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Institute for Natural Resources in Africa

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MESSAGE FROM THE DIRECTOR

In 2014, I completed four years as Director of UNU-INRA. This year brought its own challenges with the outbreak of the deadly Ebola disease which had a negative impact on projects implementation in the West African sub-region, especially in the three main affected countries: Guinea, Liberia and Sierra Leone. Nonetheless, some strides were made. We pursued our research and capacity building activities of the previous year and initiated new projects during the year. A noteworthy new project in 2014 is the one on *Climate Change, Agricultural Trade and Food Security in ECOWAS.* It aims to assess whether agricultural production systems and trade policies in the Economic Community of West African States (ECOWAS) can be adjusted to alleviate the impact of climate change on food security. This project enables us to fulfil one of our goals of serving as a 'think tank' to the United Nations System. During the year, we completed country assessment studies in relation with the project in 13 countries of the ECOWAS region.

In terms of capacity development, the Institute continued to strengthen the capacity of African researchers and other individuals through its flagship visiting scholars and training programmes. Notable among the training programmes were the Green Business Training workshop held in Lusaka, Zambia and the quarterly Geographical Information Systems (GIS) and Remote Sensing Trainings that were run in the year. Our Research Fellows also continued to contribute to the numerous discourses on issues affecting Africa's development at conferences, seminars and workshops.

Our funding has also improved, thanks to the support received from the International Development Research Centre (IDRC) and the United Nations Economic Commission for Africa - African Climate Policy Centre (UNECA-ACPC) to carry out specific projects. The regular support from our core funders, the governments of Ghana and Zambia, also made it possible for us to achieve our targets in 2014, and we continue to acknowledge their immense contributions to the Institute.

Indeed, 2014 marked a significant milestone for the Institute as it ended our strategic plan (2011-2014) and ushered us into our next four -year organisational plan. Whiles taking stocks, we realised that a lot has been achieved during the years as far as our mandate is concerned. We have made significant contributions in addressing issues affecting Africa's natural resources management, especially through the constant dissemination of our research findings to inform policies. However, as we celebrate these feats, we are also not oblivious of the challenges that remain. During the next four years, we will seek to consolidate our progress and develop stronger programmes that will enable us to promote the sustainable management of Africa's rich natural resources in a way that improves the environment and the livelihoods of people.

Elias T. Ayuk
Director, UNU-INRA

ABOUT UNU-INRA

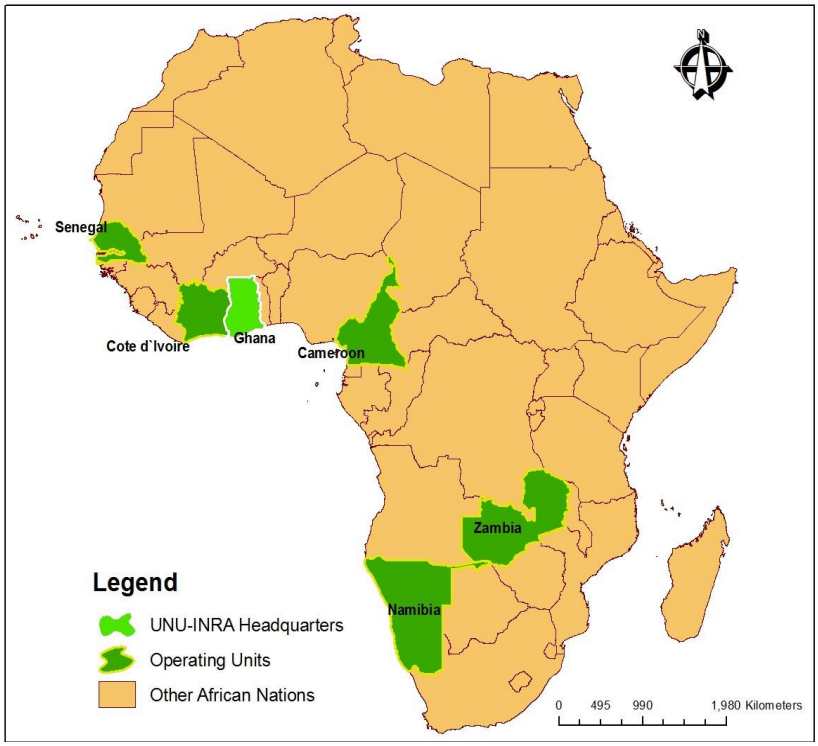
The United Nations University Institute for Natural Resources in Africa (UNU-INRA) is one of the 15 research and training centres / programmes that constitute the United Nations University's worldwide network. UNU-INRA's mission is to empower African universities and research institutions through capacity strengthening. Its vision is to be the leading institution in Africa in capacity building for research in natural resources management (NRM).

The Institute, headquartered in Accra, Ghana, also operates in five other African countries, namely Cameroon, Cote d'Ivoire, Namibia, Senegal and Zambia. Each of these Operating Units (OUs) focuses its work on specific areas of natural resources management.

UNU-INRA Operating Units (OUs)

These are:

- **University of Cocody, Abidjan, Ivory Coas**t with focus on the social, economic and policy dimensions of natural resources management;
- **University of Yaoundé I, Yaoundé, Cameroon** emphasising the use of geo-informatics and applications of computer technology to natural resources management;
- **University of Zambia, Lusaka, Zambia** with emphasis on soil fertility improvement through the use of local mineral resources;
- **University of Namibia, Windhoek, Namibia** with focus on marine and coastal resources; and
- **Institute for Food Technology (ITA) of the Ministry of Mines and Industry in Dakar, Senegal,** concentrating on processing of agricultural and local food products, food quality and food technology.



UNU-INRA's Operational Areas in Africa

Core Activities

UNU-INRA is actively involved in:

RESEARCH

CAPACITY DEVELOPMENT

POLICY ADVICE

KNOWLEDGE SHARING & TRANSFER

2014 ACTIVITIES

Policy Impact Research Projects

Climate Change, Agricultural Trade and Food Security in ECOWAS

This two-year project is being implemented in collaboration with the African Climate Policy Centre (ACPC) of the United Nations Economic Commission for Africa (UNECA). Its main objective is to assess whether agricultural production systems and trade policies in countries of the Economic Community of West Africa States (ECOWAS) can be adjusted to alleviate the impact of climate change on food security to promote sustainable development.

In 2014, UNU-INRA developed the implementation plan, which consists of four phases. The Institute has completed the first phase that involved undertaking country assessments, reviewing methodological approaches and conducting stakeholder consultations. The country assessment studies were carried out in 13 West African countries including Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The aim was to establish country profiles in terms of geographical, environmental and socio-economic characteristics, and also to determine climate, soil and hydrological characteristics, agricultural land and production systems, agricultural trade and food security, as well as to assess challenges, opportunities, policies and institutional arrangements for climate change in the West African countries.

A comparative analysis of the individual country reports revealed that, though the countries have different characteristics, there are abundant water resources and large amounts of arable land in the ECOWAS region, which present opportunities for increased agricultural production. Food security is improving but a significant proportion of the population is food insecure particularly those that depend on markets to access food, especially during the dry season. The findings pointed out that the response of the countries to the impact of climate change will be affected negatively by the high level of poverty, poor infrastructure, and institutions which are not performing optimally due to the lack of human and material resources and inadequate coordination. The available evidence suggests that there has been little or no attempt to mainstream climate change concerns into agricultural development and trade policies. Furthermore, while national level data on acreage, crop yield, and production are available, one common challenge facing the countries is lack of reliable locally generated long term data on monthly rainfall and temperature, evapotranspiration, relative humidity, cloudiness and sunshine hours for the agro-climatic zones.

UNU-INRA together with ACPC also held stakeholder consultations with officials of ECOWAS, the West African Economic and Monetary Union (WAEMU), the Volta Basin Authority (VBA) and other key actors to understand the gaps, challenges and opportunities that can inform the regional study on climate change, agricultural trade and food security in ECOWAS.

Potential of African Grass Species in Healing Industrial and Domestic Sickwater

UNU-INRA, in collaboration with Ebonyi State University, Nigeria, carried out a research project on phytoremediation and bio-systematic study of *Chrysopogon nigritana*, a vetiver grass species native to Africa. The aim of the study was to assess the potential of the grass in healing effluents from industrial and sickwater domestic sources. In recent years, these have been a major source of contamination and are increasingly becoming an important resource in Africa for different uses including irrigation in urban and peri-urban agriculture.

A phyto-engineering treatment plant was set up, using the African species of the vetiver grass with effluents from fertiliser blending companies, quarry sites, cassava processing factories, abattoirs, leachates from on-engineering dump sites, crude oil polluted water and urban wastewater from drainage sites. The comparative results of pre and post-treatment of the effluents and laboratory analyses showed that the African species of the vetiver grass is capable of reducing toxic heavy metals including phosphates, arsenic, cadmium and magnesium in effluents from industrial and sickwater domestic sources.

UNU-INRA research fellow is co-supervising an MSc student's thesis on this research. The results of this project have been disseminated to a wide-range of stakeholders in Africa and beyond through the mass media. Other training and sensitisation efforts will be carried out in the coming year to promote the adaptation of the vetiver technology in cleaning wastewater.

