

5TH CLIMATE CHANGE & POPULATION CONFERENCE ON AFRICA

CC POP-GHANA 2016

VENUE

**Noguchi Memorial Institute for Medical Research, Legon
University of Ghana, Legon, Accra, Ghana
19th – 21st July 2016**

PROGRAMME & ABSTRACTS

THEME

“Building Bridges and Research-Into-Use”





5TH INTERNATIONAL CLIMATE CHANGE
& POPULATION CONFERENCE ON AFRICA
CCPOP-GHANA2016



PROGRAMME AND ABSTRACTS

Hosts

**Regional Institute for Population Studies (RIPS)
Climate Change Resource Centre-Ghana (CCRC-Gh)
University of Ghana**





THE UNIVERSITY OF GHANA



History

The University of Ghana, the premier university and the largest university in Ghana was founded as the University College of the Gold Coast by Ordinance on August 11, 1948 for the purpose of providing and promoting university education, learning and research. As a University poised to distinguish itself in the area of research to make an impact at the national and international level, the University has launched a new Strategic Plan. This new strategic plan (2014-2024) is intended to consolidate the gains made from the review of the University's mission and practices and situate these within the context of a very dynamic environment of higher education in Ghana and beyond.

Our Vision

To become a world class research-intensive University over the next decade.

Our Mission

We will create an enabling environment that makes University of Ghana increasingly relevant to national and global development through cutting-edge research as well as high quality teaching and learning

As part of its vision to become a world class research intensive institution, University of Ghana has identified four priority areas where the university will focus and promote international collaboration in research initiatives to enhance the University's research output. These research areas are:

- Malaria Research
- Trans-disciplinary Research into Climate Change Adaptation
- Enhancing Food Production and Processing
- Development Policy and Poverty Monitoring and Evaluation



THE CONFERENCE – CCPOP-Ghana2016

The year 2015 was a watershed for several global challenges yet opportunities of the coupled human-environment system ranging from development goals to managing the environment to ensure balanced growth. The Sustainable Development Goals (SDGs) marked a new era of international development paradigm to promote Green Growth, whilst the Paris Agreement behind the Nationally Determined Contributions (NDCs) of the parties to the UNFCCC are expected to offer new opportunities and incentives to mitigate and adapt to climate change.

With increasing human population and associated increased growth and consumption, the evidence of climate change as one important challenge of our time to drive growth and development is now established with remarkable scientific evidence. The link between the science of climate change and development are very much clearer than before with reasonable level of confidence as a major challenge to ecosystems that affects the entire population, especially the poorest. Impacts will vary depending on geographical location and the characteristics of the population. Therefore the International Climate Change and Population Conference on Africa (CCPOP-GHANA) is held annually to engage discussions on local, national or regional issues as means to increase citizen engagement of duty-bearers to be responsiveness to climate change.

Adapting to the challenge of a changing climate in Sub-Saharan Africa requires strategies for an integrated management of land, water and living resources that is equitable and integrated in approach. This is because there are multiple economic, socio-cultural and technological forces operating simultaneously and at multiple scales (local to global). Therefore there is the need to raise the profile of scientific research from basic to applied, or intervention research to promote “Research-into-Use” (RIU). Science is therefore at crossroads with efforts of policy and practice to address the problems and issues arising from climate change requiring intersectoral collaboration, technocratic approaches, integrated understandings of the issues, use of evidence in decision making, and imbalances in community, civil and private sector inputs to decision-making. Such approach should provide leadership and create enabling spaces through bringing key actors together around a shared vision and strategic thinking through nurturing opportunities for and catalyzing synergies of existing and emerging climate change research and intervention activities. Subsequently, the conference in 2016 will promote and facilitate 3 major goals as follows:

- Enhance leadership that raises the profile of climate change through intervention research excellence, stakeholder engagement, knowledge sharing and impact on policy and practice;
- Enhance leadership that fosters a shared vision amongst researchers, stakeholders in development from different sectors, disciplines and levels of interest (local to international), and identifies pathways towards adaptation to climate change; and
- Enhance leadership that builds momentum and synergies to institutionalize sustainable development goals and adaptation strategies in creating space for innovation and research into use (RIU) and new pathways for scaling up adaptation practices.



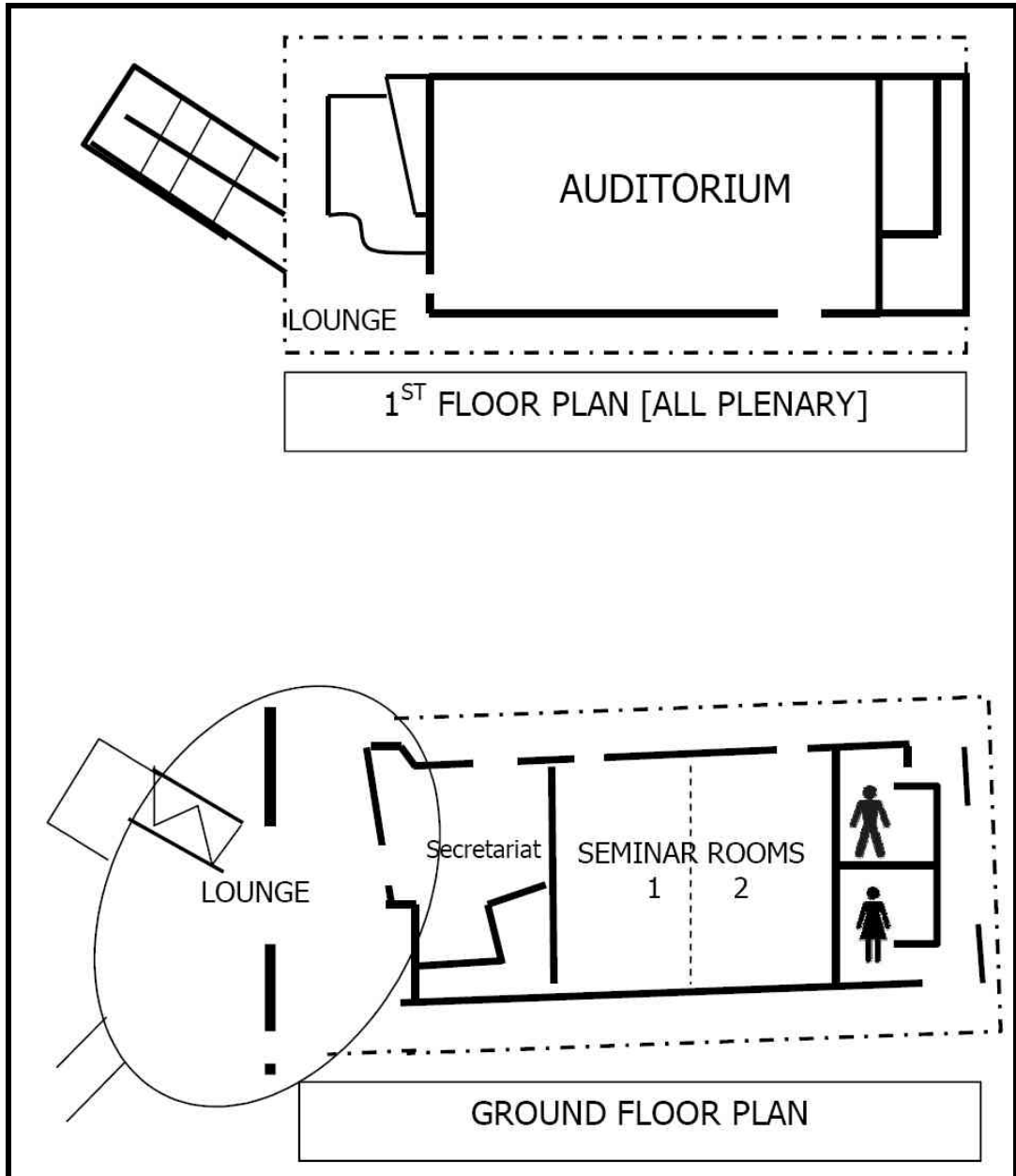
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YOUR GUIDE TO THE MEETING VENUE

Noguchi Memorial Institute for Medical Research Conference Centre, Legon





HOST INSTITUTION MESSAGE

VICE CHANCELLOR'S WELCOME REMARKS

Prof Ernest Aryeetey, Vice Chancellor

Excellencies, Distinguished Guests, The Diplomatic Corps, Heads of Missions, Invited Guests, Colleagues, Distinguished Ladies and Gentlemen:

It is with excitement and warm heartedness to welcome you to the University of Ghana and most importantly to this august and highly relevant gathering of our time. The University of Ghana prides itself in excellence across all spheres of human endeavour, including learning, research, community service and policy decision-making. This conference is one of the important revolutions in our academic calendar as a Research University in promoting legitimate response to climate change by academia. In its fifth year, the International Climate Change and Population Conference on Africa spanned my tenure as Vice Chancellor, and have made significant impact on Africa.

As I leave office in a few days I wish to emphatically state that the University of Ghana has been well represented in the global debate on climate change through its scholarly work. Our Climate Change Working Group seeded monetarily few years ago is providing regional leadership in climate science and interventions. The remarkable change I have witnessed in our approach to the global climate debate should help motivate African scientists and others present here today or who have been part of this conference over the years. This conference gives me a lot of hope that Africa will rise beyond its challenges to tackle climate change and sustainable development. I am confident that the leaders that continue to emerge from this climate change conference will reach out to governments and the world. Our scientists have already demonstrated this, and delivered on Ghana's Nationally Determined Contributions (NDCs) to the UNFCCC. The University of Ghana will not relent in providing relevant platforms to all stakeholders to support the implementation of the Paris Climate Agreement.

Since I last chaired this conference a year ago at this same venue, and announced that the University of Ghana was aiming at world class research status, our ranking has since risen significantly. I recognise the qualities of this conference and other activities which have contributed to our achievements for which I am grateful to you all. This year's theme speaks for itself and suggesting that we have indeed hit a milestone to impart policy and development in the area of climate change "Building Bridges and Research-Into-Use". I therefore call on state agencies, development partners, civil society, vulnerable populations, industry and businesses across the African continent to team up with local research scientists to find solutions to climate change through Climate Compatible Development (CDD). Investment in research pays, and today I am reliably informed that the University Ghana is developing Flood Early Warning System (FEWS) for a Climate Smart Integrated Flood Management (CSIFM) of Accra. I invite potential partners to initiate research chairs in African Universities to address some of the most challenging problems in our societies.

Excellencies, distinguished ladies and gentlemen, we have a responsibility to leave sound environment and development legacy for the future generation. That is why I wish to call for vigorous discussion of issues at this conference with passion and commitment divorced from any differences including academic warfare, and focussing on society and development. I wish to welcome you by thanking you all for your support and the opportunity to be part of this flagship conference, the last I will chair in my tenure of office.

May God Richly Bless You



CONFERENCE LOCAL ORGANISING COMMITTEE

Dr Delali B. Dovie

I wish to congratulate all those who have recognised and participated in this International Climate Change and Population Conference on Africa (CCPOP-Ghana) on the occasion of its 5th Anniversary where Scientists, Politicians, Civil Society, Young People, etc dialogue on climate change issues of utmost significance to the African continent. Several initiatives, networks and partnerships have emerged from this young conference to bring about change in our societies and may I particularly congratulate the Parliament of Uganda for consistently sending some Honourable members to this conference to influence decisions in their chamber.

This conference has also become citadel for grooming leaders and young scholars who may not have the opportunity to attend similar meetings because of high costs associated with attending such meetings outside the African continent. We should aim at growing this unique conference to support regional, sub-regional and national level initiatives, deliberations and actions on climate change and sustainable development. It is important that this year's conference discussions from science to policy and interventions, what we call "Research-into-Use" transcend several disciplines and tangible issues, based on which presentations were selected.

The international community has agreed on a new global climate compact for the period 2020 – 2030, the Nationally Determined Contributions (NDCs). The Paris Agreement partly overlapping with the new deal for the Millennium Development Goals, which culminated in the Sustainable Development Goals (SDGs), with dedicated Goal 13 to climate change. The Local Organising Committee is also looking forward to informal discussions on the 22nd Conference of Parties (COP 22) to be held in Marrakesh, Morocco later this year in November, and ready to hold Pre-COP22 event(s) if called upon to do so by our government and / or other interest groups.

Providing continuous political and financial support to sustain a conference of this nature is important and partly fulfilling the implementation of the global agreements. I wish you a Happy 5th CCPOP-Ghana Conference Anniversary.

