human resource to tackle issues related to climate and climate variability and natural risks experienced in Ethiopia and elsewhere in the region.

The out come of the needs assessment and stakeholders analysis was further strengthened through two regional workshops organized by RUFORUM where logical frame work and Monitoring and Evaluation schemes were formulated and draft MSc curriculum for the program was developed by the partner Universities. The curriculum was further refined in the context of Haramaya University based on pertinent feedbacks from stake holders and recommendations given during the national curriculum review workshop held in May 2011.

The prepared curriculum, thus, underwent through rigorous approval processes to be finally endorsed by the University Senate heralding the launching of the MSc AMNRM program,

Enrollment and teaching-learning process

Regional and National students were recruited through rigorous selection process and based on competition. The regional students were selected from Sudan(2), Zambia (1), Kenya (1) and Burundi (1).The first cohort of regional and national students, eleven in total, was enrolled in October 2013 and the students are now at the end of the first year of the study program. During the first year study period students followed theoretical and practical courses. Relevant teaching materials and modules were compiled and have been delivered to them. These students are expected to defend their thesis research proposals soon and commence data collection as they receive the approval of the thesis proposals by the School of Graduate Studies of Haramaya University. It is anticipated that their research findings will generate

Year I: Semester I (Core Courses)

Course Code	Course Title	Credit hours
AMRM 511	Climate dynamics and atmospheric circulation	3
AMRM 521	Methods of measurement and observation in agrometeorology and vulnerability assessment	3
AMRM 531	Statistical and research methods in agrometeorology and natural risk management (NRM)	3
AMRM 541	Food security and disaster risk management	3
AMRM 551	Soil Science and Agricultural Land Evaluation(E)	3
Total		12/ 15

Year I: Semester II (Core Courses)

Course Code	Course Title	Credit hours
AMRM 512	Remote sensing and GIS for agrometeorology and NRM	3
AMRM 522	Climate and dry land resources management	3
AMNR 532	Modification of microclimate	3
AMRM 542	Modelling and system analysis in agrometeorology and NRM	3
AMRM 561	Watershed Management (E)	3
AMRM 552	Graduate seminar in agrometeorology and NRM	1
Total		13/16

Year II

Course Code	Course Title	Credit hours
AMRM 611	M. Sc. Thesis Research	6

enormous scientific information relevant to combat the challenges of climate change and variability that influence the agricultural productivity and lively hood of the Ethiopian farmers.

Study duration and courses offered

The students in MSc Agromet and Natural Risk Management took the courses listed below being distributed over two semester of the first year and second year of the study program is entirely left for research work. The students are anticipated to take 25 credit hours of core courses; and 2 additional elective courses (one course in each semester). He/she shall undertake the mandatory research project (Thesis Research) equivalent to six credit hours and prepare a thesis research manuscript which shall be defended as per the procedures of the SGS.

Learning outcomes and sustainability of the study Program

The project resulted into establishment of a Masters of Science in Agrometeorology and Natural Risk Management (MSc in AMNRM)). The program was substantively approved and accredited by Haramaya University and the Government of Ethiopia and is now running as a regional program. It is intended to produce MSc graduates who are equipped with scientific knowledge for analyzing problems related to food insecurity and natural disaster, climate change and other operational problems facing African countries, apply modern tools and techniques in AMNRM, make decision on sustainable development to ensure food security and healthier climate and environment, among others. In addition, it will produce research outputs which will be used for policy recommendation and to help the private sector to solve problems related to AMNRM. For this, a relevant MSc curriculum in AMNRM was developed based on national and regional needs and priorities, relevant to local context.

The existing partnerships and regional linkages are deliberate to ensure sustainability of implementation of aspects of quality graduate teaching, learning and research. The course contents and design is unique and attracted support from the Intra-ACP Mobility projects which have contributed and supported participation of foreign students in the first cohort. The MSc program is also designed to undertake relevant research and is therefore, embedded, particularly in on-going national and continental frameworks and initiatives/programs, such as the national Disaster Prevention and Preparedness and Food Security strategy, the Climate Resilient Green Economy strategy, Nationally Adaptation Plan of Action (NAPA), and the Nationally Appropriate Mitigation Action (NAMA). Thus, the program is in line with the government of Ethiopia development strategic direction towards building a resilient society in the face of current climate variability/change and increasing environmental degradation In addition, efforts will be made to secure that resources will be mobilized from regional and international funding organizations to support the program. We believe that the MSc AMNRM will contribute much towards producing the much needed skilled personnel and continue to do so by soliciting funds from government and/or international organizations even after the life time of this project have ended.

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