UNIVERSITY OF DAR ES SALAAM

6th Research and Innovation Week-2021

Research and Innovation for Sustainable Industrial and Social Development in Tanzania

Book of Abstracts

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May, 2021

Research Projects Exhibited at the University Level Research and Innovation Week held from 24th – 26th May 2021 at the University Library, University of Dar es Salaam

PREAMBLE

Welcome to the 6th University of Dar es Salaam Research and Innovation Week (RIW) whose theme for this year is *"Research and Innovation for Sustainable Industrial and Social Development in Tanzania*" (Utafiti na Ubunifu kwa Maendeleo Endelevu ya Viwanda na Jamii nchini Tanzania). The Prime Minister of the United Republic of Tanzania, Hon. Kassim Majaliwa Majaliwa (MP) officiates the RIW events on 24th May 2021 while the closing and award ceremony is graced by Hon. Prof. Joyce Lazaro Ndalichako, Minister for Education, Science and Technology on 26th May 2021.

The idea of Research Week was conceived in 2015 for the purpose of creating an avenue for UDSM researchers and innovators to showcase their research findings and innovations. Since then, UDSM has maintained annual culture of having a Research Week annually. However, in 2020 the event could not be held due to COVID-19 pandemic. The RIW serves as a vehicle for disseminating research findings and building stakeholder and public awareness of the University's research activities. In particular, RIW is a platform for promoting UDSM's research agenda, visibility as well as contributing to the government development plans. Another importance of RIW is to foster partnerships across disciplines and extend working relationships with local and global public and private organizations and to advance resilient infrastructure grounded in freedom and responsibility.

Activities and exhibitions of the current RIW started at Unit levels (Colleges, Schools and Institutes) from 27th – 29th April, 2021 at Mlimani Campus and Dar es Salaam University College of Education (DUCE) and from 3rd – 5th May, 2021 at Mkwawa University College of Education (MUCE) in Iringa, Mbeya College of Health and Allied Sciences (MCHAS) in Mbeya and Institute of Marine Sciences (IMS) in Zanzibar. During the Unit level exhibitions, researchers and students had three days of sharing their research results and innovations with the University community and members of the public. At the Unit level, a total of 320 research projects, innovative products, publications, consultancies and public services were exhibited. The climax of this event is at the University level, whereby all selected research projects from all Units across the University are exhibited. This year, 117 projects excelled for exhibition and showcasing at the University level. Besides the exhibitions

of research and innovation outputs, there are also other pertinent events including a Strategic Partnership Dialogue and a Symposium whose aim among others is to forge collaborative platforms for achieving planned research and innovation objectives.

In recognizing and motivating staff and students in research and innovation endeavours, outstanding researchers and innovators will be awarded various prizes in terms of cash, trophies, and certificates based on a well-established assessment and evaluation criteria. In particular, this year's researchers and innovators are evaluated in ten categories namely; Best Multidisciplinary Research Groups Project, Units/Departments that have Excelled in attracting Large amount of Research Funds, Units/ Departments that have Excelled in attracting Large amount of Innovation Funds, Researchers who have Attracted Large Research Funds, Researcher of the Year, Innovator of the Year, UDSM Best Journal, Best Postgraduate Research Project, Best Undergraduate Research Project and Best Public Service/Consultancy.

This book of abstracts summarizes findings of various research and innovation projects by UDSM staff and students who are currently exhibiting in RIW. It is our hope that this event ignites collective efforts in solving societal problems through research and fostering innovations.

Thank you in advance and enjoy the 6th UDSM RIW in 2021.

Prof. Bernadeta Killian
Deputy Vice Chancellor (Research)

Contents

ABSTRACTS

COLLEGE OF ENGINEERING AND TECHNOLOGY (CoET)

Category 1: Best Multidisciplinary Research Group Project

Development of Integrated Telemedicine Infrastructure for Access to Specialist Doctors for Rural Communities in Tanzania

Joseph Sisala and Joseph Henry

Department of Electrical Engineering, University of Dar es Salaam,

Abstract

The need for exploring and the use of technology to reach out and serve the lives of community is very essential. Majority of the people in Tanzania live in the rural areas where decent medical care is still unsatisfactory. Consultation of the specialist located in cities where hospitals with modern facilities exist becomes impossible to the patients living in the rural areas in Tanzania unless the patient travels long distance from the remote areas to cities and make appointment to see the specialist. This becomes costly and takes time for patient to receive service. On the other hand, the technology is growing and has made it possible for large part of the country including the remote areas to be reached out through communication such as the use of mobile phones. However, to develop an infrastructure for a platform of bringing a specialist or panel of specialist in cities to offer consultation service to the patient in the rural area remains to be a challenge. Therefore, this research aims at improving the health care services of the rural patients by developing a telemedicine technology in the context of Tanzanian environment to ensure that patients have access to the specialists as quick as possible instead of travelling long distance to the cities and spending times and costs waiting for appointments and prescriptions.

BRrIAC: Building River Resilience through Integrated Approach under Climate Change: A Case of Msimbazi River, Dar es Salaam, Tanzania

Augustina Alexander[1], Deogratias M. M. Mulungu[1], Fides Izdori[1], Lucius Mugisha[2]

[1]Department of Water Resources Engineering, College of Engineering and Technology

[2]Department of Sociology and Anthropology, College of Social Sciences

Abstract

Msimbazi River in Dar es Salaam Tanzania has been a subject of increased flood events in the recent past. Reduction in river conveyance capacity has been growing concern along Msimbazi River, which is associated with eroded sediment deposition on the watercourse as a result of river morphological factors. Among the proposed measures for mitigating flood and associated impacts is the control of erosion and sedimentation along Msimbazi River and its catchment. This study aim at build resilience against erosion on the upstream of Msimbazi River, using affordable and locally available materials as a measure to control floods along this river. Recent climate change and variability trends have resulted into the change in rainfall patterns, increased intensities and frequency hence increased river discharge. The climatic impacts coupled with other site-specific factors such as land cover, soil characteristics (soil erodability) exacerbate the erosion and therefore sedimentation in the Msimbazi River Channel.

