JOURNAL OF ADVANCED STUDIES IN AGRICULTURAL, BIOLOGICAL AND ENVIRONMENTAL SCIENCES (JABE)

A Peer Reviewed Research Journal

http://www.jabe.in

KY PUBLICATIONS

INDIA

www.kypublications.com

JOURNAL OF ADVANCED STUDIES IN AGRICULTURAL, BIOLOGICAL AND ENVIRONMENTAL SCIENCES (JABE)-EDITORIAL BOARD

Research Article

Copy Right ©KY Publications

Journal of Advanced Studies in Agricultural, Biological and Environmental Sciences (JABE)

A Peer Reviewed & Refereed, International Open Access Journal

Vol.1.Issue.1.2014

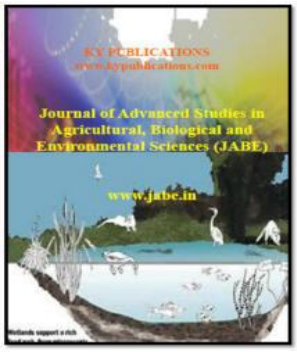
http://www.jabe.in

CLIMATE CHANGE AND CONVENTIONAL FARM PRACTICES: PERCEPTION OF SMALL-SCALE RURAL WOMEN FARMERS IN BOME VILLAGE, MOMO DIVISION OF CAMEROON

WILFRED ABIA[1,2,3*], VALERIE TATI[1], MARKJOVERT AGEH[1], EUCHARIA ABIA[1,3], PATRICK AGEJO[1,2,3*] GODWILL FONCHANG[1], JUDITH MEKOLE[1], MABEL SHU[2], GEORGE EBESOH[2], ERIC NGANG[1,3]

[1]Civil Society Capacity Building Network, Department of Education and Extension Program, Integrated Health for All Foundation (IHAF); [2]Integrated Risk Assessment Team (iRaTI), Department of Healthcare, IHAF, P.O. Box 31717, Biyem-Assi, Yaoundé, Cameroon

[3]Institute for Management and Professional Training (IMPT), Yaoundé Cameroon



Article History

Received on:18-08-2014

Revised on:28-08-2014

Accepted on:02-09-2014

ABSTRACT

Climate change affects agricultural production leading to serious environmental, socio-economic and health impacts. The situation may be more severe in the case of small-scale farmers whose livelihood depends on the use of available natural resources, especially in developing countries like Cameroon. This preliminary survey reports on the perceptions and knowledge of small-scale women farmers in Bome village, Momo division on climate change in relations to their traditional farming practices. Structured questionnaires and focus group discussions were used to collect data. Responses from 27 farmers revealed diversified educational background (primary school: 37% and higher and/or professional education: 21%). Sixty-three percent farmers had heard about climate change. "Slash" (26%) and "bury-and-burn" (26%) were the most dominant farming practices as oppose to shifting cultivation (14%) and mixed farming (11%). Ironically, farmers (70%) revealed their speculations that "slash" and "bury-and-burn" may contribute to the changing climatic situation, but however hold-on to it to increase yield as indigenous approach to fighting food insecurity. The farmers (85%) agreed to the need of routine awareness and sensitization of small-scale farmers, and indicated interest (54%) in participating in climate change related seminar and/or training programs. The study revealed that farming practices in the study area are still local with farmers depending on indigenous knowledge to interpret and adapt to the changing climate situation. The studied farmers depend on indigenous knowledge to adapt to the changing climatic conditions. As such, there is need for routine capacity building programs for small-scale women farmers in Bome village, Momo division on climate change in relations to agricultural, food security, and health with an aim of identifying various climate change perpetrating activities as well as climate smart strategies/practices to mitigate effects of climate change in that locality.

