

## MITIGATION OF FLOOD DAMAGE TO URBAN AGRICULTURE IN SIERRA LEONE USING CLIMATE-SMART STRATEGIES

### 1. EXECUTIVE SUMMARY

The deepening climate change is increasing the frequency, intensity and spread of flooding with disproportionate damage to agriculture, life and property. The landscape of Sierra Leone is largely undulating, creating the environment for the occurrence of valley bottom marshlands that are collectively known as Inland Valley Swamp (IVS). As the final deposition points of nutrients washed via runoff across the contributing watershed, the soils of this landform are vastly rich in plant nutrient. As such, IVS is generally conducive for the cultivation of a wide variety of crops. As significant part of urban landscape in Sierra Leone, IVS is often cultivated with rice in the wet season and then with maize and/or vegetables in the dry season. This provides the necessary income to support the livelihoods of urban farmers. These farmers cultivate a significant fraction of the vegetables eaten in urban Sierra Leone. The swamps are also home to a variety of freshwater fish (including crabs, shrimps, etc.) that is a good source of protein in meals of average households throughout the country.

With increasing frequency, intensity and spread of flooding in this key urban ecology due to the deepening climate change, the damage to urban agriculture, life and property has increased too. To deal with this worsening threat, a climate-smart urban landscaping strategy that is highly climate resilient is proposed in this project. The strategy is to develop 50–100 m strip of eco-forest buffer around the wetlands and waterways in urban areas. This strategy will also include the clearing of waterways and the strengthening it by river training to ensure the free flow of urban runoff. Furthermore, waste cages will be constructed at the mouths of all drainages that lead to urban wetlands to prevent the deposition of solid wastes and debris into the waterways that could block urban waterways and cause urban flooding.

Eco-forest buffers around marshlands and along waterways in urban areas perfectly fit into the concept of green city, which African has long missed out since. The implementation of the climate-smart and climate-resilient green city will have countless benefits, including enhanced urban agriculture, life and property, recreational zones, city aesthetics and revenue generation for project sustenance and expansion. It will also enhance the productivity of the marshlands/swamps in terms of crops, fishes, biodiversity, and ecological services.

### 2. BACKGROUND AND RATIONALE

Sierra Leone lies on the southwest coast of West Africa, a typical tropical region characterized by plenty sunshine and heavy rainfall. Its 71,740 km<sup>2</sup> land area is 60% undulating, giving rise to dense patches of valley bottom marshlands called Inland Valley Swamp (IVS). There are strips of lowlands along the sea cost called mangrove swamps that are also marshy ([WB-SL, 2023](#)). These forms of landscape

collectively account for about 5% of the total land area of the country. The other ecologies such as the bolilands (vast flat lands that become marshy during the rains and dry during the dries), hills and mountains ([Leipzig, 1996](#)) that are also part of the landscape of Sierra Leone.

Approximately 58% of the land area of Sierra Leone is fit for agriculture and while 20% of this fraction is arable, only 15% of the arable land is cultivated ([BEFS, 2013](#)). Even so, 65% of the 9 million people in Sierra Leone toil the soil for livelihood ([WFB, 2023](#)). This makes agriculture by far the dominant sector of the Sierra Leone economy, accounting for 48% of the Gross Domestic Product (GDP) and some 10% of the export earnings.

Settlements as villages, towns and cities account for about 6% of the land area and the respective fractions that are urban and rural settlements are not known. Although rural dwellings account for over 60% of the settlements, urban settlements as towns and cities are home to some 43% of the population of Sierra Leone ([SLPC, 2023](#)).

The fraction of urban area that is under marshland (as IVS, mangrove swamp and floodplain) is also not so investigated, but estimated at 10%. Although small, this form of land holds a great importance in terms of crop production for direct consumption of the urban population. So very many different types of food crops are cultivated in these urban wetlands, including rice, maize, cassava, potato and vegetables of different kinds — root, stem, leaf and fruit vegetables. These swamps also serve as feeding grounds for so many animals that are under the free-range system; by far the most common mode of livestock rearing in Sierra Leone. Swamps also naturally host plenty of aquatic animals like fish, crabs, shrimps and reptiles, which serve as a cheap source of protein that is virtually free for harvesting. As a form of wetland, swamps provide many ecological services, including holding runoff water, providing habitat for biodiversity, feeding ground for varieties of animals, etc.

In spite of providing vital ecological services, swamp ecosystems are increasingly being impaired by urban solid waste deposition, including gravel, plastic, tin, glass, other debris, etc. This is because on the one hand, urban areas have the most paved land surfaces and unpaved barelands in the country — making it highly prone to runoff and erosion. With climate change on the other hand, a degree of unprecedented flooding is occurring in urban wetlands. The frequency, intensity and spread of the floods are alarmingly too, causing huge destructions to urban agriculture, life and property and to ecological services. As flood damage is increasing year in and out, Disaster Preparedness and Response (DPR) activities (of both governmental and non-governmental organizations) are being intensified around the country. While DPR is excellent enough in mitigating the effect of flooding on urban agriculture, a more robust and sustainable way for fixing these unfortunate events is through climate-smart and climate-resilient strategies. The perfect mix of DPR and climate-smart/resilient strategies has

the potential to first of all mitigate and/or reverse global warming and then climate change. It can also reduce the risk of flooding that is the effect of climate change.

It is decades past when the concept of “green city” (city in balance with nature) first emerged (Breuste, 1994) and this has hardly materialized since, especially in developing countries like Sierra Leone. It was with global warming that the concept of “green city” sprang up and it is with climate change that this concept should now be implemented with an unprecedented robustness and sustainability (Breuste, 2020). While the failure to do this could have far-reaching consequences on the diet, life and property of especially the urban population, the benefits of doing it are huge. It is good for global warming and climate change, flooding and disaster, life and property, diet and food, aesthetic and recreation, etc. This research will once again make the case for a functional urban planning in Sierra Leone and make urban dwelling largely safe. It will retrigger active urban research as a way of fixing the tight and crowded outlooks of the urban settlements in Sierra Leone. This research will also build private sector confidence to invest in urban planning, construction, and disaster management and prevention.

### **3. PROJECT GOAL AND SPECIFIC OBJECTIVES**

Going it all in large-scale farms could respond to the “Feed-Salone” drive for food self-sufficiency and food security, but not in the richness as it would be in combination with small-scale urban agriculture. This is because agriculture in the swamps, wetlands or marshlands in urban environment hugely complements vegetable production in the country. The controlled deposition of solid wastes in these wetlands sufficiently enriches the soils with the nutrients required for optimal crop productivity. The goal of this research is to protect and develop this potential to the fullest capacity to make urban areas a vital crop production base in Sierra Leone. This is key because a large proportion of the vegetables cultivated are consumed by urban dwellers. With production in the same area where consumption occurs, there can be huge savings from transportation and storage.

Thus, the specific objectives of the research are to:

- i). Identify and delineate wetlands (marshland and swamp) and waterways in urban Sierra Leone;
- ii). Plan and design a climate-smart and climate-resilient strategy that can effectively control flooding in urban Sierra Leone;
- iii). Improve the aesthetics and provide recreation and relaxation for urban dwellers in Sierra Leone;
- iv). Prevent and control flood-related damages to agriculture, and life and property in urban areas in Sierra Leone; and
- v). Open up doors for future studies about green cities and urbanization in Sierra Leone.

### **4. PROJECT METHODOLOGY / APPROACH**

The research is a pilot study on mitigating flood damage to urban agriculture using climate-smart and climate-resilient strategies. This will also touch on green city, aesthetics, recreation, biodiversity,

ecosystem services, life and property, etc. Bo City will be used as a case study, representing the broader urban areas in Sierra Leone. Bo is the second largest city in Sierra Leone, second only to the capital city of Freetown and with a population of 223,075 ([Stat-SL, 2021](#)). Bo is the administrative city of the Southern Province in Sierra Leone, where Njala University (the host institution of the researchers) operates two campuses. The city has plenty of wetlands (swamps and marshlands) that receive runoff generated by torrential rains under the ongoing climate change. The generated runoff is increasing with worsening climate change, posing a significant risk of flooding and flood damage to agriculture, and life and property in the city.

