

Full Length Research Paper

Capacity for research and outreach on climate change agricultural adaptation in the Faculties of Agriculture of Universities in southeast Nigeria

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The study examined research and outreach capacities on climate change agricultural adaptation in the faculties of agriculture in southeast, Nigeria. One hundred and twenty (120) randomly selected academic staff of faculties of agriculture were used. Data were collected using questionnaire and analyzed by descriptive statistics. The results show poor investment in equipment (18.7%) and human capacity building (25.8%); limited department/faculty (43.3%) and university/university (28.3%) linkages for climate change research and outreach. Only 25.0% of the respondents expressed the existence of outreach and fund for climate change activities. The personal activities of staff were attendance to conference (62.5%), and involvement in researches (91.7%) on climate change. Capacities for research and outreach on climate change were constrained by several factors namely high cost of TV, radio and newspaper adverts ($M = 3.44$), poor understanding/knowledge of climate change concepts ($M = 3.36$), limited grant for climate change research ($M = 3.35$) and others. The study recommends that government should enact favourable policies and institutional supports that could encourage, spur and stimulate capacity acquisition activities in the universities. The university system need to internally put in place activities, strategies and programmes that could attract external aids, collaboration and raise staff interest and motivation to acquire capacity on climate change agricultural adaptation.

Key words: Climate change, university, research, outreach, adaptation, agriculture.

INTRODUCTION

Climate change is any change in climate overtime due to natural variability and human activities (anthropogenic factors) with alteration in the composition of the global atmosphere (Inter-governmental Panel on Climate Change, IPCC, 2001, 2007). According to Organic Consumer Association (2008), the agricultural land use was responsible for approximately 15 to 20% of all anthropogenic green house gas (GHG) emissions. Thus,

agriculture significantly contributes to climate change and in turn is affected by climate change. The IPCC (2007) predicted that in some African countries including Nigeria, yields from rain-fed agriculture will be reduced by up to 50% and a decrease of 30% in world food production. Moreover, between 75 and 250 million people in Africa will be exposed to water stress due to climate change and this will adversely affect livelihood in the region. This

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is attributed to wide range effects of climate change evidence as increase temperature, decrease rainfall in the continental interiors, drought, desert encroachment, melting ice, extreme weather, floods, sea level rise, sinking of Islands water scarcity, health and other agricultural problems (Odjugo, 2007, 2009; Adefolalu, 2007; Awake, 2008).

In Nigeria, there are increasing evidence of climate change with the attendant impacts and threats to rural communities and farmers in particular. Southeast agro-ecological zone of the country recorded remarkable increase in flooding, landslide and erosion which have led to loss of lives, houses, farmlands, properties, roads etc. (Agwu and Okhimamhe, 2009). Some States in the area such as Anambra and Enugu have consistently experienced sheet and gully erosion; with the worse hit areas in the Anatu-Agulu-Nanka axis, the areas around Nkisi River, Amawbia and Ozubulu areas of Anambra State. Soil productivity in many parts of the region has been badly impacted with considerable reduction in food productivity (Adesina and Odekunle, 2012). Bello et al. (2012) also observed that the area is currently confronted by irregularity in the rainfall pattern (delayed onset or early retreat of rains) leading to unsteady growing season and other soil-related problems. Thus, the challenge of building resilient society with capacity to adapt to the threats of climate change is an imperative.

Adaptation refers to adjustments in practices, processes or structures in response to projected or actual changes in climate (Ifeanyi-Obi et al., 2012), with the goal of maintaining the capacity to deal with current and future changes.

Agricultural adaptation to climate change aims at reducing and developing appropriate coping measures to address the negative impacts of climate change on crop production, soil management/conservation and animal husbandry. Adaptation and mitigation potential according to Lybbert and Sumner (2010) are nowhere more pronounced than in developing countries where agricultural productivity remains low; poverty, vulnerability and food insecurity remain high; and the direct effects of climate change are expected to be especially harsh.

Adaptation to climate change requires development of strong adaptive capacities, including provision of tools, technologies and/or information, raising awareness of adaptation options, educating society, professionals on climate change through education, research and community engagements. In other words, it calls for high climate science literacy, generation, effective diffusion and use of appropriate agricultural technologies by the public and farmers in particular. The magnitude of the challenge, particularly on the agricultural sector places universities and faculties of agriculture at the frontier of leadership in climate change adaption. In other words, through education and research, universities need to take leadership role in developing, testing and modeling solutions for meeting human needs in the face of rapid global change that threatens the viability of current

systems (www.presidentclimatecommitmen.org). In another hand, professionals and students through update to curricula need understanding of climate science, the way it affects their life and professions; and effectively contribute to building resilient community. Reports shows that as economic development drivers and infrastructure developers, as resources of expertise, student capacity and of leadership; and as advocates for specific policies at the local, state and national levels, colleges and universities have always played substantial roles in the effort to prepare communities and make them more resilient in the face of growing climate change impacts (www.presidentclimatecommitmen.org). They could serve as “hubs” in communities on adaptation issues, creating, testing, and disseminating knowledge about regional climate projections and adaptation strategies, and work directly with local communities to explain the science and implement solutions. Rising to the above responsibilities demand capacities at individuals, organizations and systems levels in the universities and their faculties. Ideally, such capacities should include knowledge/skills and competencies, scientific, resources (human and institutional) required to generate, innovate, and disseminate information, knowledge or technology for agricultural adaptation to climate change.