Keywords: Climate change, small-scale farmers, farming practices, agricultural productivity, food security, Cameroon

Cite this article: Wilfred Abia, Valerie Tati.*et al "CLIMATE CHANGE AND CONVENTIONAL FARM PRACTICES: PERCEPTION OF SMALL-SCALE RURAL WOMEN FARMERS IN BOME VILLAGE, MOMO DIVISION OF CAMEROON". Journal of Advanced Studies in Agricultural, Biological and Environmental Sciences, 1(1): 2014, 24-32*

INTRODUCTION

Climate change is a crucial issue of our era [1] and is expected to have serious environmental, economic, and social impacts on resource limited countries such as Cameroon. In particular, small-scale farmers depending on available natural resources as well as on traditional farm practices are more affected. Like elsewhere, local farmers' perceptions of climate change and their strategies to mitigate its impacts are based on indigenous knowledge and their own experiences [2].

According to the Intergovernmental Panel on Climate Change [3] climate change refers to the statistically significant variations that persist for an extended period, typically decades or longer. Basically, climate change is a process of global warming, in part attributable to the greenhouse gases generated by human activity [4]. These greenhouse gases are generated from the burning of fossil fuels such as coal, oil and gas. These fuels contain carbon and carbon dioxide is one of the gases which contribute to global warming.

The current magnitude and rate of climate change is already altering species distributions, life histories, community composition, as well as ecosystem function. Many authors assert that the impacts of climate change are far ranging, including poor soils and crop yields, soaring food prices to famine, reduced access to land and mass migration of species and conflicts amongst humans [5, 6, 7]. Additionally, there is a link between climate change, resource scarcity and resource conflict [8].

Generally, the impacts of climate change are being felt by both developed and developing countries. The concern with climate change is heightened given its linkage to the agricultural sector and poverty. How serious the repercussions will be, depends on how fast measures and strategies are adopted to facilitate coping with the extreme and inevitable conditions posed by climate change especially for grass root communities. Many case studies in some communities in East Africa reveal that households are successfully introducing new practices and use of local knowledge leading to enhance food security than less innovative farming communities [9]. Although these have been described as marginal rather transformational, these practices most of which have been indigenous are making significant contribution to community adaptation and changing circumstances at community level, including responding to climate change. Many other authors and institutions propound that there is a correlation between these improved community farming practices and their ability to cope with climate variability [10, 11, 12]. Studies in other contexts also correlate the level of income and food security with the capability of diversification of options for households in a community within the framework of climate change adaptation. Report by Thornton et al. [13] has also pointed to a direct proportional relationship between income and food security within the framework of climate change adaptation.

According to McSweeney et al. [14], mean annual temperatures have increased by 0.7^{o}C as oppose to a 2.2 percent decrease in mean annual precipitation per decade since the 1960s. Generally, the western highland zone (e.g. North West region) is relatively cooler than most other agro-ecological zones of the country, and has short dry season. The years 2003 and 2005 experienced very low rainfalls [14]. Furthermore, McSweeney et al. [14] predicts a moderate increase in temperature this century with more hot days and nights. It is expected that agricultural growth will be slow relative to growth in population, with agriculture and livestock production being likely to be most affected by any future changes in temperature [15].

In response to this changing climatic conditions, the climate change adaptation and mitigation needs and strategies of Cameroon [16] are built into the Cameroon's National Plan for Environmental Management (Plan National de Gestion de l'Environnement, PNGE) and the National Programme for Food Security (Programme

National pour la Securite Alimentaire, PNSA) generated in 2007 in conjunction with the United Nations Environment Programme (UNEP) and the Food and Agriculture Organization (FAO) of the United Nations (Law No 96/12 of August 5, 1996 relating to Environmental Management in Cameroon). Cameroon as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) - Kyoto Protocol on climate change - has taken some actions geared towards addressing climate change at national level. For example, a set of Nationally Appropriate Mitigation Actions (NAMAs) was submitted to UNFCCC in 2010 and thereafter a Readiness Preparation Plan (REDD RPP) and a National Adaptation Plan of Action (NAPA) to prepare for future climate change financing. Generally, in view of the review from Adaptation Partnership [17] which is based on documents like the UNFCCC's National Adaptation Programs of Action and National Communications, the national strategies on climate change adaptation and mitigation efforts are on a good footing..