Conservation Agriculture Practice: The Psychology of Smallholder Farmer Adoption in Ghana

This research aims to understand the psychological determinants that predict the adoption of Conservation Agricultural Practices (CAPs) in small-scale farmers in Ghana. This has become necessary because, while resources are being directed to changing farmer behaviour, the adoption rate of CAPs is low and de-adoption rate is high. Using a sample size of 600 smallholder farmers, data was collected using a survey determining the Values, Beliefs and Norms (VBN) of farmers in decision making roles. In addition, a list of CAPs was used to assess the number of practices the farmers have adopted. The data from the VBN survey and CAP checklist is being tested using a Structural Equation Modelling methodology. The results, when finalised, will support Advisory Organizations running CAP programmes as well as other stakeholder groups in the agricultural value chain.

Gender and the Political Economy of Land in Africa

This study involved a desk review of available information on gender and the politics of land in Africa. Its overall objective was to identify and analyse the implications for gender equality in the context of the political economy of land in Africa. More precisely, the study examined how political systems functioning on the continent affect land tenure and property rights of women. The findings revealed that the political systems in Africa have not facilitated women's access to and control over land. Customary land tenure which remains relevant in most of the African communities has significantly limited women's tenure security.

Despite recent general awareness on the issue of women's right to land in Africa, most laws and policies on land were not implemented; revealing the existence of a substantial gap between the development of laws and their effective implementation. Moreover, the potential role that the land markets could play in improving women's tenure security is still limited. The analysis therefore showed that there is the need for innovative approaches in determining and operationalising good strategies to strengthen women's access to land. The roles that different actors (women, men, women's organizations, community leaders, donors) can play would be crucial in the process of securing women access to land in Africa.

Impact of the Transition towards a Green Economy on Employment and Growth in Côte d'Ivoire

Started in 2013, this study is still ongoing with a deep microeconomic analysis. Its main objective is to assess the potential contribution of a green economy in terms of employment and GDP in Côte d'Ivoire.

The preliminary results indicated that promoting investment in natural resources management (land and water) provides a sustained agricultural growth in the long term. However, reducing land under agricultural production for forest will reduce contribution of the agricultural sector to GDP. At the same time, the green scenarios in the energy sector and waste recycling showed an increase in production and employment in the industrial sector. Investments in social sphere particularly in health and education, which will increase the labour force and the efficiency of the labour, would improve labour productivity as well as production in agricultural and services sectors.

Mushrooms Cultivation Development in Senegal

This project, which started in 2012 in northern Senegal, was extended to the center (Kaolack) and to the south (Bignona) in 2014. Its main objective was to build mushroom farming demonstration centres in different communities in Senegal in order to create awareness on cultivation and the benefits of consuming mushrooms. As part of the project, UNU-INRA OU in Senegal, ITA, has supplied pure spawn culture of *Pleurotus sajor caju* and *Pleurotus florida* to the communities.

Similarly, the OU hosted a Master's degree student from the Université d'Abomey Calavi, Benin, who carried out a study on *"**The Production of Edible Mushrooms and their Inclusion in Local Flours***". The study involved the incorporation of the edible mushrooms, *Pleurotus florida*, into millet and bean flour. The nutritional characteristics of the flours with or without mushrooms (mixed flour 1 and mixed flour 2) were analysed in order to appreciate the best flour. From the results obtained, the best flour could be the mixed flour 1 (flour with mushrooms) which presented a level of 15.27% of proteins content, a value intended for children as per Codex Alimentarius' international standard for food complement flours.

Unleashing the Potential of African Rural Economies through Green Growth

Evidence from developed and some developing countries suggest that green growth can lead to increase in productivity, income, and create employment. For developing countries, it is important to understand how a green growth trajectory can address some of their major developmental challenges that include high unemployment, poverty, environmental degradation, pollution, biodiversity loss, soil erosion and lack of access to energy. To address the knowledge gap on green growth in Africa, UNU-INRA with support from the International Development Research Centre (IDRC) is implementing this three-year project, which started from June 2013 and is expected to end in June, 2016. Its overall objective is to generate, enhance and strengthen scientific knowledge on the effects of green growth on rural economies in Africa.

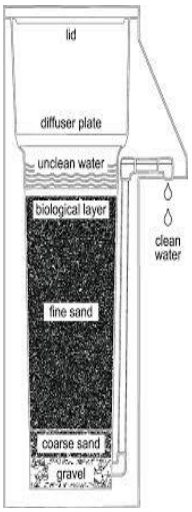
In 2014, five Visiting Scholars and six PhD Interns were recruited to carry out research in the context of the project. Below are summary reports on these studies:

- ***Environmental and Economic Burden of Sand Dredging on Artisanal Fishing in Lagos State, Nigeria***

This study considered environmentally detrimental input (water turbidity) and conventional production inputs within the framework of stochastic frontier analysis to estimate environmental efficiencies of fishermen in sand dredging and non-dredging areas in Lagos State, Nigeria. Cost and return analysis showed the constituents of average gross profit of fishermen in the study area. The result revealed that environmental efficiency was low among fishermen in the sand dredging areas. Educational status, experience in fishing and sand dredging were the factors influencing environmental efficiency in the sand dredging areas. The gross profit per day was higher among the fishermen in the non-dredging areas. The study affirmed large household size among fishermen and revealed that fishermen in the fishing community around the dredging areas travelled long distance in order to reduce the negative effect of sand dredging on their fishing activity.

The study recommended that governments and other policy makers regulate the activities of the sand dredgers by restricting them to non-fishing communities. It was also suggested that family planning campaigns be intensified in fishing communities to reduce the negative effect of high household size on fishing. The need to encourage fish rearing among fishermen to complement their meagre incomes was also proposed by the study.

- ***Acceptability and Eco-Business Potential of Biosand Filter for Rural Household Water Treatment in Ghana***





The study took a look at biosand filter (BSF) as a household water treatment and safe storage (HWTS) technology in Ghana and assessed the acceptability of this technology at the household level in rural communities. The study further applied lifecycle environmental and cost assessments to analyse the eco-efficiency potential of the biosand filter and examined prospects of leveraging this potential for green business development. The findings revealed that females were more inclined to accept the BSF. Also, BSF acceptability may improve with aging and education of individuals. Cultural reasons emerged strongly for not applying any household water treatment method. Compared to sachet water production, which was considered as the most likely alternative with respect to drinking water provision in Ghanaian households, it was established that the BSF has superior eco-efficiency and could provide appreciable profitability as a rural enterprise.

- ***Ethnobotanical Study of Neglected and Underutilised Plant Species in Southwest Ethiopia***

This study was conducted to determine the ethnobotany of neglected and underutilised plants in southwest Oromia, Ethiopia. Use of 71 neglected and underutilised plant species belonging to 36 families and 55 genera were reported by informants of the study area. Of these, the majority (55,77.5%) was obtained from the wild followed by domestic (16,22.5%) from home garden and farm land. Of the growth habits, herbs constituted the highest percentage (26,36.6%) followed by shrubs, trees and climbers (23,32.4%; 20,28.2%; 2,3%, respectively.

Fruit (30,57.7%) was the most widely consumed plant by the communities of the study area, followed by tubers (8,15.4%) and seed (7,13.5 %) parts. In the preference ranking analysis, the highest score was given to ‘’Anclote (*Cocconia abyssinica)’’* as the ‘’most appreciated’’ in Wollega Zones followed by Ensete (*Ensete ventricosum* (Welw) Cheesman) and Godarree (*Colacaceae esculenta* (L.) Schott) in the remaining zones.

In paired comparisons, it was found that *Syzygium guineense* stood out first by being frequently selected followed by *Ficus sur* as the most preferred wild food plants. Neglected and underutilised plants in the study area were threatened by agricultural expansion, overharvesting for fuel wood and construction, and by overgrazing. The findings of this study recommended the establishment of small and medium sized enterprises to increase the value of NUPs in the region through farmer associations.

- ***“Waste to Wages”: Scrap Metal Recycling for Employment and Entrepreneurship in Zimbabwe’s Informal Sector***

This study analysed the nature and scope of scrap metal recycling activities of the informal sector as an alternative and sustainable solid waste management strategy for green economic growth and decent employment opportunities in Zimbabwe. Findings revealed that a significant large proportion of the entrepreneurs (65%) are mainly into manufacturing. While some producers source part of their raw materials from other sources, 56 percent depend on material sourced from scrap yards. Majority of producers (91%) produce agricultural implements, equipment and machinery followed by 83% who produce building materials. Consumers of goods produced in the informal sector are mainly individual or household customers (98%). Other firms within the informal sector (59%), corporate sector (47%) and cooperatives (42%) are important consumers of products made from scrap metal by informal sector entrepreneurs.

Operations in the sector are still highly labour-intensive with 75 percent of gross value added coming from labour contribution. The mean technical efficiency of the informal firms is 0.72, implying that there is still scope for the industry to increase its productivity by 28 percent if they efficiently allocate available productive inputs using available technology. The study recommended advocacy to regularise and integrate informal sector initiatives into the mainstream waste management strategies and the wider economy towards the attainment of greater efficiency and green economic growth.

- ***Resource Use and Environmental Efficiency, Productivity Differential and Resilience of Underutilised Indigenous Vegetables of Southwest Nigeria***

The aim of this research was to investigate prospects and limiting factors of the production of underutilized indigenous vegetables (UIVs) among resource-poor farmers. It measured resource use and environmental efficiency, productivity differential and resilience of UIVs in Southwest Nigeria. With over twenty vegetables identified in the study area, the results showed that UIVs present great opportunity for the adoption of agricultural biodiversity as a strategy for promoting agricultural growth and a green economy. Constraints to production and utilisation of indigenous vegetables include scarcity of seed/stem and difficulties in propagation due to absence of propagation programs. The study called for capacity building programs for farmers' and improvement in rural infrastructure including market and communication facilities.