To do this, a high-resolution (1 m x 1 m) remote-sensing (both land-use and DEM) data will be sought for Bo City and the environs. These data sets will be used to delineate very precisely what part of the city that is used for what purpose and the area most likely prone to the 100-year flooding event. The 100-year flooding event will be simulated using the Artificial Neural Network (ANN)-Derived Models, with precipitation and water-level data ([Wu, 20023](#)). Next, the flood-prone areas will be delineated and buffer zones set up in the flood belts around the wetlands and along the waterways. Finally, engineered climate-smart and climate-resilient strategies will be used to establish economic trees, ponds, lakes and drainage cages to capture solid waste in runoff and prevent it from deposition into the wetlands or waterways. The captured solid waste can then be collected for either landfilling or for recycling depending on which is option is optimal. River training will also be done along the waterways to make free the flow of water and prevent flooding that could affect agricultural activities in the wetlands.

Before the development intervention, however, baseline (pre-development) data will be collected. This data will be analyzed against post-development data to measure the impact of the development intervention on urban agriculture, biodiversity, aesthetic, greenery, life/property and on the socio-economic growth of the city.

#### **4.1. Conceptual / Theoretical Framework**

The conceptual/theoretical framework is based on the premise that engineered climate-smart techniques can be used to build buffer zones around wetlands and along waterways in urban areas to control damage to urban agriculture but also to life and property. The buffer zones will be planted with a mix of useful trees and low bush and then lawns maintained under the trees. Where applicable, runoff retention ponds or artificial lakes will be built as collection, settlement and cleaning points of runoff waters from across the city. Where also applicable, fortified solid waste cages will be built to capture solid wastes at the mouth of drainages that discharge into wetlands and waterways.

The waste cage is the filter that prevents all solid wastes from being discharged into the wetlands and waterways. The wastes (e.g., plastic, tins and other solid wastes) will then be collected for recycling or for engineered landfilling. The roads, ponds, lakes, lawns, bushes and trees of the buffer zone can

provide paid recreation and other ecological services in the city. It will also serve the concept of green city, with the aesthetic and beauty required of modern cities today. The buffers can also help clear urban air by capturing carbon from the atmosphere and storing it as biomass and soil carbon in the buffer zones and the wetlands.

To make this possible, the team of researchers will engage key stakeholders (especially those who own land/property in delineated buffer zones) through the city council authorities on the project and work out mutually agreeable ways of smoothly implementing the project. This will reinforce the GoSL land policy of not construct (like putting up dwelling houses) in wetlands.

#### **4.2. User Participation**

This type of project usually belongs to the government, specifically the local/city council. It is a city development project that makes provision for the recreation and relaxation of city inhabitants. It is also as an income-generating project and as it is a job-creating one. Thus, the implementation could call for buyouts of all such lands if it is entirely a government venture. It can also be one of public-private venture, in which case a limited or no land buyout could be required. Where it is a completely private venture (and especially so involving the land owners), no land will be bought out. By the GoSL land policy, marshlands/wetlands are not dwelling lands. This, however, is hardly enforced today in Sierra Leone. This project will build consciousness about this policy and fully factor it into urban/city planning and development.

Irrespective, the strategy will require significant financial investment and it will therefore be piloted for a small area in the project city. A limited trial case will allow the space needed to determine the economic impacts of the climate-smart/climate-resilient intervention on urban agriculture, but also on the related social, cultural and ecological services.

#### **4.3. Data Collection**

As already noted, there will be two phases of data collection — the pre-intervention (baseline) data collection phase and then the post-intervention data collection phase. In each phase, both quantitative and qualitative data will be collected.

The qualitative data will principally be collected through questionnaires, personal interviews, focus group discussions, past experiences and personal observations. Professional digital photographs of the pre-intervention phase will be taken and documented too.

For the quantitative data, a portion will be remotely collected and another portion collected directly in the field. Land-use data, topographic (DEM) data, investment and development data, climate data, and impact data will be variously collected. The details of each dataset (collection frequency, coverage,

resolution, etc.) will be determined at the implementation phase of the project, but guided by the degree of information needed at each phase.

#### **4.4. Data Analysis**

The GIS platform will be used for spatial data (e.g., land-use and DEM data) analysis. The SPSS will also be used for temporal, social and economic data analysis — impact analysis. The MS Excel will as well be handy in preliminary data processing, including data inputting, outlier removal and correcting other irregularities. The flood model will be used to simulate the 100-year cycle flooding in the case-study area. These software platforms are powerful enough for also plotting and visually displaying the results of the analyzed data.

### **5. ANTICIPATED OUTPUTS AND OUTCOMES**

The anticipated outputs and outcomes of the project include a green city that is sustainable and without flooding, and therefore no flood disaster to urban agriculture and life and property. The climate-smart strategies that will be used in protecting the wetlands/swamps will add to the resilience of the city against global warming and climate change. The urban environment will be cleaner both in air quality and on the land surface, enhancing the aesthetic beauty of the city urban environment. The built buffers not only make urban area green, but also provide recreational, relaxation and ecological services in the city. These engineered climate-smart buffers will also create employment and thereby income for the city dwellers — the private, public or private-public management arrangements. Also, the cleaner urban environment will prevent the city dwellers from contracting diseases. The relaxation/recreation facility will reduce crime rate, and the engineered buffer zone will protect life and property in cities by preventing flooding.

### **6. KNOWLEDGE UTILIZATION AND DISSEMINATION PLAN**

The project, led by a consortium of researchers from Njala University (a public university institution), will showcase the concept, its potential and mode of execution. The stakeholders in the wider urban environment and the Sierra Leonean society will learn first-hand from the execution of the project every knowledge it entails. From here, the failures endured will be a valuable experience for the researchers and the wider stakeholders, and could guide against recurrences in future project trials. In the same way, the successes scored can be leveraged on and aggressively expanded, replicated and promoted in future projects across Sierra Leone and beyond. This will for a solid package of community service that is a key mandate of public universities in Sierra Leone. The success will encourage private sector investment in urban greenery and green-city projects that are driven by climate-smart technologies to prevent or control urban flooding and damage to urban agriculture and life and property in the country.

### **7. PROJECT GOVERNANCE**

The pilot project will be governed by a consortium of experienced research scholars in Njala University, including:

1.	Ing. Dr. Juana Paul Moiwo (Post-PhD)	—	PI
2.	Md. Fatmata Sheriff (MSc)	—	Co-PI
3.	Dr. Yahaya Kudus Kawa (PhD)	—	Team Lead
4.	Dr. Steven Brima Mattia (PhD)	—	Member (physically challenged)
5.	Mrs. Millicent Alie (MSc)	—	Member
6.	Dr. John Paul Kaisam (PhD)	—	Member
7.	Mr. Umaru Kanneh (MSc)	—	Member

This consortium of scientists has the expertise to successfully execute the proposed climate-smart project and make urban agriculture, life and property resilient to climate change. The host institution, Njala University, will provide guarantee for project fund management and proper project implementation. After a successful pilot project, the community and private sector are expected to take over, expand and replicate similar projects that will generate income and provide jobs in a sustainable way.

## 8. SUITABILITY OF THE HOST INSTITUTION

Njala University started as an agricultural experimental station in 1910, from where it has transformed into a training center, a college, a university college and then an autonomous university in 2005. The university has expanded into four campuses now (Njala campus, Torwama Campus, Kowama Campus and Bonthe Campus) and 18 Schools and some 72 departments offering various certificate and degree programs. It is a top public university in Sierra Leone, with a core mandate of teaching, research and community service. Since its founding, it has significantly contributed to human capacity development and agricultural productivity in Sierra Leone. Since its autonomy, Njala University has been the leading university in Sierra Leone. Njala university has the reputation of successful implementation of countless number of local, national and international projects. This is the role Njala University has played in the past, the role it plays now and the role it will continue to play in the near and distant future. Thus, Njala University is totally suitable to manage and coordinate the proposed project as a host institution.