Although these strides have been made at policy level, translating these policies to have a real meaning for those who feel the effect is still at a rudimentary stage, especially when compared with the impending catastrophe. Hence, the pertinent questions that guided this research work are: what are the perception of local small-scale farmers and effects of conventional farm practices (such as "slash"/"ankara" and "bury and burn" i.e., burning of farmlands and hill tops during the dry and raining seasons in other to carry out extensive subsistence farming) in the Momo division on climate change?; as well as what climate smart strategies can be encouraged and promoted to ameliorate the impacts of climate change on agricultural productivity and the environment? Therefore, this preliminary survey was aimed at appraising the perceptions of local farmers in the Momo division on climate change in relations to their traditional farming practices, as well as to identify potential risk factors/practices which may be controlled to mitigate the speculated effects of climate change on agricultural production and health likewise.

2. Methodology:

This preliminary survey was carried out in Bome (a small village) in the Momo division, North West Region of Cameroon with questionnaires administered to some 35 randomly selected women farmers in 2012 in a cross-sectional research approach. The primary target populations in this study were the women farmers, while some randomly selected "communitants" (i.e., community members) in the studied community were secondary targets.

Data were collected with the aid of self-reported data collection tools (i.e., structured questionnaires and interviews); observations (direct observation); as well as through meetings (focus group discussions). Information collected was analyzed using the Statistical Package for Social Sciences (SPSS).

3. RESULTS

Table 1 (#1) below presents data on the level of education of the 26/27 (96.3%) respondents in this preliminary survey on the perception and knowledge of local farmers from Bome village – Momo division in the North West region of Cameroon on climate change. Generally, majority of responses were provided by participants with elementary primary, likewise junior and senior secondary school levels with 37% each as oppose to 25% responses from respondents with education level above high school. In addition, the majority of participants (mainly rural women, 63%) had heard of climate change (Table 1 (#2)). The predominant traditional farming systems being practiced include "slash" or "ankara" as equally as "bury and burn" (25% each) while mixed cultivation is done by few (11.1%) rural women under study (Table 1 (#3)).

Research Article

Copy Right ©KY Publications

Journal of Advanced Studies in Agricultural, Biological and Environmental Sciences (JABE)

A Peer Reviewed & Refereed, International Open Access Journal

Vol.1.Issue.1.2014

http://www.jabe.in

Table 1: Educational levels, awareness on climate change, and farming practices of rural women from Bome village, North West region of Cameroon

#	Question focus	Parameter	Frequency (%)
1	Level of Education	Elementary primary	10 (37)
		Secondary	5 (18.5)
		High school	5 (18.5)
		Higher Education	4 (14.8)
		Professional studies	2 (7.4)
		Sub-total	26 (96.3)
		Missing system	1 (3.7)
		Total	27 (100)
2	Awareness on "climate change"	Yes	17 (63)
		No	9 (33.3)
		Sub-total	26 (96.3)
		Missing system	1 (3.7)
		Total	27 (100)
3	Farming methods being practice	Shifting cultivation	4 (14.8)
		Mixed farming	3 (11.1)
		Slash or Ankara	7 (25.9)
		Bury and burn	7 (25.9)
		Farming along the slopes	5 (18.5)
		Sub-total	26 (96.3)
		Missing system	1 (3.7)
		Total	27 (100)

Over 70% of the rural women farmers under study were not aware of the chances of some of their farming practices may be risk factors to climate change (Table 2 [#1]). Apparently, over 84% of the interviewees agree (in some cases, strongly) that there is need for continuous community awareness and education trainings on the how climate change and their activities are interconnected (Table 2 [#2]). Of these over 84% participants, more than 55% indicated their interest and willingness to participate in such trainings as trainees (Table 2 [#3]).

Table 2: Knowledge on traditional farming practices in relation to climate change, need and willingness to participate in climate change and agriculture related training workshops.