As a result, soil investigation to characterize soil composition at different river section will be undertaken to facilitate the estimation of erodibility index at different river sections. Historical LANDSAT images will be analysed and studied to establish changes in river morphology over the years following extreme climatic events. Criteria will be set to identify trend or shift in the river morphology by statistical analysis so as to identify areas prone to erosion and deposition. The study is expected to contribute in determination of appropriate erosion control measures and the effectiveness of using different locally available materials and engineering structures through proper analysis of river hydraulic characteristics in aggregate with other key parameters such as land use/ land cover, river section slope. Also, socio-economic analysis on the proposed measures to

establish their socially, economically and environmentally acceptability.

Category 2: Units/Departments that have Excelled in Attracting Large Amount of Research Funds

RESBEN: Unlocking Resilience Benefits from African Water Resources

***Name of Lead Researcher**: Dr. Augustina Alexander*

***Department**: Water Resources Engineering*

***Sponsor**: United Kingdom Research and Innovation Fund (UKRIF)-Global Change Fund*

***Amount**: 405,106,790 TZS*

Abstract

The Research Excellence Grant commenced in April 2020 with the aim to apply transformative, transdisciplinary, community-engaged research, to shift water development outcomes towards achieving the SDGs, with focus on continental water development priorities: water supply and pollution.

The project consists of six project Case Studies (Figure 1) that exemplify water-related challenges across Africa, and support progress towards SDG 6, the core water-related goal. In addition to the six Case Studies, there are three South African learning sites (University of KwaZulu-Natal, University of Cape Town and Rhodes University), that will provide insights and cross-country learning opportunities related to Case Studies. The research impact will be measured against contributions to SDG 6 Goals (**G**) & Indicators (**I**). Two city-based, water services Case Studies (led by University of Lagos and Makerere University) aim to catalyse change towards: **G6.3** Improved water quality, reduced pollution & proportion of untreated wastewater, I: Evidence of increased safe wastewater treatment, recoveries from wastewater & urban water bodies with improving water quality. Three landscape/catchment Case Studies (led by University of Dar es Salaam, Addis Ababa University and University Cheikh Anta Diop) will catalyse change towards: **G6.4** Reduced water stress and increased water-use efficiency I: proportion

water use in relation to availability. All Case Studies will contribute to **G6.5**: Implement IWRM. I: Evidence of IWRM using governance & institutional development indicators. The cross-cutting biodiversity Case Study (conducted by University of Rwanda) will contribute to **G6.6**: Protect and restore water–related ecosystems, I: Evidence of ecosystem monitoring. All Case Studies will contribute towards **G6.8** Support & strengthen participation by local communities in improving water & sanitation management. **I**: Evidence of governance process & institutional change towards participatory governance, especially by women. Each Case Study will report on the progress towards relevant SDG goals and targets: SDG6 and other indirectly related goals, many of which are influenced by water. The project team's vision is to change the approach to water development, for Africa, by Africans.

The project objectives are:

1) To develop new collaborative ways of working by applying a novel Adaptive Systemic Approach (ASA) to six country-based Case Studies that shifts developmental research outcomes towards greater equity and sustainability.

2) To contribute to addressing equitable sharing of water supply benefits arising from contested water use, in three catchment-based Case Studies.

3) To establish the sources, pathways and impact of selected pollutants and to develop community pollution resilience in two city-based Case Studies.

4) To develop participatory governance to support resilient water supply, water quality, and ecosystem protection in all Case Studies.

5) To build an effective, excellent, partnered African water research network.

All the Case Studies will apply four steps of the ASA approach, and there will be two aspects that they will research (Figure 2): the local water problem science question of the Case Study, and a social science question relating to researching the actual ASA process.

Category 6: Best Innovator of the Year

Performance Optimization of Small Wind Turbine under Low Speed Conditions

Joel Mbwiga[1], Cuthbert Kimambo[2] and Joseph Kihedu[2]

[1]*Department of Mechanical and Industrial Engineering, University of Science and Technology*

[2]*Department of Mechanical and Industrial Engineering, University of Dar es Salaam, College of Engineering and Technology*

Abstract

SWTs have been in use for centuries, however, seem to be uncertain implying immaturity of technology. In most cases, the actual energy that is generated from Small Wind Turbine is lower than manufacturer prediction. Small Wind Turbine has been found to experience difficult in starting while taking time to attain operational rotational speed. So, operation is characterized by long idling time which cumulatively amounts into tremendous reduction in power output. Various scholars who attempted to solve the problem approached it by modifying chord and twist distribution of the rotor blades. Starting were found to improve to some extent but with proportionate sacrifice in power extraction performance. The existence of the problem to date is manifested by inadequate performance of most of commercial Small Wind Turbines. This research has come up with an approach that manipulates the rotor solidity to improve starting and also power performance for Small Wind Turbine operating in low wind speed regimes. The rotor consists of longer and shorter blades so that starting which depends on the root airfoil sections is interacted by all rotor blades, longer and shorter blades to produce high starting torque. On the other hand, when started, the tip airfoil sections which consist of the longer blades only produce high tip speed necessary for power extraction performance. Experiments in the wind tunnel show that starting has been improve to conventional one. Likewise, power coefficient was found to improve for low wind speeds and therefore suitable for low wind speed regimes.