Therefore, this study aimed to assess the extent to which the requisite capacities exist in the faculties of agriculture of the universities. The objectives were to: 1) assess the research capacities on climate change agricultural adaptation in the faculties of agriculture; 2) examine the capacities for outreach on climate change agricultural adaptation and 3) determine the factors that constrained the capacities for research and outreach in the faculties of agriculture on climate change agricultural adaptation.

METHODOLOGY

The survey was conducted in southeast agro-ecological zone of Nigeria. Southeast is located between latitudes 04°17' N and 07°06' N and longitudes 05°23' E and 09°28' E (Macmillan, 2009). The area comprises the geographical location of five States namely Abia, Anambra, Ebonyi, Enugu, and Imo (Figure 1). The climate of southeast Nigeria is generally tropical with two clear identifiable seasons: the wet and dry seasons with average highest annual rainfall at 1952 mm and temperature pattern-mean daily and annual temperature at 28 and 27°C, respectively (Igbokwe et al., 2008). It is primarily an agricultural zone with sandy, mostly loose and porous soil, hence its vulnerability to climate change. Three States namely Abia, Anambra and Enugu out of five States were purposively selected because of the presence of Federal and State universities/faculties of agriculture. All academic staff within the faculties of agriculture constituted the population for the study. In each State, two universities (State and Federal) were purposively selected as follows: Abia State (Michael Okpara University of Agriculture (MOUA), Umudike, and Abia State University (ABSU) Uturu); Anambra State (Nnamdi Azikiwe University (UNIZIK) Awka and Anambra State University (ANSU), Uli); Enugu State [University of Nigeria, Nsukka (UNN) and Enugu State University of Science and Technology (ESUT), Enugu]. Simple random sampling

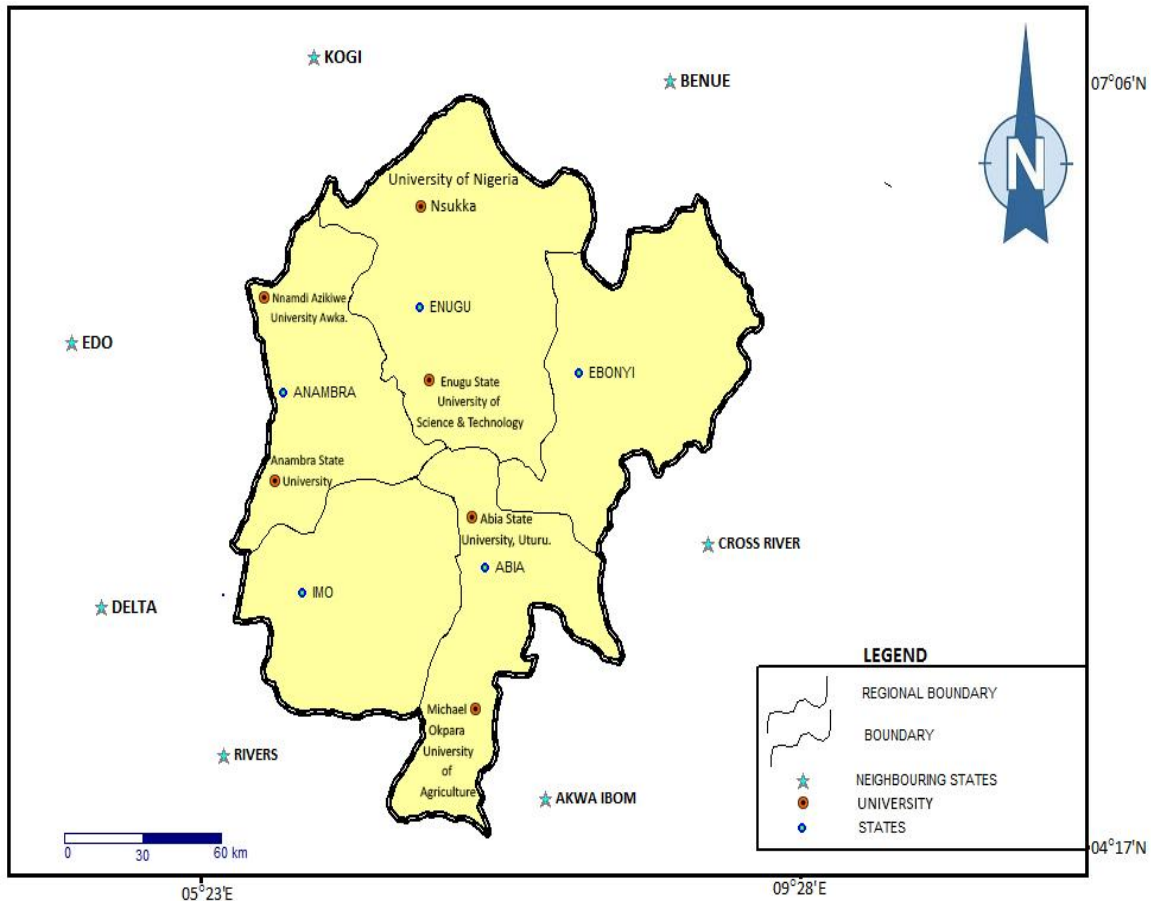


Figure 1. Map of southeast Nigeria showing the study area and the selected universities. **Source:** Macmillian Atlas series (2009).