#	Question focus	Parameter	Frequency (%)
1	Awareness that some farming practices cause climate change	Yes	7 (25.9)
		No	19 (70.4)
		Sub-total	26 (93.6)
		Missing data	1 (3.7)
		Total	27 (100)
2	Need for routine awareness,	Disagree	0 (0)

	sensitization and capacity building workshops on effects of our activities on climate change and climate change on our environment and health	Agree	11 (40.7)
		Strongly agree	12 (44.4)
		Neither agree nor disagree	2 (7.4)
		Sub-total	25 (92.6)
		Missing data	2 (7.4)
		Total	27 (100)
3	Willingness to participate in training programs on climate change in relation to farming practices and our health	Disagree	3 (11.1)
		Agree	8 (29.6)
		Strongly agree	7 (25.9)
		Neither agree nor disagree	8 (29.6)
		Sub-total	26 (93.6)
		Missing data	1 (3.7)
		Total	27 (100)

4. DISCUSSIONS

The aim of this preliminary survey was to appraise the perceptions of small-scale women farmers' in the Momo division on climate change in relations to their traditional farming practices. Additionally, the study intended to identify potential risk factors/practices the speculated effects of climate change on agricultural production and health and for which recommendations may be made to improve upon adaptation and mitigate strategies to outsmart climate change. As a result, some randomly selected 35 women farmers were sampled, 27 of which ended up providing responses to questionnaires and several others engaged in interviews and/or focused group discussions. Generally, the majority of the women farmers sampled were primary school leavers (37 %) converse to few university graduates (14.8 %) and/or professionally trained (7.4 %). A few of these farmers are aware of climate change while over 50 % of farmers practice slash/Ankara and/or bury-and-burn farming as indigenous ways to improve productivity. Seventy percent were not aware that some farming practices may influence climate change while 84 % of farmers agreed to the need of routine platforms on climate change, agriculture and health, with 54 % of them demonstrating interest in participating as long as it is at no cost to them.

Climate change is amongst the greatest challenge worldwide [18], Cameroon inclusive. Its effects may present itself differently in different parts of the world, for example as drought, flooding and inundation of coastal lands, low agricultural productivity, alteration of surface and ground water amongst others [19]. In Cameroon, almost all sectors are affected by climate change [20, 21]. For example, the reported increase in malaria may partly be as a consequence of rising temperatures as evident by the decrease in rainfall since 1960 [22]. Likewise, since early 80s, agricultural productivity in Cameroon has drop drastically. This is converse to the country's consideration as self-sufficient in agricultural production and played a role of food garret for its neighbouring countries, thus referred to as "Africa in miniature" until the late 80s. As such, Cameroon began spending billions of francs CFA to import significant quantities of food items such as rice, maize, onion, tomatoes, milk and poultry even though it has a clear comparative advantage in producing them. This has been very worrisome as it undermines local production potentials and pushes many small-scale farmers/producers out of the production chain as a result of unfair competition.

Generally, over 75 % of the active populations in Cameroon are involved in small-scale agricultural production partly due to favourable climatic conditions. Specifically, the climatic conditions in the North West region (long rainy periods from March to September, annual average rain fall of 2022.3mm; average maximum yearly

temperature of 30 ^{0}C) are highly favourable for the cultivation of grains (corn, rice), tubers, and fruits, many of these are food staples in the region, meanwhile the cold temperatures at the top of the highland areas permit the cultivation of market garden crops like cabbages, carrots and green spices. Also, more than 80% of the rural population of the North West region depends solely on small-scale agriculture. Nevertheless, they contribute significantly to the nation's food economic basket by supplying foods to several other regions, allowing room for ample interactions in trade, farming, education, health and other services with the entire country. However, yields are already insufficient relative to inputs of efforts for which climate change may be partly responsible

Beside climate change, most of the people in rural communities indulge in agriculture as a hobby instead of a profession. This may be due to the low levels of education of the farmers (37 %) that happened to be the majority in this survey as well as the country's concentration on imported foods, for which nationally strategy is currently reverting to promote agriculture in Cameroon encouraging farmers and even offering start-off capitals and instrumentations to various established farmers groups.