INVITATION TO THE AWARD – WINNING PLENARY ON DAY 3

The LOC is pleased to invite you to the Day 3 Plenary featuring the University of Ghana Scientist who won Gold at the 2016 Prestigious Global Innovation Competition Grand Challenge for Development. The event was organised by Making All Voices Count, an initiative of USAID and DFID–UK. The only Ghanaian Team among the fifteen finalists was led by Dr Delali Benjamin Dovie, Senior Lecturer at the University of Ghana, and Dr Raymond Kasei of the University for Development Studies as Co-Awardee. The competition which started in September 2015 and entered by 400 Teams from Asia and Africa involved 5 thematic areas which finally ended in Accra from 21st – 26th February 2016 where the Awards were announced. A major output of the project will be "Flood Early Warning System" with the Command Centre resident at the University of Ghana's Regional Institute for Population Studies (RIPS). Photo: Dr Dovie (extreme left) and Dr Kasei (Middle) received Plaque and Certificate from Dr Omame Boamah, Minister of Communications Ghana and officials from USAID and MAVC looked on.



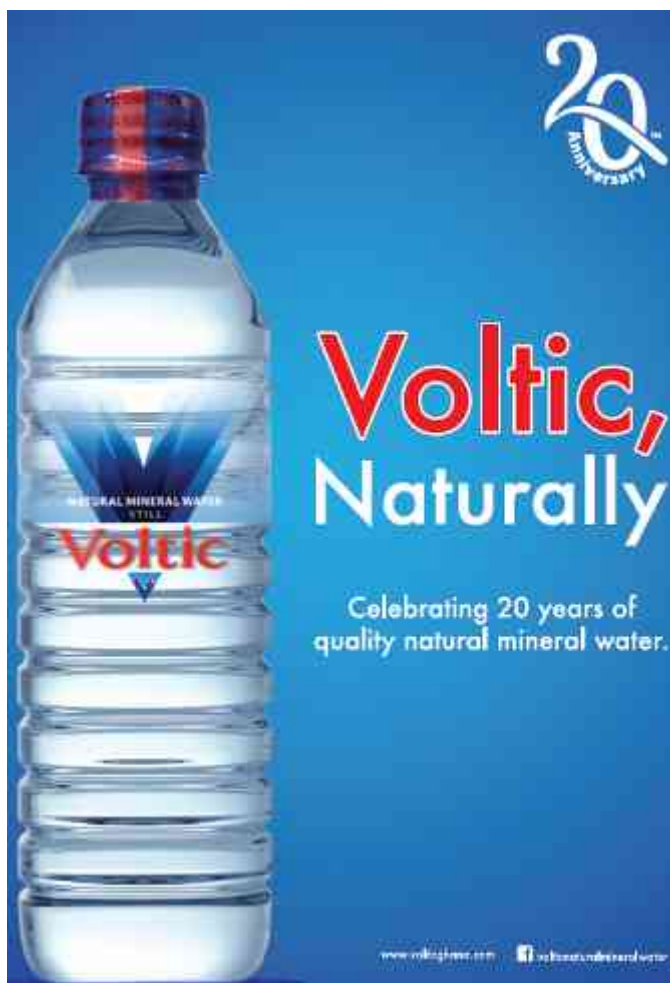


CONFERENCE ORGANISATION AND MANAGEMENT

Local Organising Committee (LOC)

Dr. Delali B.Dovie	Chair, Head of Scientific Programming & International Relations
Prof. Samuel Codjoe	Member, Institutional Facilitation
Mrs Arhizah Blay-Abiti	Member, Coordination and Logistics
Mr Michael Wiredu	Member, ICT Programming and Communication
Ms Victoria Anim	Member, Administrative Support
Mr Samuel Quaye	Member, Finance and Registration
Mr Felix Larbi Aryeh	Member, ICT Logistics / Webmaster

THE LOC APPRECIATES THE SUPPORT OF VOLTIC





GENERAL CONFERENCE INFORMATION & LOGISTICS

Accommodation

The two main accommodations to be used by meeting participants are the University Guest House and Yiri Lodge (African Studies Chalets). They are easy to find once you get to the University Ghana Campus. You may also inquire from the security post at the main entrance of the university. Note that certain taxis / cars may not be allowed in so let them know that you are attending the Climate Change Conference at Noguchi organised by the University of Ghana. You may call the following number for attention: +233 (0)546264518.

Restaurants

There are several eating places on campus ranging from traditional restaurants “chop bars” to sophisticated settings. The campus accommodations have their own restaurants and bars from which both local and European dishes are available and reasonably priced. Amounts from \$3 - \$10 should give you an excellent meal around the meeting venue but you must be prepared to spend more for a buffet or extras. You will also find eating places in all the residences on campus, the closest to the meeting venue is the Night Market close to the International Students Hostel. You do not have to go outside the campus to find food. There is also a restaurant bordering the meeting venue.

Transportation

Taxicabs are easily accessible and plying between the University of Ghana Campus and the Legon Lorry Park / bus stop (although just a walking distance), from where you can connect to Accra CBD and other suburbs. In most of the cases, you do not have to hire a taxi. Mini and big buses are also available, again on the University of Ghana campus and the bus stops outside the main University entrance. When in central Accra, you can join any bus or taxi heading towards Madina, Adenta, Atomic, and Ashale Botwe, and get off at the Pentagon Residence, Legon Bus Stop or Police Station opposite the old university entrance, waling distance or short drive to meeting venue.

Shops & Banks

There are various forms of shops in Accra, ranging from table top to kiosks, tuck shops and supermarkets and shopping malls. On campus, you will find smaller shops and tuck shops. Supermarkets are found around the university basic schools, central cafeteria & the international students' hostel, easy to reach on foot, and Banks. You may also visit the student halls for other services and the central cafeteria

around the athletic oval (refer to map). The closest Accra shopping mall is the Accra Mall (about 3 km from the University Campus on your way to the CBD). Get off at the Tetteh-Quarshie interchange and cross left to the Spintex Road.

Pharmacies, drug stores and clinic

These are also available on campus and within some of the halls (e.g. Legon Hall Annex B) where you can purchase simple medications. There is a campus clinic located within the Central Cafeteria. The university hospital is behind the Police Station, opposite the old University entrance which is ready to assist with all cases.

Laundry

The two major laundries on campus are found in the Legon Hall (main) and opposite the Faculty of Arts building on your way to the University Guest Centre. The other is at the Akuafu Hall car park and opposite Crops Science Department. Guest Centres, Lodges / Hotels also offer such service.

Security

Although security is not a serious issue in Ghana, and only involving petty stealing, be alert and call for help. Keep all valuables with you (e.g. credit card, cameras, passports, money, laptop) and beware of roaming taxicabs already with passengers. The Campus Security Help Line is 0285460669 / 0285460668.

Telephone

The campus is full of telephone machines belonging to different telephone operators. Card telephones work on the Vodafone Network whilst MTN operates other forms of services. For international calls, dial 00 followed by the country code and the number. The various gsm / cell phone providers are Tigo, Vodafone, MTN, Espresso, Glo and Airtel, all that you need is a chip that costs around \$0.25, and registration and you are connected to the rest of the world. Vendors are easily located.

Volunteers and other contacts

Please make use of the Volunteers / Protocol at the meeting venue, whose name tags are clearly marked. The language of the Ghanaian is courtesy and not always about rights so observe that and be polite even if you insist on something.

Conference Help line: +233 (0)546264518



PROGRAMME AT GLANCE

DAY	TIME	ACTIVITY
01	10:00 – 12:00	Official Opening Ceremony [Auditorium]
	12:00 – 12:30	Poster / Exhibition [Marquee / Tent]
	12:30 – 13:30	LUNCH [Marquee / Tent]
	13:30 – 15:00	PL-01: African Union [Auditorium]
	15:15 – 17:00	SP-01: UAPS Symposium [Auditorium]
	17:00 – 18:00	Opening Reception [Marquee / Tent]
02	09:00 – 10:30	PL-02: Alliance for a Green Revolution in Africa (AGRA) [Auditorium]
	10:30 – 11:00	BREAK / Poster / Exhibition [Marquee / Tent]
	11:00 – 12:30	PN-01: RiU in Action [Auditorium]
	12:30 – 13:30	LUNCH / Meeting with LOC Chair [Marquee / Tent]
	13:30 – 15:00	SE-01: Vulnerability to Climate Change [Seminar Room]
		SE-02: Population and Multiple Hazards [Auditorium]
	15:00 – 15:30	BREAK / Poster / Exhibition [Marquee / Tent]
	15:30 – 17:00	SE-03: Climatic Change & Policy Mainstreaming [Auditorium]
	SE-04: Climatic and Disaster Risks [Seminar Room]	
03	09:00 – 10:30	PL-03: Climate Smart Integrated Flood Management [Auditorium]
	10:30 – 11:00	BREAK / Poster / Exhibition [Marquee / Tent]
	11:00 – 12:30	SE-05: Biodiversity, Land Use & Land Cover [Auditorium]
		SE-06: Numerical Weather Prediction and Projection [Seminar Room]
	13:30 – 15:00	PN-02: Reproductive Health Care and Climatic Risks [Auditorium]
	15:00 – 15:30	OFFICIAL CLOSING [Auditorium]
	18:30 – 20:00	DINNER [To Be Announced]



Every year large numbers of Conference.

Abstracts are submitted to the CCPOP-Ghana. It has therefore become a meeting place for researchers, policymakers, politicians, practitioners, civil society, etc. on climate change matters concerning and beneficial to the African Continent. Abstracts are therefore received globally once they have lessons for Africa. Yet, limited space has made it impossible to accommodate some great abstracts let alone all the submissions. We hope to expand the slots in the face of lack of core funding and sponsorship.

LUNCH WITH LOC CHAIR &
GET OVER YOUR ABSTRACT
SUBMISSION TO CCPOP
HEADACHE
Wednesday 20th @Lunch

This year, the space for Oral presentations reduced (i.e. to 40 maximum from 64 in 2015) as we tended to encourage submissions on Science to Practice in the form of Panel and Symposium whilst expanding the Plenary to absorb oral presentations to enhance relevance. In 2016, 178 Abstracts were submitted for Oral Presentation, of which 71 were wrongly submitted and rejected by default and leaving 107 Abstracts which entered into the Thematic Assessment for relevance. The remaining 82 Abstracts were then subjected to Double Blind Review (DBB) out of which 58 Abstracts were shortlisted based on (i) technical merit, (ii) novelty, (iii) clarity and conciseness, (iv) potential to make an impact (lessons), and (v) trans-disciplinary.

Comprehensive comments from the reviews were sent to over 50% of the shortlisted Authors for redress, constituting the draft presentations, and resubmission consideration before the final short listing. At this stage, all abstracts which were not accepted were invited to join the Poster Session in order to (i) help them sharpen the message, (ii) have more time to explain their work, and (iii) maintain contact throughout the period of the conference. We therefore encourage more Poster Submissions in future or a combination of Oral and Poster. **Less than 40% of Effectively Submitted Abstracts were Accepted!**

For the first time, Authors who were not successful with their abstracts or those with complaints can speak directly to the LOC Chair. **Look for that Table with the LOC Chair!**

Is CCPOP-Ghana about Excellence and not Numbers?

COME ONE COME ALL!!!