technique was used to select five staff across the departments in the faculty/college of agriculture of each university. An exception was made at the Nnamdi Azikiwe University Awka, where five staff of the faculty was selected because the faculty was not yet fully departmentalized. The total sample size for the study was 130 respondents. Questionnaire was used for data collection and only 120 questionnaires were found analyzable. Capacities of universities for research on climate change adaptation were assessed by asking respondents to indicate investment/efforts that have taken place by the universities in the areas of equipment, staff training, linkages within institution, with relevant institutions and researches carried out, among others. Outreach capacities were measured in terms of its existence, methods and/or strategies adopted for outreaches and others. The respondents were asked to indicate the channels (example: use of radio programmes/jingles on climate change issues, use of television, posters, fliers, farm visits, public lectures etc) employed for climate change outreach and whether they have participated in State/National discuss on climate change. Information on constraints to research and outreach capacities of the universities were elicited using 16 possible constraint items such as inadequate fund, lack of favourable policy, poor infrastructural facilities and others. Respondents indicated the extent to which the items constrained capacities of the universities on a four point Likert-type scale of: no extent (1), little extent (2), great extent (3) and very great extent (4). Data were analyzed using descriptive statistics. Mean scores ≥ 2.5 were considered as major constraints. Data were presented with histograms.

RESULTS AND DISCUSSION

Capacities for research on climate change agricultural adaptation in the faculties of agriculture

The issues discussed here include: investment in equipment and human development, linkages and collaboration with institutions/agencies, and conferences attended on climate change, etc.

Investment in equipment and human development in faculties of agriculture

About 19.0% of the respondents indicated that they had invested on equipment for research on climate change adaptation in the universities (Figure 2). Personal observation and communication show that some of the investments on equipment are in the areas of library stocking, information communication technologies facilities and refurbishing of a Geographic information systems (GIS) laboratory used in accessing information in geographic systems. About 26% expressed that there

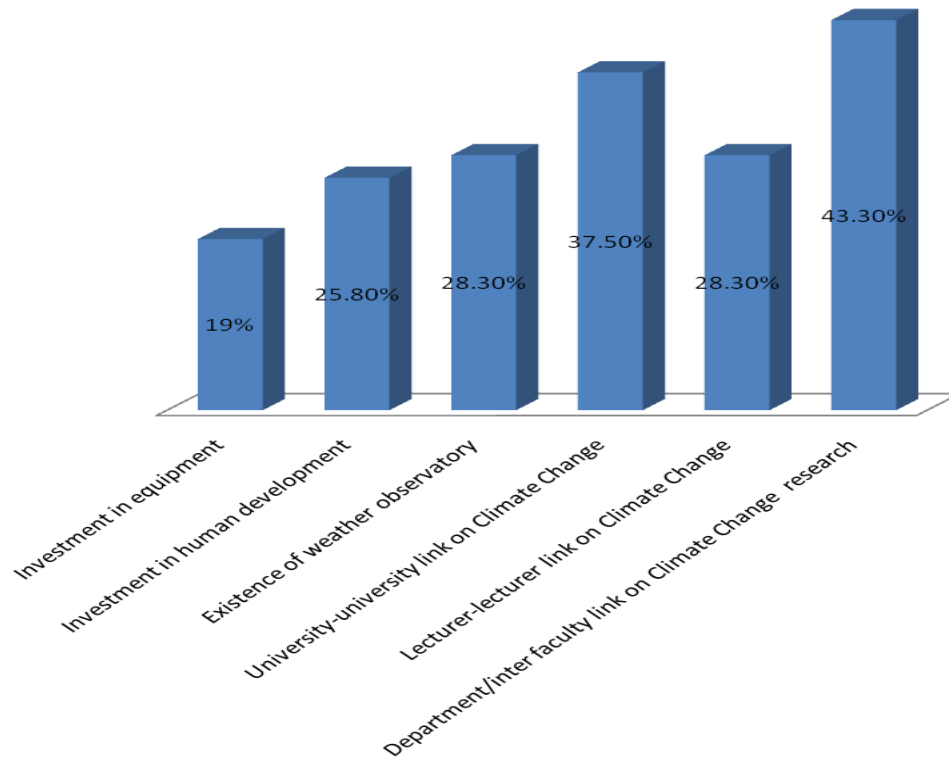


Figure 2. Investment and linkages on climate change.

were investment in human development for research on climate change adaptation. Further interview with the respondents however, revealed that they had received training on trans-disciplinary research methodology and update to curriculum in response to the need for adaption to climate change. Specifically, respondents from UNN had participated in trainings on climate change and sustainability, general knowledge on climate change, sensitization workshop/ trans- disciplinary climate change adaptation capacity, air and water pollution. Generally, the efforts so far made by the universities are insufficient to size the magnitude of the challenges posed by climate change. According to World Bank (2010), human development (level of education and specific skills) and technical capacity (type of equipment for climate data collection and monitoring, GIS, quality of information technology services, etc.) available within an institution to support activities for adapting and/or mitigating the impacts of climate variability and change on the agricultural sector remains paramount in curbing the challenges of climate change.