Category 8: Best Postgraduate Student Project

High Performance Solar Photovoltaic Energy DC-AC Converter with Bipolar Output Voltage for Rural Areas

Stampinus Stephano, Dr. Jackson J. Justo, Prof. Bakari M. M. Mwinyiwiwa

Department of Electrical Engineering

Abstract

Solar Photovoltaic (SPV) energy is the proven solution for easy and fast electrification in rural and unelectrified areas in Tanzania and all over the world. This is due to the fact that the price of SPV modules is rapidly decreasing. Also, SPV energy is very clean, hence it is environmentally friendly and it is scalable. Moreover, SPV systems are integrated with DC-DC converters so as to give a constant DC voltage to the load from a varying DC voltage source. Commonly used conventional DC-DC converters suffer from voltage stresses, primary losses, limited ranges and applications. This project proposes a 400 W high-performance DC-DC converter that is capable of providing a bipolar output voltage from a unipolar source for SPV applications. This converter is capable of producing 12 V and 24 V constant DC voltages and a balanced bipolar ± 12V DC voltage source from a varying solar PV output voltage as shown in Fig. 1. Also, the converter aims at reducing converter losses that are exhibited by conversional converters, hence increasing the efficiency and the performance of the proposed converter. The implemented converter will be tested in solar PV system so as to validate its performance.

Category 9: Best Undergraduate Student Project

Automatic Room Light Controller Using Android

Names: ***Ndika Chanjo A, Tibalema Deus T, Mdindile Efron R***
Sitta Masanja N, Desdery Bwakila A
Department of Electrical Engineering (EE)

Abstract

The main objective of this project is to develop a remote controlled smart home automation system which is a low cost and user friendly. Due to advanced technology houses are getting smarter.

- It is the Era of centralized control system, also remote controlled switches.
- Conventional wall switches located in different parts of the house becomes difficult for the user to go near them and operate it.
- It becomes more difficult for the elderly or physically handicapped people to near it and operate it. It saves time and energy.
- This project presents the design and implementation of a low cost but yet flexible and user friendly cell phone base automation system.

Smart phones have made life easier than ever. They are portable and can be kept in the pockets. This portability of smart phones have led the marketers and designers to develop services and solutions around the mobile domain, There are apps to shop online, do banking, trade stocks and other day to day tasks.

It is on this basis that Remote controlled home automation system provides a modern solution using **smart phones**.

Implementation of this control system will give the facility of controlling tube lights, fans, Television, Air conditioners, Electrical machines and other electronic appliances at home using a smart phone.

Category 10: Best Public Service/Consultancy

Preparation of an Integrated Water Resource Management and Development Plan for Lake Victoria Basin

Department: *Water Resources Engineering*

Principal Researcher: *Dr. Joel Norbet*

Registration: *UDSM-UCB/CoET/20022*

Project team members: *Dr. Joel Nobert (Team Leader) Dr. Richard Kimwaga (Assistant Team Leader) Dr Patrick Valimba (Assistant Team Leader), Dr. Simon Mkhandi (Member) Dr Ibrahim Mjema(Member), Dr Augustina Alexander (Member) Dr Lulu Kaaya(Member) Dr Thobias Swai(Member) Eng. Leonidas Luteganya (Member) Eng Edwin Ndibalema (Member) Prof Fredrick Kahimba (Member) Eng. Prof Felix Mtalo (Member) Julian Ijumulana (Member) Dr Subira Munishi (Member) Eng. Dr Cuthbert Nahonyo (Member) Dr Daniel Mushi (Member) Dr Mathew Senga (Member) Dr. Benno Benniah (Member) Prof Preksedis Ndomba (Member)*

Project Summary

The project aims at developing an Integrated Water Resources Management and Development (IWRMD) Plan for the Lake Victoria Basin as required by the Water Resources Management Act No.11, 2009. This IWRMD plan will be centered on the principles of economic efficiency, social acceptability and environmental sustainability. More specifically, the development of IWRMD for Lake Victoria basin involves the following:

i. Assessing water resources (both surface and groundwater) and identifying current and future water demands of different sectors;
ii. Identification of gaps for future reviews and updating;
iii. Formulating/evaluating alternatives that will meet those demands;
iv. Recommending specific water resources development and management options to meet the specific identified demand;
v. Developing a sound and environmentally sustainable IWRMD Plan;

vi. Preparation of implementation strategy including financing options, and action plan; and

vii. Building capacity of

a) The Lake Victoria Basin Water Board in IWRMD planning and in undertaking periodic reviews and updating of the plan;

b) The stakeholders to enable them to participate fully in the planning and management processes.

COLLEGE OF AGRICULTURAL SCIENCES AND FOOD TECHNOLOGY (CoAF)

Category 1: Best Multidisciplinary Research Group Project

Design and Development of Efficient Cashewnut Shelling Machine for Small Scale Farmers in Tanzania

Principal Researcher: *Dr. Athuman Juma Mahinda*

Department*: Agricultural Engineering*

Abstract

The group project has researchers from College of Agricultural Sciences and Food Technology (CoAF) and School of Aquatic Sciences and a Fisheries Technology (SoAF) .The project has involved different disciplines in Agronomy, Engineering, Aquatic, Social Sciences, and it will be implemented by staff from CoAF, SoAF and CoET. The name of the Project is "**Design and Development of Efficient Cashewnut Shelling Machine for Small Scale Farmers in Tanzania**" and it is registered by the UDSM as CoAF-AME20132, worth TZS 30,000,000/=, and is funded by the University of Dar es Salaam.