- ***Banana Cultivation in Pastoral Cattle Grazing Rangelands:*** **Are Pastoralists Progressing towards Green Job Creation?**

This study examined gender inclusiveness and jobs creation through banana production and distribution chain. The regular income of individuals accruing from different small scale banana business related activities in south western Uganda was tracked to test the hypothesis that pastoralists progress towards green economy through integrated banana cultivation in cattle grazing rangelands. Field data was gathered to track banana business activities of individuals in each category: banana farmers, transportation agents, roadside traders and brokers for hired trucks in order to generate insights into the employment opportunities created.

The results revealed that banana cultivation in the rangelands of south western Uganda has the potential to improve household income as well as create employment opportunities for men and women in a unique way. The jobs from the business networks in the banana distribution chain make banana production a promising transition path towards green employment in Uganda. Exploring the use of banana pseudo-stems and other plants after harvesting the fruit will make integrated livestock and banana production more environmentally friendly, a more sustainable and socially inclusive source of income for a large population in Uganda.

Capacity Development

Green Business Training Workshop

UNU-INRA organised a five-day training workshop in Lusaka, Zambia from the 22nd - 26th September, 2014 under the theme *"Greening Business through Biodiversity and Ecosystem Services"*. The aim of the workshop was to equip African researchers, businesses and policy makers with the necessary tools to be able to identify potential risks of business activities on the ecosystem and its biological components and develop effective management strategies to mitigate them.

The workshop brought together twenty-participants (including five females) from Cameroon, Egypt, Ghana, Nigeria, Malawi, Kenya, Uganda, Tunisia, Zambia and Zimbabwe. The training workshop was one of the major activities under the Institute's Green Economy Project entitled ***"Unleashing the Potential of African Rural Economies through Green Growth"***, a three-year project that is being supported by the International Development Research Centre (IDRC). The overall objective of this project, as already stated above, is to generate, enhance and strengthen scientific knowledge on the effects of green growth on rural economies in Africa.

CAPACITY DEVELOPMENT

Greening Business through Biodiversity and Ecosystem Services

Date: *September 22-26, 2014*

Venue: *Lusaka, Zambia*

Participating Countries: *Cameroon, Egypt, Ghana, Nigeria, Malawi, Kenya, Uganda, Tunisia, Zambia and Zimbabwe.*

Male: *15*

Female: *5*

Training Package on Greening Business through Biodiversity and Ecosystem Services

In ensuring a successful transition towards a green economy, more knowledge and understanding is needed to clarify and support the roles and responsibilities of businesses in the conservation and use of biodiversity and ecosystem services. In response to this, UNU-INRA, under its green economy project entitled "*Unleashing the Potential of African Rural Economies through Green Growth*", has developed a training package on "Greening Business through Biodiversity and Ecosystem Services. The training package comprises a facilitator guide; participants training manual and a training material with five modules.

The learning outcomes of the training package aim at equipping participants with a better understanding of the Green Economy concept and its major principles. It is also to give them a good appreciation of the relationship between biodiversity, human wellbeing and green economy; improve their understanding of the existing frameworks for considering the value of nature and under which circumstances/context they can be applied; offer understanding of design of BES information management and accounting system; improve their capacity to manage biodiversity-related business risks as well as support biodiversity-related business opportunities using available state of the art methodologies and tools. Also, the package is to improve understanding of different policy options and instruments, and their main limitations and challenges in supporting biodiversity business.

Development of a Toolbox for Operationalising Green Economy Transitions at a Sub-National Level in Africa

This project which is ongoing, aims at developing a toolbox to operationalise Green Economy transitions at sub-national levels in Africa. The project is being implemented by a consortium of three institutions: Sustainability Institute (lead institution), United Nations University Institute for Natural Resources in Africa (UNU-INRA), and the Stockholm Environment Institute.

The draft toolbox, with practical step-by step guidelines has been developed. UNU-INRA contributed to four sectoral toolboxes (sustainable forest management, sustainable mobility, integrated waste management, and resource efficiency and clean production) and the implementation support toolbox. An International Experts Group meeting is scheduled in February 2015 to review the draft toolbox for operationalising green economy at the sub-national level in Africa.

UNU-INRA Internship Programme on Natural Resource Conservation and Green Economy

The purpose of the Internship programme is to bring highly qualified and motivated students with diverse backgrounds to the Institute to work on projects linked to Natural Resource Conservation and Green Economy in Africa. Its main goal is to give successful candidates an opportunity to improve their analytical and technical skills. Two interns have successfully completed their internships under the programme, spending 6 months each at the Institute. They were both females.

Geographical Information Systems and Remote Sensing Training

As part of its Geographical Information System (GIS) and Remote Sensing training programme, UNU-INRA has organised three short term courses in Accra, Ghana, in 2014, to enhance the capacity of natural resources managers and researchers in GIS and remote sensing applications. The first training, which was a ten- day course, was run from the 12th - 23rd May, 2014. This involved ten participants from Burkina Faso, Cameroon and Ghana. There was only one female participant.

The second and third training sessions were held from August 18 -22, 2014 and December 9 - 12, 2014, respectively for researchers and other professionals involved in the Project ***"Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa: An Integrated Approach",*** called CECAR Africa Project. There were ten participants including two females in each of these trainings.

The participants of the three trainings were taken through theoretical background to GIS and hands-on applications in collecting natural resources related data with GPS and from satellite imagery and analysing them with ArcGIS and Erdas Imagine for decision making.

CAPACITY DEVELOPMENT

GIS Training for Professionals in Natural Resource Management

Date: *May 12- 23, August 18-22 & December 9-12, 2014*

Venue: *Accra, Ghana*

Participating Countries:

Burkina Faso, Cameroon, and Ghana.

Stakeholder Consultative Session on Short-term Courses

UNU-INRA brought together various institutions, associations and organisations on July 17, 2014 to discuss four (4) short-term training courses that the Institute intends to run. These include training on *Governing Extractive Industries; Environmental Journalism; Environmental Leadership*, and *Sustainability of Urban Africa*. The session provided a platform for the participants to share ideas on the course modules. This was to ensure that the modules reflect the most pressing issues that need to be addressed in Africa. UNU-INRA also seized the opportunity to discuss possible collaboration with the stakeholders in running the courses.

Among key organisations present at the meeting were Ghana Journalists Association (GJA), School of Communications of the University of Ghana; Institute of Environmental and Sanitation Studies, also of the University of Ghana; University of Ghana Business School; Environmental Protections Agency (EPA), Ministry of Food and Agriculture (Ghana), Ghana Chamber of Mines, Forestry Commission, Enerwise Africa, and UN agencies. There were 30 participants, 22 males and 8 females.

UNU-INRA hopes that these short-term training courses, when rolled out in the coming year, will enhance the capacity of journalists, personnel working in the extractive industries, business leaders and urban planners.

CAPACITY DEVELOPMENT

Stakeholder Consultation on Short-term Courses: *Governing Extractive Industries; Environmental Journalism; Environmental Leadership,* and *Sustainability of Urban Africa*

Date: *July 17, 2014*

Venue: *Accra, Ghana*

Participating Organisations:

Ghana Journalists Association, University of Ghana, Environmental Protections Agency, Ministry of Food and Agriculture, Ghana Chamber of Mines, Forestry Commission, Enerwise Africa, UNESCO, UNIC and UNDP

1st African Research Discovery Camp

CAPACITY DEVELOPMENT

African Research Discovery Camp

Date: *March 3 -25, 2014*

Venue: *Henties Bay, Namibia*

The UNU-INRA Operating Unit in Namibia, Sam Nujoma Marine and Coastal Resources Research Centre (SANUMARC) of the University of Namibia, hosted the 1st African Research Discovery Camp from the 3rd -25th March, 2014. The aim of the programme was to provide opportunities for advanced Master's students and creative PhD candidates to learn new developments in the scientific field. The three-week research programme on "*Geochemistry, Ecology and Diversity of Marine Micro-organisms in Ocean Upwelling Systems*", received students and scientists from eight different countries. As part of the programme, participants were given the opportunity to spend 6 days at sea, collecting water and sediment samples for analysis. This activity, coupled with lectures and practical exercises, would enable the participants to apply the newly gained knowledge to explain geochemical cycles, environmental changes, upwelling system fertility, food production and health concerns.

The discovery camp was sponsored and supported by the Agouron Institute through the Scientific Committee on Oceanic Research (SCOR), as part of their initiative on Graduate Education in Oceanography in countries that offer opportunities for students to study global environmental topics in marine ecosystems.

Knowledge Sharing and Transfer

Academic and Research Seminar

UNU-INRA organised a two-day academic and research seminar from 16th -17th December, 2014 to disseminate key findings from research conducted by three of the institute's visiting scholars and a PhD Intern. The seminar was on the following topics:

- *Environmental and Economic Burden of Sand Dredging on Artisanal Fishing in Lagos State, Nigeria*, by Dr Fatai Abiola Sowunmi
- *Acceptability and Eco-Business Potential of Biosand Filter for Rural Household Water Treatment in Ghana*, by Dr. Jonathan Hogarh
- *Resource Use and Environmental Efficiency, Productivity Differential and Resilience of Underutilised Indigenous Vegetables of Southwest Nigeria*, by Dr Agbola Peter Oluwafemi

- *Green Business Model Innovation in Agriculture for Rural Africa*, by Mr Yirviel Janvier Métouolé Méda.