Furthermore, 28.3% of the respondents acknowledged the existence of weather observatory facilities in their faculties. Weather forecasting facilities are critical in addressing the challenges of climate change in the Universities. According to Mude et al. (2009), better and more timely information through weather facilities could help to forecast impending weather events such as

flooding, drought, early and late rain etc more effectively and thereby improve response times and adaptation. Thus, its limited availability in the faculties of agriculture suggests poor climate science capacities in the system.

Linkages for climate change research

The respondents acknowledged the existence of weak departmental and faculty (43.3%), university-university (37.5%), and lecturer-lecturer (28.3%) linkages in the universities for climate change research (Figure 2). Largely, the findings agree with Orusha et al. (2012) that academic programs in agriculture tend to exist in isolation, with little collaborations between institutions, even among those in the same geographic area. This means that innovations, research activities and programs are conducted with limited linkages/collaborations, interactions and synergy across and within institutions and disciplines. The impacts of climate change cut across sectors and discipline; thus approaches, initiatives or research activities targeted at developing adaptive capacities should be inter and/or trans-disciplinary and participatory. In other words, resources, ideas, skills among universities, departments, faculties and lecturers should be harnessed for interdisciplinary research in the whole system. Such interaction expunge knowledge flow and expunge idea fertilization across disciplines on how

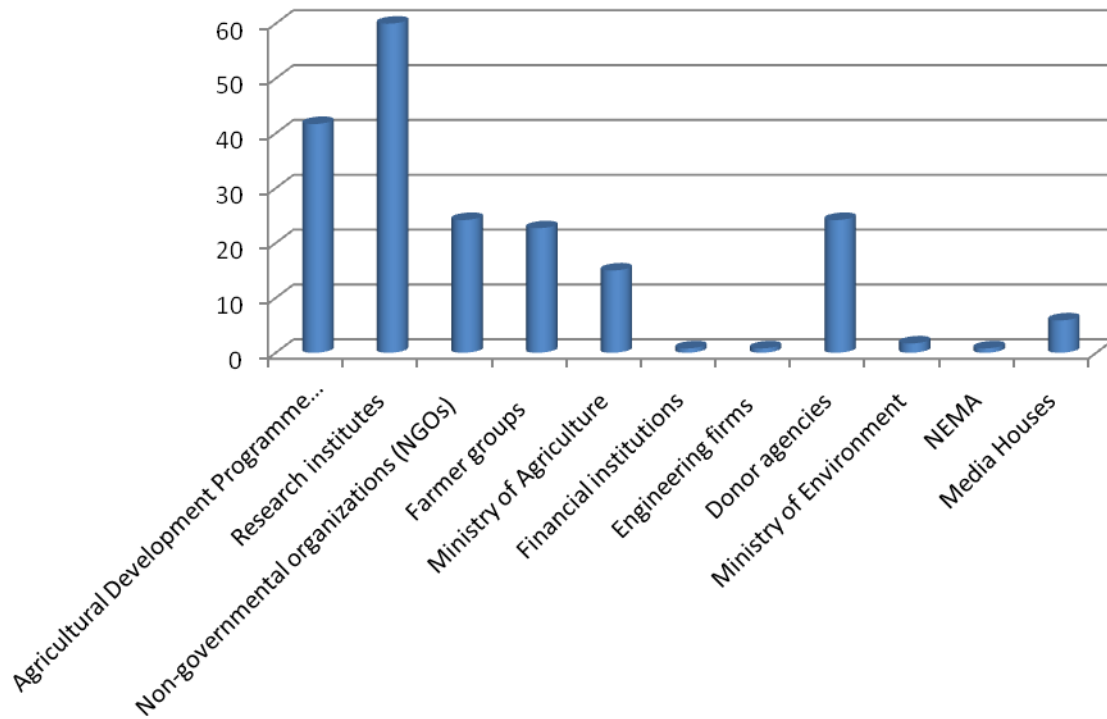


Figure 3. Percentage distribution of respondents by linkages with institutions on climate change.

best to tackle the challenge of agricultural adaptation to climate change. Above all, institutions shape and modify the capacity of one another; collectively prepare farmers, and all-dependent people to adapt their livelihoods to the context of climate change (FAO, 2010).

Linkage with other organizations on climate change agricultural adaptation

Figure 3 shows that majority (60 and 57.5%) of the respondents indicated the existence of linkages with research institutes and Agricultural Development Programmes (ADPs), respectively. Other areas of institutional linkages include: Non-governmental organizations (NGOs) (24.2%), farmer group (22.7%), Ministry of Agriculture (15.0%), financial institutions (0.8%), engineering firms (0.8%), donor agencies (24.2%), Ministry of Environment (1.7%), National Emergency Management Agency (NEMA) (0.8%) and media houses, (5.9%). Linkage particularly with research institutes and ADPs is more common probably due to interdependency in roles, functions and operations of the institutions; however, the strength, mechanisms and orientations may not be strong and effective. Generally, most linkage arrangements among institutions and agencies are dysfunctional, ad-hoc and inhibited by several economic, structural, organizational and institutional problems. However, linkage and collaboration

on issues of public and global interest like climate change are crucial for evolution of multifaceted and holistic approaches to climate change adaptation needs. Though, each institution and agency has roles to perform but not in isolation. For instance, while education and research institutions are looked upon for generation/development of technologies, knowledge and skills; the ADPs, weather and environmental agencies, the media houses are critical actors in the dissemination of relevant information to the users for agricultural adaptation to climate change. Hence, World Bank (2010) recommended collaboration and communication with other agencies, bilateral/multilateral exchanges with other countries (south-south or north-south collaboration) on addressing climate variability and change.

