Research Application Summary

MSc Programme in agrometeorology and natural risk management at Harmaya University, Ethiopia

Lisanework Nigatu & Beneberu Shimeles
School of Natural Resource Management and Environmental Sciences, College of Agriculture and Environmental Sciences, Haramaya University, Dire-Dawa, Ethiopia
Corresponding author: lisaneworkn@yahoo.com

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 other Universities is planning to launch an MSc training programme in Agro-meteorology and Natural Risk Management during the 2012/13 academic year. The focus of the MSc programme is to develop and strengthen the regional human resources and institutional capacity in impact-oriented training and research in Agro meteorology and Natural Risk Management (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. To this end, stake holder analysis, curriculum development and its subsequent approvals by the university Senate has been in process. It is anticipated that students will be recruited from the region and nationally from different administrative regions of Ethiopia. The MSc programme will help build human resource capacities that will be able analyse and interpret climatic and natural risk based information.

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

Résumé

L'Afrique est la région la plus vulnérable au changement climatique / à la variabilité / aux risques. Plus que jamais, une meilleure compréhension des systèmes d'alerte précoce, y compris la prévision météorologique et climatique et les initiatives mettant en évidence les effets du réchauffement climatique sont une importante priorité éducative. Dans cette perspective, l'université de Haramaya, en collaboration avec d'autres universités régionales prévoit de lancer un programme de formation en Maitrise de science d'agro-météorologie et de gestion des risques naturels au cours de l'année académique

2012/13. L'objectif du programme de maîtrise est de développer et de renforcer les ressources régionales de l'homme et de la capacité institutionnelle axée sur l'impact de la formation et de la recherche en météorologie Agricole et la gestion des risques naturels (AGMNRM), comme point d'entrée vers l'autosuffisance alimentaire grâce à l'utilisation durable des ressources, et de la gestion des risques climatiques et non climatiques, ou les risques dans l'Afrique orientale, centrale et australe. A cette fin, l'analyse des dépositaires, l'élaboration de programmes et de ses approbations subséquentes par le Sénat de l'université a été en cours. Il est prévu que les étudiants seront recrutés dans la région et au niveau national à partir de différentes régions administratives de l'Ethiopie. Le programme de maîtrise aidera à renforcer les capacités des ressources humaines qui seront en mesure d'analyser et d'interpréter les informations sur les risques climatiques et naturels.

Mots clés: changement climatique, la sécheresse, la sécurité alimentaire, l'économie verte, Haramaya, le risque naturel

Background

Africa, home to about 65% of the least developed countries, is the most vulnerable region to climate hazards, variability and change. 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, 1997) are the most vulnerable areas. Unequivocally, these hazards or the changes are becoming major threats to sustainable growth and development in Africa and to the achievement of the Millennium Development Goals (MDGs).

It is well known 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 African countries 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 support for climate change and other natural risk management strategies.

Agriculture plays a vital role in Ethiopia's national economic development as a source of livelihood, industrial raw materials and employment. Although various African governments including Ethiopia are making strenuous efforts to increase food production, poor and subsistence farmers are facing ever-increasing difficulties to cope with the demand even for staple foods. Technologies that proved to be superior in the past are not currently being adapted or transformed fast enough compared to the rapid environmental changes occurring today. Indigenous strategies neither are sufficient to cope with or adapt to the effects of climate hazards/variability/change nor are such strategies adequately supported by policy processes. This calls for improved and adapted technologies, which in turn stipulate for the presence of trained and well-qualified human resource in the areas of agro- meteorology and natural risk management systems.

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).

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 Natural Risk Management 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 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

As one of the pioneer agricultural universities in Ethiopia, Haramaya University is launching an MSc programme in Agrometeorology and Natural Risk Management. Because of the regional demand for this capacity, Haramaya will work with the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM: A Network of 29 African Universities in Eastern, Central and Southern Africa), to train for the wider Eastern, Central and Southern African region. The aim is to produce highly qualified agrometeorologists that can assist the region's endeavors in fighting the adverse impacts of climate hazards/variability/change on its citizens and ensure food security and sustainable use of its natural, physical and human resources. Ethiopia is also a leading campaigner and implementer of the climate resilient green economy, striving to contribute its utmost share to climate change mitigation as well as striving to ensure coping and adaptation mechanisms in its agricultural and other sectors. For all these to be fulfilled requires the presence of adequate well trained human resource (at MSc and PhD levels) in agrometeorology and natural risk management, and related fields. It is against this background that the Haramaya University is launching the MSc programme in Agrometeorology and Natural Risk Management (AGNRM) during the 2012/2013 Academic Year.