Category 6: Best Innovator of the Year

Value Addition and Reduction of Post-harvest Losses in Fruits and Vegetables for Sustainable Industrial Development in Tanzania

Principal Innovator: *Dr. Lilian Daniel Kaale*

Department*: Food Science*

Abstract

The world is aiming to end hunger, achieve food security, improve nutrition, ensure healthy lives, and promote well-being for people of all age groups by 2030 per Sustainable Development Goals (SDGs). However, the prevalence of undernourishment, severe food insecurity, and stunted growth of children under the age of 5 years is 25.0%, 23.8%, and 31.8%, respectively, in Tanzania. Research indicates that 44% of children worldwide lack fruits or vegetables in their diet, which leads to lack of nutrients; moreover, this deficit with maternal undernutrition

is indicated as one of the top 10 risk factors contributing to mortality. In addition, according to the United Nation's Food and Agriculture Organization, the production of different fruits around the world exceeded one billion tones, which, leads to the generation of large amounts of by-products and waste. On the other hand, vegetables, fruit and their byproducts and waste represent a good source of vitamins, minerals, lipids, proteins, and carbohydrates.

In Tanzania, pineapple, amaranth and yellow sweet potatoes are very easy to grow and take shorttime from planting to harvesting. However, there are various problems in the value chain particularly that of postharvest losses which is between 50 to 70%. The main reason is lack ofskills and knowledge on how to turn these products into value added food products to extend shelf life, reduce postharvest losses and hence improve livelihood. This will also promote sustainability of industries in Tanzania. The objective of this study was value addition and reduction of postharvest losses in fruits and vegetables as well as promotion of vegetable consumption and fruits in the community. Pineapple, amaranth and yellow potato were used in this study. Several products were developed using both raw materials and wastes generated from the selected materials. The materials were dried either by solar drier or convention drier at high temperature short time (HTST) technology in order to retain the nutrients. Pineapple juice and wine, composite bread and biscuits were developed using raw pineapple andpineapple spent pulp (wastes) flour, respectively. The preliminary results indicated that the lossescan be reduced up to 98% and nutritious food products can be developed especially from vegetables/fruits wastes like pineapple spent pulp. The study recommends using the developed flour in soups, include the flour in tea spices, porridge, ugali making to promote eating of vegetables and fruits. In the future, the flour can also be used in developing fortified foods, use as tea masala recipe etc. This is a new and innovative idea which may be useful in promoting eating of vegetables and fruits worldwide. This will also be allied with theWHO Global 5+ a Day Program (G5+DP) which promotes the inclusion of at least five servingsa day of fruits and vegetables (a minimum of 400 g of fruits and vegetables daily). Further research is necessary for establishing the required standards (which meet Tanzania Bureau Standards, TBS) for the developed products for commercialization.

Category 9: Best Undergraduate Research Project

Development of Online Application for Enhanced Agricultural Value Chain of Perishable Crops for Sustainable Industrial economy

Name of students: *Zuhura Mazrui and Jackline Robert*

Department: *Agricultural Economics and Business*

Abstract

Lack of proper storage facilities, improper transport system, and limited market access poses significant challenges to small holder farmers in marketing perishable agricultural produces and products. This prompts the need to develop an online app for marketing Agricultural products, which connects actors along the value chain in a way that would enhance availability of the raw material for industrialized economy. The App intends to link farmers to the market, traders, transporters and warehouse owners, thereby reduce transaction cost brought by middlemen. The App is most likely going to enhance a specialized service that links farmers, traders, transporters and warehouse owners. Therefore, it will mitigate the current complex marketing system, and ensure availability of raw materials and supply which will stimulate industrial growth, increase actors' profits, improve livelihood and promote the overall economic growth of the country.

COLLEGE OF HUMANITIES (CoHU)

Category 2: Units/Departments that have Excelled in Attracting Large Amount of Research Funds

Skills, Employability, Sustainable Development for the Humanities: Musical Samples of Tanzania for Music Production

UDSM Registration number: *COHU-CA 19039*

Department*: Creative Arts*

Name of Lead Researchers*: Dr. Kedmon Mapana and Mr. Andrew Mjema*

Sponsor*: DAAD*

Amount*: TZS. 92,465,100 TZS*

Preamble

The joint-project entitled **"Skills, Employability, Sustainable Development for the Humanities" [SESDH]** runs in collaboration between the SRH University of Popular Arts in Berlin, German (here in after **hdpk**) and the Department of Creative Arts at the University of Dar es Salaam (here in after **CA-UDSM**)

Funding

The total amount of the project is **182,704.00 Euro** over the period of four years (2019 to 2022) to cover costs for travel and conferences and technical supplies.

This funding agreement is made between **SRH hdpk**, represented by Prof. Dr. Robert Lingnau, and **COHU-UDSM**, represented by Dr. Rose Upor (and Head CA-Dr. Kedmon Mapana). The **SRH hdpk** agrees to support the **CA-UDSM** in its joint-project named above in the amount of **33,070.00 Euro** (in letters: Thirty Three Thousand and Seventy Euro).

Project Objectives: Before COVID-19

- Reviewing the B.A. programs offered in the Department of Creative Arts at the University of Dar es Salaam – especially the one in the Music Department – so as to build competencies in our graduates focusing on employability
- Introducing innovative teaching methods to improve the quality

of the degree programs offered in the College of Humanities at the UDSM.