In addition, farmers have relied on certain indigenous farming practices with believes of increasing agricultural productivity for their daily living which involves the burning of the rainforest plant cover to create plots for cultivation as well as making of slash or Ankara, and bury-and-burn farming practices currently being practiced by over 50 % of the studied farmers. The effect of these kinds of farming practices is a significant loss of rainforest, increase in the greenhouse gases and no significant improvement in income or nutrition. Instead the environment is exposed to the effect of climate change. Indeed, there are chances that greenhouse gasses such as CO_2 will be released in greater quantities into the atmosphere and thus play a contributing role to adjust earth's temperation at least few meters around the farm neighborhood. Thus, such indigenous practices may likely be contributing factor to climate change in the study location as they have been in practice over the years with no speculations (70 %) on any adverse effects talk less of being associated with the currently observed unfavourable changes in climatic situation in the study locality. Perpetuation of such farming practices which may influence climate change in a positive manner was not unexpected considering the level of education of the farmers and the inadequate awareness and sensitization available to these farmers. Basically, climate change is most perceived by the prolonged dry seasons' which directly affects the timing of planting of crops by the studied farmers, as well as unusual illnesses, especially amongst children.

Furthermore, aside from agriculture, climate change has become more severe considering its relationship or bearings on other circumstances such as food security (which is a current challenge in Cameroon, like elsewhere in the world), food safety, poverty, nutrition, and health related issues. For example, the concern with climate change is heightened given its linkage not only to the agricultural sector, but also to poverty. In particular, it is anticipated that adverse impacts on the agricultural sector will exacerbate the incidence of rural poverty. Impacts on poverty are likely to be especially severe in Cameroon where the agricultural sector is an important source of livelihood for a majority of the rural population. Also, food production is more likely to be adversely affected by the variability in timing and amount of rainfall, frequent outbreaks of crop pests and diseases and heat stress [15]. Likewise, climate change could be associated with high prevalence of malaria [22] as well as threats of cholera diseases [15]. How serious the repercussions will be, depends on how fast measures and strategies are adopted to facilitate coping with the extreme and inevitable conditions posed by climate change, a situation for which current national strategies are likely to keep under control in case its expansion and implementation will involve all stakeholders and effected routinely especially for grass root communities such as the Momo division in the North West region of Cameroon.

Broadly speaking, in a rapidly changing world, the rural areas and their people especially the rural women are often experiencing greater and faster changes than any other subpopulations. In Cameroon, like elsewhere, while there is rapid increase in population, meaning more mouths to feed, there is climate change damping our agriculture leading to reduced yields. Rural women must be considered as major participants in the struggle to deal with these challenges. They are at the heart of the solutions to these problems, through their direct involvement on the ground. But the greatest challenge here is that these rural women have very little knowledge on climate change. The studied farmers depend on indigenous knowledge to adapt to the changing climatic conditions. As such, there is need for routine capacity building programs for small-scale women farmers in Bome village, Momo division on climate change in relations to agricultural, food security, and health with an aim of identifying various climate change perpetrating activities as well as climate smart strategies/practices to mitigate effects of climate change in that locality.

Generally, almost all participants in this study, except at most 16% of them, appraised the need for and hopes that routine awareness, sensitization and capacity building workshops focusing on climate change, agricultural (farming) practices and related issues will significantly reduce positive influences of human activities on climate change while minimizing effects of any eventual climate change on our environment and health. Therefore, there is absolute need for capacity building training programs and workshops focusing on climate change, farm practices, food security, poverty, environment and health as well as to encourage and improve sound agricultural practices that will prevent release of greenhouse gasses to minimize global warming and consequential climate change in the neighbourhood. This off course is beneficiary driven action to be possibly put in force via small scale community training and demonstration grants to or via implementing organizations such as the Integrated Health for All Foundation (IHAF), and/or community-based organizations (CBOs) or farmers-led common initiative groups (F-CIGs). Such an initiative will be best replicated and in some cases tailor-made to suite several other similar communities in the same and or other regions in the country to contribute significantly to the national efforts towards mitigating effects of climate change on our environment and health.