Approach Used to Develop the MSc AGNRM Programme

An inception workshop was conducted at Haramaya University 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. programme in Agrometeorology and Natural Risk Management at Haramaya University. Cognizant of this, need assessment within the country was conducted and a stakeholders' analysis was performed. This was further strengthened through two regional workshops organized by RUFORUM where logical frame work and Monitoring and

Evaluation schemes were set and draft MSc curriculum for the programme was developed by partner Universities. The latter was further refined in the context of Haramaya University, as stated here in under, and underwent through approval processes to be finally endorsed by the University Senate. Besides, course modules will be prepared and announcement for admission of students will be made public. It is anticipated that students from the region and within the country will be recruited on competitive basis and the Programme launched in 2012/13 academic calendar of the University.

Admission

Admission to the MSc programme requires candidates to have a BSc degree or its equivalent in Climatology/Agrometeorology, Soil Science, Natural Resource Management, Environmental Science, Plant Science, Horticulture, Ecology, Irrigation Agronomy/Engineering, Soil and Water Conservation/ Engineering, Dry-land Agriculture, Arid Land Resources, Range Management and Eco-tourism, Forestry, Physics, Chemistry, Geology, Biology, Geography and other related fields. In addition, applicants must fulfil other admission criteria of the School of Graduate Studies (SGS) of Haramaya University.

Structure and Duration

The course will last a minimum of 4 semesters (2 years) (Table 1). The candidate shall be required 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

Graduates of this programme will be able to:

- Have knowledge and skills, and capacity to be flexible to address problems associated with food insecurity and natural disaster, climate change and other operational problems facing African countries;
- Apply modern tools and techniques in Agrometeorology and Natural Risk Management, and also work for continuous refinement and upgrading of existing practices;
- Make decision on sustainable development to ensure food security and healthier climate and environment;
- Monitor climate change, and other natural and man-made hazards including land degradation, deforestation, water pollution and others;

Table 1. Proposed courses to be offered to MSc. students.

Course Code	Course Title	Credit Hours
Year I: Semester I (Core Courses)		
AMRM 511	Climate dynamics and atmospheric circulation	3
AMRM 521	Measurement and observation in agrometeorology	3
AMRM 531	Statistical and research methods in agrometeorology and NRM	3
AMRM 541	Food security and disaster management	3
Semister I total		**12**
Year I: Semester II (Core Courses)		
AMRM 512	Remote sensing and GIS for agrometeorology and NRM	3
AMRM 522	Climate and dry land resources management	3
AMNR 532	Agricultural microclimatology	3
AMRM 542	Modelling and system analysis in agrometeorology and NRM	3
AMRM 552	Graduate seminar in agrometeorology and NRM	1
Semister II total		**13**
Year II		
Course Code	Course Title	
AMRM 611	MSc Thesis Research	6
Elective Courses: Two courses shall be selected from any of the following electives		
AMRM 551	Watershed management	3
AMRM 561	Soil properties and processes	3
AMRM 571	Measures for flood and drought relief	3
AMRM 581	Crop protection and climate	3
AMRM 562	Environmental impact assessment, policy and law	3
AMRM 572	Communication in agrometeorology	3
AMRM 582	Crop ecology and physiology	3
AMRM 592	Animal production systems and management in climate change	3
Total		**24**

- Carry out environmental impact assessment and auditing of development projects;
- Communicate effectively on weather forecasting, early warning, and disaster preparedness and risk management to diversity of stakeholders including farming and pastoral communities and policy makers;
- Manage government/private enterprises, distribution systems, teaching and research institutions.

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References

Africa Partnership Forum Support Unit (APFSU), 2007. Climate Change and Africa. BRIEFING PAPER No. 1

Eriksen, S., O'Brien, K. and Rosentrater, L. 2008. Climate Change in Eastern and Southern Africa: Impacts, Vulnerability and Adaptation. GECHS Report 2008:2. University of Oslo.

IPCC. 2001. Climate Change 2001: Impacts, Adaptation and Vulnerability. In: McCarthy, J.J., Canziani, O.F., Leary, N.A., Dokken, D.J. and White, K.S. (Eds.). IPCC Working Group II, Third Assessment Report. Cambridge University Press.

Olufayo, A.A., Stigter, C.J. and Baldy, C. 1998. On needs and deeds in agrometeorology in tropical Africa. *Agricultural and Forest Meteorology* 92:227-240.

Sequeira, E.L. (Ed.). 1998. Report of the Rapporteur on Training in Agrometeorology, CAgM XI (Havana, Cuba). WMO, Geneva, in print.

United Nations Development Programme (UNDP), 2009. Fighting Climate Change: Human solidarity in a decling world. Human Development Report 2007/2008. Palgrave Macmillan, USA.

Yao, N.R., Orsot-Dessi, D.S., Ballo, K. and Fondio, L. 1995. DeÂclin de la pluviositeÂ en CoÃ te d'Ivoire: Impact eÂventuel sur la production du Palmier aÁ Huile. *SeÂcheresse* 6:265-272.