Activities

- Stakeholders' meeting
- Mobility of Teachers and Students
- Curriculum Development (Review)

Project Objectives: After COVID-19

- To record musical samples of Tanzania
- To design and produce of digital learning materials and online modules

Category 4: Researchers who have attracted Large Amount of Research Funds

Bahari Yetu Urithi Wetu (Our Ocean Our Heritage)

UDSM Registration number: COHU-AY19047

Department: Archaeology and Heritage Studies

***Name of Lead Researcher**: Dr. Elgidius Ichumbaki*

***Sponsors**: Rising from the Depth Network, University of St. Andrews, British Council, Universityof Dar es Salaam*

***Amount**: TZS 488,560,000*

***Collaborating Institutions**: University of Exeter, University of St. Andrews, University of St. Andrews*

***Project outputs**: 2 students trained (Students training: 1 MA and 1 Ph.D.), 2 community enterprise formed, 1 music video, 1 documentary (45 minutes), 2 exhibitions, 2 engager workshops, 3 articles in international journals, 1 mobile application*

Project Summary

The coast of Tanzania is alive with a sight rarely seen elsewhere in

the world today: locally built wooden watercraft, powered by sail and engaged in economic activity. Their aesthetic has been readily incorporated into global representations of Tanzania's coastal beauty and monetised for touristic and social-media profit. For example, the Bagamoyo communities who build and use these craft, however, economic development—urban expansion, the planned Special Economic Zone and tourism—is pressuring 'traditional' lifeways and threatening the practises that build these iconic craft. Maritime communities face displacement and loss of access to traditional fish landings, markets and construction areas, while coping with overfishing and disruption to traditional timber supplies. The project contends that the living heritage of Bagamoyo's maritime communities is undervalued, under-recorded and under threat, while community perspectives are overlooked.

This project explores, through collaborative community engagement, the value of maritime heritage as perceived by the communities of Bagamoyo and Kilwa, and document endangered material culture, craft and fishing practise and connectivity with maritime space. Based at the major boatbuilding centre of Mlingotoni, the project has established a boatbuilding association as a community maritime heritage hub that promotes traditional boatbuilding as a tourist attraction and facilitates training, ideas exchange, and the articulation of concerns surrounding traditional maritime practice. The project has also trained students and early-career heritage workers in methodologies of maritime heritage appraisal, recording and protection. It has promoted boatbuilding association and the women enterprise group through community engagement activities including a launch event comprising a grass-roots exhibition, talking-heads video presentation of fieldwork results, schools' participation and a workshop, as well as through social media and academic publication. Finally, it has formulated a coastal heritage strategy briefing for municipal planning, tourism and heritage agencies.

Category 5: Researcher of the Year

Digitization of Majimaji War Memory and Memorization

Nancy Rushohora

Department: *Archaeology and Heritage Studies*

Synopsis and Position

The MajiMaji War forms the main focus of this Lab. In particular the inter-generational memories of colonial violence. Dichotomies of official and unofficial histories will be explored as well as the forms and limits of heroizing – often male centred – in such a multi-faceted conflict. As part of exploring and exposing diverse and divergent narratives, the Lab will address the dynamics of closed and open archives, and the ways in which the material that remains inaccessible speaks through other agencies—in telling the stories of absence. The Tanzania Lab is also about materiality, mediality and digitisation of multiple narratives of the MajiMaji War bottom up, without othering (Rushohora 2019; Silayo 2020). It is listening to voices of 3rd or 4th generation of victims of colonial violence and recording how interaction with sites and the landscape of trauma affect such memories of it. Our institutional local partners, along with community leaders such as Chief Mchekenje in Ndanda and his family, are: The Benedictine Monastery in Ndanda, the Lindi Regional Commissioner's Office, and the Tanzania National Museum's MajiMaji Memorial Museum in Songea.

Objectives and Methods

The lab intends to 1) Record and digitize dialogues, which will emerge from listening to stories of colonial violence on visits to sites of memory. A further cross-cultural initiative will use materials developed for and in Baddawi Camp. 2) Layers of history, memory and ruination connect this project with the Labs in Beirut and of Ghana's coastal-landscapes. Through local voices, audio-visual materials and performance, we will develop methods for reading the past through the use of sites and landscapes of conflict. 3) Co-production of knowledge will be explored with the local community in the creationof a digital resource centre, possibly at SMUC, modelled on the LDRC in Ghana.

Archiving and Unarchiving Tools

We will consider an online database hosted between Stellenbosch and the LDRC to increase access across the continent. **Self-archiving technology** developed by CSM partners will be tested as a documentation strategy from below and as a teaching aid.

Workshops on understanding transgenerational memories will reflect on experiences from Tanzania, Lebanon and South Africa. One at University of Dar es Salaam and another with Office of Historical Trauma & Transformation at Stellenbosch University.

Workshops and Events

- Imagining Futures training workshop, 11th/ December 2020
- Distribution of Majimaji book authored by Nancy Rushohora to schools in Lindi and Mtwara regions, September/October 2020
- Archaeological research in Mgao, Mtwara Tanzania, September/ October 2020

Activities

- Documentation and digitalization of the Majimaji war narratives as part of the Lab
- Documentation of all the known Majimaji war sites

Affiliated Groups and Organisations

- *Chief Mchekenje and family*
- *Tanzania National Museum's and Majimaji Memorial Museum in Songea*
- *Lindi Regional Commissioners Office*
- *Benedictine Abbey in Ndanda, missionary archive*

Other Connected Projects and Initiatives

Mgao – Rising from the depths.

Category 6: Best Innovator of the Year

Geometrical Forms Fused with Old Recycled Dhow-wood and Metal Inspired Furniture

Safina Kimbokota

***Department**: Creative Arts (Arts & Design)*

Project Synopsis

Dhows are lateen navigating vessels that have catered the waters of the Indian Ocean along the coastal areas in East Africa, and the Persian Gulf since ancient times. When these venerable boats made out of mangrove wood, reach the end of their useful lives after many decades spent carrying cargoes of spices, silks, exotic woods, and many other products, their ancient timbers are left as garbage and useless. The same to car tires, they have traveled miles on roads from different parts of the world and once their life span ends they are thrown away to endanger the Mother Nature. This project uses artistic skills and innovative ideas to create contemporary furniture which suits our contemporary time using recycling materials into precious products. The project opens new doors for self-employment for students of Art and Design and inculcates the spirit of confidence, enthusiasm, and a sense of achievement in the practice of art and design through experimenting with a range of media, techniques, and recycled materials.