## 9. CAPACITY BUILDING

The consortium of researchers comprises of university lectures with years of teaching, research and consultancy experiences. The consortium is also rich in community service and student supervision, including postgraduate students. This project will support at least one consortium member (Dr. Yahaya K. Kawa) to pursue a one-year post-doctorate research in the project area. A number of the supervised postgraduate students (at least five) by the consortium of researchers will have their research work in the project area too. As the budget is limited, the incorporation of postgraduate work into the project will not only build the capacity of the students in urban research, but will also hugely benefit the project



in terms of implementation, monitoring, data collection, data analysis and reporting results. It will also add layers of experience to the consortium of researchers, beneficiary students and other stakeholders of the project.

Specifically, through this project:

- One member of the consortium of researchers will pursue a one-year post-doctorate degree in a credible university in Africa;
- At least five postgraduate students will be supported for research work in the project area; and
- A total of four stakeholder seminars will be held — one at pre-intervention phase, two during the project-execution phase and one at end-of-project phase.

## **10. MONITORING AND EVALUATION STRATEGY**

This is a data-driven project with an on-ground implementation in Bo City, Southern Sierra Leone. It is also a community-based project that requires significant community involvement, albeit the fact that it will be implemented with government oversight via the local council. This mix of involvements implies that monitoring of the project implementation and the evaluation of its impact will be the joint responsibility of all of these stakeholders.

Specifically, the project will be fully monitored and evaluated against the layout objectives and the impacts stated therein. This monitoring and evaluation are part of the project development (planning, writing and implementation) and the objectives must be fully captured in the implementation so that stated impacts are evaluable. The project cycle is two years and the Gantt Chart of project activities will suggest when and how monitoring and evaluation are needed.

Irrespectively, a mix of approaches will be used to monitor and evaluate the project. In the proposed seminars, it will be determined whether the project is implemented as developed in the first place. Secondly, it will further be determined if the objectives of the project are met. Next, questionnaires will be developed for the attention of the stakeholders and the community regarding the performance of the projects against its objectives and impacts. Group discussions will also be held, involving the community and the stakeholders. Also, the monitoring will gather a lot about the evaluation of the project. This series of exercises will be conducted jointly by the consortium of researchers, the local council, the community people and other stakeholders.

## **11. GENDER, ETHICS AND SUSTAINABILITY**

Project ethics is a concept of moral and behavioral excellence of project participants, usually realized by developing and fulfilling a project ethics policy that determines a set of rules and standards governing the conduct of persons as members of the project community. The concept of project management ethics addresses the following: equality (equal treatment of project resources); truthfulness (communication



of truth to stakeholders/team members); honesty (not misleading or deceiving others); and integrity (maintaining good values and respect for job).

Project management is driven by decisions — some small and barely noticed and others prominent; some involve people, resources and the environment and therefore require deep thought; and some are in conflict, creating dilemma and significant risk. While it is normally known what to do, how to do it can be puzzling when interests are in conflict. The best way around this is to make decisions on the values of trust (which is equality, truthfulness, honesty and integrity). For further details, please see the attached policy document on research ethics.

Gender mainstreaming is strategic in making the concerns and experiences of women and men heard in the degrees needed. It not only improves the lives and livelihoods of the most vulnerable and poor, but also catalogues the disproportionate negative impacts of projects on different gender groups. Thus, gender equity, disability and social inclusion (GEDSI) are key in the successful implementation of community development projects of this nature.

Here, 29% of the consortium of researchers are female and another 14% are physically challenged. In fact, a female is the co-principal investigator of the project. The project will ensure social inclusion by involving a cut-across demography of the project implementing community.

There is more involvement of women in agriculture in Sierra Leone than men, and farming of especially food crops in the country is the domain of women. Thus, designing climate-smart/climate-resilient ways of protecting and preventing damage to urban agriculture will disproportionately benefit the women and vulnerable than the men.

In this technological and information age, project sustainability is ever so critical. It is an individual, organisational and community responsibility to ensure that project outputs, outcomes and impacts are met in the project life cycle — development, implementation and decommissioning. To be sustainable, this project will be adaptable, manageable and scalable in the ways the administrative, environmental, social and economic issues will be addressed.

## 12. PROPOSED PROJECT TIMELINE

This will be a \$45,000.00 project with a life cycle of 21 months. Against that backdrop, the Gantt Chart below details the key activities that will be undertaken, tied by timelines.

NO.	PROJECT ACTIVITY	YEAR 1				YEAR 2			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

### CLIMATE-SMART URBAN AGRICULTURE (CUA)

1.	Stakeholder meeting on pending project	√							
2.	Feasibility study & Site selection	√							
3.	Stakeholder meeting study result land use	√							
4.	Project site mapping		√						
5.	Soil & water sample collection & analysis		√						
6.	Project site layout and design development			√					
7.	Stakeholder meeting on design no-objection				√				
8.	Seminar on project performance				√				
9.	Project implementation (drainage development)					√			
10.	Project implementation (land development)						√		
11.	Project implementation (tree growing)							√	
12.	Project implementation (waste cage installation)								√
13.	Project impact dissemination (seminar)								√
14.	Stakeholder meeting on project wrap-up								√

### 13. PROJECT BUDGET

The detailed budget of the \$45,000.00 project with 21-month life cycle is given in the table below.

NO	OFFICE ITEM	QTY	UNIT COST (\$)	TOTAL COST (\$)
1.	Laptop computer	3 pcs	1,000.00	3,000.00
2.	Laser printer	1 pc	1,000.00	1,000.00
3.	Stationary (paper, ink, stapler, pin, envelop, paper file, pen, pencil, etc.)	1 set	1,000.00	1,000.00
4.	Software acquisition	1	500.00	500.00
5.	Data acquisition (land use/DEM)	1 set	500.00	500.00
6.	Fuel for internal travels	1000 l	1.33	1,329.78
7.	Per diem for travels and meetings	300 prsns	44.33	13,297.76

## CLIMATE-SMART URBAN AGRICULTURE (CUA)

8.	One-year post-doctorate study	1 prsn	5,000	5,000.00
9.	Land development	5 ac	500.00	2,500.00
10.	Drainage development	300 m	20.00	6,000.00
11.	Waste case installation	50 pcs	30.00	1,500.00
12.	Steel/wire mesh fencing	5 ac	2,622.46	7,122.46
13.	Contingency	5%	2,250.00	2,250.00
	<b>GRAND TOTAL</b>			<b>45,000.00</b>

### 14. LITERATURE CITED

Sierra Leone". The World Factbook (2023 ed.). Central Intelligence Agency. Retrieved 22 June 2023.

Sierra Leone - The World Factbook (cia.gov)

Breuste, J. (2020). The Green City: General Concept. In: Breuste, J., Artmann, M., Ioja, C., Qureshi, S. (eds) Making Green Cities. Cities and Nature. Springer, Cham. [https://doi.org/10.1007/978-3-030-37716-8\\_1](https://doi.org/10.1007/978-3-030-37716-8_1)

Breuste J (1994) "Urbanisierung" des Naturschutzgedankens: Diskussion von gegenwärtigen Problemen des Stadtnaturschutzes ("Urbanization" of the idea of nature conservation: discussion of contemporary problems of urban nature protection). Naturschutz und Landschaftsplanung 26(6):214–220

Sierra Leone". The World Factbook (2023 ed.). Central Intelligence Agency. Retrieved 22 June 2023.