Similar seminars were also organised at the Operating Units in Namibia, Senegal and Zambia for visiting scholars and PhD Interns to disseminate their research findings. Below are the topics of the studies:

- *Ethnobotanical study of Neglected and Underutilised Plant Species in Southwest Ethiopia*, by Balcha Abera Erena (Zambia)

- *"Waste to Wages": Scrap Metal Recycling for Employment and Entrepreneurship in Zimbabwe's Informal Sector*, by Kingstone Mujeyi (Namibia)

- *Banana Cultivation in Pastoral Cattle Grazing Rangelands: Are Pastoralists Progressing towards Green Job Creation*?, by Nina Pius Mbuya and Masinja Jewette (Zambia)

- *Infrastructure, Technical Efficiency and Agricultural Productivity in Rural Areas in Cameroon*, by Mfoulou Olugu Jean Patrick (Senegal)

Validation Workshops

UNU-INRA Operation Unit in Côte d'Ivoire, in conjunction with the office of Green Economy of the Ministry of Environment and Sustainable Development, Côte d'Ivoire, organized a consultative workshop to launch a strategic plan entitled: *"Strategy for the Promotion of Green Industries and Technologies".* This was held from 11th –12th September, 2014 in Abidjan. The overall objective of the workshop was to provide an operational strategy for the promotion of green industries and technologies in Côte d'Ivoire. The workshop proposed four strategic directions for promoting green jobs in Côte d'Ivoire: appropriate institutional and regulatory framework; a suitable vocational training; innovative financing mechanisms; and effective transfer and diffusion of green technologies. There were 73 participants from various organisations including FAO; World Bank; UNDP; UNIDO and the Ministries of Agriculture, Animal Resources, Water and Forest Resources, Industry and Energy.

Similarly, the OU also participated in a national validation workshop organised by the Ministry of Environment and Sustainable Development, Côte d'Ivoire that aimed to analyse and validate the National Strategy for Biodiversity and Action plan. This was held from 17th - 18th November, 2014, in Abidjan. The OU was again involved in another validation workshop, organized by the Ministry, on the evaluation of ecosystem services in Côte d'Ivoire from 8th – 10th December, 2014 at the University of Félix Houphouet Boigny in Abidjan.

4th Conference on Climate Change and Development in Africa (CCDA-IV)

Three UNU-INRA Research Fellows participated in the 4th Conference on Climate Change and Development in Africa (CCDA-IV), held in Marrakech, Morocco from the 8th-10th October, 2014, under the theme **"Africa Can Feed Africa Now: Translating Climate Knowledge into Action".** The Fellows are Dr Effiom Oku, Senior Research Fellow for Land and Water Resources, Dr Gessesse Dessie, Curriculum Development Fellow and Dr Euphrasie B.H Kouame, Post-doctoral Research Fellow for Green Economy. The event was an opportunity for the Fellows to share information with the participants on the Institute's climate change related projects.

Dr Oku, who made a presentation on a paper entitled "***Fighting Climate Change and Feeding Africa Using Steep Land: A Green Solution in an African Grass Species***", called for the adoption of vetiver buffer strips as a green farming technology on steep land. This, according to him, would help reduce soil, water and nutrient losses, increase crop yields and create climate resilience.

On his part, Dr Dessie made a poster presentation on UNU-INRA's flagship curriculum on ***Sustainable Development Diplomacy*** with specializations in ***Water Diplomacy, Bio-Diplomacy*** and ***Climate Diplomacy.*** The main objective of this curriculum is to develop a critical mass of Africa's diplomats that can reinforce sustainable natural resources management through peace building, partnership and prosperity. In a presentation on a paper entitled**: *Risk Aversion and Agricultural Decision Making under Weather Uncertainty: Evidence from Rural Cote d'Ivoire***", Dr Kouame underscored the

need to address the individual barriers and design problems that work as disincentives to farmers' participation in weather insurance program, urging stakeholders in the agriculture value chain to pay more attention to farmers' risk aversion.

Dr Kouame made another presentation on the Institute's project on **Climate Change, Agricultural Trade and Food Security in ECOWAS,** at a side event organised by the African Climate Policy Centre of the United Nations Economic Commission for Africa (ACPC/UNECA) at the conference.

KNOWLEDGE SHARING AND TRANSFER

4th Conference on Climate Change and Development in Africa (CCDA-IV)

Date: *December, 8 -10, 2014*

Venue: *Marrakech, Morocco*

International Conference on Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa (CECAR AFRICA Project)

The United Nations University Institute for the Advanced Study for Sustainability (UNU-IAS), in partnership with UNU-INRA, the University of Tokyo, Kyoto University, University of Ghana, University for Development Studies and Ghana Meteorological Agency, organised a three-day international conference on Climate Change from August 6 -8, 2014, in Tamale, Ghana. The Conference was held under the Project "*Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa: An Integrated Approach*", dubbed CECAR Africa Project. This is a five-year project being sponsored by the Japanese International Cooperation Agency (JICA) and the Japanese Science and Technology Agency (JST). The conference, which was under the theme "*Adaptation Strategies for Mitigating Impacts of Climate and Ecosystem Changes on Developing Societies*" examined adaptation strategies for mitigating the effects of climate and ecosystem changes on developing countries. It attracted over 150 participants from Africa, Asia and Europe.

The Director of UNU-INRA, Dr Elias T. Ayuk, chaired the keynote session of the conference. Two Research Fellows of the Institute, Dr Effiom Oku, Senior Research Fellow for Land and Water Resources and Mr Kwabena O. Asubonteng, Geographical Information System (GIS) Fellow also made presentations at the conference. Dr Oku presented a paper on "***Green Farming Practice for Climate Change Mitigation and Adaptation: Experience with Usual Practice and Vetiver Technology***". The paper was based on research findings that underscored the importance of vetiver grass; which allowed farmers to

International Conference on Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa (CECAR AFRICA Project)

Date: *August 6 -8, 2014*

Venue: *Tamale, Ghana*

derive maximum benefit from every millimetre of rain in drought stricken areas in Nigeria.

Mr Asubonteng and Mr Seyram Kofi Loh; also part of the CECAR Africa Project team, made a poster presentation on "***Understanding Extreme Climatic Events in Northern Ghana: an Application of DPSIR Framework*".** This was based on a study that analysed anthropogenically triggered environmental change and its contribution to human vulnerability to extreme events in the Wa-west District in Northern Ghana. In response to the changes in climate, the study found that farmers were practicing early planting, valley farming during droughts, upland farming in the raining seasons, changing their consumption patterns and using soil and water conservation methods.

In a different poster presentation entitled "***Estimation of USLE's C-Factor from Vegetation Indices for Soil Erosion Modelling in Lake Bosumtwi Basin*",** Mr Asubonteng and Mr Loh compared the capabilities of Normalised Difference Vegetation Index (NDVI) and Enhanced Vegetation Index (EVI) in mapping land cover types for cover and management factor (the Universal Loss Equation: C-factor estimation), in order to estimate the erosion hazard in the Lake Bosumtwi basin. The study revealed that EVI is better at separating land cover types than the NDVI.

KNOWLEDGE SHARING AND TRANSFER

International Conference on Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa (CECAR AFRICA Project)

Date: *August 6 -8, 2014*

Venue: *Tamale, Ghana*

Other Events

Event Title	Date	Place	Role of UNU-INRA	Papers Presented / Responsibility
Investment and Governance of Africa's Resources for Economic Diversification and Development	10-12/12/2014	Doha, Qatar	Contributor	Extractive Resources, Global Volatility and Africa's Growth Prospects, by Dr Elias T. Ayuk, Director, UNU-INRA
Education for Sustainable Development (ESD) in Higher Education, International Training Program (ITP) - Results Seminar	25 -28/ 11/ 2014	Grahamstown, South Africa	Contributor	Rethinking Forestry and Natural Resources Higher Education in Ethiopia: An Education for Sustainable Development Perspective, by Dr Gessesse Dessie, Curriculum Development Fellow, UNU-INRA
Advancing Integrated Soil and Water Management for Climate-Adapted Land Use in Low-Fertility Areas of Sub-Saharan Africa	20-21/11/2014	Nairobi, Kenya	Co-organiser	Dr Effiom Oku, Land and Water Resources Fellow, UNU-INRA
GIS Day	19 /11/ 2014	Accra, Ghana	Contributor	Application of Geospatial Tools in Identifying Local Areas of Deforestation: Practical Demonstration, by Mr Kwabena O. Asubonteng, UNU-INRA GIS Fellow

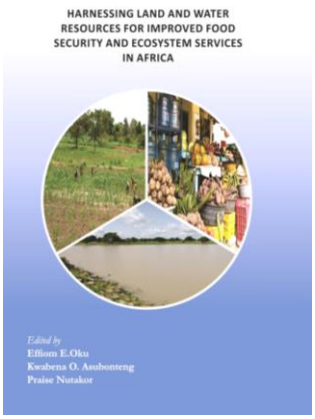
Water and Food: Africa in a Global Context	23-24/ 10/ 2014	Uppsala, Sweden	Contributor	Land for Drug, Cash for Food Khat Production: and Food Security in Ethiopia, by Dr Gessesse Dessie, Curriculum Development Fellow, UNU-INRA
Climate Change and Environment Workshop	17/09/2014	Accra, Ghana	Contributor	Achieving Sustainable Development through Inclusive Green Growth, Dr Calvin Atewamba, UNU-INRA Green Economy Fellow
Achieving Sustainable Development Goals (SDGs) through Transformative Governance Practices and Vertical Alignment at the National and Sub-National Levels	03-05/03/ 2014	Nairobi, Kenya	Participant	UNU-INRA Director, Dr Elias T. Ayuk
Mentoring Orientation Workshop (MOW)	17-21/02/2014	Nairobi, Kenya	Contributor	Dr Effiom Oku, Land and Water Resources Fellow, UNU-INRA
GIS Training	20- 27/ 01/ 2014	Tokyo, Japan	Facilitator	Mr Kwabena O. Asubonteng, UNU-INRA GIS Fellow

COMMUNICATION AND DISSEMINATION

Publications

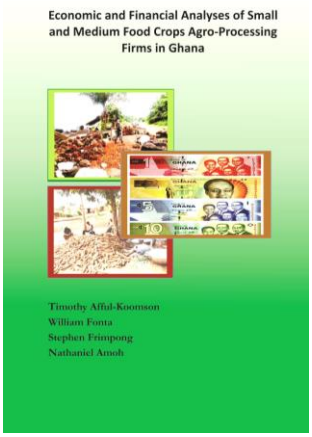
Monographs

Harnessing Land and Water Resources for Improved Food Security and Ecosystem Services in Africa



This book examines challenges facing land and water resources management in Africa and explores possible measures to improve food security and reduce poverty on the continent. It is a compilation of research papers, written by eminent researchers and scientists from renowned Universities and reputable organisations in Africa and beyond. Its main objective is to draw attention to the impact of human activities on land and water resources and the need for the sustainable management of Africa's ecosystem services to improve livelihoods.