Respondents' personal activities on climate change

Collaboration with agencies/organizations and supervision of climate change research

Figure 4 shows that only 5.0% of the respondents had personal collaboration with agencies and organizations on climate change issues. Twenty percent (20%) had supervised postgraduate students, while a lesser proportion (2.0%) had supervised undergraduate students on climate change research. The result reflects poor capacities and participation of the staff of faculties of

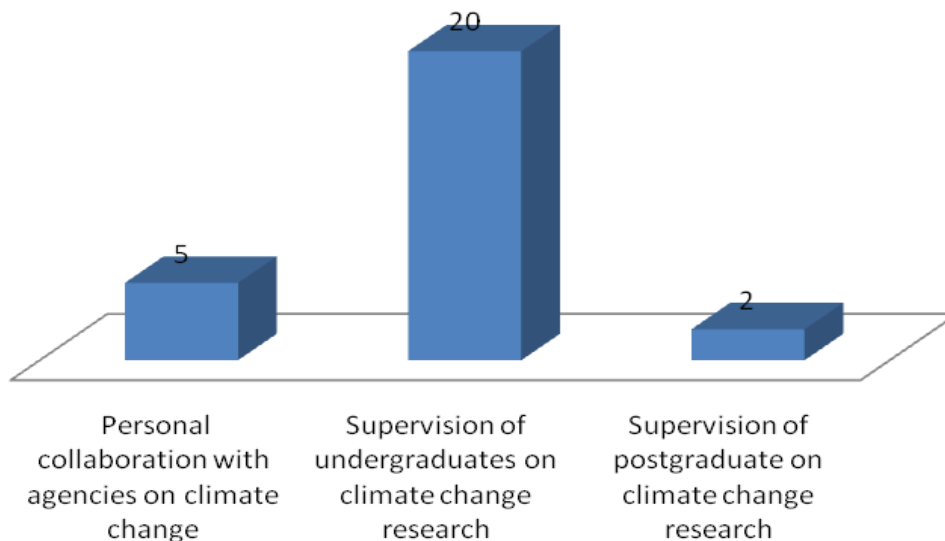


Figure 4. Percentage distribution of Staff by collaboration and supervision on climate change.

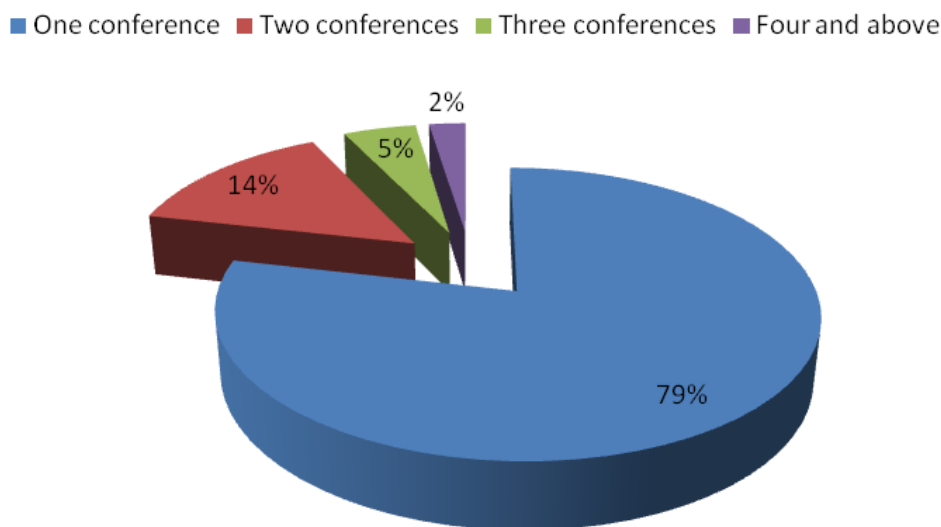


Figure 5. Percentage of respondents based on conferences attended on climate change.

agriculture in climate change research. It suggests poor commitment, orientation and perhaps lack of incentive for participation in climate change adaptation concern. Research and collaboration are interrelated activities critical for both development of technology, creation of knowledge, facilitation of interaction, exchange, and sharing of information for climate change adaptation. Interactions between actors on climate change according to Dominguez and Brown (2004), allow sharing of information, learning and boosting the capacities of researchers. This is because adaptation capacity demands incorporation of multi-stakeholders including climate science experts, agricultural practitioners and

technicians, local communities/civil society, donors and policy makers (Asiedu et al., 2011).