Sierra Leone - The World Factbook (cia.gov)

Breuste, J. (2020). The Green City: General Concept. In: Breuste, J., Artmann, M., Ioja, C., Qureshi, S. (eds) Making Green Cities. Cities and Nature. Springer, Cham. [https://doi.org/10.1007/978-3-030-37716-8\\_1](https://doi.org/10.1007/978-3-030-37716-8_1)

Breuste J (1994) "Urbanisierung" des Naturschutzgedankens: Diskussion von gegenwärtigen Problemen des Stadtnaturschutzes ("Urbanization" of the idea of nature conservation: discussion of contemporary problems of urban nature protection). Naturschutz und Landschaftsplanung 26(6):214–220

Wu, S.J. Modeling rainfall-induced 2D inundation simulation based on the ANN-derived models with precipitation and water-level measurements at roadside IoT sensors. *Sci Rep* 13, 17664 (2023). <https://doi.org/10.1038/s41598-023-44276-3>

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## **ANNEX 1: Curriculum Vitae (CV)**

### **i). PRINCIPAL INVESTIGATOR (PI)**

**ING. DR. JUANA PAUL MOIWO**

#### **PERSONAL DETAIL**

1. FULL NAME: Juana Paul Moiwo
2. DATE OF BIRTH: 15th October, 1973
3. MAILING ADDRESS: NH16, SSQ, Njala Campus, Njala University
4. NATIONALITY: Sierra Leonean
5. PLACE OF BIRTH: Kailahun District, Sierra Leone
6. SEX: Male
7. MARITAL STATUS: Married
8. DEPARTMENT AND SCHOOL: Department of Agricultural Engineering, School of Technology, Njala University
9. APPOINTMENT
  - (a) Date: 21st July, 2015
  - (b) Designation: Lecturer 1
  - (c) Promotion: Senior Lecturer
10. SALARY SCALE AND PRESENT SALARY: Scale 3, Point 1, and Le 228,336.00 per annum
11. GRADE TO WHICH PROMOTION IS SOUGHT: Associate Professor

#### **QUALIFICATION**

- a). Academic Qualifications (with dates and granting bodies)
  1. 2010–2013 — Post-PhD in Hydrology and Water Resources Engineering, Chinese Academy of Sciences, China.
  2. 2002–2006 — PhD in Hydrology and Water Resources Engineering, Jilin University, China.
  3. 1998–2002 — MSc in Environmental Engineering, Jilin University, China.
  4. 1989–1993 — BSc (HONS) in Agricultural Extension (22), Njala University College, University of Sierra Leone.

#### **PROFESSIONAL QUALIFICATION**

1. 2019 — Utility Regulation and Strategy — Organized by PURC/World Bank, University of Florida, Gainesville, USA.

2. 2019 — APMG International Training, APMG Certified PPP Professional® (CP3P®) Foundation Examination.
3. 2018 — Resources Mobilization — Organized by Sierra Leone Urban Research Centre, Freetown.
4. 2018 — University Curriculum Development and Teaching — Organized by Strategic Partnership for Higher Education Innovation and Reform (SPHEIR), implemented under Assuring Quality in Higher Education in Sierra Leone (AQHEd-SL), Njala University. (Appx 008; not available)

### **TEACHING / PROFESSIONAL EXPERIENCE**

1. 2015–2023 — Lecturer, Njala University, Sierra Leone; Appointment Letter.
2. 2006–2014 — Research Fellow, Chinese Academy of Sciences, China.
3. 2010–2018 — Editor, Chinese Journal of Eco-Agriculture.
4. 1993–1998 — Program Officer, Organization for Research and Extension of Intermediate Technology (OREINT), Freetown, Sierra Leone.

### **PUBLISHED JOURNAL ARTICLES**

1. Qingtao Ma, YonghuiYang, Zhuping Sheng, Shumin Han, Yanmin Yang, Juana Paul Moiwo (2022). Hydro-economic model framework for achieving groundwater, food and economy trade-offs by optimizing crop patterns. *Water Research*, (SCI Journal), ISSN 0043-1354. <https://doi.org/10.1016/j.watres.2022.119199>.
2. Suluku Roland, Emikpe Benjamin, Bagla V. Patrick, Moiwo Juana, Asare Derrick (2022). Seroprevalence and predisposing factors of rabies antibodies in unvaccinated dogs in Sierra Leone. *Veterinary Medicine Science*, (SCI Journal), ISSN 2053-1095: 1–6. <https://doi.org/10.1002/vms3.946>.
3. Kiasheng Luo, Juana P. Moiwo (2022). Rapid monitoring of abandoned farmland and information regulation achievements of government based on remote sensing technology. *Environmental Science & Pollution*, (SCI Journal), ISSN: 1462-9011. <https://doi.org/10.1016/j.envsci.2022.02.019>.
4. Kiasheng Luo, Juana P. Moiwo (2021). Comparison of two object-oriented technologies for detecting land use change. *Arab Journal of Geoscience*, 14, 20 (2021), (SCI Journal), <https://doi.org/10.1007/s12517-020-06307-5>.
5. Mohamed M. Blango, Richard A. C. Cooke, Juana P. Moiwo, Patrick A. Sawyerr, Emmanuel Kangoma (2020). Rainwater harvesting for supplemental irrigation under tropical inland valley swamp conditions. *Irrigation and Drainage*, (SCI Journal), ISSN: 1531–0361.
6. Juana P. Moiwo, Alusine Wahab, Emmanuel Kangoma, Mohamed M. Blango, Mohamed P. Ngegba, Roland Suluku (2019). Effect of biochar application depth on crop productivity under

- tropical rainfed conditions. *Applied Sciences*, (SCI Journal), ISSN: 2076–3417, DOI:10.3390/app9132602.
7. Mohamed M. Blango, Richard A. C. Cooke, Juana P. Moiwo (2019). Effect of soil and water management practices on crop productivity in tropical inland valley swamps. *Agricultural Water Management*, (SCI Journal), ISSN: 0378–3774, DOI:10.1016/j.agwat.2019.05.036.
  8. Luo Kaisheng, Li Bingjuan, Juana P. Moiwo (2018). Monitoring land-use/land-cover changes at a provincial large scale using an object-oriented technique and medium-resolution remote-sensing images. *Remote Sensing*, (SCI Journal), ISSN: 2072-4292, DOI:10.3390/rs10122012.
  9. Mohamed P. Ngegba, Patrick Moriba, cJoseph B. A. Kandeh, Juana P. Moiwo, Saffa B. Massaquoi (2018). Assessing efficiency of Action Aid Sierra Leone (AASL) extension services in Sierra Leone, *International Journal of Agricultural Extension*, (Academic Journal), ISSN: 2311–6110, 06(02), 129–138.
  10. Roland Suluku, Abu Macavoray, Juana P. Moiwo, Bashiru M. Koroma (2018). Effect of PPR disease on socio-economic characteristics of farmers in Moyamba District, Sierra Leone. *Agricultural Science Research Journal*, (Academic Journal), ISSN: 2026–6073.
  11. Luo Kaisheng, Tao Fulu, Juana P. Moiwo (2018). Transfer of virtual water of woody forest products from China. *Sustainability*, (SCI Journal), ISSN: 2071–1050, DOI:10.3390/su10020410.
  12. Dengpan Xiaoa, Yanjun Shen, Yongqing Qi, Juana Paul Moiwo, Leilei Min, Yucui Zhang, Ying Guo, Hongwei Pei (2017). Impact of alternative cropping systems on groundwater use and grain yields in the North China Plain Region. *Agricultural Systems*, (SCI Journal), ISSN: 1873–2267, DOI: 10.1016/j.agry.2017.01.018.
  13. Emmanuel Kangoma, Mohamed M. Blango, Augustine B. Rashid-Noah, Joseph Sherman-Kamara1, Juana P. Moiwo, Alie Kamara (2017). Potential of biochar-amended soil to enhance crop productivity under deficit irrigation. *Irrigation and Drainage*, (SCI Journal), ISSN: 1531–0361, DOI: 10.1002/ird.2138.
  14. Juana P. Moiwo, Yahaya K. Kawa, John P. Kaisam, Umu Lamboi (2016). Implications of groundwater depletion for aquifer geomatrix deformation and water availability. *Hydrology*, (Academic Journal), ISSN: 2330–7609, DOI: 10.11648/j.hyd.20160405.11.
  15. Dengpan Xiao, Yongqing Qi, Zhiqiang Li, Rende Wang, Juana P. Moiwo, Fengshan Liu (2017). Impact of thermal time shift on wheat phenology and yield under warming climate in the Huang-Huai-Hai Plain, China. *Frontiers of Earth Science*, (SCI Journal), ISSN: 2095-0209, DOI 10.1007/s11707-016-0584-1.
  16. Kaisheng Luo, Fulu Tao, Juana P. Moiwo, Dengpan Xiao (2016). Attribution of hydrological change in Heihe River Basin to climate and land use change in the past three decades. *Scientific Reports*, (SCI Journal), ISSN: 2045–2322, doi:10.1038/srep33704.