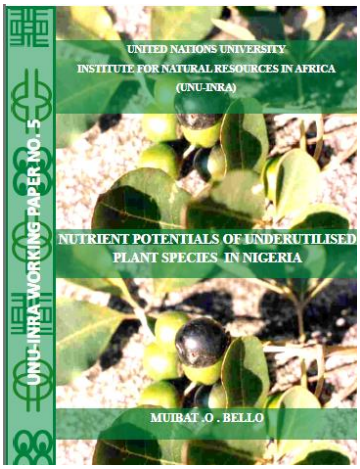
Economic and Financial Analyses of Small and Medium Food Crops Agro-Processing Firms in Ghana



The book reports on a research project that analysed the economic and financial situations of agro-processing firms in Ghana. Its aim is to provide empirical evidence for stakeholders in the agricultural value-chain to improve efficiencies in food crops agro-processing in Ghana. The research project, undertaken by economics and financial experts, focused on food crops agro-processing firms' structure and concentration, their ownership and employment characteristics, operational capacities, use of technology, productivity, and credit conditions.

Working Papers

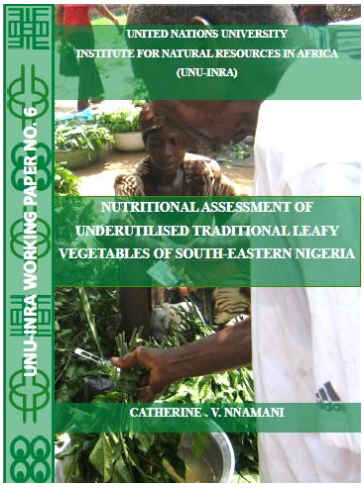
Nutrient Potentials of Underutilised Plant Species in Nigeria



The chemical compositions of some underutilised plants (green leafy vegetables, fruits, seed oils and spices) collected from different locations in Oyo and Osun States of Western Nigeria were determined by standard analytical methods in an effort to evaluate their nutrient potentials.

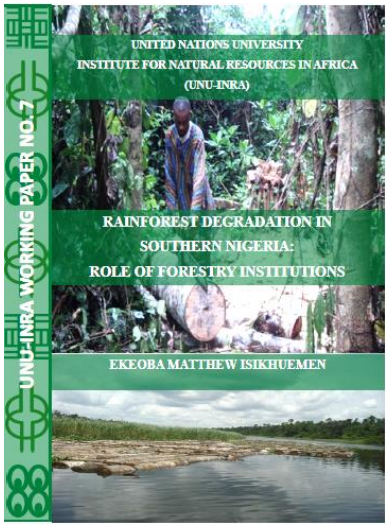
The results established a basis for continuous evaluation of the agro-biodiversity to identify food crops with promising nutrient potentials that could complement the conventional so as to improve livelihoods.

Nutritional Assessment of Underutilised Traditional Leafy Vegetables of South-Eastern Nigeria



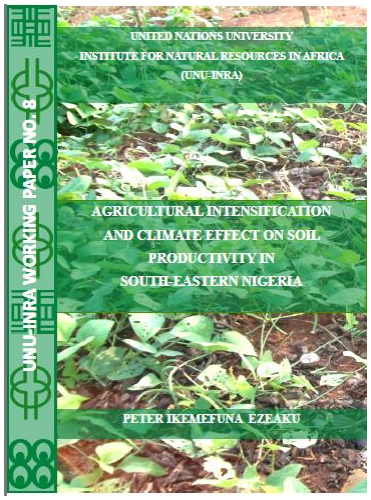
Diversification of dietary menu to include underutilised Traditional Leafy Vegetables (TLVs), which are cheap, readily available and affordable, could contribute to the daily dietary requirements of resource-poor rural and semi-urban dwellers. The proximate and antioxidant values of 13 underutilised TLVs of South-eastern Nigeria were determined by the study. The results showed that these underutilised TLVs are potentially endowed with some levels of essential nutrients higher than those of the most cherished and expensive species. They could contribute to daily nutritional requirement and help reduce malnutrition.

Rainforest Degradation in Southern Nigeria: Role of Forestry Institutions



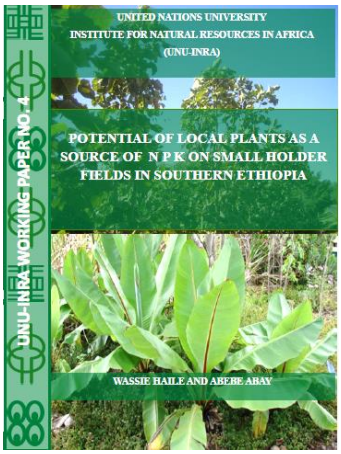
The exclusionary 'top-down' and management models that were introduced by the colonial administration in the governance of Nigeria's rainforest over a century ago have endured till present day in the federal and state forestry services. Over time, the rainforest ecosystem has been progressively turned into mere vestige, triggering irreversible damage to species and ecosystems; and weakening the livelihood systems of forest-dependent populations. While it is imperative to replace the obsolete policies and incongruent institutional frameworks at all levels of government with good participatory governance, intensified efforts should be made towards confronting direct drivers of rainforest degradation.

Agricultural Intensification and Climate Effect on Soil Productivity in South-Eastern Nigeria



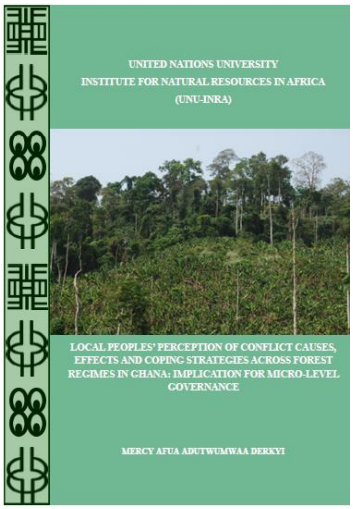
This study involved an analysis of soil and 12 years (2000-2011) rainfall/temperature data using standard schemes. Anomalies and variations in rainfall and temperature over the 12 year period revealed rainfall decreases and temperature increases, hence the susceptibility of crop yields. The results indicated that temperature changes had a much stronger impact on crop yields than rainfall changes. This implied that agricultural intensification and climate variability will affect food security. Improved soil, land and water management strategies are desired to enable science-based land management interventions for improved soil productivity to achieve food security.

Potential of *Erythrina Brucei, Erythrina Abyssinica and Ensete Venticosum* as Organic Sources of N P K on Small Holder Fields in Southern Ethiopia



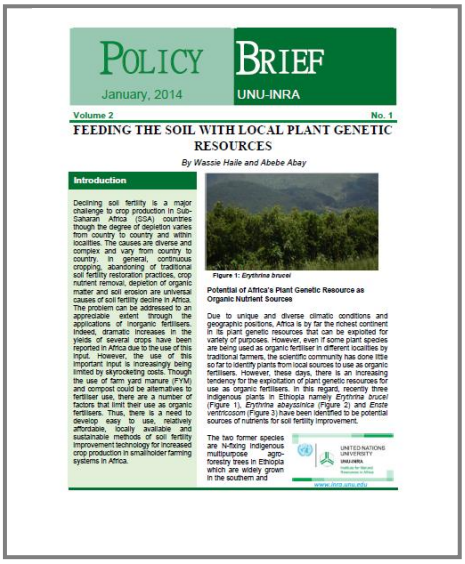
Erythrina spp. and *Ensete ventricosum* are indigenous to Ethiopia and noted as N-fixing agroforestry and high value food trees respectively. These trees were highly used as organic fertilisers to improve crop production. The study sought to determine the nutrient and chemical compositions of the species, their mineralisation rates and N-equivalence values. The study provided both field and laboratory information on the benefits of the *E. brucei* biomass as organic fertiliser for improving crop yields.

Local Peoples' Perception of Conflict Causes, Effects and Coping Strategies across Forest Regimes in Ghana: Implication for Micro-Level Governance



This study explored forest and tree resources conflicts in terms of causes, effects and coping strategies across the protection, production and plantation regimes in the Tano-Offin Forest Reserve in the Ashanti Region of Ghana. Drawing from local people's perspectives, it also sought to ascertain the implications for micro-level governance. The findings revealed that the three regimes do have diverse actors governed by different laws and strategies, however whilst some actors in the plantations and production regimes do benefit from forest resources, none of these are experienced by inhabitants in and around the protection regime.