DAY 1 (Registration & Official Opening) TUESDAY, 19TH July 2016

08:00 AM: Registration of Conference Participants Starts at the Conference Venue

OPENING CEREMONY— ORDER OF PRESENTATION	
09:30 AM	Arrival of Participants / Invitees / Guests & Registration
10:00 AM	All Seated / Opening Prayer, Rev. Dr Elias Asiama, University of Ghana, Legon / Minister, Presbyterian Church of Ghana
10:10 AM	Conference Background & Guest Introductions: Prof Samuel Codjoe, Director, Regional Institute for Population Studies, University of Ghana, Legon
10:20 AM	Chairperson's Acceptance & Welcome Remarks Prof Ernest Aryeetey, Vice Chancellor, University of Ghana, Legon
10:30 AM	Interlude / Launch of Climate Change Resource Centre-Ghana (CCRC-Gh): Prof Ebenezer Oduro Owusu, Provost, College of Basic and Applied Sciences, University of Ghana, Legon
10:35 AM	Goodwill Message Her Excellency Madam Nezha Alaoui M, Hammdi, Ambassador of the Royal Kingdom of Morocco in Ghana
10:50 AM	Interlude
11:00 AM	Nation State Address by Hon. Mahama Ayariga, Minister of Environment, Science, Technology & Innovation, Ghana
11:20 AM	Keynote Address and Official Opening Special UN Secretary General Envoy on Climate Change Address His Excellency John Agyekum Kufuor Former President, Republic of Ghana
11:45 AM	Chairman's Response / Closing Remarks
11:50 AM	Vote of Thanks / Closing Prayer, Rev. Dr Elias Asiama, University of Ghana, Legon / Minister, Presbyterian Church of Ghana
11:55 AM	Group Photograph
12:00 AM	Reception / Poster / Exhibition

12:30-13:30 LUNCH BREAK



DAY 1 (Technical Sessions) TUESDAY, 19TH JULY 2016

PLENARY

PL-01	The African Union (AU)
Speaker:	Nana Kyeretwie Osei African Union Commission
Title:	Climate Change Responses and National Development Planning at Sustainable Crossroads
Chair:	Samuel Confidence Dotse Climate Change Resource Centre-Ghana
Venue & Time:	Auditorium (upstairs) / 13:30 – 15:00 Hrs

Synopsis

Climate change is a core developmental issue and must be understood and addressed as such. This means that the approach of governments ought to undergo transition from situating climate change within a simply environmental or scientific discourse (with vaguely defined linkages to national development priorities) to a new paradigm where climate change is explicitly acknowledged and articulated as a developmental policy imperative which requires the attention of full range of resources. In this light the newly launched SDGs offer a key strategic opportunity for African governments. As opposed to the MDGs which, while commendable, suffered from a persistent categorization as a UN agenda; the process leading to the development and adoption of the SDGs was more inclusive of Africa and its interests; and therefore African states are able to take full ownership of the resulting goals and targets, including SDG 13 on climate change. The key challenge for African governments, now, is to ensure that the SDGs on climate change and its associated areas are fully aligned with national development priorities as well as the commitments they have made through the Intended Nationally Determined Contributions (INDCs). By integrating climate change action – and there are multiple continental frameworks and initiatives, including the Climate for Development in Africa Program (ClimDev-Africa), the African Renewable Energy Initiative and the African Initiative on Adaptation and Loss and Damage, among others. Representing pillars of ongoing national development planning, African states would be positioned to draw on resources from global, continental and regional levels as part of a consolidated approach to climate and development. By so doing, the chances increase for the emergence of a sustainable platform of action that might not otherwise be possible if governments were to approach climate change action as an “add-on” or as a stand-alone agenda with no clear intersection with development policy.



SYMPOSIUM PRESENTATION – LATE AFTERNOON

SP-01 Bridging the Research and Policy Gap
[Union for African Population Studies (UAPS)]

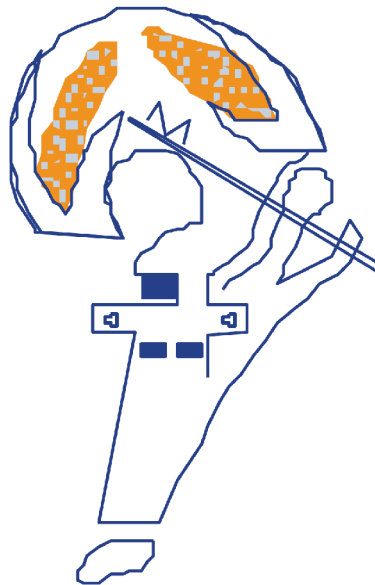
SPEAKERS

- *Samuel N.A. Codjoe*, President, UAPS
- *Stephen O. Kwankye*, Assoc. Prof., University of Ghana, Legon

MODERATOR Nancy Akwen Sah, Union for African Population Studies (UAPS)

VENUE Auditorium

TIME 15:30-17:00



UAPS
UEPA

Union For African Population Studies
Union Pour L'Etude De La Population Africaine

CLOSE OF DAY 1
WE THANK YOU FOR YOUR SUPPORT

OPENING RECEPTION COCKTAIL FROM 5:00 PM



DAY 2
WEDNESDAY, 20TH JULY 2016

PLENARY

PL-02	AGRA
Speaker	Rebbie Harawa The Alliance for a Green Revolution in Africa (AGRA)
Title	TBA
Chair	Fadel Ndiame , The Alliance for a Green Revolution in Africa (AGRA)
Venue & Time	Auditorium (upstairs) / 09:00 – 10:20 Hrs

10:30-11:00 SNACK / TEA / COFFEE BREAK

PANEL PRESENTATION – LATE MORNING [11:00 – 12:20]

PN-01	RiU in action: before, during and after the Research
MODERATOR	Prosper Adiku Adaptation at Scale in Semi-Arid Regions (ASSAR)
VENUE	Auditorium
SPEAKERS	<ul style="list-style-type: none"> • <i>Dr Adelina Mensah</i>, Institute for Environment and Sanitation Studies (ASSAR, Ghana) • <i>Dr. Appeaning Addo</i>, Department of Marine and Fisheries Sciences (DECCMA, Ghana) • <i>Lillian Kuutiero</i>, OXFAM, Ghana • <i>M.P Dagbui</i>, Municipal Planning Officer, Keta, Ghana

SYNOPSIS

The Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) is a research initiative funded by the UK Government’s Department for International Development (DFID) and the Canadian International Development Research Centre (IDRC). A key objective of CARIAA is to ensure that results from the initiative inform and influence relevant adaptation plans, strategies, practices and policies at the national level. CARIAA aims to achieve this through the adoption of effective Research-into-Use (RiU) strategies in engaging diverse stakeholder groups and audiences during the project cycle, in order to influence changes in development, adaptation policy and practice. Ghana hosts two of CARIAA’s four consortia: Adaptation at Scale in Semi-Arid Regions (ASSAR) and Deltas, Climate Change, Migration and Adaptation (DECCMA) which are currently carrying out research in the Upper West region and the Volta estuary, respectively. These projects aim at improving the wellbeing and adaptive capacities of the most vulnerable populations in semi-arid and deltaic regions.

12:30-13:30 LUNCH BREAK



ORAL PRESENTATIONS

Early AFTERNOON [13:30 – 15:00]

SE-01
MODERATOR
VENUE

Vulnerability to Climate Change

Johnny Ogunji, Scientist, Ebonyi State University, Nigeria
Seminar Room (Ground floor)

SE-01-01 **Planned Experiments or Autonomous Adaptation? An Assessment of Initiatives for Climate Change Adaptation at the Local Level in Ghana**

Azabre Atiyure Bismark¹, Atanga Aitibasa Raymond² [¹Sirigu Senior High School, Sirigu-Navrongo, ²Department of Development Studies, University for Development Studies, Ghana]

SE-01-02 **Collective action drives community innovations to address household food insecurity**

John Recha, Maren Radeny, Philip Kimeli [International Livestock Research Institute (ILRI), Kenya]

SE-01-03 **Historical coastal erosion rates, future shoreline positions and opportunities for sustainable management of erosion in the Elmina, Cape Coast and Moree area of Ghana**

Jonah Fredrick Ekow¹, Jonah Robert Ebo^{2,3}, Adams Osman⁴ [¹Department of Fisheries and Aquatic Sciences, University of Cape Coast, Ghana, ²Seafrost Environmental, Ghana, ³Ghana Technology University College, Ghana, ⁴Department of Geography and Regional Planning, University of Cape Coast, Ghana]

14:30-15:00 **General Discussion & Conclusion**

SE-02
MODERATOR
VENUE

Population and Multiple Hazards

Catherine Mungai, International Livestock Research Institute, Kenya
Auditorium

SE-02-05 **Assessment of Livelihood Vulnerability and Adaptation Planning Options in Ankobra River Estuarine Communities**

Justice Mensah, Alex Amoako and Stephen Kankam [Hen Mpoano, Ghana]

SE-02-06 **Susceptibilities of human population to multiple hazards in a Savannah Ecosystem of Ghana**

Yiran Gerald Albert Baeribameng [Department of Geography and resource Development, University of Ghana, Ghana]

SE-02-07 **The Indigenous Perspective of Climate Change and its Effects on Outputs of Small Scale Farmers in Northern Ghana**

Jabik Benjamin B, Bawakyillenuo Simon [Institute of Statistical, Social and Economic Research, University of Ghana, Ghana]

14:30-15:00 **General Discussion & Conclusion**

15:00-15:30 **SNACK / TEA / COFFEE BREAK**



ORAL PRESENTATIONS

LATE AFTERNOON [15:30 – 17:00]

SE-03
MODERATOR
VENUE

Climatic Change & Policy Mainstreaming

Kwasi Appeaning Addo, Scientist, University of Ghana, Ghana
Seminar Room (Ground floor)

SE-03-08 **Linking Science and Policy: Beyond Climate Change Policy Development to Implementation in Agriculture**

Catherine Mungai, Radeny Maren [CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)/International Livestock Research Institute (ILRI), Kenya]

SE-03-09 **Building Synergies to Reducing the Impacts of Climate Change and Disaster Risks on Vulnerable Populations**

Antwi-Boasiako Amoah [Regional Institute for Population Studies, University of Ghana, Ghana]

SE-03-10 **Climate-proofing Local Plans through Mainstreaming: Challenges and Opportunities for Achieving Sustainable Development Outcomes in Ghana**

Atanga Raymond Aitibasa [Department of Development Studies, University for Development Studies, Ghana, Department of Planning, Kwame Nkrumah University of Science and Technology, Ghana]

SE-03-11 **Review of the Implementation of the Population Policy and International Conference on Population and Development in South Africa**

Swartz Leon [National Department of Social Development, South Africa]

16:50-17:00 **General Discussion & Conclusion**

SE-04
MODERATOR
VENUE

Climatic and Disaster Risks

Albert Baeribameng Yiran, Scientist, University of Ghana, Ghana
Auditorium

SE-04-12 **Simulating future flood incidence in Accra for disaster risk reduction**

Sovoe Simon [Environmental Protection Agency, Ghana]

SE-04-13 **Gender-Disaggregated Perceptions of Smallholder Farmers on Climate Change Adaptation Strategies in the Kintampo North Municipal District of Ghana**

Annor Angela A¹, Amikuzuno Joseph² [¹Department of African and General Studies, ²Department of Climate Change and Food Security, University for Development Studies, Ghana]

SE-04-14 **Awareness, Cost of Adaptation and the Adaptive Strategies to Climate Change by Farmers in Imo State, Nigeria**

Iheke, Onwuchekwa Raphael, Agodike, Winner Chiagoziem [Department of Agricultural Economics, Michael Okpara University of Agriculture, Nigeria]

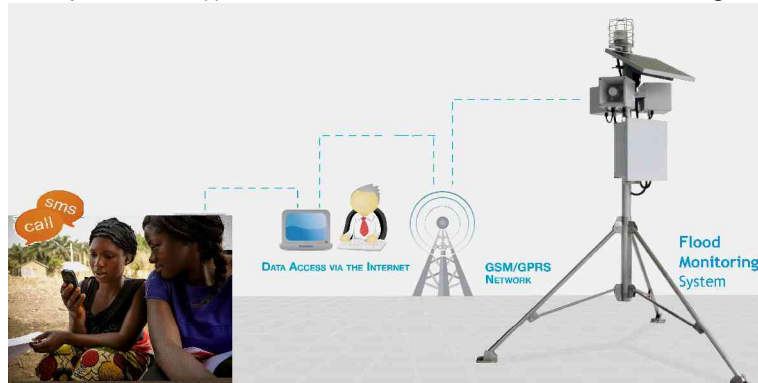
SE-04-15 **Climate change impacts and responses: Insight from Mount Elgon forest ecosystem, Kenya**

Achieng Therezah [Kenya Forestry Research Institute, Kenya]

16:50-17:00 **General Discussion & Conclusion**

DAY 3
THURSDAY, 21ST JULY 2016**PLENARY****PL-03 MAVC 2016 GLOBAL INNOVATION GOLD AWARD****Speakers** **Delali B. Dovie**, University of Ghana, Legon , Ghana
Raymond Kasei, University for Development Studies, Tamale, Ghana**Title** **Gender-based Flood Early Warning System (FEWS)****Chair** **Samuel N.A. Codjoe**, University of Ghana, Legon, Ghana**Venue & Time** Auditorium / 09:00 – 10:20 Hrs**SYNOPSIS**

Globally, population growth and haphazard development are compromising spatial planning in cities and leading to increased demand for housing and industries which have exposed several land area to increased flood risks and flooding. As demonstrated by recent floods in Accra, associated losses and disruption of life and business, climate change will intensify floods as added burden to population growth and poor city planning. This is because not much leadership has been demonstrated to integrate climate resilience into city planning and flood management even though it is possible to live with floods by using adaptation to climate change as a major entry point. The innovation will result in (i) flood early warning system (FEWS) using ICT and remote applications e.g. telephony (voice, sms & alarm) and thus assisting city planners and managers to integrate climate data, ICT and spatial planning to deliver flood early warning in a single software platform, (ii) monitor real time weather and flood events, and flooding using state of the art applications such as drones and automatic weather stations fitted with telemetric devices, and (iii) partner key city management agencies to collect relevant data towards monitoring flood events within the catchments of the Odaw Stream in Accra. The central business district of Accra is targeted for the project whilst benefit the least capacitated and highly vulnerable in society (e.g. women, poor people, children, etc.), as well as capacity for policy decision-making and information for industry and the private sectors. The innovation is expected to (i) reduce the time between flood warning and response, (ii) minimize



impacts on the vulnerable (e.g. women, elderly, and physically challenged), (iii) reduce losses (e.g. human lives, property and wares of especially female traders), and to GDP, and (iv) promote public-private-civil society partnership in response to climate change.