17. Kaisheng Luo, Fulu Tao, Xiangzheng Deng, Juana P. Moiwo (2017). Changes in potential evapotranspiration and surface runoff in 1981–2010 and the driving factors in Upper Heihe River Basin in Northwest China. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.10947.
18. John P. Kaisam, Yahaya K. Kawa, Juana P. Moiwo, Umu Lamboi (2016). State of well water quality in Kakua Chiefdom, Sierra Leone. *Water Science & Technology: Water Supply*, (SCI Journal), ISSN: 0273–1223, DOI: 10.2166/ws.2016.049.
19. Yahaya K. Kawa, John P. Kaisam, Juana P. Moiwo, Victoria Kabia (2016). Physical, chemical and bacterial analysis of drinking water: Kakua Chiefdom, BO district, Sierra Leone. *International Journal of Water Resources and Environmental Engineering*, (Academic Journal), ISSN: 2141-6613, DOI: 10.5897/IJWREE2015.0610.
20. Juana P. Moiwo, Fulu Tao (2015). Satellite signal shows storage-unloading subsidence in North China. *Hydrology and Earth Systems Sciences*, (SCI Journal) ISSN: 1607-7938, DOI:10.5194/hessd-12-6043-2015.
21. Dengpan Xiao, Yanjun Shen, He Zhang, Juana P. Moiwo, Yongqing Qi, Rende Wang, Hongwei Pei, Yucui Zhang, Huitao Shen (2015). Comparison of winter wheat yield sensitivity to climate variables under irrigated and rain-fed conditions. *Frontiers of Earth Science*, (SCI Journal), ISSN: 2095-0209, DOI 10.1007/s11707-015-0534-3.
22. Alhaji M. H. Conteh, Juana P. Moiwo, Xiangbin Yan (2015). Using a logistic regression model to analyze alley farming adoption factors in Sierra Leone. *Small-scale Forestry*, (SCI Journal), ISSN: 1873-7854, DOI: 10.1007/s11842-015-9311-0.
23. Dengpan Xiao, Yongqing Qi, Yanjun Shen, Fulu Tao, Juana P. Moiwo, Jianfeng Liu, Rede Wang, He Zhang, Fengshan Liu (2015). Impact of warming climate and cultivar change on maize phenology in the last three decades in North China Plain. *Theory and Applied Climatology*, (SCI Journal), ISSN: 0177-798X, DOI: 10.1007/s00704-015-1450-x.
24. Alhaji M. H. Conteh, Xiangbin Yan, Juana P. Moiwo (2015). The determinants of grain storage technology adoption in Sierra Leone. *Cashier Agriculture*, (SCI Journal), ISSN: 1166-7699, DOI: 10.1684/agr.2015.0733.
25. Juana P. Moiwo, Fulu Tao (2014). Evidence of Land-use Controlled Water Storage Depletion in Hai River Basin, North China. *Water Resources Management*, (SCI Journal), ISSN: 1573-1650, DOI: 10.1007/s11269-014-0772-2.
26. Juana P. Moiwo, Fulu Tao (2014). Contributions of precipitation, irrigation and soil water to evapotranspiration in (semi)-arid regions. *International Journal of Climatology*, (SCI Journal), ISSN: 1097-0088, DOI: 10.1002/joc.4040.
27. Dengpan Xiao, Juana P. Moiwo, Fulu Tao, Yonghui Yang, Yanjun Shen, Quanhong Xu, Jianfeng Liu, He Zhang, Fengshan Liu (2013). Spatiotemporal variability of winter wheat phenology in response to weather and climate variability in China. *Mitigation and Adaptation*



- Strategies for Global Change, (SCI Journal), ISSN: 1573-1596, DOI: 10.1007/s11027-013-9531-6.
28. Juana P. Moiwo, Fulu Tao (2014). Groundwater recharge and discharge analysis for land use conditions suitable for the hydrology and ecology of semiarid regions. *Hydrology Research*, (SCI Journal), ISSN: 0029-1277, DOI: 10.2166/nh.2013.103.
  29. Juana P. Moiwo, Fulu Tao (2012). The changing dynamics in citation index publication position China in a race with the USA for global leadership. *Scientometrics*, (SCI Journal), ISSN: 0138–9130, DOI: 10.1007/s11192-012-0846-y.
  30. Juana P. Moiwo, Fulu Tao, Wenxi Lu (2012). GRACE, GLDAS and measured groundwater data products show water storage loss in Western Jilin, China. *Water Science & Technology*, (SCI Journal), ISSN: 0273–1223, DOI: 10.2166/wst.2012.053.
  31. Juana P. Moiwo, Fulu Tao, Wenxi Lu (2012). Analysis of satellite-based and in situ hydro-climatic data depicts water storage depletion in North China Region. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.9276.
  32. Dengpan Xiao, Fulu Tao, Juana P. Moiwo (2011). Research progress on surface albedo under global climate change. *Advances in Earth Science*, (SCI Journal), ISSN: 1001–8166. Vol. 2012, No. 11, pp 1217–1224.
  33. Juana P. Moiwo, Fulu Tao, Wenxi Lu (2011). Estimating soil moisture storage change using quasi-terrestrial water balance method. *Agricultural Water Management*, (SCI Journal), ISSN: 0378–3774, DOI: 10.1016/j.agwat.2011.10.003.
  34. Shumin Han, Yonghui Yang, Tong Fan, Dengpan Xiao, Juana P. Moiwo (2011). Precipitation-runoff processes in Shimen hillslope micro-catchment of Taihang Mountain, north China. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.8233.
  35. Juana P. Moiwo, Yonghui Yang, Fulu Tao, Wenxi Lu, Shumin Han (2011). Water storage change in the Himalayas from GRACE and an empirical climate model. *Water Resources Research*, (SCI Journal), ISSN: 0043–1397, DOI: 10.1029/2010WR010157.
  36. Juana P. Moiwo, Yonghui Yang, Shumin Han, Wenxi Lu, Nana Yan, Bingfang Wu (2010). A method for estimating soil moisture storage in regions under water stress and storage depletion — a case study of Hai River basin, North China. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.7991.
  37. Juana P. Moiwo, Yonghui Yang, Nana Yan, Bingfang Wu (2010). Comparison of evapotranspiration estimated by ETWatch with that derived from combined GRACE and measured precipitation in Hai River Basin, North China. *Hydrological Sciences Journal*, (SCI Journal), ISSN: 2150–3435, DOI: 10.1080/02626667.2011.553617.
  38. Yukun Hu, Juana P. Moiwo, Yonghui Yang, Shumin Han, Yanmin Yang (2010). Agricultural water-saving and sustainable groundwater management in Shijiazhuang Irrigation District,