Policy Briefs



POLICY BRIEF
January, 2014 UNU-INRA

Volume 2 No. 1

FEEDING THE SOIL WITH LOCAL PLANT GENETIC RESOURCES

By Wassie Haile and Abebe Abay

Introduction

Declining soil fertility is a major challenge to crop production in Sub-Saharan Africa (SSA) countries though the degree of depletion varies from country to country and within localities. The causes are diverse and complex and vary from country to country. In general, continuous cropping, abandoning of traditional soil fertility restoration practices, crop nutrient removal, depletion of organic matter and soil erosion are universal causes of soil fertility decline in Africa. The problem can be addressed to an appreciable extent through the applications of inorganic fertilisers. Indeed, dramatic increases in the yields of several crops have been reported in Africa due to the use of this input. However, the use of this important input is increasingly being limited by skyrocketing costs. Though the use of farm yard manure (FYM) and compost could be alternatives to fertiliser use, there are a number of factors that limit their use as organic fertilisers. Thus, there is a need to develop easy to use, relatively affordable, locally available and sustainable methods of soil fertility improvement technology for increased crop production in smallholder farming systems in Africa.

Figure 1: *Erythrina brucei*

Potential of Africa's Plant Genetic Resource as Organic Nutrient Sources

Due to unique and diverse climatic conditions and geographic positions, Africa is by far the richest continent in its plant genetic resources that can be exploited for variety of purposes. However, even if some plant species are being used as organic fertiliser in different localities by traditional farmers, the scientific community has done little so far to identify plants from local sources to use as organic fertilisers. However, these days, there is an increasing tendency for the exploitation of plant genetic resources for use as organic fertilisers. In this regard, recently three indigenous plants in Ethiopia namely *Erythrina brucei* (Figure 1), *Erythrina abyssinica* (Figure 2) and *Ensete ventricosom* (Figure 3) have been identified to be potential sources of nutrients for soil fertility improvement.

The two former species are multi-purpose indigenous agro-forestry trees in Ethiopia which are widely grown in the southern and

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POLICY BRIEF
January, 2014 UNU-INRA

Volume 2 No. 2

TACKLING HIDDEN HUNGER: THE POTENTIAL OF UNDERUTILISED PLANT SPECIES

By Mubat O. Bello

Introduction

Food security has been understood by many as when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). This definition implies that the ability of a household to acquire sufficient food does not necessarily guarantee adequate nutrition and dietary needs of the body. Thus, even in the absence of hunger, the population may suffer from the lack of essential micronutrients, often referred to as hidden hunger.

According to UNICEF and the Micronutrient Initiative, as many as a third of the world's population do not meet their physical and intellectual potential because of vitamin and mineral deficiencies. The WHO (2002), also stresses that approximately 1.7 million (2.8%) of death worldwide are attributed to low fruit and vegetable consumption, partly related to unavailability or inaccessibility of commonly consumed fruits and vegetables believed to contain essential micro-nutrients.

Eucalyptus camaldulensis: Underutilised plant species in Nigeria

Eucalyptus citriodora: Under- utilised plant species in Nigeria

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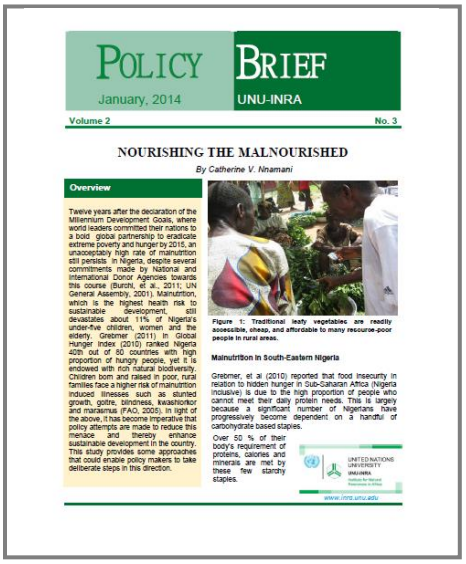

POLICY BRIEF
January, 2014 UNU-INRA

Volume 2 No. 3

NOURISHING THE MALNOURISHED

By Catherine V. Nhamani

Overview

Twelve years after the declaration of the Millennium Development Goals, where world leaders committed their nations to a bold global partnership to eradicate extreme poverty and hunger by 2015, an unacceptably high rate of malnutrition still persists in Nigeria, despite several commitments made by National and International Donor Agencies towards this course (Burchi, et al., 2011; UN General Assembly, 2001). Malnutrition, which is the highest health risk to sustainable development, still devastates about 11% of Nigeria's under-five children, women and the elderly. Grebmer (2011) in Global Hunger Index (2010) ranked Nigeria 40th out of 80 countries with high proportion of hungry people, yet it is endowed with rich natural biodiversity. Children born and raised in poor, rural families face a higher risk of malnutrition induced illnesses such as stunted growth, goitre, blindness, kwashiorkor and marasmus (FAO, 2005). In light of the above, it has become imperative that policy attempts are made to reduce this menace and thereby enhance sustainable development in the country. This study provides some approaches that could enable policy makers to take deliberate steps in this direction.

Figure 1: Traditional leafy vegetables are readily accessible, cheap, and affordable to many resource-poor people in rural areas.

Malnutrition in South-Eastern Nigeria

Grebmer, et al (2010) reported that food insecurity in relation to hidden hunger in Sub-Saharan Africa (Nigeria inclusive) is due to the high proportion of people who cannot meet their daily protein needs. This is largely because a significant number of Nigerians have progressively become dependent on a handful of carbohydrate based staples.

Over 50 % of their body's requirement of proteins, calories and minerals are met by these few starchy staples.

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POLICY BRIEF
January, 2014 UNU-INRA

Volume 2 No. 4

SALVAGING NIGERIA'S VANISHING FORESTS

By Matthew I. Ekeoba

A forester examining an Okubaka aubrevillei tree in the tropical rainforest of Nigeria

Introduction

As Nigeria celebrates her centenary of existence, its forest resources has little to be proud of. The current condition of the rainforest ecosystem and the spate of decline of biodiversity aptly portray the gloomy circumstances of the livelihood system of subsistence populations. The nation has been faced with enormous governance crisis and arrant waste of resources impelled by corrupt leadership and inspired by rent-seeking bureaucrats. At independence in 1960, the forest reservation policy of the colonial government had set aside 9,700,000 ha of the country as forest reserves. Historical accounts indicate that the country's rainforest which was over 60,000,000 ha in 1897 was reduced by less than 50% in 1960. The resource plunged to 1,190,000 ha in the late 1990s with only about 288,000 ha in official forest reserves (Blaser, et al. 2011). Beyond the 1990s, most published data and statistical information on the size and condition of the rainforest of Southern Nigeria have been based principally on simulations obtained largely from speculative reports.

For example, FAO (2010) cited in Blaser et al. (2011) claims that Nigeria's primary forest declined from 13,100,000 ha in 2000 to 9,100,000 ha in 2005 and to 6,940,000 ha in 2010. But FAO (2010) reported that the area of primary forest declined from 326,000 ha in 2005 to zero in 2010. Despite the fact that Nigeria's forests have been on accelerated decline from the colonial era through independence to contemporary period, unfortunately, the country contends with dearth

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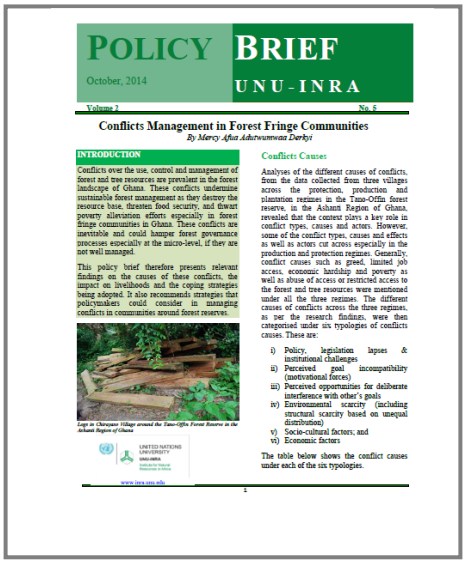


POLICY BRIEF
UNU-INRA
October, 2014
Volume 2 No. 5

Conflicts Management in Forest Fringe Communities
By Mercy Afua Adutwumwaa Darkyi

INTRODUCTION

Conflicts over the use, control and management of forest and tree resources are prevalent in the forest landscape of Ghana. These conflicts undermine sustainable forest management as they destroy the resource base, threaten food security, and thwart poverty alleviation efforts especially in forest fringe communities in Ghana. These conflicts are inevitable and could hamper forest governance processes especially at the micro-level, if they are not well managed.

This policy brief therefore presents relevant findings on the causes of these conflicts, the impact on livelihoods and the coping strategies being adopted. It also recommends strategies that policymakers could consider in managing conflicts in communities around forest reserves.