Conferences attended on climate change in the last 3 years

Majority (62.3%) of the respondents attended one conference, while about 21 and 11.3% attended 2 and 3 conferences on climate change, respectively (Figure 5). Only 3.8 and 1.9% of the respondents had attended between 4 and 5 conferences on climate change, respectively. The average number of conferences

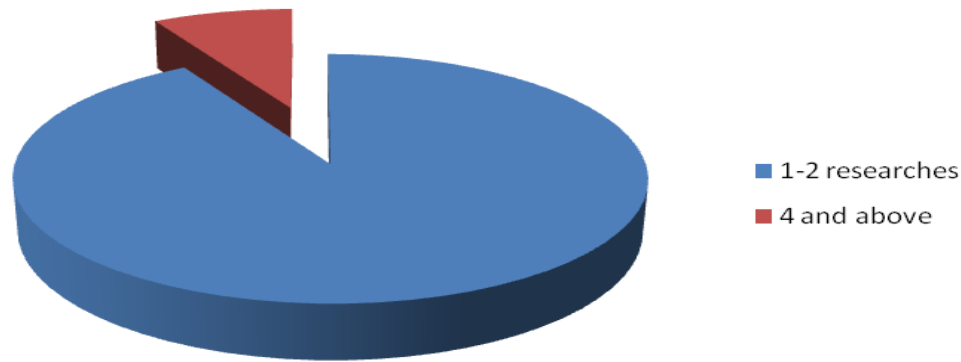


Figure 6. Percentage distribution of respondents based on researches carried out on climate change.

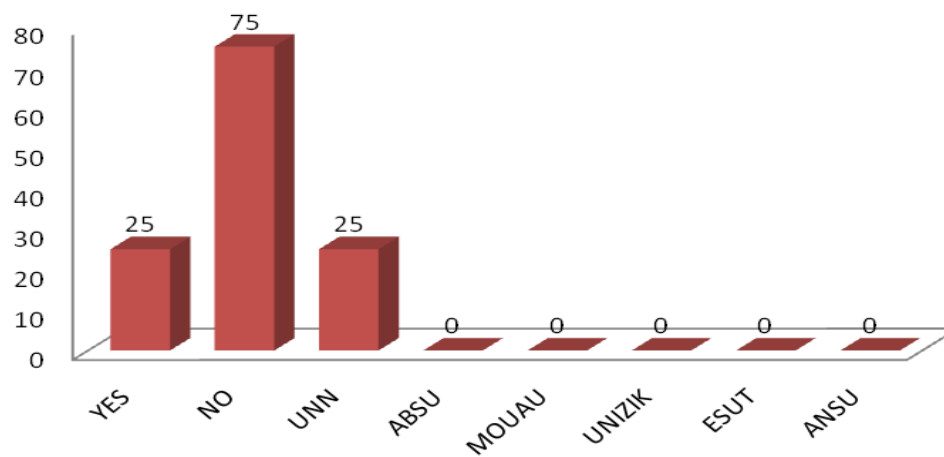


Figure 7. Percentage distribution of respondents based on availability of fund for climate change research.

attended in the last 3 years was 2. Relatively, this shows low exposure of the academic staff of the faculties to climate change issues. Attendance to professional conferences are expedient to facilitate exchange of ideas, encourage innovativeness; articulate and focus research priority to the need of the moment. This is even more pertinent for issues of global concern like climate change.

Researches carried out on climate change in the last 3 years

A greater proportion (91.7%) of the respondents had carried out 1 to 2 researches, while 8.4% had conducted 4 or more researches on climate change in the past 3 years (Figure 6). The average number of researches carried out by the respondents was 2. The results show that a considerable number of researches have been conducted on climate change in faculties of agriculture in the universities. Interview revealed that majority the

researches were conducted at the University of Nigeria, Nsukka. This is not surprising because the University has organized a number of workshops on climate change and related issues. Many universities may not have had such novel opportunities and hence limited incentive and motivation for notable research efforts on climate change.

Availability of fund for climate change activities

Twenty-five percent (25%) of the respondents, specifically from University of Nigeria, Nsukka indicated availability of fund for climate change activities (Figure 7). Other universities expressed non-availability of fund for climate change activities. This appears to be one of the long aged and unabated problems in higher institution in Nigeria. According to Nigeria University Commission (NUC) (2000), Nigerian Universities have been underfunded especially in the area of capital development and research grant. Hence, researchers

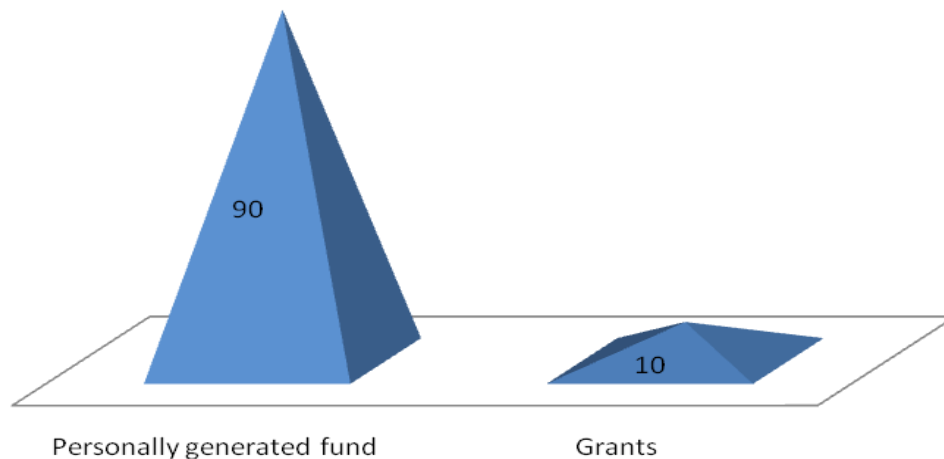


Figure 8. Percentage distribution of respondents based on sources of fund for climate change research.