- North China Plain. *Journal of Hydrology*, (SCI Journal), ISSN: 0022–1694, DOI: 10.1016/j.jhydrol.2010.08.017.
39. Fei Tian, Yonghui Yang, Shumin Han, Juana P. Moiwo, Guoyu Qiu (2010). Determination of the period of major runoff decline and related driving factors in Ye River basin, North China. *Journal of Water and Climate Change*, (SCI Journal), ISSN: 2040–2244, DOI: 10.2166/wcc.2010.001.
  40. Yanmin Yang, Yonghui yang, Juana Paul Moiwo, Yukun Hu (2010). Estimation of irrigation requirement for sustainable water resources reallocation in North China. *Agricultural Water Management*, (SCI Journal), ISSN: 0378–3774, DOI: 10.1016/j.agwat.2010.06.002.
  41. Juana Paul Moiwo, Yonghui Yang, Huilong Li, Shumin Han, Yanmin Yang (2010). Impact of water resource exploitation on the hydrology and water storage in Baiyangdian Lake. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.7716.
  42. Juana Paul Moiwo, Wenxi Lu, Yongsheng Zhao, Yonghui Yang, Yanmin Yang (2009). Impact of land use on distributed hydrological processes in the semi-arid wetland ecosystem of Western Jilin. *Hydrological Processes*, (SCI Journal), ISSN: 1099–1085, DOI: 10.1002/hyp.7503.
  43. Juana Paul Moiwo, Yonghui Yang, Huilong Li, Shumin Han, Yukun Hu (2009). Comparison of GRACE with in situ hydrological measurement data shows storage depletion in Hai River Basin of Northern China. *Water SA.*, (SCI Journal), ISSN: 18166–7950, Vol. 35, No. 5, pp 663–670.
  44. Shumin Han, Yonghui Yang, Yuping Lei, Changyuan Tang, Juana Paul Moiwo (2008). Seasonal groundwater storage anomaly and vadose zone soil moisture as indicators of precipitation recharge in the piedmont region of Taihang Mountain, North China Plain. *Hydrological Research*, (SCI Journal), ISSN: 0029-1277, DOI: 10.2166/nh.2008.117.
  45. Juana Paul Moiwo (2006). Spatial analysis of the impact of land-use on surface runoff and soil erosion — A case study of western Jilin. *Journal of Geoscientific Research in Northeast Asia*, (Academic Journal), Vol. 9, No. 1, pp 83–96 (东北亚地学研究英文版).
  46. Juana Paul Moiwo (2006). Impact of land-use patterns on distributed groundwater recharge and discharge — a case study of western Jilin. *Chinese Geographical Science*, (Academic Journal), Vol. 16, No. 3, pp 229–235 (中国地理科学, 英文版).
  47. Juana Paul Moiwo (2003). The effect of flow on pollution and remediation of groundwater. *Journal of Geoscientific Research in Northeast Asia*, (Academic Journal), Vol. 6, No. 2, pp 183–190 (东北亚地学研究, 英文版).

48. Juana Paul Moiwo (2001). Porosity, dispersity, and contaminant transport in groundwater. *Journal of Geoscientific Research in Northeast Asia*, (Academic Journal), Vol. 4, No. 2, pp 192–199 (东北亚地学研究, 英文版).

## REFERENCED BOOK CHAPTERS

1. Mohamed M. Blango, Richard A. Cooke, Juana P. Moiwo, Emmanuel Kangoma (2022). Modeling the effect of climate change on water stored above a micro-dam in an inland valley swamp in Sierra Leone using SWAT. *Challenges in Agro-Climate and Ecosystem*, ISBN: 978-1-80355-325-2, DOI:10.5772/intechopen.104894.
2. Juana P. Moiwo, Yahaya K. Kawa, Alhaji M. H. Conteh (2022). Sustainability of water resources and agricultural production in semi-arid regions. *Research Aspects in Biological Science*, Vol. 6, B. P. International, ISBN: 978-93-5547-778-1, DOI: 10.9734/bpi/rabs/v6.
3. Juana P. Moiwo, Mohamed M. Blango, Yahaya K. Kawa, Alhaji M. H. Conteh (2022). Potential for sustainable irrigation towards food self-sufficiency in Sierra Leone. *Emerging Challenges in Agriculture and Food Science*, Vol. 3, 25 January 2022, Page 99-106, ISBN: 978-93-5547-020-1, DOI: 10.9734/bpi/ecafs/v3/2463C.
4. Juana P. Moiwo, Yahaya K. Kawa, Alhaji M. H. Conteh, John P. Kaisam (2021). Effects of unloading groundwater on aquifer storage and water availability. *Current Advances in Geography, Environment and Earth Science*, Vol. 1, 11 December 2021, Page 64–73, ISBN: 978-93-5547-094-2, DOI: 10.9734/bpi/cagees/v1.
5. Yonghui Yang, Jing Fan, Yukun Hu, Juana Moiwo. Sustainability of water-use and food production in Haihe Catchment, pp 231. *Sustainability in Food and Water — An Asian Perspective*, 2010, XIV, 466 p, Hardcover, ISBN: ISBN: 978-90-481-9914-3.

## HIGHER DEGREE RESEARCH SUPERVISION

### i). PHD THESIS

1. Steven B. Mattia (2019). Assessment of the structure, carbon stock and species diversity of forests in Moyamba District, Sierra Leone.
2. Roland Suluku (2018). Dog ownership pattern, current rabies status and one health approach in Sierra Leone.
3. Yukun Hu (2008). Agricultural water-use and groundwater dynamics in the piedmont landscape of Taihang Mountain.

### ii). MSc Dissertation

1. Thomas Sesay (2021). Effect of upstream water management on downstream communities in Alama Micro-catchment in Port Loko District, Sierra Leone.

2. Sahr Lebbie (2021). Assessment of sachet (packaged) water quality in Kono District, Sierra Leone.
3. Joseph Bangura (2021). Impact of irrigation scheme on income and livelihood of rural farmers in Mabilowfu Community in Bombali District, Sierra Leone.
4. Augustine S. Cole (2021). Land-use and landslide incidence in Motormeh Community in Rural Freetown, Sierra Leone.
5. Amara E. Jambai (2021). Impact of water scarcity on socio-economic development of Wilberforce Region of Urban Freetown.
6. Michael Kamara (2020). Variations in NERICA-4 rice yield productivity with increasing seedling stand rate under tropical rainfed conditions.
7. Mabel Y. Pratt (2020). Evaluation of Guma Valley Water Company water supply distribution network in Regent Village, Western Sierra Freetown.
8. Luck Koker (2020). Impact of inland valley swamp development on rice productivity and rural livelihood in Bo District, Southern Sierra Leone.
9. John V. Tarawally (2019). Safety and Sustainability Analysis of Municipal Solid Waste Management at Whein Town Landfill in Monrovia, Liberia.
10. Jah E. Toby (2019). Impact of Sierra Leone Water Company (SALWACO) solar-powered boreholes on local communities along Freetown-Masiaka highway.
11. David M. Abou (2019). Analysis of drinking well water quality in Samamie Section of Bo City, Southern Sierra Leone.
12. Salamattu B. Kargbo (2019). Characterization of diurnal variations in PM<sub>2.5</sub> and PM<sub>10</sub> particulate emissions at Bumeh Landfill in Freetown, Sierra Leone.
13. Osman A. Kanu (2019). Land evaluation for integrated agriculture and water resources management — A case study of Kono District, Eastern Sierra Leone.
14. Mickail N. Turay (2019). Assessment of non-pipe-borne drinking water sources in Grafton Community and role of Sierra Leone Standards Bureau (SLSB) in quality compliance.
15. Matilda M. Moiwo (2019). Effect of artisanal gold mining on surface water quality — A case study of Laminaia Village, Sanda Loko Chiefdom, Sierra Leone.
16. Abubarkarr Swaray (2019). Treatment profile of Guma-Valley Water Company pipe-borne drinking water supply in Freetown, Sierra Leone.
17. Emmanuel Kangoma (2016). Response of potted rice to deficit irrigation and biochar treatment under greenhouse conditions.

## RESEARCH / PROJECTS FUNDS

I attracted research funds/projects for 8 consecutive years as hydrologist in the Chinese Academy of Sciences (CAS). Please see below and also printed documents.

1. Post-doctoral Program for African Researchers of China-Africa Science and Technology Partnership Program (CASTEP).
2. China Post-Doctoral Science Foundation.

### **PROJECT / CONSULTANCY REPORTS**

1. Juana P. Moiwo (2021) — Training Manual on Vegetable & Rice Cultivation through Climate-smart Agricultural Practices.
2. Mohamed M. Blango, Juana P. Moiwo and Morison Lahai (2019) — Rural Women's Access to Information, Productive Resources and Services, TRŌCAIRE, Sierra Leone. Report is yet to be written (on-going).
3. Juana P. Moiwo (2019) — Contract for consultancy services for project peer review of the science fund of the Republic of Serbia.