Category 9: Best Undergraduate Student Project

Salama Song: UDSM Remembering JPM

***Student names:** Kadondoro Yusuph, Pendo Njau, Anansia Sweya, Dotto Botea Nduguru Rafael, Gift Gervas and Ngambeki Kaijage*

***Department:** Creative Arts (Music)*

Abstract

The project named Musical samples of Tanzania in Action because we

use some of the Tanzanian traditional music samples in production of the project. The idea of the project came during the death of the late president of Tanzania, Dr. John Pombe Magufuli, on March 17, 2021. As other Tanzanian who in one way or another felt affected by the tragedy, we as students of the University of Dar es salaam felt the same and we composed a song titled Salama as a sign of appreciation to what Dr. John Pombe Magufuli did to/in the University of Dar es salaam. The production of the Salama song took us three days to complete both audio production and Video production. Music production is very huge process which involves different process, stages and procedures and methodologies which all of them requires much creativity. The following are the five (5) stages/ processes/steps or methodologies used in the production of Salama Song remembering Dr. John Pombe

COLLEGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (CoICT)

Category 1: Best Multidisciplinary Research Group Project

Through the Wall Radar Imaging for Efficient Rescue Mission

PI: *Dr. Abdi T. Abdalla. PhD: Senior Lecturer and Project Coordinator (Lead Researcher-PI): Mobile: 0776188588*

Co-Researcher(s): *Dr. Idrissa Amour, Dr. Baraka Maiseli, Dr. Kwame Ibwe, Mr. Emmanuel Kassi (MSc Student), Mr. Joseph Sisala (MSc Student), Mr. Florian Mkwemwa (MSc Student), Mr. Rambika Magundu (MSc Student), Ms. Candida Mwisomba (MSc Student)*

Department*: Electronics and Telecommunications Engineering*

UDSM Registration: *CoICT - ETE190*

Abstract:

Through-the-wall radar imaging (TWRI) is an emerging technology that applies electromagnetic waves to detect and visualize objects inside enclosed structures. TWRI may be applied by firefighters and defence forces to save people trapped inside a burning building. Furthermore, this technology can be applied in military operations to increase situational awareness. In this project, researchers from various disciplines teamed up to address the state-of-the-art challenges in TWRI to obtain more effective results when the technology is applied in rescue missions.

Category 6: Best Innovator of the Year

SmartStock

Joshua Mshana (Researcher) and Eva Shayo (Supervisor)

Department*: Computer Science and Engineering*

Abstract

Business owners keep records in exercise books where records can easily get lost. Hence, SmartStock offers business owners a digital tool to control sales, stocks and provide business predictions and insights.

Category 8: Best Postgraduate Student Project

Intelligent Maintenance Automation in Electrical Secondary Distribution Network

Name of student: *Hadija Mbembati*

Supervisors: *Dr. Kwame Ibwe & Dr. Baraka Maiseli*

Department: *Electronics and Telecommunications Engineering*

Distribution networks are one of the most maintenance-intensive parts of the power systems. The implementation of maintenance automation and equipment fault prediction lead to enhanced system reliability with reduced total costs. However, in Tanzania, maintenance automation is not deployed in secondary distribution network (SDN). Traditional methods are used for power assets (lines and transformers) state prediction and fault identification. Manual methods may introduce human-related errors, are costly and time-consuming. Therefore, the maintenance automation problem is addressed by implementing proper maintenance and fault identification methods in the reliable network architecture as proposed in this work.

Category 9: Best Undergraduate Student Project

Child Violence Awareness and Reporting System

Student Names: Caroline Lewanga, Blessing Rweikiza, Arnold Mashely

Supervisor: Dr. Hellen Maziku

Department: *Computer Science and Engineering*

Abstract

There is violence in the society. Yet, people are not aware of the extent to which it is actually happening, hence there is a need to increase awareness in the society. Lack of a comprehensive and integrated protection system

delivering coordinated, quality and timely support to children affected by violence makes people not to report violence cases to the right organ.

Category 10: Best Public Service/Consultancy

UDSM DHIS Project: Digital Health Innovations for Development in Tanzania

Principal Researcher: *Dr. Honest C. Kimaro*

Co-Researchers: Mr. Bernard Mussa, Mr. Henry Kalist, Dr. Leonard Peter Binamungu, Dr. Masoud *Mahundi, Dr. Wilfred Senyoni, Dr. Jimmy Mbelwa, Dr. Mathew Mndeme, Ms. Merina Marcelino, Ms. Lilian Nkyoni, Mr. Sogorya Mwita, Mr. Fortunatus Kawasa, Hassan Omary,*

Department: *Computer Science and Engineering*

UDSM Registration: *CoICT-IS 1605*

Abstract:

Goal: To use digital health innovations and solutions to support the provision of quality and sustainable health care services to all Tanzanians so that they can effectively participate in sustainable industrial and social development. How? By creating innovative data capture, reporting, analysis, and visualisation tools for use by health service providers, managers, stakeholders, and the general public, to inform effective health programming, management and intervention at all levels. UDSM DHIS Project provides technical advice, support, and expertise to the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) and PMO-RALG on better ways to develop and implement various digital health solutions. We have also collaborated with the Ministry for over the past 15 years to establish the National integrated health data warehouse and create a wide array of associated web and mobile health digital tools to support health services so as to improve the health status of all Tanzanians.

In this 2021 research and innovation week exhibition will only focus on

showcasing four selected categories of innovation tools among many others: These are:

i. Interactive Dashboards and Scorecards,
ii. DHIS2 health solutions, and
iii. Other two context-sensitive innovations.