rely mostly on limited external funding for a qualitative research. This is a strong disincentive and impediment to any meaningful efforts on capacity building in teaching, research, and outreach on climate change. As reported by FAO (2010), confronting the challenge of climate change creates new financing requirements in terms of both amounts and financial flows associated with needed investments, which will require innovative and institutional solutions.

Sources of funding for research on climate change

Majority (90.0%) of the respondents indicated that the universities depended on internally generated funds for research on climate change, while 10.0% indicated that funding was from grants (Figure 8). This suggests strong demonstration of commitment to research on climate change. However, dependence on internally generated fund may not be adequate and sustainable. Severally, scholars have sported out poor funding as one of the major constraints in tertiary institution (Chakaredza et al., 2008). Access and use of external/donor funds for research on climate change are necessary and cannot be over emphasized.

Area of funding on climate change adaptation

The areas of funding on climate change were library stocking with climate change text books (23.3%), research (20.8%), workshops (18.8%) and conferences (15.5%). Other areas include; symposiums (14.5%) and funding of staff travel (14.5%) for climate change- related issues (Figure 9). Many relevant activities for capacity acquisition are funded in the university, but the low

responses of the respondents suggest inadequate investment and limited coverage. Climate change adaptation requires knowledge and capacity building across disciplines which requires adequate and sustainable funding.

Outreach programmes/extension on climate change

Only 25.0% of the respondents from the University of Nigeria, Nsukka indicated participation of the University in State or National discourse on climate change issues. Similarly, 25.0% of the respondents indicated the existence of outreach programme on climate change in the Faculty of Agriculture (UNN) (Table 1). Respondents revealed that the major outreach programme in the university is carried out by the 4th year students of the Faculty of Agriculture as part of the Student Internship Work Experience Scheme (SIWES). The outreach targets creating awareness, building knowledge and capacity of the rural farmers on climate change, sustainable adaptation strategies etc. It is also accepted as means of promoting collaboration between scientists and practitioners, and enhancing local adaptation capacity including the ability to draw on climate data (Open Society Foundation, 2012). Besides, the students as well as academic staff explore the opportunity to build critical mass of capacities on climate science and to respond appropriately in their professions.

Furthermore, Table 1 shows different media of outreach to rural communities on climate change. The medium used always were posters (10.0%), radio (9.2%), fliers (2.5%), newspaper (0.8%) and newsletter (0.8%). About 36% of the respondents indicated that the university sometimes used fliers as a medium of outreach on climate change. Other media sometimes used for

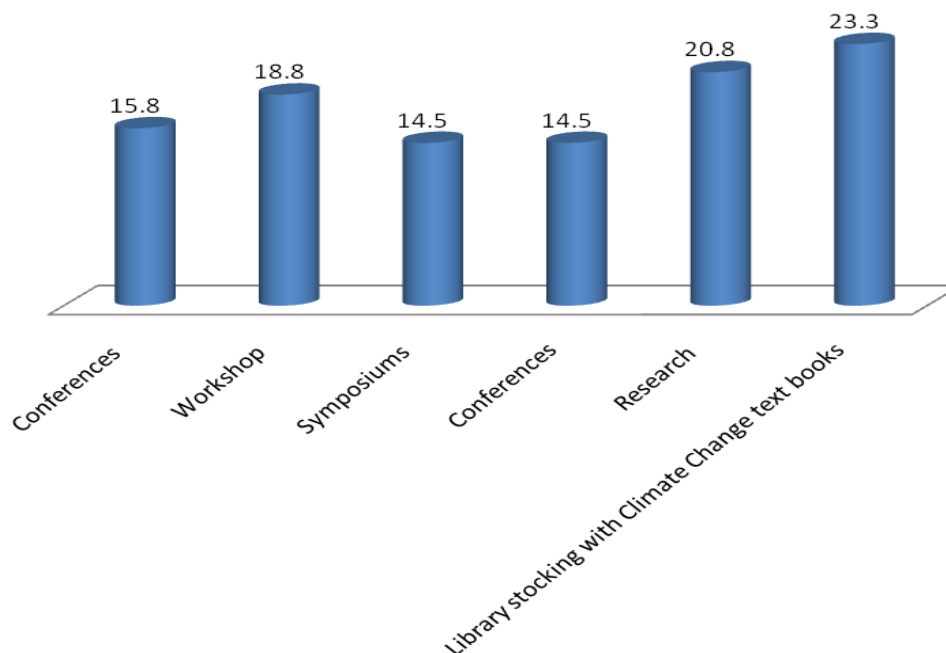


Figure 9. Percentage distribution of respondents based on activities on climate change funded

Table 1. Percentage distribution of respondents based on outreach/ medium of outreach and state/national discourse on climate change.