10:30-11:00 SNACK / TEA / COFFEE BREAK



LATE MORNING [11:00 - 12:30]

SE-05 **Biodiversity, Land Use & Land Cover**
MODERATOR *Leon Swartz*, National Department of Social Development, South Africa
VENUE Auditorium

SE-05-16 **Mainstreaming climate change into biodiversity management: experiences from the Middle Zambezi Biosphere Reserve, Zimbabwe**

Kupika Olga Laiza, Edson Gandiwa

School of Wildlife, Ecology & Conservation, Chinhoyi University of Technology, Zimbabwe

SE-05-17 **Soil Organic Carbon Variations and Selected Soil Chemical Properties as Affected by Different Land Use Types in Benin (South-Southern Nigeria)**

Thomas, Eunice Y, Orimoloye, JR

Agronomy Dept, University of Ibadan, Nigeria

SE-05-18 **Accelerating Seed Germination and seedling development of Sorghum (*Sorghum bicolor* L. Moench) through hydro-priming**

Dembele S¹, Zougmore R², Coulibaly A¹, Lamers JPA³, Tetteh JP⁴

¹Institut d'Economie Rurale, Mali, ²International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Mali, ³University of Bonn, Germany, ⁴University of Cape Coast, Ghana

SE-05-19 **Scenarios based land use/cover changes impact on flood regime in the Ouémé basin, Benin Republic**

Hounkpè Jean¹, Diekkrüger Bernd², Afouda Abel A¹

¹West Africa Science Service Centre on Climate change and Adapted Land Use, University of Abomey-Calavi, Benin, ²Dept of Geography, University of Bonn, Germany

12:20-12:30 **General Discussion & Conclusion**

SE-06 **Numerical Weather Prediction and Other Projection**
MODERATOR *Faustina Frempong-Ainguah*, Scientist, University of Ghana, Ghana
VENUE Seminar Room (Ground floor)

SE-06-20 **Relationship of Global-Scale Ocean-Atmosphere Features to Dominant Modes of Boreal Spring Central African Precipitation**

Tetteh Isaac Kow

Department of Physics, and Department of Theoretical & Applied Biology, Kwame Nkrumah University of Science & Technology (KNUST), Ghana

SE-06-21 **Seasonal Global-scale Climatic Conditions in Relationship to the Dominant Modes of East African Long Rains**

Nana Kofi Ahoi Appiah-Badu

Department of Physics, Kwame Nkrumah University of Science & Technology, Ghana

SE-06-22 **Spatio-Temporal Rainfall Variability over Ghana using Wavelet Analysis**

Michael Baidu, Leonard K. Amekudzi and Jeffery Ayee

Meteorology and Climate Science Unit, Department of Physics, KNUST, Ghana

SE-06-23 **Using remotely-sensed soil moisture data as an alternative / complement to runoff time series in poorly gauged and ungauged basin**

Djigbo F. Badou

Program on Climate Change and Water Resources, University of Abomey-Calavi, Benin

12:00-12:30 **General Discussions & Conclusion**

12:30-13:30 LUNCH BREAK

PANEL PRESENTATION

PN-02	Quality Reproductive Health Care and Emergency Supplies: The Context of Climatic Risks
MODERATOR	Martin Bawa Amadu UNFPA Ghana
VENUE	Auditorium
TIME	13:30 – 15:00
ORGANISERS / SPEAKERS	<ul style="list-style-type: none">• <i>John Koku Awoonor-Williams</i>, Ghana Health Service, Ghana• <i>Robert K Mensah</i>, UNFPA Ghana• <i>Martin Bawa Amadu</i>, UNFPA Ghana

Abstract

Access to emergency reproductive health commodities for use in facilities in urgent/critical situations in developing countries is hampered by availability at the point of need. Even when the commodity is available in the country, bad road network, lack of efficient transport systems coupled with poor distribution systems often prove inimical to its ready access. The situation has worsened within the last 10 years as Ghana witnessed unprecedented effects of climate change especially during the rainy season when several communities are cut off through widespread flooding. In more recent times the affected communities were cut off for prolonged periods. In order to save lives and improve the quality of reproductive health delivery in such environmentally distressed communities, it is imperative to strengthen the health system and remove transport and distribution barriers in order to facilitate access to reproductive health commodities and drugs.

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**SE-01 ABSTRACTS****VULNERABILITY TO CLIMATE CHANGE****SE-01-01****Planned Experiments or Autonomous Adaptation? An Assessment of Initiatives for Climate Change Adaptation at the Local Level in Ghana***Azabre Atiyure Bismark¹, Atanga Aitibasa Raymond²*¹Sirigu Senior High School, Sirigu-Navrongo, ²Department of Development Studies, University for Development Studies, Ghana

There is increasing concern about the likely impacts of climate change on poverty, economic growth and the overall development of poor countries. The need to adapt to the daunting challenges posed by climate change has resulted in a multiplicity of responses from various actors across scales. In order to promote climate proofing and sustainable adaptation, there is the need to integrate climate change adaptation interventions into development planning at multiple scales. Evidence suggests that at the national and sub-national levels in Ghana, initiatives to address climate change are nascent. The objective of this paper is to uncover the nature of these initiatives, the actors involved and the successes and challenges for achieving sustainable outcomes through local level interventions in Ghana. The paper adopted the qualitative method involving the use of key informant interviews, focus group discussions and direct observations, and secondary data. The analysis suggests that, initiatives for adaptation to climate change were largely experimental in nature and autonomous since they were not necessarily outcomes from mainstream planning. Key actors behind the initiatives were those in the formal context of planning (District Assembly, governmental agencies and decentralised departments) and those outside the formal context of planning (NGOs and community leaders). Initiatives by NGOs had the greatest prospects in terms of sustainability and adaptation. The paper recommends that, further efforts be made to integrated climate change adaptation initiatives in local level plans for proper targeting and sustainable development.

SE-01-02**Collective action drives community innovations to address household food insecurity***John Recha, Maren Radeny, Philip Kimeli*

International Livestock Research Institute (ILRI), Kenya

Rural households in East Africa depend on rain fed agriculture as the primary source of food and income. The changing climate affects agriculture and nearly 15% of households are unable to meet their food needs for 3-4 months in a year. This paper examines how communities across East Africa are addressing climate related risks to ensure food security through collective action. Using case studies from five climate smart village (CSV) sites in Nyando and Wote in Kenya; Lushoto in Tanzania; Hoima in Uganda and Borana in Ethiopia, we examine how communities have organized themselves through innovative partnerships that provide new knowledge and skills and build the capacity to make changes to farming practices, while adopting new crop and livestock interventions. Through collective action, self-help groups are empowering their communities to pool financial resources for savings within the villages, labour for farm operations and agro-advisory services for input acquisition. While collective action has mainly been used for natural resource management by rural communities, the case studies clearly demonstrate increasing importance of addressing multiple challenges. These range from food insecurity in mixed crop-livestock systems of Nyando, Wote and Hoima, promoting commercial horticultural production in Lushoto, to dealing with climate risks in pastoral systems of Borana as a social safety net mechanism. Through collective action, these communities are accessing agricultural inputs of good quality at affordable prices.

**SE-01-03****Historical coastal erosion rates, future shoreline positions and opportunities for sustainable management of erosion in the Elmina, Cape Coast and Moree area of Ghana***Jonah Fredrick Ekow¹, Jonah Robert Ebo^{2,3}, Adams Osman⁴*¹Department of Fisheries and Aquatic Sciences, University of Cape Coast, Ghana,²Seafront Environmental, Ghana, ³Ghana Technology University College, Ghana,⁴Department of Geography and Regional Planning, University of Cape Coast, Ghana

Ghana's coastline like most coastlines around the world has been eroding for decades. However, management techniques usually employed to control these issues have often been ad hoc and uncoordinated leading to recurrence or shifting of the problem to adjoining coasts. In addition, projected sea level rise and increased climate change impacts puts many coastal communities, livelihoods and important historical monuments under severe risk to the ravages of the sea. The aim of this study was to determine the historical rate of erosion along the Elmina, Cape Coast and Moree coastline and determine future coastline positions under the present management conditions and predicted sea level rise values. The study also aimed at identifying human-related causes of coastal erosion in the area and assesses entry points for ameliorating the current rates of erosion. Using coastline data spanning a period of 40 years (1974-2014), historical rates of erosion were determined and future positions of the coastline projected in Geographic Information System (GIS) environment using ArcGIS. The paper further provides an overview of coastal sediment mining activities in the area using a mixed-method approach, involving individual and group interviews, administration of a set of structured questionnaire and field observations, to identify coastal sediment mining and emerging sustainable management issues. Overall, historical rates averaged 1.22 m/year for the study area while the widespread practice of coastal sediment mining was identified as the leading human contributor to coastal erosion. This paper concludes that in order to forestall the future impacts of climate change and safeguard livelihoods and assets, coastal sediment mining activities should be controlled. The paper further concludes that each of the three identified sediment mining type has its own peculiar issues and mode of operation, hence coastal managers should address each category independently in order to derive lasting impacts in curtailing the practice.

SE-02 ABSTRACTS**POPULATION AND MULTIPLE HAZARDS****SE-02-05****Assessment of Livelihood Vulnerability and Adaptation Planning Options in Ankobra River Estuarine Communities***Justice Mensah, Alex Amoako and Stephen Kankam*

Hen Mpoano, Ghana

Coastal ecosystems, particularly estuaries and intertidal environments are important sources of food and livelihood security for growing coastal population. However, estuarine-dependent livelihoods are increasingly threatened by climate change and unsustainable human exploitation of estuarine resources. An assessment of climate vulnerability using 15 indicators and evaluation of adaptation planning options was undertaken in 5 estuarine communities along the Ankobra River in Ghana's Western region. A coastal community vulnerability index (CCVI) was computed for each community using data collected through hazard mapping, vulnerability matrix, seasonal calendar and historical timeline of climate-related events. These approaches were supplemented with geographic information system (GIS) - based analysis of land cover to detect changes in critical fishery habitat and mangrove ecosystems as a result of human-induced threats. The results of the assessment indicate that livelihoods are vulnerable to flooding, declining food production,



poor management of estuarine resources and demographic changes. Building livelihood resilience against climate and non-climate stressors require a co-management approach where rights and responsibility for estuarine management are shared between communities and district level authorities

SE-02-06

Susceptibilities of human population to multiple hazards in a Savannah Ecosystem of Ghana

Yiran Gerald Albert Baeribameng

Department of Geography and resource Development, University of Ghana, Ghana

The interior savannah ecosystem of Ghana over the past 3 decades has been subjected to a number of hazards of varying severity. These have had differential impacts spatially and temporally on the living conditions of people in the ecosystem. Susceptibility studies have often focused on biophysical systems with little attention paid to human systems, especially in the savannah where hazards related to earth movements rarely occur. This paper maps the susceptibilities of human systems to multiple hazards arising from climate variability and change (CVC). The objective was to identify variables from the local people's perspective that make them susceptible to CVC for mapping. Questionnaire, focus group discussions and in-depth interviews were used. The study participants scored, ranked and weighted the variables, which were used in the weighted overlay in ArcGIS 10.2. Spatially, the study found the Builsa South District as the most susceptible while Talensi and Nabdam Districts were the least. The findings show that the high levels of susceptibilities of the people to CVC are due mainly to agricultural losses leading to food insecurity. Equally important factors include high incidences of illnesses (cerebrospinal meningitis, malaria), injuries and loss of properties and lives. The study has contributed to the understanding of factors responsible for the spatial susceptibilities and lowering the welfare of people and therefore offers decision makers the opportunity to target intervention to improve living conditions. It is necessary to reduce the dependency on rainfed agriculture by increasing access to both surface and ground water for dry season farming. Also, accepting premiums for the health insurance in forms other than cash only, community visitation by Community Health Nurses and the use of mobile clinics in the short term could improve healthcare and emergency services.