### **PROFESSIONAL ACTIVITIES**

#### **A). NATIONAL / INTERNATIONAL PROFESSIONAL ASSOCIATION**

1. 2010–2014 — Post-Doctoral Research Fellow, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China.
2. 2006 — Expert Hydrologist, Centre for Agricultural Resources Research, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Shijiazhuang, China.
3. 2007–2010 — Head of Post-Graduate Research Unit, Centre for Agricultural Resources Research, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Shijiazhuang, China.
4. 2008–2010 — Foreign Expert, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Shijiazhuang, China.

#### **B). PROFESSIONAL BODY MEMBERSHIP**

1. 2019–2023 — Member of Sierra Leone Institute of Engineers.
2. 2001–2023 — Member of the European Geosciences Union.

#### **C). REPUTABLE JOURNAL EDITORSHIP**

1. 2022–2023 — Editor, Frontiers in Irrigation.
2. 2022–2023 — Editor, Frontiers in Agronomy.
3. 2010–2023 — Editor of Chinese Journal of Eco-Agriculture.

#### **D). REPUTABLE JOURNAL REVIEWERSHIP**

1. Ecological modelling
2. Journal of Hydrology
3. Agricultural Water Management

4. Global and Planetary Change
5. Ecological Engineering
6. Applied Geography
7. Science of the Total Environment
8. Ecological Indicators
9. Computers and Electronics in Agriculture
10. Field Crops Research

#### **ADMINISTRATIVE EXPERIENCE**

1. 2020–2022 — Acting Dean, School of Technology, Njala University.
2. 2022–2023 — Acting Director, Research and Development, Njala University.

#### **UNIVERSITY / PUBLIC SERVICE (UPS)**

##### **A). APPOINTMENT AS MEMBER OF UNIVERSITY COMMITTEES / AD HOC AND STATUTORY BOARDS / SERVICE AT FACULTY LEVEL / HALL WARDEN, ETC.)**

1. 2018 — Hall Warden for Block A, Njala Campus, Njala University.
2. 2018–2019 — School Representative to Njala University Senate.
3. 2018–2019 — Chairman, Research & Publication Committee, School of Technology, Njala University.
4. 2018–2019 — Secretary, Agri-Food Taskforce, Njala University.
5. 2019 — External Examiner, School of Natural Resources, Njala University.
6. 2019 — Chairman, Bribery & Extortion Investigation Committee.
7. 2019–2022 — Member, ASA Governance Committee.
8. 2020 — Chairman, Njala Energy Committee.
9. 2020 — Member, Court Committee on Njala Campus Disciplinary Committee.
10. 2020 — Chairman, Evaluation Committee of University International & Experimental Schools, Njala Campus.
11. 2020 — Member, Njala University Bailout Committee.
12. 2021 — Chairman, Masters Block Investigation Committee, Njala Campus.
13. 2021 — Member, Campus Disaster Management & Hostels Privatization Initiative Committee.
14. 2022 — Member, Cyber Fraud Investigation Committee.
15. 2022 — Member, Committee to Investigate Disclosure of External Examiner's Report, School of Agriculture.
16. 2022 — Chairman, Committee to Evaluation Casual Workers on Njala Campus.
17. 2022 — Appointment as External Examiner, School of Basic Sciences, Njala University.
18. 2022–2024 — Chairman, Finance, Budget & Emolument Committee, ASA, Njala University.

**B). APPOINTMENT (ON PROFESSIONAL MERIT) TO OUTSIDE BODIES – E.G., CONSULTATIVE OF ADVISORY BODIES**

1. 2022 — Member, Apprenticeship Policy Development Committee, Ministry of Technical and Higher Education.
2. 2021–2023 — Commissioner, Sierra Leone Electricity and Water Regulatory Commission.
3. 2018–2020 — Commissioner, Sierra Leone Electricity and Water Regulatory Commission.
4. 2015–2016 — Chairman, CTA, University Secondary School.
5. 2018–2019 — Chairman, CTA, University International School.
6. 2010–2014 — Adviser, Wal-Mart Supermarket, Beijing Branch, China.
7. 2010–2014 — Lead Adviser, New Inter-Continental Enterprises, Beijing, China.

**OTHER RELEVANT INFORMATION**

**A). ARTICLE CITATION REPORT**

1. Google Scholar Published Article Citation Matrix

**REFERENCES**

1. Dr. Mohamed M. Blango, Dean, School of Technology, Njala University. Tel: +23230323965 / +23279313716 / +23231117523
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**ii). CO-PRINCIPAL INVESTIGATOR**

**MD. FATMATA SHERIFF**

**PERSONAL DATA**

**NAME:** Fatmata Sheriff

**DATE OF BIRTH:** 22nd January 1970

**OCCUPATION:** Lecturer, Institute of Food Technology, Nutrition & Consumer Studies;  
School of Agriculture and Food Sciences, Njala University

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**NATIONALITY:** Sierra Leonean

**PLACE OF BIRTH:** Bonthe

**SEX:** Female

**MARITAL STATUS:** Married

## **EDUCATION**

**i).** Methodist Primary school Bo — 1976–1982

**ii).** Holy Rosery Secondary School Kenema — 1983–1988

## **QUALIFICATION**

### **(A) ACADEMIC**

**i).** PhD Candidate in Nutrition & Dietetics, since 2020, Njala University, Sierra Leone

**Thesis Topic:** The impact of single parenting on the health, nutrition and academic performance of children in the Western Rural and Urban of Sierra Leone

**ii).** MSc in Nutrition and Dietetics, 2007–2009, Njala University, Sierra Leone

**iii).** BSc (Edu) in Home Economics, 2004–2007, Njala University College, University of Sierra Leone

**iv).** HTC, Milton Margai College of Education, 2000–2003

### **(B) PROFESSIONAL**

**i).** Certificate of Attendance for Professional Development Course for Staff Lecturing on Food Security and Nutrition in Sierra Leone. Njala University.

**ii).** Certificate On Educational Curriculum development for the institute of Food technology Nutrition and Consumer Studies under the school of Agriculture: Njala university Sierra Leone (2015).

**iii).** Certificate: Training as trainee for teaching of Right to Food in Universities in Sierra Leone

### **(C) TEACHING / PROFESSIONAL EXPERIENCE**

**i).** Lecturer I — Institute of Food Technology and Nutrition and Consumer Studies, Njala University, Sierra Leone, 2017 to date.

**ii).** Lecturer 2 — Institute of Food Technology and Nutrition and Consumer Studies, Njala University. Sierra Leone: 2011–2018.

**iii).** Research Assistant — School of Agriculture, Njala University Sierra Leone, 2008–2018.

### **(D) RESEARCH AND PUBLICATIONS**

- i). E. M. Sesay, M. M. M. Sesay, F. Kobba, F. Sheriff (2017). Role of women in small ruminant disease control within Kenema District, Eastern Sierra Leone.
- ii). Tarawally F. B. A., Smith Nyamawa A., Sheriff F. (2016). The prevalence of diarrhea and effect on the nutritional status of under-five children: a case study of the kaiyamba Chiefdom, Moyamba District. 2<sup>nd</sup> Annual Conference Organized by Njala University Society for Academic Advancement (NUSAA), Njala, Sierra Leone, 3rd–5th May 2016.
- iii). Dore F., Allie M., Nyamawa A., Sheriff F. (2016). The effect of teenage pregnancy on the socio-economic growth of the Njala University. 2nd Annual Conference Organized by Njala University Society for Academic Advancement (NUSAA), Njala, Sierra Leone, 3rd–5th May, 2016.
- iv). Bangai E. B., Smith A., Nyamawa A., Sheriff F. (2016). The prevalence of malaria and helminthes among children aged 0-5 years. (A case study of Bo and Kenema Government Hospitals). 2nd Annual Conference Organized by Njala University Society for Academic Advancement (NUSAA), Njala, Sierra Leone, 3rd–5th May, 2016.
- v). Koroma F. T., Smith A., Nyamawa A., Sheriff F. (2016). Assessment of the availability accessibility and neutralization of fruits and vegetables for the households in improving their nutritional status. (a case study of the NjalaMokonde Community). 2nd Annual conference Organized by Njala University Society for Academic Advancement (NUSAA), Njala, Sierra Leone, 3rd – 5th May, 2016.
- vi). Contributed in writing a Chapter of the Right to Food Manuel (chapter 6 Determinant of food intake 2018) already published by FAO for the teaching of the Right to Food Project in Njala University

**(E) PROFESSIONAL ACTIVITIES**

- i). Lead team and develop other's team working skills acquired in my experience as a lecturer, researcher, and teacher.
- ii). Collaboration — I endeavour to create a friendly environment in which colleagues and students are free to contribute positively to capacity building processes and inspire other by: advocating plans and ideals within and outside organizations.
- iii). Maintain a high influential network, all acquired in my experience as a lecturer, researcher, and teacher.
- iv). Mutual respect - I share information via all the channels of communication with other staff in a professional manner acquired in my experience as a lecturer, researcher, and teacher.