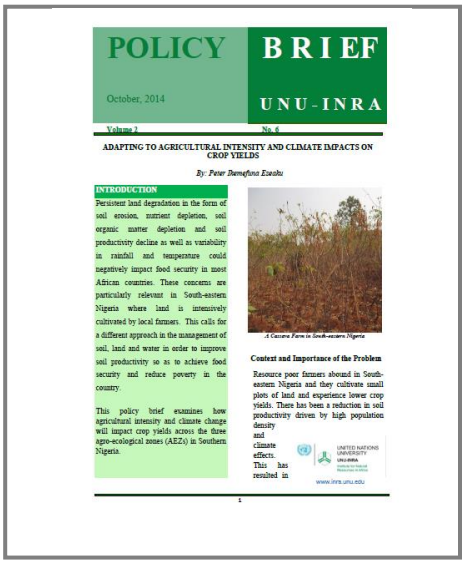
Logs in Chirapaso Village around the Tano-Offin Forest Reserve in the Ashanti Region of Ghana

Conflicts Causes

Analyses of the different causes of conflicts, from the data collected from three villages across the protection, production and plantation regimes in the Tano-Offin forest reserve, in the Ashanti Region of Ghana, revealed that the context plays a key role in conflict types, causes and actors. However, some of the conflict types, causes and effects as well as actors cut across especially in the production and protection regimes. Generally, conflict causes such as greed, limited job access, economic hardship and poverty as well as abuse of access or restricted access to the forest and tree resources were mentioned under all the three regimes. The different causes of conflicts across the three regimes, as per the research findings, were then categorised under six typologies of conflicts causes. These are:

i) Policy, legislation lapses & institutional challenges
ii) Perceived goal incompatibility (motivational forces)
iii) Perceived opportunities for deliberate interference with other's goals
iv) Environmental scarcity (including structural scarcity based on unequal distribution)
v) Socio-cultural factors; and
vi) Economic factors

The table below shows the conflict causes under each of the six typologies.



POLICY BRIEF
UNU-INRA
October, 2014
Volume 2 No. 6

ADAPTING TO AGRICULTURAL INTENSITY AND CLIMATE IMPACTS ON CROP YIELDS
By: Peter Ikemefuna Ezeaku

INTRODUCTION

Persistent land degradation in the form of soil erosion, nutrient depletion, soil organic matter depletion and soil productivity decline as well as variability in rainfall and temperature could negatively impact food security in most African countries. These concerns are particularly relevant in South-eastern Nigeria where land is intensively cultivated by local farmers. This calls for a different approach in the management of soil, land and water in order to improve soil productivity so as to achieve food security and reduce poverty in the country.

This policy brief examines how agricultural intensity and climate change will impact crop yields across the three agro-ecological zones (AEZs) in Southern Nigeria.

A Cassava Farm in South-eastern Nigeria

Context and Importance of the Problem

Resource poor farmers abound in South-eastern Nigeria and they cultivate small plots of land and experience lower crop yields. These has been a reduction in soil productivity driven by high population density and climate effects. This has resulted in

Other Publications

Working papers and policy briefs were developed on the following research topics for publications:

- Environmental and Economic Burden of Sand Dredging on Artisanal Fishing in Lagos State, Nigeria, by Fatai Abiola Sowunmi.
- Acceptability and Eco-Business Potential of Biosand Filter for Rural Household Water Treatment in Ghana, by Jonathan Hogarh.
- Resource Use and Environmental Efficiency, Productivity Differential and Resilience of Underutilised Indigenous Vegetables of Southwest Nigeria, by Agbola Peter Oluwafemi.
- Ethnobotanical study of Neglected and Underutilised Plant Species in Southwest Ethiopia, by Balcha Abera Erena.
- "Waste to Wages": Scrap Metal Recycling for Employment and Entrepreneurship in Zimbabwe's Informal Sector, by Kingstone Mujeyi.
- Banana Cultivation in Pastoral Cattle Grazing Rangelands: Are Pastoralists Progressing towards Green Job Creation?, by Nina Pius Mbuya1 and Masinja Jewette.
- Green Farming Practice for Enhanced Productivity and Conserving Hillsides under Cultivation, by Efiom Essien Oku, Emil Olorun Ambrose Aiyelari and Kwabena Owusu Asubonteng.

Journal Articles & Book Chapters

Afful-Koomson, T. (2014): The Green Climate Fund in Africa: what should be different?, *Climate and Development*. http://www.tandfonline.com/doi/full/%2010.1080/17565529.2014.951015#.VSQNCo4yiEd

Antwi, E.K., Boakye-Danquah, J., Asabere, S. B., Yiran, G. A. B., Loh, S. K., Awere, K. G., Abagale, F. K., **Asubonteng, K.O**., Attua, E.M., & Owusu, A. B,. (2014). Land use and landscape structural changes in the ecoregions of Ghana. *Journal of Disaster Research, 9* (4), 452-467.

Kusakari, Y., Asubonteng, K. O., Jasaw, G S., Dayour, F., Dzivenu, T., Lolig, V., Donkoh, S. A., Obeng, F. K., Gandaa, B & Kranjac-Berisavljevic, G,.(2014). Farmer-perceived effects of climate change on livelihoods in Wa West District, Upper West Region of Ghana. *Journal of Disaster Research, 9* (4), 516-528.

Lolig, V., Donkoh, S. A., Obeng, Ansah, I. G. K., Jasaw, G S., **Kusakari, Y., Asubonteng, K. O**., Gandaa, B, Dayour, F., Dzivenu, T., F. K., & Kranjac-Berisavljevic, G,.(2014). Households' Coping Strategies in Drought- and Flood-Prone communities in Northern Ghana. *Journal of Disaster Research, 9* (4), 542-553.

Oku, E. E., & Aiyelari, E.A., (2014). Green technology for keeping soil-water-nutrient fluxes on cultivated steep land and climate change mitigation. *Journal of Agriculture and Environment for International Development*, *108* (1), 17-27. http://dx.doi.org/10.12895/jaeid.20141.151

Oku, E.E., Aiyelari, E.A., & Truong P., (2014). Green structure for soil and water conservation on cultivated steep land. *Kasetsart Journal*, 48, 167-174.

Oku, .E.E., & Asubonteng, K.O., (2013). Urban solid waste management: case of Ghana in West Africa. In: S. Hulsmann, M. Ito and R. Ardakanian (eds), *Advancing a nexus approach to the sustainable management of water, soil and waste* (pp. 75-83). UNU-FLORES and Dolfersal, Technische Universitat Dresden, Germany.

Media Publications

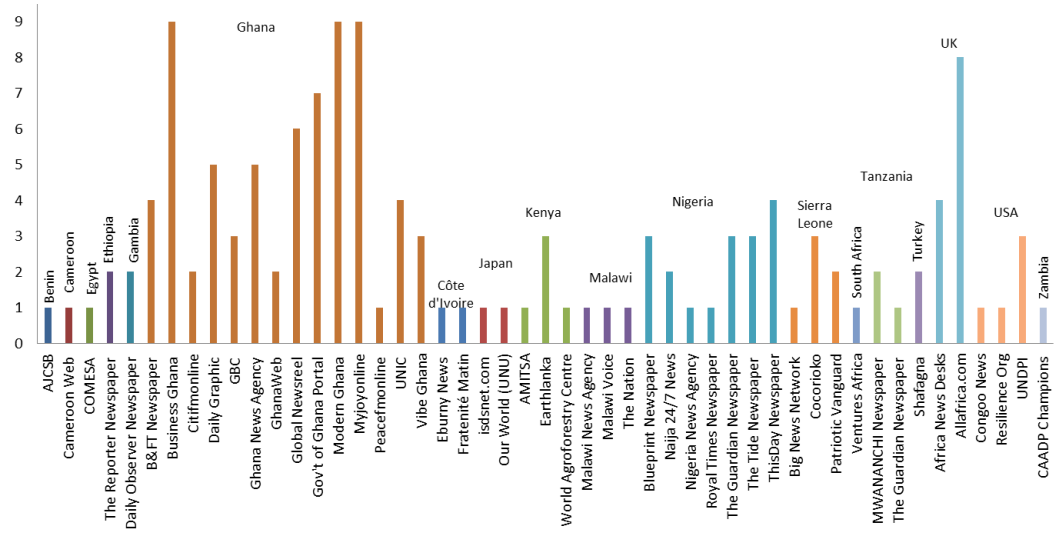
In order to widely disseminate its research findings and share more information on the Institute's activities, UNU-INRA continues to prioritise communications in its operations. In this regard, a communication strategy was developed and fully implemented in 2014. The strategy aimed to improve the Institute's visibility and attract stakeholder support for its projects and programmes.