SE-02-07

The Indigenous Perspective of Climate Change and its Effects on Outputs of Small Scale Farmers in Northern Ghana

Jabik Benjamin B, Bawakyillenuo Simon

Institute of Statistical, Social and Economic Research, University of Ghana, Ghana

Climate variability and change has been described differently in various context and its effects also vary from one location to another. Indigenous people through their epistemological knowledge offer alternative ideas about climate variability and change and, its effect on their livelihoods. Their traditional education processes are carefully constructed around observing natural processes, adapting modes of survival, obtaining sustenance from the plant and animal world amongst others. This paper assessed the ability of indigenous people in the East Mamprusi District of northern Ghana apply indigenous knowledge to describe climate change, and the effect of the change on the output of small-scale farmers. Using participatory research approach, this study reveals that indigenous people of northern Ghana perceive climate change to be increased in temperature, changes in the timing of the rains, changes in seasonal calendar, decline in precipitation, prevalence of wind storm etc. They also revealed that these changes have affected their output in various ways, including threat to animals life (frequent outbreak of diseases that kill cattle, sheep, goats, fowls amongst others), reduction in some crops



yields such as guinea corn, rice, late millet and crops extinction (total failure of some crops) like the early millet, indigenous guinea corn amongst others. This implies that indigenous people describe climate by observation and feelings of their immediate environment and the effects are affecting the outputs of small-scale farmers negatively. It is imperative, therefore, that we approach the issue of climate change broadly including capturing local ideas and knowledge.

SE-03

CLIMATE CHANGE & POLICY MAINSTREAMING

SE-03-08

Linking Science and Policy: Beyond Climate Change Policy Development to Implementation in Agriculture

Catherine Mungai, Radeny Maren

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)/International Livestock Research Institute (ILRI), Kenya

Integration of agriculture in the United Nations Framework Convention on Climate Change (UNFCCC) process has been very slow. Despite this, several countries are developing national and local level policies for climate change adaptation and mitigation in agriculture. Interestingly, majority of country-level climate plans prioritize agriculture, despite the sector's slow progress at UN negotiations. In East Africa, for instance, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is working with governments, research and academic institutions, non-governmental and community based organizations and the private sector in Kenya, Uganda, Tanzania and Ethiopia to provide scientific evidence and tools to be used in planning climate smart investments in agriculture. CCAFS seeks to support countries to synergize their National Agricultural Investment Plans (NAIPs) and agricultural sector programmes with their national climate change policies, strategies and action plans. Kenya, Uganda and Tanzania, for example, have included climate-smart agriculture (CSA) in their Intended Nationally Determined Contributions (INDCs) submitted to the UNFCCC towards the end of 2015 and have developed National Climate-Smart Agriculture framework programs which seek to increase the resilience of agricultural landscapes and communities to the impacts of climate change. While countries have made tremendous progress in developing policies and establishing institutions to advance climate change adaptation and mitigation in agriculture from national to local level, implementation has been slow. Since 2011, CCAFS has been collaborating with partners from the CGIAR, regional and national organizations and governments to gather evidence on how to advance CSA and to develop tools which can be used to advance policy implementation. Drawing from experience and emerging lessons, our paper will illustrate how CCAFS tools (climate analogues, TargetCSA) and scientific evidence can be applied to prioritize and target policy interventions for implementation.

SE-03-09

Building Synergies to Reducing the Impacts of Climate Change and Disaster Risks on Vulnerable Populations

Antwi-Boasiako Amoah

Regional Institute for Population Studies, University of Ghana, Ghana

The objective of the project is to demonstrate how combined strategic policies on climate change adaption and disaster risks reduction could inform tangible local actions and vice versa. Climate change and disaster management communities have mainly operated in isolation from each other in the past. In many ways, disaster events represent tipping points from which the coping capacity of households, communities and nations are overwhelmed. Tipping points involve a rapid collapse of a system from one state to



another, the effects of which often cascade across other economic, social and environmental systems and threaten development gains. Adding climate change to the equation brings the risk that these shocks would become even more devastating and frequent. At the household and community levels, however, there is no delineation between climate change adaptation, disaster risk reduction, economic development or survival. Keta in the Volta region and Enchi in the Western region are classic examples of how disaster risks and climate shocks have impacted adversely on small scale businesses such as car artisans (mechanics), carpenters, market women, among others, resulting in loss of income, lives, livelihoods and property. Using participatory planning methods through community workshops and focus group discussions, communities identify immediate disaster risks hotspots and develop plans to adapt to current and future impacts of recurrent floods. The Africa Adaptation Programme (AAP), together with the affected communities, constructed artisan sheds and market stalls to relocate over 300 people including carpenters, fitters and market women in Enchi. The project also, using local materials and engineering, constructed two separate foot bridges to aide community access to market, schools, healthcare facilities and social functions such as funerals at Suipe in the Volta region. A key policy outcome of the project is mainstreaming climate change adaptation and disaster risks reductions strategies into the medium term development plans of both of both Assemblies.

SE-03-10

Climate-proofing Local Plans through Mainstreaming: Challenges and Opportunities for Achieving Sustainable Development Outcomes in Ghana

Atanga Raymond Aitibasa

Department of Development Studies, University for Development Studies, Ghana,
Department of Planning, Kwame Nkrumah University of Science and Technology, Ghana

Climate change impacts can seriously affect development interventions and perhaps, reverse the successes and gains made in economic development and poverty reduction. In northern Ghana for instance, perennial droughts and flood disasters resulting from climate change have eroded the livelihoods of many poor resource-dependent households. Consequently, there is a growing concern for development plans to be climate-proofed through mainstreaming to ensure their sustainability under a changing climate. Mainstreaming offers the twin benefits of protecting development investments from the adverse impacts of climate change while ensuring that development interventions do not inadvertently increase the vulnerability of target populations to the impact of climate change. This paper discusses the challenges and opportunities for mainstreaming climate change into local level plans for sustainable development in Ghana. Within a case study framework, data for the study was collected through in-depth interviews, focus group discussions and the content analysis of institutional reports. The findings indicate that, low awareness, weak institutional capacity, poor coordination of interventions, weak collaboration, lack of statutory support and limited access to funds were the main challenges hindering the mainstreaming of climate change into local plans in Ghana. However, the existing participatory planning framework, the ex ante environmental assessment of local plans, prevailing international support systems as well as local knowledge systems were the opportunities for mainstreaming climate change at the local level. Therefore, to achieve climate-proofing of local plans through mainstreaming, there is the need to raise awareness, strengthen institutional capacities, provide statutory arrangements as well as build collaborations across scales

**SE-03-11****Review of the Implementation of the Population Policy and International Conference on Population and Development in South Africa***Swartz Leon*

National Department of Social Development, South Africa

Given the challenges facing South Africa, in particular the high levels of poverty and unemployment, the priorities of government tend to veer towards economic growth and social development initiatives. The purpose of this paper was to examine this drive towards attaining sustainable development as well as the impacts and interrelationships between population dynamics, economic development and the environment. In particular, the paper examined government's role and subsequent initiatives in pursuing this drive towards attaining sustainable human development. Interventions were to strengthen and build human capacity required for the implementation of policy initiatives at the population, environment and development (PED) interface; Departments of Social Development (NPU) and Environment. Integrate population dynamics systematically into climate change science, following a rights and gender focused approach; Departments of Woman, Science and Technology as well as the Presidency. Conduct research on the relationship between population dynamics and climate change and adaptation to climate change and the impact on the poor, vulnerable and marginalised. These evidence based findings should then inform policy, capacity building and training as well as advocacy initiatives; Departments Social Development, National Population Unit, Rural Development. Support efforts to reduce carbon emissions at a national as well as global level, including the adoption of green technology, where appropriate and achievable; Departments of Environment and Science and Technology. Incorporate demographic factors such as sex, age, population group, geographical location appropriately in sustainable development and climate change at all levels; NPU, Woman and Identify, target and address conditions that threaten food security, including issues around gender and land tenure as well as the overall deterioration of fresh water sources and the looming water deficit facing the country.

SE-04**CLIMATIC & DISASTER RISKS****SE-04-12****Simulating future flood incidence in Accra for disaster risk reduction***Sovoe Simon*

Environmental Protection Agency, Ghana

The twenty first century will experience rapid urbanization as a result of increasing population and industrialization especially in the developing countries including Ghana. As many more parcels of land are being converted into settlements, roads, industries, coupled with haphazard development and climate change, the incidence of flash flood and urban flood hazards will be exacerbated in cities located in floodplains. Mitigating impacts of these will require adequate knowledge of the frequency, extent, depth and velocity of these floods for risk assessment. In Ghana disaster risk reduction, is a huge task since the information required for risk management is completely non-existent. Accra has been hit by several flood disasters in the past, several lives and properties have been lost to these floods. The recent one which occurred on the 3rd of June, 2015 claimed over One Hundred and Fifty (150) lives, over Fifty Thousand people were affected. To this end, detailed hydrology of the Odaw catchment, hydraulic of the drains and the risk associated with them has not been studied. It is against this background that this research, which is being conducted in the Odaw catchment in Accra, is aimed at developing a comprehensive flood risk reduction strategies that could significantly reduce the impact of flood hazard in the city of Accra when implemented. The specific objectives are: 1) To conduct flood hazard analysis of the city, 2) To generate the first elements at risk database



of the city, 3) To develop flood hazard maps for disaster risk management, 4) To develop flood vulnerability map for the city, 5) To develop flood risk damage function of the city, and 6) To evaluate flood risk reduction alternatives (construction of retention pond, deepening of the river channel, removal of structures from water ways, and flood forecasting assessment) for the city. High spatial resolution (0.5m) satellite data is being used to map and generate the first elements at risk database of the city. Flood stage-damage functions for commercial buildings, wooden structures, and residential buildings have been developed through participatory GIS survey. Flood hazard map (through flood modelling) is on-going. Flood risk management options (retention pond, re-engineering of drains, demolition of structures and restriction on land use) will be evaluated and the appropriate recommendations highlighted for policy makers.

SE-04-13

Gender-Disaggregated Perceptions of Smallholder Farmers on Climate Change Adaptation Strategies in the Kintampo North Municipal District of Ghana

Annor Angela A¹, Amikuzuno Joseph²

¹Department of African and General Studies, ²Department of Climate Change and Food Security, University for Development Studies, Ghana

Climate change is one of the greatest threats to the Ghanaian economy since crop farming which is the most climate sensitive sector is largely dependent on rain-fed cultivation. This study examined the perceptions of male and female crop farmers on the indicators and adaptations strategies to the changing climate in the Kintampo North Municipality. A total of 120 crop farmers were selected using multistage sampling procedure. Data was collected using a semi-structured questionnaire and secondary data on climate variables was obtained from Ghana Meteorological Agency. The observations of the majority of both male and female farmers on temperature were contrary to the weather data by Ghana Meteorological Agency while the observations of the majority of the farmers on rainfall confirms the rainfall data recorded in the study area. The majority of both male and female farmers have noticed an increase in wind speed, in duration of drought and a decreased intensity of flooding in the study area. There was significant difference ($p < 0.05$) in the adaptation strategies employed by both male and female farmers in coping with rainfall and drought with male farmers having better adaptation strategies than female farmers. However, there was no significant difference ($p > 0.05$) in the adaptation strategies by both sexes in terms of temperature, wind speed and flooding. Therefore climate change adaptation policies in the agriculture and food security sector should consider the gender-related factors in our cultural systems like the dynamics in the ownership and acquisition of land and choice of crops to plant by females and males as climate change does not impact both male and female equally.