COLLEGE OF NATURAL AND APPLIED SCIENCES (CoNAS)

Category 1: Best Multidisciplinary Research Group Project

A Discovery of Sars-Cov-2 Inhibitors by Computational Studies: Current Candidates for Clinical Trials

Stephen S. Nyandoro[a], Geradius Deogratias[a], Daniel M. Shadrack[b], Hulda S. Swai[c], John-Mary Vianney[c], Lucy W. Kiruri[d]

[a]Chemistry Department, College of Natural and Applied Sciences, University of Dar es Salaam, Dar es Salaam, Tanzania; [b]Department of Chemistry, Faculty of Natural and Applied Sciences, St John's University of Tanzania, Dodoma, Tanzania; [c]Department of Health and Biomedical Sciences, School of Life Science and Bioengineering, The Nelson Mandela African Institution of Science and Technology, Arusha, Tanzania; [d]Department of Chemistry, Kenyatta University, Nairobi, Kenya.

Abstract

The outbreak of the severe acute respiratory syndrome novel coronavirus (SARS-nCoV-2) pandemic has called for worldwide attention among scientists and physicians searching for effective drugs to combat the virus. Covid-19 has caused death to hundred thousands of people worldwide with higher cases reported in the United States of America (USA), Italy, UK, France, Spain and Brazil during different waves of the disease. In Africa, including our own country, Tanzania, has been hit by infection at different rates. This called for an urgent interventions including identification or development of drugs to treat the disease. In our project, a computational approach was used as a means of identifying possible drugs that are already approved for treating other ailments to be repurposed to combat COVID-19. Using computational methods, selected antiviral natural products from Tanzanian medicinal plants were screened, and based on their hits; similarity search with FDA approved drugs was performed. Drugs obtained from the similarity search namely diosmin, isoquercetin and rutin were assessed for their stability and inhibition against SARS-CoV-2 targets. Diosmin was found to be a promising drug that works by two distinct mechanisms, preventing viral replication and viral fusion into the host cell whereas isoquercetin and rutin work by inhibiting viral replication and preventing cell entry, respectively. Diosimin and its analog hesperidinare in clinical trial for treatment of COVID-19 by

another group of researchers abroad, a coincidental discovery.These computationally identified SARS-CoV-2 inhibitors and other similar flavone glycosides being plenty available from natural sources (green tea, herbal rosemary, orange juices, passion flowers, apple and buckwheat, mango and custard apple), they could serve as cheap alternative remedy to combat COVID-19 once their clinical efficacy is validated.Such computational screening approach can be extended in terms of training, capacity building and searching for other potential molecules for the remedies of COVID-19 and other infections. The government through its institutions responsible for health should provide policy and guidelines for drug repurposing strategies including both modern and indigenous based remedies.

Solar Cooking in Tanzania, Removing Technical Barriers

Name Investigators: *Dr. M. Samiji (PI), Dr. N. Mlyuka, Mr. H. Vedasto (IDS), Mr. S. Musa, Eng. Kh. Mtelela, Mr. Haidar Ussi and Mr. Jerry Mosses.*

Department: ***Physics***

Abstract

The project investigates sociocultural, economic, health, environmental and technical factors that favour or hinder communities and institutions from adopting solar thermal technology. One MA (IDS) student (Mr. Jerry Mosses) works on the social aspect with a tittle "An investigation of the barriers towards the adoption and development of solar cooking technology in Tanzania; The case study in Moshi and Zanzibar" while one MSc student (Mr. HaidarUssi) works on the scientific/technical aspect with a title "Investigation of thermal performance of solar boxcooker using clay as thermal storage material". One PhD student, Mr. Justine John works on materials properties with a tittle (Investigation of the effect of multilayer design parameters on the structural, absorption selectivity and thermal stability of thermally evaporated Dielectric-Metal-Dielectric interference stack selective solar absorbers). All the three students gets pa

The project is still ongoing, but expects to supply over 40 different cooker types to Isimani ward Iringa region, train the ward community on the benefits and use of solar energy. The expected outcomes of the project include; potential adoption of solar cooker and associated contribution to poverty reduction, conserving the environment and improved health in rural and sub-urban communities. The project will also provide useful information to policy makers with regard to adoption of the technology.

A Discovery of Plant-Derived Natural Products that Attenuate Neurodegenerative Disorders in the Drosophila model of Parkinson's Disease

Flora Stephano Nyaki[1], Stephen S. Nyandoro[2], Joan J.E. Munissi[2], Angela Siima[1,2]

[1] Department of Zoology and Wildlife Conservation, College of Natural and Applied Sciences

[2] Chemistry Department, College of Natural and Applied Sciences

Abstract

Parkinson's disease (PD) is a neurodegenerative disease associated with the progressive loss of dopaminergic neurons (DA). PD ("Ugonjwawakutetemeka" in Swahili) treatment remains unsatisfactory as the current synthetic drugs in clinical use relies on managing only motor symptoms. This study investigated antioxidant potentials of selected compounds namely, 5,6,7,4´-tetramethoxyflavone (**1**), 6-hydroxy-2,3,4,4´-tetramethoxychalcone (**2**), 6-methoxyhamiltone A (**3**),diosquinone (**4**) and toussantine D (**5**) against rotenone (**6**) induced PD in *Drosophila melanogaster*. We exposed flies (1-4 days old) to 500 μM of a neurotoxin, rotenone and co-treated with known concentrations of selected flavonoids and polyketides in the diet for seven days. Rotenone fed flies showed impaired climbing ability compared to control flies, the phenotype that was rescued by the treatment of tested phytochemicals. Rotenone toxicity also increased malondialdehyde levels assayed by lipid peroxidation in the brain tissues relative to control flies. This effect was reduced in flies exposed to rotenone and co-treated with the

phytochemicals. Moreover, expression levels of mRNA of antioxidant enzymes; superoxide dismutase and catalase were elevated in flies treated with rotenone and normalized in flies that were co-treated with tested compounds. Besides compound **1**, this study provides overall evidence that the tested flavonoids and polyketides ameliorated the rotenone provoked neurotoxicity in *D. melanogaster* by battling the induced oxidative stress in brain cells including DA neurons and hence rescue the locomotor behaviour deficits.