With regard to media publications, 7 press releases and 2 feature articles were developed and widely published in Africa and international media to increase UNU-INRA's visibility. The Institute also received two news coverage in the year under review. Below are details of these media publications:

Media Coverage of UNU-INRA's Activities

No.	Headlines	No. of Media Publications
Press Releases		
1	Early Planting could Mitigate Climate Change Impact on Maize Yields, Suggests UNU-INRA Report	6
2	Formalise Non-State Stakeholder Participation in the Extractive Industries – Says UNU-INRA Book	15
3	UN University Hails Ghana for Supporting Natural Resources Management Research in Africa	14
4	UNU-INRA Supports World Environment Day Challenge	14
5	UN University Mourns Prof. Alexander A. Kwapong, Former Vice Rector	16
6	UNU-INRA Holds Training Workshop on Green Business / UNU-INRA Organise un Atelier de Formation Sur L'Enterprise Verte	22
7	Soil Fertility Decline in Sub-Saharan Africa Prompts Climate Adaptation Project	25
Feature Articles		
8	Traditional Leafy Vegetables: Africa's Hope for Tackling Malnutrition	24
9	An Urban Wastewater Solution: African Vetiver Grass	27
News Coverage		
10	Expand Infrastructure, Toilets in Slums Areas, Dr Atewamba	5
11	UNU-INRA 2014 Academic and Research Seminar News Coverage	2
Total		**170**

Major Media Channels that Covered UNU-INRA Activities

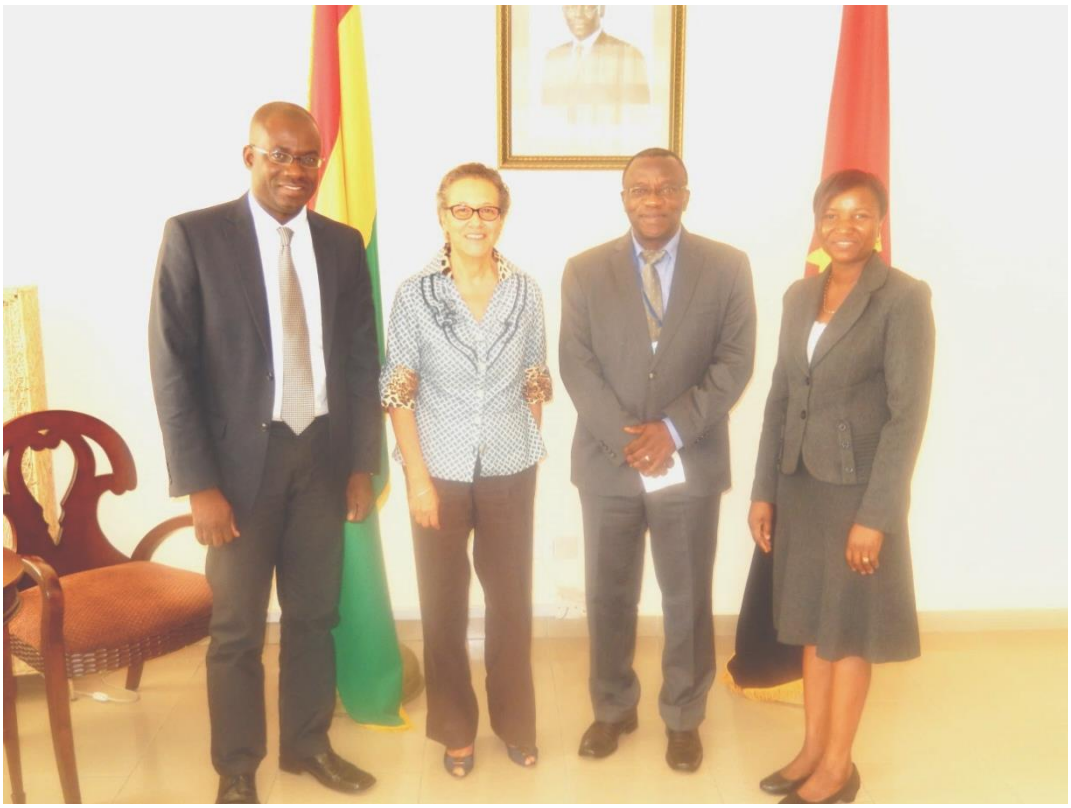


Out of the media publications, the article on the Institute's vetiver grass project entitled: "*An Urban Wastewater Solution: African Vetiver Grass"* received the highest media publicity in 2014. This was followed by the press release on UNU-FLORES/ UNU-INRA workshop with the title "*Soil Fertility Decline in Sub-Saharan Africa Prompts Climate Adaptation Project".* Also receiving good media attention was the feature article entitled "*Traditional Leafy Vegetables: Africa's Hope for Tackling Malnutrition*", which was developed on UNU-INRA Policy Brief Vol. 2, No. 2 and 3. Similarly, the Institute's training workshop on green business held in Lusaka, Zambia was also widely published in many African and international media.

In terms of reach, major media outlets in Africa including myjoyonline (Ghana), Business Ghana, Modern Ghana, Daily Graphic (Ghana), Government of Ghana Official Portal; ThisDay Newspaper, Blueprint Newspaper, The Guardian Newspaper, all in Nigeria; Malawi News Agency; Cocorioko (Sierra Leone), Patriotic Vanguard (Sierra Leone), as well as international media platforms such as Allafrica.com (UK), Shafagna (Turkey), United Nations Department of Public Information (UNDPI) and International Society for Development and Sustainability (isdsnet.com) based in Japan dedicated good space to UNU-INRA news. Other countries where the Institute also received publicity include Benin, Cameroon, Egypt, Ivory Coast, Japan, Kenya, South Africa, Switzerland, Tanzania, UK, USA and Zambia.

For more information on UNU-INRA news, please visit the media relations section of the Institute's website on the link: http://inra.unu.edu/media-relations

Stakeholder Relations



In 2014, the Institute engaged a number of government representatives to share information on its operations. These include courtesy calls on the ambassadors of the Angola and the Norwegian embassies, calls on the representatives of the Equatorial Guinea and the Nigeria embassies, all in Ghana. The Director of the Institute, Dr Elias T. Ayuk, also held a number of meetings with representatives of permanent missions to the UN in New York, especially those from Africa including Cameroon, Cote d'Ivoire, Nigeria and South Africa, to share information with them on the Institute's operational modalities and priority programme areas.

Additionally, as part of its mandate, the Institute has disseminated its publications to key stakeholders in Africa and beyond. The policy briefs, working papers indicated above as well as the Institute's book entitled "*Collaborative Governance in Extractive Industries in Africa",* which was produced in 2013 were shared with African governments, departments and agencies, and also with several universities including the University of Ghana, University of Mines and Technology, Kwame Nkrumah University of Science and Technology, University for Development Studies, University of Cape Coast, all in Ghana, University of Benin in Nigeria,

Ladoke Akintola University of Technology, Nigeria, the University of Zimbabwe and Ebonyi State University Abakaliki, Nigeria. These publications were also disseminated to UN agencies, civil society organisations (CSOs), non-governmental organisations (NGOs) and other institutions mainly in Ghana, Nigeria, Botswana, Zimbabwe and Cote d'Ivoire. These countries were selected because the research reports were produced on projects that were carried out in those countries.

FINANCE

Income

The projected budget of the Institute for the biennium 2014-2015 amounts to USD 3,724,000. This budget covers all activities at UNU-INRA's head office in Ghana and its five Operating Units in Cameroon, Côte d'Ivoire, Namibia, Senegal and Zambia. The income projection for 2014 was USD 2,011,000. Specific programme contributions have improved significantly from USD 302,000 in the previous biennium (2012-2013) to USD 838,000 in 2014. The table below shows the overall SPC income category to the Institute's funds as of December 31, 2014. This include SPC carried forward from the previous biennium:

UNU-INRA Income for 2014

Categories	Income (USD)	Contribution to Budget (%)
Specific Programme Contributions (SPCs)	939,000	42
Core Income	1,072,000	58
Total	**2,011,000**	**100**

Specific Programme Contributors

IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international

Economic Commission for Africa

ACPC
African Climate Policy Centre

Governments

The governments of Ghana and Zambia also continued to make contributions to the Institute's endowment fund.

OUR TEAM

Board Members

Prof. Dr. Paul Vlek	Board Chair Executive Director, West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), Professor, University of Bonn.
Prof. Emmanuel Owusu-Bennoah	Professor, College of Agriculture & Consumer Sciences, University of Ghana
Prof. Sara B. Feresu	Professor, Institute for Environmental Studies, University of Zimbabwe
Prof. Olugbemiro Jegede	Office of the Secretary to the Governor of Kogi State, Nigeria

Ex- Officio Members

Dr. David M. Malone	Rector, United Nations University
Dr. Elias T. Ayuk	Director, UNU-INRA
Mr. Max Bond	Vice Rector, Chief Executive Officer, Office of the Rector

Programme (Academic) Staff

Ayuk, Elias T	Director
Dessie, Gessesse	Senior Research Fellow, Curriculum Development
Oku, Effiom	Senior Research Fellow, Land & Water Resources
Atewamba, Calvin	Senior Research Fellow, Green Economy
Asubonteng, Kwabena O	Research Fellow, Geographical Information Systems (GIS)
Kouame, Euphrasie B.H	Post-doctoral Research Fellow, Green Economy
Binaté, Namizata	Coordinator, Côte d'Ivoire Operating Unit
Fotso, Pauline Laure	Coordinator, Cameroon Operating Unit
Mamadou Amadou SECK	Coordinator, Senegal Operating Unit
Omoregie, Edosa	Coordinator, Namibia Operating Unit
Simukanga, Stephen	Coordinator, Zambia Operating Unit

Programme Support Staff

Turkson, Benjamin	Finance & Administrative Officer
Nutakor, Praise	Communications & Public Relations Associate
Aggrey, Eugina	Bilingual Secretary
Briandt, William	Logistics Officer

Visiting Scholars

Sowunmi, Fatai Abiola	Visiting Scholar
Agbola, Peter Oluwafemi	Visiting Scholar
Hogarh, Jonathan	Visiting Scholar
Balcha, Abere Erena	Visiting Scholar

Interns

Boimah, Mavis	PhD Intern
Kemeze, Francis	PhD Intern
Métouolé Méda, Yirviel Janvier	PhD Intern
Nina, Pius	PhD Intern
Mfoulou Olugu Jean Patrick	PhD Intern
Kemeze Francis Hypolite	PhD Intern
Kingstone Mujeyi	PhD Intern
Klege, Rebecca	Intern

Volunteers

Johnston-Billings, Amber	Research Officer
Saccoh, Karamzo	Communications & Public Relations Officer

National Service

Agamah, Edem	Information & Communication (ICT) Officer
McJoseph, Kwame	Library Assistant
Opoku, Prince	Administrative Assistant

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