SE-04-14

Awareness, Cost of Adaptation and the Adaptive Strategies to Climate Change by Farmers in Imo State, Nigeria

Iheke, Onwuchekwa Raphael, Agodiike, Winner Chiagoziem

Department of Agricultural Economics, Michael Okpara University of Agriculture, Nigeria

This study was aimed at ascertaining the awareness, cost of adaptation and adaptive strategies to climate change by farmers in Imo state, Nigeria. Multi-stage sampling technique was used in selecting the respondents. Primary data, collected using structured questionnaire, were analyzed using descriptive and inferential statistical tools. Results showed that majority of the farmers were aware of climate change and its link with agricultural production. Based on the perception of the farmers, the major practices that contribute to climate change were deforestation, bush burning, burning of wood fuel/crop residues, continuous cropping, and the use of agrochemicals. Mulching, increased use of



fertilizer, multiple/ intercropping and the use of improved/resistant varieties were the major adaptive strategies employed in mitigating the effect of climate change by the farmers. Result showed that the average cost of adaptation was ₵23433.53. The significant factors influencing adoption of climate change adaptation strategies were age of the farmer, farming experience, education, extension contact, and knowledge of climate change effects on agriculture. Among the major constraints faced in adapting to climate change were land tenure system, high cost of irrigation facilities, scarcity and high cost of improved varieties of crops, and poor access to information sources. The study therefore, recommends education and training of farmers especially as it pertains to climate change adaptation; and provision of credit to enable them adopt adaptive measures to climate change. In addition, policies that would enable farmers overcome the myriad of constraints militating against their climate change adaptation was equally recommended.

SE-04-15**Climate change impacts and responses: Insight from Mount Elgon forest ecosystem, Kenya***Achieng Therezah*

Kenya Forestry Research Institute, Kenya

Responses to impacts of climate change have drawn global attention given its increasing effects to vulnerable populations. Livelihood sources of subsistent communities are threatened by un-anticipated extreme climate events. The role and capacity of ecosystem services in these communities have significantly declined due to natural and triggered environmental course, causing shifts in ecosystem functions. Vulnerability assessment of communities proximate to Mount Elgon forest Ecosystem gives a comparative analysis and present current results of a population under pressure of climate change and related livelihood uncertainties. The forest resource as an ecosystem provides crucial products to adjacent dwellers, both as a value and a measure. The study integrated socio-economic surveys (Poverty and Environment Network), forest monitoring and community-based institution analysis focus groups and key stakeholder interviews (International Forestry Resources and Institutions (IFRI) tools, and assessments of stakeholder vulnerability to climate change. Ecosystem based adaptation strategies vary significantly, ranging from sale of forest products, small enterprises, agroforestry practices to crop diversification practices. Land sizes, education level and livestock owned influence exposure, sensitivity and adaptive capacity of communities to climate uncertainties. The resilience of local populations and the forests that support them require effective climate change adaptation strategies. The capacity of forest-dependent communities to adapt to climate change is constrained by overlapping, even contradictory, sectoral policies. While there are some efforts at coordination of objective setting at national levels, the implementation of policies by individual ministries and forestry-related extension and enforcement tend to take place in isolation from those enacted by other ministries. This approach undermines their own and each-others' achievements.

**SE-05 ABSTRACTS****BIODIVERSITY, LAND USE & LAND COVER****SE-05-16****Mainstreaming climate change into biodiversity management: experiences from the Middle Zambezi Biosphere Reserve, Zimbabwe***Kupika Olga Laiza, Edson Gandiwa*

School of Wildlife, Ecology & Conservation, Chinhoyi University of Technology, Zimbabwe

Climate change is a threat to biodiversity management in Africa and consequently to sustainable development and poverty eradication. This study investigated the extent to which post colonial Zimbabwean government has addressed the need for climate change action in the biodiversity sector. The study used a qualitative approach where data was gathered through document analysis and a case study from the Middle Zambezi biosphere reserve (MZBR), Zimbabwe. Primary documents i.e. National Adaptation Programmes of Actions (NAPAs), National Biodiversity Strategies Action Plans (NBSAPs), technical reports and biodiversity policies reviewed to determine the extent to which these instruments have mainstreamed climate change adaptation and mitigation. Purposive sampling was used to select key informants, focus group discussions participants from stakeholders in the wildlife sector and Nyamakate Resettlement wards located within 10 km from adjacent to Hurungwe Safari Area. Findings from document reviews indicate that the country is still using old generation biodiversity management legislation that at times fails even to address climate change. However, recent documents such as the Zimbabwe's national biodiversity strategy and action plan (2013-2020) address climate change adaptation and mitigation. Private stakeholders in the biosphere reserve engage in different adaptation and mitigation strategies such as the Reducing Emissions from Deforestation & Forest Degradation (REDD+) projects, bamboo projects, and nutritional gardens to cope with the effects of climate change. However, wildlife managers cited limited financial and technical capacity as a constraint to adaptation and mitigation

SE-05-17**Soil Organic Carbon Variations and Selected Soil Chemical Properties as Affected by Different Land Use Types in Benin (South-Southern Nigeria)***Thomas, Eunice Y, Orimoloye, JR*

Agronomy Dept, University of Ibadan, Nigeria

Soil organic carbon is an essential component of soil quality assessment. It determines soil chemical and physical properties, soil fertility and ultimately soil productivity. Essentially, organic carbon storage in soil organic matter has a way of mitigating climate change by reducing greenhouse gas emission. This study therefore examined the soil organic carbon content of different land use and selected soil chemical properties. Organic carbon at the soil depth of 0-25cm in four different land use namely Rubber age (Young rubber; 3-10yrs; Middle aged : 12-20 yrs.; Old rubber : > 25yrs), Fallow/ forest, Arable farm and Residential area were examined. Organic carbon revealed significant differences among the land use types considered. Highest organic carbon of 33.4 g kg⁻¹ was obtained in the fallow/forest while the lowest was recorded for residential (13.4g/kg) land use. However, there existed significant differences in soil pH, exchangeable acidity, ECEC, Base saturation, Fe and the land use types. The lowest soil acidity (highest pH) of 4.7 was obtained at the young rubber plots, while the lowest pH of 4.41 was obtained in the old rubber plots. The pH values obtained from the old rubber compared favourably with the 4.48 value obtained from the forest soils. Result also shows that fallow/forest land use with the highest organic carbon content had a corresponding significant value for exchangeable acidity, ECEC and Mg, while the concentration of Ca and Cu were highest for same land use. This implies that soils with high organic carbon enhance soil fertility, hence, forest and fallow soils had more organic matter than the other land use type. Agricultural



activities that will promote soil organic carbon like manuring, little or no tillage, crop rotation, allowing the land to fallow for couple of years and afforestation should also be encouraged through agricultural extension education and farmers' demonstrations plots will in no measure conserve soil fertility and organic soil carbon and consequently mitigate climate change effects.

SE-05-18

Accelerating Seed Germination and seedling development of Sorghum (*Sorghum bicolor* L. Moench) through hydro-priming

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Mali is a Sahelian country in West Africa, characterized by a strong dependence on rain-fed agriculture. Mali has low adaptive capacity, making it one of the most vulnerable regions to climate change worldwide. Most climate models used for the region recognize a growing uncertainty in the onset of the rainy season, which demands urgent adaptation measures. Sorghum often suffers from drought and heat stress at the early stage of plant growth, translating into 30-90% seedling loss. Early-season drought limits crops germination, and hence growth and yield as rainfed dependent production is now common which is locally suitable and socially and economically acceptable management option in particular to meet the challenges of Climate Change and Climate variability. This could be improved by using heat and drought tolerant sorghum varieties and seed priming, a process whereby dry seeds take up water to initiate germination, but the amount of water added is not enough for completing germination. The effects of hydro-priming using water from different sources (distilled, tap, rain, river and well water) were evaluated for three priming durations (4, 8 and 12 hour) in 2014 and 2015. Preliminary results showed that hydro-priming significantly improved seeds of nine sorghum genotypes compared to non-primed seed treatments. Four out of the nine genotypes evaluated showed good response to hydro-priming. The priming with different sources of water resulted in higher seed germination (95%) and seedling development with well and river water, compared to the others. Seed germination rate, uniformity and speed were also enhanced by hydro-priming. Hydro-priming is a simple but effective method for improving seed germination and seedling development of sorghum. In addition hydro-priming is a safe, simple and inexpensive method to enhance germination and could be implemented by farmers themselves at no additional farm extension cost to contribute to effective planned adaptation to climate change.

SE-05-19

Scenarios based land use/cover changes impact on flood regime in the Ouémé basin, Benin Republic

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The work aims at assessing the effects of land use change on the flood regime in of the Ouémé River, Benin. The analysis has been carried out by applying distributed and semi-distributed hydrological models (WaSiM and SWAT) to quantify the impact of land use change after calibration and validation. Projected land use maps for the time horizon 2015–2019; 2020–2024 and 2025–2029 combined with two socio-economic scenarios have been used as forcing inputs for the hydrological models. The peak over threshold analysis was undertaken to produce flood frequency distributions from which the magnitude and return periods are computed. According to the median of all scenarios, the magnitude of flood event is shown to increase for most return periods, changes being



greatest for low return periods. Though increase in magnitude of flood events was simulated by both models and for the different scenarios, the magnitude of change is influenced by the model types. The overall combined results from both models show that a 5-year event may become a 3.4-year or 4.7-year event depending on the scenario. The more extreme events are projected to occur more often. A 40-year flood event may turn into a 23.4-year or 31.1-year event depending on the scenario. These increases in flood magnitudes are accompanied with increase in mean monthly and mean annual discharges in the study area. These findings highlight the growing challenges for water resources managers and planners while developing water management plans. Infrastructural and non-infrastructural actions to reduce the flooding risk must be taking and these include updating current flood infrastructure designed methods; reinforcing flood forecast systems, improving population awareness and preparedness, urban planning, and discouraging human settlements in flood-prone areas.

SE-06**NUMERICAL WEATHER PREDICTION & OTHER PROJECTION****SE-06-20****Relationship of Global-Scale Ocean-Atmosphere Features to Dominant Modes of Boreal Spring Central African Precipitation***Tetteh Isaac Kow*

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The study seeks to investigate the standardized global sea surface temperature(SST) anomalies and their associated atmospheric structures in relationship to the dominant modes of boreal spring rainfall variability over Central African. The atmospheric patterns of interest for the study are the velocity potential(divergence) and stream function(rotational). Climate Research Unit(CRU TS 3.23) precipitation data from University of East Anglia, vector winds from National Centre for Environmental Prediction (NCEP)-National Centre for Atmospheric Research(NCAR), National Oceanic and Atmospheric Administration (NOAA) Extended Reconstructed Sea Surface Temperature(ERSST) were the datasets used. The period of study was 1950/1951-2007/2008. The methods employed in the study were empirical orthogonal function (EOF), monthly lagged heterogeneous gridpoint correlation and computation of stream function and velocity potential at 200hpa. The result showed the dominant modes of March-April-May (MAM) rainfall (1951-2008) variability accounted for 43.6% of the total explained variance. The eigenvector showed a dipole mode for EOF1, EOF2, EOF 3 and EOF4. The temporal loadings for all the leading modes showed an interannual variability. The heterogeneous grid point correlation revealed precipitation positively correlating with Atlantic Niño, Tropical north Atlantic(TNA) and Subtropical Indian ocean, on the contrary, there were negative correlation with the El Niño southern oscillation components like Nino 3.4, Nino 1+2 and Nino 3 as well as the tropical Indian ocean. Atmospheric circulation showed an upper level divergence and the tropical easterly jet (TEJ) over central Africa. The results suggest, the signals detected over the global ocean are weak, possibly regional-scale dynamics may be the most influential factors in controlling the rainfall variability.