The effect of climate change on the livelihood of most sub-groups in some parts of the North West region especially in rural areas plague with poverty is becoming conspicuous. The effects may be influenced by poor farming practices, poor grazing methods, rapid population growth and inappropriate management skills. In recent years local farmers have witnessed very low crop production, poor food yield and quality reduction in soil fertility and consequential poor harvest despite the much more efforts made by farmers, suggesting that climate change may be a major, though silent, inhibitory factor here. The rural communities are the major actors and stakeholders to be consider in this struggle to deal with these challenges. They are in the heart of the solutions to these problems through their direct involvement with the soil. However, these rural communities have very little or no knowledge on the outbreak of climate change, it causes, effect, consequences. Addition there is absolute need to improve upon the existing traditional agricultural techniques so as to improve upon the yields of crops to alleviate poverty and fight against food insecurity consequently improve health.

CONCLUSIONS

Based on the aforementioned discussions, farming practices in the study area are still conventional with local farmers' perceptions of climate change based on indigenous knowledge and their own experiences although majority had heard of climate change. Additionally, farmers have relied on this poor farming method of agriculture for their daily living which involves the burning of the rainforest plant cover to create plots for cultivation as well as slash making which simply promotes climate change. Majority of the farmers are very

willing to participate in training on climate change and agricultural strategies/practices to mitigate effects of climate change.

RECOMMENDATIONS

Based on findings from this study, the researchers recommend that it is necessary for local farmers to build a system of adaptive climate change strategies (including adjusting planting and harvesting dates, changing crop species, improving irrigation infrastructure, trees planting, etc) that combines traditional experience and indigenous knowledge with scientific research and government polices as key factors.

Additionally, farmers should consider farming as a profession and not a hobby, this way they will consider engaging/practicing farming systems which exhibit high adaptability to climate variability e.g. avoiding “slash”. Notwithstanding, this may only be buttressed by a high demand for local or home agricultural products to give the farmers adequate incomes in exchange from their produces.

It is equally recommended that policy makers and lobbying groups address more the issue of land tenure conflict and associated land tenure rights in Cameroon. This is because these issues are essential for successful climate change adaptation and mitigation initiatives.

There is a need to facilitated processes that enable farmers and local communities to harness and value their indigenous/traditional knowledge and finding strategies to feed these into local and national policy formulation process.

These farming communities need more educational trainings both formal and technical to practice modern day agriculture or second generation agriculture which will mitigate causes of climate change.

ACKNOWLEDGEMENTS

Authors are thankful to the Integrated Health for All Foundation (IHAF) Cameroon through her 3 months free-of-charge internship program on project planning and management for admitting V. Tati as an intern. This piece of work was designed by W Abia, mentor of V Tati. V Tati carried out the field work within the framework of her 3 months internship at the IHAF and wrote a project report. W Abia proposed the manuscript while the co-authors proofread the manuscript.

REFERENCES

[1]. Annan, K. (2007). The human face of climate change, *Mail & Guardian,* 19 October 2007;

[2]. Li C, Tang Y., Luo H., Di B., and Zhang L. (2003). Local farmers' perceptions of climate change and local adaptive strategies: a case study from the Middle Yarlung Zangbo River Valley, Tibet, China. Environ Manage. 52:894-906.

[3]. IPPC (International Plant Protection Convention), (2007). Climate Change 2007: Synthesis report. IPCC fourth assessment report. Geneva, Switzerland.

[4]. EPA (Environmental Protection Agency, US), (2001). Greenhouse effects

[5]. World Bank, (2013) 4o, Turn down the heat, Climate Extremes, Regional Impacts, and the Case for Resilience, A Report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics Turn Down

[6]. Yamano, T., Otsuka, K., and Place, F. (2011). *Emerging development of agriculture in East Africa: Markets, soil and innovation*. Dordrecht: Springer.