Outreach and medium	% (n = 120)	
Faculty outreach on climate change	25	
State/National discourse on climate change	25	
Medium of outreach	Sometimes	Always used
Radio programmes/jingles	15.1	9.2
Television	3.4	
Newspaper	10.3	0.8
Fliers	36.4	2.5
Posters	31.9	10.9
Newsletters	12.7	0.8
Pamphlet	8.5	-
Farmers' visit	18.3	5.8
Public lecture	10.1	19.3
Group discussion visits	12.6	14.3

outreach include; posters (31.9%), farm visit (18.3%), radio, (15.1%), newsletter (12.7%), newspaper (10.3%), public lecture (10.1%), and pamphlet (8.5%). Many channels are used but the extent of use in communicating climate change information and technology is very poor. Indeed, the urgency of building climate change adaptation capacities, particularly in the agricultural sector requires adoption of multiple, but appropriate and effective channels of communication. FAO (2010) affirms that communication and equitable information access of rural people and institutions to

information related to impacts of climate change variability and adaptation demands appropriate channels. Appropriateness however, is relative to the audience the messages are intended.

Perceived constraints to capacities for research and outreach on climate change

The major constraints to capacities of the universities for research and outreach on climate change were high cost

Table 2. Mean scores on constraints to capacity building for research and outreach on climate change.

Constraint factors	Mean	Standard deviation
Poor teaching material	2.67	0.643
Inadequate ICTs facilities	2.88	0.640
Lack of reliable weather forecasts/climate change information	2.79	0.592
Limited grant for climate change research	3.35	0.691
Lack of interest of staff and the public	1.88	0.977
Poor collaboration with other agencies	2.74	0.567
Lack of weather observatory	2.76	0.606
Lack of fund	3.36	0.653
Poor human resources capacity	2.65	0.691
Poor interest in climate change research	1.65	0.849
limited outreach on climate change	2.24	0.741
Poor technical and communication skill	2.74	0.567
Limited availability of media network	3.00	0.651
High cost of TV, radio and newspaper adverts on climate change	3.44	0.561
Lack of CC issues integrated in rural development	2.85	0.702
Corruption in the university system	2.65	0.646
Poor remuneration of staff	2.76	0.663
Lack of policies/policy implementation on climate change	2.85	0.558
Poor understanding of climate change concepts	3.36	0.603

of TV, radio and newspaper adverts ($M = 3.44$), poor understanding/knowledge of climate change concepts ($M = 3.36$), limited grant for climate change research ($M = 3.35$), limited availability of media networks ($M = 3.00$) and inadequate Information and Communication Technologies (ICTs) facilities ($M = 2.88$) (Table 2). Others include poor integration of climate change issues in rural development ($M = 2.85$), lack of policies/policy implementation on climate change ($M = 2.85$), and poor weather forecast/climate change information ($M = 2.79$), lack of functional weather observatory ($M = 2.76$), poor remuneration of staff ($M = 2.76$), poor collaboration with agencies ($M = 2.74$), poor technical and communication skill ($M = 2.74$), poor human resources capacity ($M = 2.65$), corruption in the university system ($M = 2.65$) etc. In other words, capacities for climate change adaptation research and outreach in the universities are inhibited by economic, technical, infrastructural and personnel-related factors. The results corroborates with Aiyamenkhue (2012) which reports that the Nigeria university system is bedeviled with the challenges of poor infrastructure (inadequate classrooms and teaching aids etc); paucity of quality teachers, poor or polluted learning environment and others. This presents a formidable challenge to the university system in positively and significantly contributing to addressing the problem of climate change. For instance, poor infrastructural base, human resource and environment could hinder teaching, research, technology generation, communication and dissemination of useful information on climate change adaptation. In turn, it could leads to poor adaptation to climate change

as pointed out in Ozor et.al. (2010). Also, unfavourable government policies are inhibitors to the propagation and advancement of climate science and adaptation capacities in the institutions and the public in general. Ideally, government is expected to play the roles of setting priorities, participating and enacting laws that could enhance capacity and development needed for adaptation to climate change. Furthermore, lack of fund or grant for teaching, conducting research and outreach on climate change according to Obiora (2012) incapacitates the universities in taking leadership role for climate change adaptation in the country.

Conclusion

Results of the study show that capacities for research and outreach on climate change adaptation in the faculties of agriculture are weak. Relatively, no substantial programmes/workshops/conference, investment, researches and outreach have been implemented or carried out in the universities. Minimal responses and commitment to the challenges of climate change adaptation is only visible in one of the universities studied. Capacities for research and outreach are constrained by several issues ranging from economic, institutional, infrastructural and personnel related factors. Given the critical roles of universities as centers of learning, research and innovation, government should enact favourable policies, mandates and institutional supports that would encourage, spur and stimulate

activities in the universities on climate change adaptation. The university system should internally put in place activities, strategies and programmes or projects that could attract external aids, collaboration and raise staff interest and motivation to acquire capacities and contribute to increase awareness, knowledge, skill and technology generation for agricultural adaptation to climate change.

Conflict of Interests

The authors have not declared any conflict of interests.

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