**SE-06-21****Seasonal Global-scale Climatic Conditions in Relationship to the Dominant Modes of East African Long Rains***Nana Kofi Ahoi Appiah-Badu*

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This study presents an update of the East African long rains in relationship to seasonal global-scale ocean-atmospheric features during the climatologically prominent phase of El Niño Southern Oscillation (ENSO). The study sourced Climatic Research Unit (CRU; $0.5^\circ \times 0.5^\circ$ resolution), Extended Reconstructed Sea Surface Temperature (ERSST; $2^\circ \times 2^\circ$ resolution) and National Centres for Environmental Prediction-National Centre for Atmospheric Research (NCEP-NCAR) ($2.5^\circ \times 2.5^\circ$) data for the analysis. To isolate the dominant modes of precipitation, Empirical Orthogonal Function (EOF) analysis was performed on CRU data (1951-2008). The first four leading modes accounted for 34.2% of the total variance. Lagged grid-point correlations computed between standardized global ERSST anomalies (1950/51-2007/2008) and the dominant modes at four time-lags, from December to May, showed EOF 1, 3 and 4 responding differently to the Pacific ENSO, the Atlantic and Indian Oceans. However, the EOF 2 was not related to global Sea Surface Temperature (SST), which is consistent with recent literature and needs further modelling studies. To identify the atmospheric circulation patterns associated with the dominant modes, standardized global winds (200hPa) were correlated with the dominant modes. The divergent (convergent) patterns over the Indian (eastern Pacific) Oceans, further reveals the impact of the positive (negative) phases of ENSO to the dominant modes of the East African long rains. Overall, the findings from this study provide useful prediction information to policy makers in the East African community to outline measures and to improve the capacity of the people to adapt to the impact of climate change.

SE-06-22**Spatio-Temporal Rainfall Variability over Ghana using Wavelet Analysis***Michael Baidu, Leonard K. Amekudzi and Jeffery Ayee*

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Rainfall variability has serious implications on food security and livelihood in West Africa since it modulates the socio-economic activities in the sub region. The inter-annual, inter-seasonal and inter-decadal rainfall variability in rainfall over Ghana has been studied and their periodicities analysed using wavelet analysis. A rainfall time series from 1901-2010 from GPCC was used in this analysis. A decreasing trend is observed over all the agro-ecological zones except for the coastal zone where a slight rise in trend is seen. The Coastal zone records the lowest mean rainfall values for all the seasons with the highest of about 150 mm recorded in MAM. The Forest zone on the other hand records very high rainfall values for all the seasons with the highest of about 200 mm recorded in JJA followed by about 170 mm in MAM. The Transition zone however records almost similar rainfall values for all the seasons except for DJF where a lower mean value of about 50 mm is recorded. The Savannah zone records the lowest mean rainfall amount of about 6 mm in the DJF season. On inter-decadal time scale, below normal rainfall values are observed between the 1901 - 1920 and 1980 - 2010 periods for all the agro-ecological zones except for the Savannah. The wavelet analysis also revealed a strong annual periodicity over all the agro-ecological zones except for the Coastal and Forest zones where the annual periodicity is accompanied by 4-8 months signal. The results of both the 5 year moving average and the inter-decadal anomaly confirm that rainfall amount is significantly decreasing even in the transition zone which is the food hub of the country. This will have negative consequences on agricultural practice, water resource management and food security.

**SE-06-23****Using remotely-sensed soil moisture data as an alternative / complement to runoff time series in poorly gauged and ungauged basin***Djigbo F. Badou*

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The fifth report of the IPCC warns that climate change will exacerbate the “existing stress” on water resources in Africa. To face such a challenge, sound policies based on reliable scientific research and data are required. Hydrological modelling is a powerful tool to support the development and implementation of adaptation strategies. However, successful hydrological modelling is hampered by the availability of stream flow data in terms of quantity and quality (runoff time series being the common variable against which models are calibrated and validated). Furthermore, discharge data provide only integral information and not the spatial patterns of fluxes and state variables. Although growing worldwide, remote sensing soil moisture archives have received little attention in West Africa. This study demonstrates how remotely-sensed soil moisture information could be valorised as an alternative or complement to runoff time series in hydrological modelling in data scarce regions. To this end, the remotely-sensed soil moisture dataset of the ESA-CCI (European Space Agency Climate Change Initiative) project served as validation data for the running of four hydrological models whose performances (i.e. ability to capture the dynamic of the observed variable) were compared. The models are the HBV-light (Hydrologiska Byråns Vattenavdelning), UHP-HRU (Universal Hydrological Program – Hydrological Response Unit), SWAT (Soil Water Assessment Tool), and WaSiM (Water balance-Simulation Model) and were applied to a poorly gauged tributary of the Niger River basin, Couberi (13,217 km²). The results showed that parsimonious hydrological model structures yielded best results (in the order UHP-HRU, SWAT, and WaSiM performed better than the HBV-light). We concluded that the ESA CCI soil moisture dataset is a sound substitute/supplement to stream flow data for the research area. Similar research in other ungauged basins would probably reveal all the potential of using remotely-sensed soil moisture in hydrological modelling in the coming years.



POSTER ABSTRACTS

PS-01

Social Differentiation in the Adaptation Strategies of Smallholder Farmers to Climate Variability and Change in the Upper West Region

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There is growing attention on socially differentiated stakeholder groups in understanding vulnerability and adaptation to climate change. This study sought to conduct an empirical investigation to identify different social groups among rural farmers in the Lawra district of northern Ghana, their patterns of vulnerability and adaptation and the effectiveness of different adaptation strategies on household food security. Individual farmer survey involving 164 respondents, eight community focus group discussions disaggregated by gender, 12 in-depth interviews with individuals in the various social groups and community leadership and one key informants' interview with agriculture extension zonal coordinator for the Lawra district was used in the study. Migration among rural farmers was also explored to identify the type, age, gender, and destination of migrants in the study area. Reasons for migrating and remittance of food and cash by migrants were also explored. The results revealed that access to land and traditional cropping patterns mediated social differentiation among rural farmers in the district. Males comprised 53.7% while females were 46.3% of the study population. Of these, the youth aged 17-34 years made up 47.3% of the study population. The mean farm size of farmers was 1.9 acres for females, 4.4 for males and 2.8 for youth. Majority of males (84%) are engaged in mixed farming while female and the youth are predominantly engaged in crop farming with 61% and 52.9% respectively. Dry spells was ranked as the most pressing hazard and conflicts the least pressing hazard confronting all social groups. However males identified decreasing soil fertility as the second most pressing hazard followed by high input prices, females and youth identified water stress and decreasing soil fertility as the second and third most pressing hazards. The different social groups do not significantly differ in their use of adaptation strategies related to sustainable land management practices like legume intercropping, anti-erosion measures, composting, and water harvesting and the use of modern inputs including improved varieties, chemical fertilizer use and the use of weedicides and pesticides. They however differ significantly in the use of diversification. Males are more inclined to irrigation compared to the other groups whilst more females engaged in off-farm income generating activities. Majority of youth engaged in migration as an adaptation to climate change compared to the other groups.

PS-02

Assessment of Vulnerability of Assets and Livelihoods to Climate Variability for Adaptation Planning in a Coastal Community in Ghana

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Since 1970, climate variability particularly temperature increase of over 1°C and reductions in rainfall of approximately 20% have been recorded in Ghana. The situation poses a threat to assets and livelihoods especially those built around climate-sensitive sectors such as agriculture, coastal and marine resources. The aim of the study was to contribute to the processes of adaptation planning to climate variability through an assessment of official climatic data trends vis-à-vis perceptions of a local coastal



community on climate change and its associated impacts. The methodology combined historical climate data obtained from the Ghana Meteorology Agency and the active involvement of the community on their local knowledge on climate change obtained through questionnaire interviews. Temperature, rainfall and humidity from 1970 to 2012 were analyzed for trends using linear regression analysis and statistical anomalies. The hypothesis was that farming and fishing livelihoods and community infrastructure e.g. houses are vulnerable to climate variability. Akwidaa, a low lying coastal community in the Western Region of Ghana was used as a test case with the assumption that it is predisposed to climatic risk by virtue of its location on a sandy bar. Possible adaptation strategies were explored with active participation of the respondents in the community. The views of the district planning and disaster management officials were also sought. The results showed that, rainfall in the area had reduced over the past 43 years by approximately 0.2 mm whilst temperature increased by 0.2 °C. Relative humidity in the area had also decreased by 2%, signifying reduction in atmospheric moisture content. The study concludes that these changes in the environmental conditions have consequential effects on the assets and livelihoods of the people. This potentially could lead to a decline in general livelihood conditions of the people. This paper calls for a well planned community-based adaptation strategy working with the local district assembly to also consider relocation of the community to allow for possible adverse impacts to be mitigated.

PS-03

Rainfall variation and child health: Effect of rainfall on diarrhoea among under 5 children in Rwanda, 2010

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Diarrhoea among children under five years of age has long been a major public health concern. Previous studies have suggested an association between rainfall and diarrhoea. Here, we examined the association between Rwandan rainfall patterns and childhood diarrhoea and the impact of household sanitation variables on this relationship. We derived a series of rain-related variables in Rwanda based on daily rainfall measurements and hydrological models built from daily precipitation measurements collected between 2009-2011. Using these data and the 2010 Rwanda Demographic and Health Survey database, we measured the association between total monthly rainfall, monthly rainfall intensity, runoff water and anomalous rainfall and the occurrence of diarrhoea in children under five years of age. Among the 8,601 children under five 5 years of age included in the survey, 13.2% reported having diarrhoea within the two weeks prior to the survey. We found that higher levels of runoff were protective against diarrhoea compared to low levels among children who lived in households with unimproved toilet facilities (OR= 0.54, p=0.010 for moderate runoff and OR=0.50, p=0.012 for high runoff) but had no impact among children in household with improved toilets. Our finding was that children in households with unimproved toilets were less likely to report diarrhoea during periods of high runoff water highlights the vulnerabilities of those living without adequate sanitation to the negative health impacts of environmental events.

**PS-04****Climate Change and Perennial Crops Production in Nigeria: Implications for Agricultural Development**

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Climate change and its adverse impacts on the various systems at different levels and locations have taken the front burner of global and national academic discourses in the past couple of decades. Emanating from these is the consensus that developing countries and the agricultural sector are more vulnerable to the impacts of climate change. Nigeria like other developing countries faces the challenges of climate change. There have been assertions that agriculture in Nigeria, which is largely rainfed, would be greatly affected by climate change and variability. Available literature reveals major gaps in empirical data linking impacts of climate change and agriculture in Nigeria, particularly on the perennial crop sub-sector. Records show that perennial crops such as oil palm, cocoa and rubber were major foreign exchange earners for Nigeria from independence in the 1960s up to late 1970s. With climate change manifesting in all facets of national economies, it becomes essential to investigate the performance of perennial crops out in Nigeria. Results of the study could help design measures that can boost the development of the sector and bring perennial crops to its hitherto dominant position as major revenue earner for Nigeria.

PS-05**Effect of Environmental Regulated Water Temperature Variations on Survival, Growth and Haematology of *Clarias gariepinus***

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A 56 day study was carried out to evaluate the effect of temperature changes on the survival, growth performance and haematology of *Clarias gariepinus* fingerlings fed housefly maggot meal (Magmaeal) diet. Ninety (90) *Clarias gariepinus* fingerlings, (initial mean weight 4.33 ± 0.03 g) were subjected to different environmental regulated temperature conditions in three locations (laboratory, outdoor, greenhouse). Ten (10) fingerlings were distributed to each tank containing 20 litres of water in triplicates for each treatment location. Magmaeal diet was used as the major dietary protein source and was formulated to yield a protein content of 41.97%. The fingerlings were fed 5% of body weight twice daily. Growth performance, haematological performance and carcass composition were assessed at the end of the experiment. In this experiment all the experimental fish in the greenhouse died after 8 days of exposure. This happened around 14 hours when water temperature reached 40°C. The mortality may be due to failure of the fish to adapt to extreme temperature conditions. So no further sampling and data was got from treatment 3 (greenhouse). Result of the experiment showed that the average temperature was 26.53 ± 0.01 °C, 26.06 ± 0.01 °C and 31.52 ± 0.00 °C for laboratory, outdoor, greenhouse respectively. It was observed that that different water temperatures affected fish growth. There is no significant difference ($P < 0.5$) in Final Weight (g), Weight Gain (g), Food Conversion Ratio (FCR) and Standard Growth Rate (SGR) among the fish reared in the laboratory (26.53°C) and outside tanks (26.06°C) respectively. The initial carcass crude protein (Cp) value was (58.97%). At the end of the experiment fish reared in the laboratory had a crude protein value of 63.97 ± 0.06 %Cp and those reared outdoor (26.06°C) had 71.28 ± 0.00 %Cp. Comparing fish reared in the laboratory (26.53°C) and those reared outside in tanks (26.06°C), there was no significant difference in the values of Packed cell volume (PCV); White blood cell (WBC); Haemoglobin (Hb) and mean corpuscular haemoglobin concentration (MCHC). However the Red blood cell (RBC); Mean corpuscular haemoglobin (MCH) and Mean corpuscular volume showed significant



difference ($P > 0.05$). The result confirms that *Clarias gariapinus* fingerlings reared at a mean temperature of 26°C (within the recorded optimal temperature range for good growth) performed well. *Clarias gariapinus* fingerlings are not able to survive when water temperature reaches to 40°C.