**(F) ORGANIZATIONAL / MANAGERIAL SKILLS**

- i). Administration of Institute of Foods Technology, Nutrition and Consumer Studies is one of my responsibilities in the absence of the Director. I ensured its smooth running, and continuity of services amidst numerous constraints (man-power shortage, grossly inadequate departmental facilities, and so on).
- ii). I also ensured that state programmes are well integrated into the University's basic capacity building services.
- iii). I solicited the support of local politicians and traditional rulers for the institute.

**(G) JOB-RELATED SKILLS**

- i). Good skills in Agricultural and Nutritional Research
- ii). Good skills in stress management
- iii). Good skills in conceptualizing specific management
- iv). Good skills in database management (filings, computer storage, etc.)
- v). Gender Activist on gender Development and gender Mainstreaming
- vi). A highly productive foods and nutrition professional, gender advocate, with a litany of professional certificates and trainings to credit and 11+ years of brilliant track record of handling high end projects and capacity building processes, with competences in conceptualizing and supporting specific management and application, implementing policies, managing people and needs selection.
- vii). Self-assessment on digital skills: Information processing Communication Content creation Safety Problem solving and independent user, word processor, spread sheet, presentation software, etc.
- viii). I have good knowledge of Microsoft office. I can write documents, process, organize, present and store data.
- ix). Member of Young Scientist Organization in Sierra Leone
- x). Member of Academic Staffs Association (ASA) Njala University

**REFERENCES**

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**2. PROF. ADOLPHOUS JOHNSON**

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**3. PROF. EDWIN J. J. MOMOH**

Vice Chancellor & Principal

Ernest Bai Koroma University, Sierra Leone

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**iii). TEAM LEADER****DR. YAHAYA KUDUSH KAWA****PERSONAL DATA**

**ADDRESS** — #3 Heddle Lane off Circular Road Freetown Sierra Leone West Africa/Chemistry Department, School of Environmental Sciences, Njala University, Sierra Leone West Africa

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**EDUCATION**

**DEGREE** — PhD in Environmental Sciences and Engineering, China University of Geosciences (Wuhan)

**AREA OF SPECIALIZATION** — Functional and unique diversities of genes and microorganisms involved in redox reactions of arsenic from the severely-contaminated soils (July 2019)

**DEGREE** — MSc in Analytical Chemistry. Northeast Normal University Changchun Jilin PRC

**AREA OF SPECIALIZATION** — Natural Products Analysis of polysaccharide from the plant (July 2012)

**DEGREE** — BSc (Ed) in Chemistry/Biology, Njala University Sierra Leone West Africa

**AREA OF SPECIALIZATION** — Water analysis (July 2009)

**CAREER / ACADEMIC APPOINTMENT**

**HEAD** — Department of Chemistry.

**LECTURER** — Njala University, Department of Chemistry, School of Environmental Sciences (2013–Present).

**TEACHER** — Sierra Leone Grammar School Freetown Sierra Leone West Africa (Feb-2010-2010 August)

### PROFESSIONAL TRAINING HONORS / AWARDS

- **MANAGER** — State Key Laboratory, Department of Microbiology 2016–2018, China University of Geosciences (Wuhan).
- **MEMBER** — Society for Environmental and Public Health Practitioners of West Africa, (SEPHPWA).
- **TRAINER** — Workshop on Biosafety, Biosecurity and Good Laboratory Practices (Noguchi Memorial Institute for Medical Research College of Health Sciences University of Ghana), 2016.
- **SCIENTIST** — Research at Mar-ship Hospital Laboratory, Bo 2010–2016.
- **LABORATORY TECHNICIAN** — UBC-Hospital Laboratory – Matru Jong 2004–2005.

### COURSES

Biosafety Risk Assessment and Management; Waste Management, disinfection, autoclaves, and global harmonization; Biosecurity; Personal Protective Equipment; Occupational Health and incident Management; Chemical Safety; Basic Principles of Good Laboratory Practice; Infection Diseases; Specimen Collection and Transport; Safety Inspection/Audit.

### SERVICES

#### NJALA UNIVERSITY SERVICE

Assistance Marshals 2016 Congregation Ceremony

Co-ordinator for Examination in the Chemistry department 2013-2016

Committee member for consensus of students 2013-2016

#### OTHER PUBLIC SERVICE

1. External Examiner; Ernest Bai Koroma University of Science and Technology (2019/2020–Date).
2. Workshop to Review and Validate Harmonization Training Curricula for Allied Health Professionals in ECOWAS Region (5–7 April, 2022).
3. Integration Meeting for Accredited Colleges CAMES, Professional Associations and Regulatory bodies in ECOWAS Region (8–9 April, 2022).
4. Examiner West Africa Examination Council 2010–Date

### PUBLICATION

1. Charles Esther, Koroma Alusine Hassan, **Kawa Yahaya Kudush**, Kaisam John Paul: Assessment of knowledge and Participation on Households Solid Domestic Waste Management in Some selected Communities in Bo Southern Sierra Leone (2022) International

- Journal of Environmental Chemistry. ISSN: 2456-5245 Volume 8, Issue 1,2022 DOI (Journal): 10.37628/IJEC.
2. Barrie Ibrahim Kanneh Umaru, **Kawa Yahaya Kudush**, Kaisam John Paul, Pujeh Mohamed Physicochemical Analysis of Palm Oil Effluent and its Environmental Effects at Daru, Eastern Sierra Leone (2022), International Journal of Prevention and Control of Industrial Pollution Volume 7, Issue 2, 2021 DOI (Journal): 10.37628/IJPCIP.
  3. Pujeh Mohamed Junior, **Kawa Yahaya Kudush**, Kpaka Jonathan and Kanneh Umaru, Assessment of the quality of hand dug well used for drinking and agricultural activities at Blama, Small-Bo Chiefdom, Eastern, Sierra Leone (2022), Journal of Chemical Engineering and Material Sciences. Vol. XXXX

### PROJECT / CONSULTANCY REPORT

1. Community-led Independent Scientific Evaluation of Impacts of Mining Activities on the Community in the Vicinity of Koidu Ltd. in Koidu, Kono District, Sierra Leone (ongoing)
2. Assessment and Development Policy Framework, Guidance and operational Plan on Integrated National Healthcare Waste Management for Sierra Leone (Ongoing)

### REFERENCES

1. Professor Bashiru Mohamed Koroma, Chancellor, Njala University, Tel.: +23276706819, E-mail: [bashiru.mkoroma@njala.edu.sl](mailto:bashiru.mkoroma@njala.edu.sl)/[bashiru.koroma@yahoo.com](mailto:bashiru.koroma@yahoo.com).
2. Dr. John Paul Kaisam, Dean School of Basic Sciences, Njala University Njala Campus., Tel.: +23276926710, E-mail: [jpkaisam@njala.edu.sl](mailto:jpkaisam@njala.edu.sl).
3. Professor Alhaji Brima Gogera, Deputy Vice-Chancellor, Ernest Bai Koroma University of Science and Technology, Port-Loko Campus, Tel.: +23278820533, E-mail: [agogra@njala.edu.sl](mailto:agogra@njala.edu.sl)/[abgogra@gmail.com](mailto:abgogra@gmail.com).
4. Dr. Feng Xu, Deputy Dean International Cooperation Office, Head of International Student Affairs, China University of Geosciences (Wuhan), Tel: +862767883081, Fax: +862787515956