[7]. Jayne, T. S., Mather, D., and Mghenyi, E. (2006). Smallholder farming under increasingly difficult circumstances: Policy and public investment priorities for Africa. MSU International Development

Working Paper No. 86. Michigan State University, East Lansing, Michigan. Available at http://www.aec.msu.edu/agecon/fs2/index.htm.

[8]. Mwiturubani and van Wyk (2010) (Eds), Climate Change and Natural Resources Conflicts in Africa, Institute for Security Studies (ISS) publication, www.makepeacehappen.net, accessed November 2013

[9]. Kristjanson, P., Neufeldt, H., Gassner, A., Mango, J., Kyazze, F.B., Desta, S., Sayula, G., Thiede, B., Förch, W., Thornton, P.K. and Coe, R. (2012), Are food insecure smallholder households making changes in their farming practices? Evidence from East Africa, in *Food Security, The Science, Sociology and Economics of Food Production and Access to Food*, doi:10.1007/s12571-012-0194-z

[10]. World Bank (2009). Climate risk management through sustainable land management in sub-Saharan Africa. Report submitted to the World Bank by IFPRI, ICRAF, ICRISAT, FUT, MUIENR. Washington, DC: World Bank.

[11]. Hellmuth, M.E., Moorhead, A., Thomson, M. C., and Williams, J. (Eds.). (2007) *Climate risk management in Africa: Learning from practice. International Research Institute for Climate and Society (IRI)*. New York, USA: Columbia University.

[12]. Adejuwon, J. (2006). Food Security, Climate Variability and Climate Change in Sub Saharan West Africa. Assessments of Impacts and Adaptations to Climate Change (AIACC) Project, International START Secretariat, Washington, DC, www.start.org.

[13]. Thornton, P. K., Rufino, M. C., Karanja, S., Jones, P. G., Mutie, I., and Herrero, M. (2011). *Genesis reversed: Climate change impacts on agriculture and livelihoods in mixed crop-livestock systems of East Africa. Final report to the World Bank* (p. 162). Nairobi: International Livestock Research Institute (ILRI).

[14]. McSweeney, C., M. New and G. Lizcano (2008). UNDP Climate Change Country Profiles: Cameroon. Oxford: United Nations Development Programme and University of Oxford

[15]. CMEF (Cameroon Ministry of Environment and Forests) (2005). First National Communication. Ministry of Environment and Forests of the Republic of Cameroon, Yaounde

[16]. CMEF (Cameroon Ministry of Environment and Forests) (2012). Law No 96/12 of 5th August relating to National Environmental Management in Cameroon.

[17]. Adaptation Partnership, (2011). Cameroon: Review of current and planned adaptation action. Short URL:http://preventionweb.net/go/25671

[18]. Adebayo, A.A. and Oruonye, E.D. (2013). An assessment of climate change in Taraba State, Nigeria. Nigerian Journal of Tropical Geography, 4(2): 602– 612.

[19]. Fischer, G., M. Shah and Van, V.H. (2002). Climate change and agricultural vulnerability. International institute for applied systems analysis. Report Prepared under UN Institutional Contract Agreement 1113 for World Summit on Sustainable Development. Laxenburg, Austria.

[20]. United Nations for Environmental Programme (UNEP) (2000). Developing Strategies for Climate Change: The UNEP Country Studies on Climate Change Impacts and Adaptations Assessment. Report 2000:2

[21]. Ministry of Environment and Forestry (MINEF) (2001). First initial communication to climate change. National report submitted to UNFCCC. 160 P

[22]. Molua, E.L. and Lambi, C.M. (2007). The Economic Impact of Climate Change on Agriculture in Cameroon. Policy Research Working Paper 4364. The World Bank Development Research Group Sustainable Rural and Urban Development Team. 33 p