PS-06

Estimation of Groundwater in the crystalline basement aquifer of Northern Ghana

Kouakou Valentin Koffi

Northern Ghana has a semi-arid climate, that experiences prolonged dry season (7 months of limited rainfall) leading to the drying up of many rivers and streams. In addition, rainfall is highly variable in space and time. Therefore, surface water is unreliable and insufficient to meet the water demands for socio-economic development in this part of Ghana. As a result, it is heavily dependent on groundwater for domestic water supply and dry season irrigation, mostly vegetables (cash crops). Furthermore, because of its buffer capacity, groundwater is the most reliable means to adapt to climate change. Therefore, it is important to study the impact of climate on groundwater recharge towards better water management plan. But estimating this impact is complex and first requiring the estimation of current recharge. For this purpose, Chloride mass balance method was applied in crystalline basement aquifers of Northern Ghana. Results were found to fall within the range of 3 to 12% of the mean annual rainfall depending on the type of Geology.

PS-07

Carboxyhaemoglobin, Lung Function and 1-Urinary Hydroxypyrene in Occupationally Exposed Charcoal Workers in Ogun and Oyo States, Nigeria

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Charcoal production and utilization as cooking fuel is a common practice in rural areas of developing counties. Charcoal production releases Greenhouse Gases and Particulate Matter into the atmosphere during pyrolysis and harvesting activities. This study aimed to assess the level of carboxyhaemoglobin, pulmonary functioning and urinary 1-hydroxypyrene as pollution indicators among occupationally exposed charcoal workers. Socio-demographic data were obtained through the use of structured questionnaire, carboxyhaemoglobin and lung function were monitored with the use of non-invasive pulse CO-oximeter Rad-57 meter and a calibrated digital Piko spirometer, respectively. Urinary 1-hydroxypyrene in consented participants were extracted using liquid-liquid extraction technique and analyzed high performance liquid chromatography. Demographic analysis revealed that male are predominantly involved in charcoal production with the Tiv tribe accounting for over 40% and Yoruba's with about 40%. The frequently experienced health symptoms among the occupationally exposed workers include body pain 87.7%, dry throat 66.7%, chest pain and sneezing 59.6%, Sputum production 57.9%, catarrh 56.1%, cough 52.6%, shortness of breath and eye irritation and headache 47.4%, dizziness 29.8%, skin irritation 24.6% and nausea 19.3%. These symptoms were rarely reported among the control group. Levels of urinary 1-hydroxypyrene for subjects and controls are 1.28 ± 1.44 and 0.66 ± 0.51 respectively. FEV1 of consented participants 2.35 ± 0.73 and 2.69 ± 0.56 while PEFR are 253.72 ± 103.45 and 330.02 ± 94.61 for subject and control respectively. FEV1 was strongly positively correlated with PEFR ($r=0.875$ and $P=0.01$). The urinary 1-hydroxypyrene, FEV1 and PEFR in occupationally exposed workers might pose future health challenges.

**PS-08****Assessing Climate Change Adaptation Strategies used by Smallholder Livestock Farmers in the Upper West Region of Ghana**

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As a result of the challenges that climate variability and change brings about, farmers have adopted certain measures in order to adapt to their environment. The study assesses climate change adaptation strategies used by smallholder livestock farmers in the Upper West region of Ghana. Two quintile choice modules were used: first, the Tobit regression was used to determine the factors influencing the vulnerability level of smallholder livestock farmers and second, the multinomial logit regression to determine the factors influencing the adoption of adaptation strategies by these farmers. Also, the Livelihood Vulnerability Index (LVI) was used to measure the level of vulnerability of these farmers whereas descriptive statistics explained the level of adoption of these adaptation strategies. To obtain independent views of these adaptation strategies, four communities were selected in each of Lawra and Nandom districts. For a particular district, one community was selected from the Northern, Southern, Eastern and Western side. In all, 200 smallholder livestock farmers were interviewed, comprising different social groups. The average respondent had 19 years of experience in livestock rearing. With respect to education, 95.5% of the respondent had no education whereas 3 and 1% had basic and secondary education respectively. Categories of adaptation strategies identified included feed, health, housing, and livestock breed, and the non-adopters. Each category of an adaptation strategy was identified as indigenous and / or introduced. In all, 96% of the respondents use at least one adaptation strategy and 4% of non-adopters of the strategies. Preliminary findings of the results show that, about 57% of the respondents use an indigenous feeding strategy whereas 43% use the introduced strategy. Again, while 47% of the respondents use and indigenous health strategy, 53% use the introduced health strategy. For housing and breed related strategies, 39 and 79% use the indigenous strategy, and the opposite is true for an introduced strategy.

PS-09**Community Renewable Energy Project in Imini Community: A baseline report**Talabi, FM¹, Adekoya AE²¹*Department of Aquaculture and Fisheries Management, University of Ibadan, Nigeria.*²*Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria.*

This study reports a baseline study towards the execution of community renewable energy project in Imini, a rural community in Oyo state. Imini community has not been connected to the national grid by the Power Holding Company of Nigeria. The project is an initial effort towards mitigating climate change effect on one hand and on the other, providing solution to the perennial energy problems in the rural community. Quantitative data were collected through the use of interview schedule while Focus Group Discussion with different gender and generational groups and In-depth Interview with Key informants constituted the qualitative methods used. Most of the households were male headed (62.9%), Yorubas, and married, with 54.3% being Christians. More than half (54.3%) had no formal education, 68.5% were aged more than 50 years, having more male than female children, with an average monthly income of N10,000 (\$35.00). Livestock rearing was the most important livelihood activity, followed by crop farming with cassava and maize being the prominent crops. Generally, residents prefer to use energy for water pumping, household lighting and charging of mobile phones. An average energy requirement of 500Wh/day was estimated, and households are willing to pay for renewable energy sources only if well subsidized. Therefore for a sustainable renewable energy project,



households should only be made to pay to the minimum cost possible of the services provided.

PS-10**Flooding in the Context of Climate Change in Douala, Cameroon's Economic Capital**

Teke Johnson Takwa

Douala is a coastal city found in the Equatorial zone in the heart of Cameroon's economic activities and hosting over 65% of country's economic activities. Currently, the mean annual rainfall of 3813mm for the zone shows significant decline compared to three decades ago when it averaged 4200mm. Another feature of rainfall in this locality is the high variation of its intra and inter annual amounts. The annual rainfall of 218 days with sequences of continuous rainfall sometimes lasting more than 31 days are increasingly becoming common. This combined with rising temperatures, a rise in sea level estimated to attain 0.9 cm by 2050, a rapid and uncoordinated urbanization, the blocking of drainage channels by households and industrial waste has intensified the frequency of floods in low lying coastal city. There is likelihood of more floods in future with projected 35% increase in rainfall over the next two decades and the gradual but continuous increase in sea level. Even though climate change is key cause of flooding in Douala, the situation has been aggravated by human activities. Many coping strategies have been adopted by the population and municipal authorities but special efforts still need to be made in the reduction of greenhouse gases, urban planning and the building of an embankment to halt the invasion of the city by rising ocean waters and early warning systems.

PS-11**Climate Change and Water Management: Implications for Shared Use of Water Resources**

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A highly diverse set of user groups depend on freshwater resources and services for domestic use, agricultural and industrial purposes as well as ecosystem functioning. Many freshwater supply sources are already over allocated, suffer degraded water quality, and are often not in sufficient condition to support life. The steps towards poverty reduction targets, the Millennium Development Goals (MDGs) and sustainable development will be jeopardized if improved water resources management and effective storage measures are not instituted. A mixed method survey is being conducted in four randomly selected communities in the Lawra district of the upper west Region of Ghana. Semi-structured questionnaires are being administered to community members (N=161) to identify the various users of water, assess quality and identify adaptation measures to climate change with respect to water resources. The GPS coordinates of the water resources from which samples are being collected will be integrated into ArcGIS software to enable a spatial representation of the water resources in study area. Preliminary results from laboratory analysis indicate that the level of phosphate and nitrate was high in boreholes close to farms as compared to those far away and the river. From the focus group discussion, Irrigation farmers, livestock owners, households, brewers, shea butter producers and builders are identified as the main users of water within the communities in the district. Water related conflicts have been experienced within some communities involving women and between irrigation farmers and livestock herders especially in the dry season due to water scarcity.

**PS-12****Analysis of meteorological data and farmers' perception of climate change in Burkina Faso**

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Farmers in Burkina Faso are among the most exposed to climate change / climate variability, as their livelihoods are greatly hampered by climatic hazards. Annual rainfall, temperature, length of the rainy season, maximum dry spell during the rainy season, and onset and offset of the growing period are among the inputs farmers use to take decisions in their farming activities. A better understanding of factors that shape farmers' perceptions of climate change is needed to take appropriate measures. There is a link between people's perceptions of changes in their environment and their reactions. Understanding local perceptions of long-term fluctuations may add valuable information to scientific assessments of environmental change. This article aims at establishing a link between local farmers' perceptions of environmental change and the evolution of observed climate variables in the Southwest of Burkina Faso. The study is based on a household survey conducted among randomly selected 250 households sampled using a multi-stage sampling procedure. This study revealed contrasting evidence, while farmers' perception of temperature match with historical data, their perception of rainfall evolution was not always corroborated by scientific evidence. However, the analysis of the evolution of monthly rainfall has shown a decrease in the amount of rainfall and the number of rainy days recorded in August over the last decade; this could potentially explain the contrasting negative household perceptions of rainfall trends since this month refers to the peak of the wet season and whose rainfall is particularly important for the growth of most local crops.

PS-13**Analysis of intensive crop cultivation and implications for national climate policies and praxis**

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Declining smallholder agricultural productivity and livelihoods have been a major concern for the global community due to the impacts of global environmental and climatic changes. Intensification is often presented as a sustainable option to close gaps in productivity and yield instead of expanding cultivation into marginal lands and fragile ecosystems. However, with intensification comes other intertwined health, sustainable use of terrestrial resources and water use concerns, all of which have been identified as priority sustainable development goals (SDGs). There is no consensus in the literature about the effects and value of intensification as a viable option for sustainable production. More research is needed to unravel this dilemma. To ensure that farmers pursue sustainable intensification that reverses current untenable trends by 2030, effective evidence-based policies are needed to enhance national adaptation policies. This mixed methods comparative study with goals to analyze the concerns, and experiences of farmers using different intensive organic and inorganic cultivation regimes was used. Soil samples were analyzed to assess soil carbon and chemical residues relative to farmer concerns. It is expected that findings from this study will contribute to national climate policies and praxis.

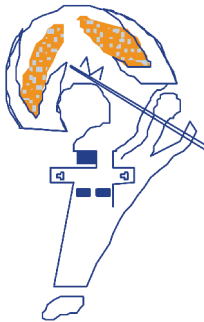
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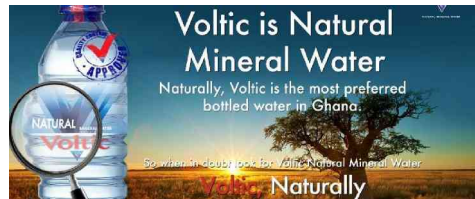
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2015 [TOP LEFT]: Head of the European Union in Ghana His Excellency Mike Hanna, the Vice Chancellor, University of Ghana and Ghana's Environment Minister Hon Mahama Ayariga in 2015. **RIGHT:** Section of Participants at 2015 Opening.



2014 [UPPER MIDDLE LEFT]: The Chief of Mission of the International Organization for Migration in Ghana (Left) engages Prof Audrey Gadzekpo after her Keynote Address at the 2014 conference. **RIGHT:** Posters & Exhibition.



2013 [LOWER MIDDLE LEFT]: Members of Uganda's Parliament (front row) led by Hon. John Bagoole. **RIGHT:** Prof Akosua Adomako-Ampofo, Chair of the Opening Ceremony in 2013 and Dr. Joe Oteng Adjei (right), Ghana's Environment Minister.



2012 [BOTTOM LEFT]: The Maiden Event showing Brazilian Ambassador to Ghana Madam Vida Gala, Vice Chancellor of University of Ghana & others. **RIGHT:** Ms Joyce Aryeh, a Politician, Industrialist & Entrepreneur delivering a Plenary Address.