Category 4: Researchers who have Attracted Large Amount of Research Funds

Project Title: Mathematics for Sustainable Development Project

***Name**: Prof. E Mureithi (PI), Dr. Sylvester Rugeihyamu, Dr. Egbert Mujuni and Prof. Allen Mushi, Dr. SeptimiKitta, Dr. Kasubi Mabula*

***Department**: Mathematics*

***Sponsors**: NORHED*

***Amount**: USD 827,000 approximated 1,902,100,000 TZS*

Popular Science Description

This is a new project. The team from Mathematics Department won mathematics project in December 2020 under NORHED II proposals. Our project worth USD 827,000 for the period from 2021-2026.

The project will train four (4) PhD students in Applied Mathematics and 2 PhD in Mathematics Education. Data Science, Computational Mathematics or Mathematics applied to Health. The project will also support the review of the current PhD curriculum with a taught component. The project will also support visits of students for supervision, conferences and meetings and equipment for mathematics computer lab. Furthermore, the project will support some outreach activities related to the teaching of Mathematics in Secondary Schools in Tanzania.

Category 5: Researcher of the Year

Researcher: Dr. Stephen S. Nyandoro

Department: Chemistry

Short Biography

Dr. Stephen S. Nyandoro is a Senior Lecturer in the Chemistry Department, University of Dar es Salaam (UDSM).His research and consultancy interests are in the field of natural products with focus on bioactive compounds from plants, algae and microbes. Dr. Nyandoro obtained his Bachelor of Science with Education (BSc.Ed) at UDSM where he graduated with a First Class Honours degree in 2000. He further obtained postgraduate training in M.Sc. (2003) and PhD (2010)in the area of natural products chemistry at the UDSM. Upon completion of MSc training, Nyandoro embarked on academics as a career by joining the University of Dar es Salaam in 2004 as an Assistant Lecturer. He was then promoted through the University academic ranks to a Lecturer (2010) immediately after completing his PhD studies.

His passion for research and quest for academic excellence eventually saw him being promoted to the rank of a Senior Lecturer in 2015 having published 10 scholarly journal articles and 1 conference proceeding. Ten years down the academic progression lane as an independent researcher in the field of natural products since completion of PhD, Dr. Nyandoro has extensively shared and imparted knowledge to others by supervising a total of **31** postgraduate students(23 M.Sc. and 8 PhDs)and **1** Postdoctoral research fellow by the year **2021**in natural products chemistry and related fields. He has published widely in his area of expertise with **48** articles in international peer reviewed/reputable journals, out of which **17** articles were published between 2020 – April 2021. More publications are underway. Dr. Nyandoro is compiling his publications to apply by June 2021 for academic promotion to Associate Professorship.

He has presented his research findings in various local and international conferences and symposia and visited a good number of international research groups abroad through which he has established lasting and fruitful research cooperation in various countries including Kenya, South-Africa, Sweden, Australia, United Kingdom, Germany and United States of America. Dr. Nyandoro`s International Research awards

include Swedish Research Council Collaborative Research Awards 2012-2015,2017-19,& 2020-2022; The Lever hulme–Royal Society Africa Award (UK-Tanzania-Ghana Collaborative Research) 2013 – 2016; Royal Society-Royal Society of Chemistry International Exchanges Award 2016–2018. He has also won three UDSM Competitive Research Grant Awards (2018-2019), three UDSM Competitive Research and Innovation Grant Awards (2020-2021), serving as the lead investigator in two of them. Dr. Nyandoro received the Overall 2nd Best University of Dar es Salaam Individual/Group Research Award during the Second UDSM Research Week in May 2017. He became the Best Academician in the Chemistry Department for the 2016-2017 Academic Year and 3rd Best Researcher at College Level Research Week Award May 2018. Dr. Nyandoro is a member of Natural Product Research Network for Eastern and Central Africa (NAPRECA) -Tanzania Chapter, where he is serving as a treasurer from 2009 until now. He is also a member of Southern African Biochemistry and Informatics for Natural Products Network (SABINA) – Tanzania Node since 2009 and a member of Tanzania Chemical Society. Dr. Nyandoro did his one year (September 2014 to August 2015) postdoctoral research at the University of Gothenburg receiving financial support from the Swedish Institute (SI) by virtue of which he became a member of the SI Network for Future Global Leaders (NFGL). Dr. Nyandoro is actively serving the nation in various capacities including as the Chairperson of Tanzania Bureau of Standards (TBS) Spices and Condiments Technical Committee (AFDC 7, since 2014, concurrently serving as a Chairperson of the same committee at the level of East African Community, EAC), Member of Chemist Professionals Council (since 2019)and the Deputy Principal, College of Natural and Applied Science (CoNAS, for 2018/2019–2021/2022 Triennium).He is nationally, regionally and internationally recognized for his tremendous scientific contribution in area of natural products chemistry, as evidenced from his publications and through participating in research collaborations and networks.

Category 6: Best Innovator of the Year

Fukiza UDANOL

Deployment and Valorization of Traditional Medicine for Intervention against Acute Respiratory Diseases Associated with COVID-19

Principal Innovator: Dr. Clarence Mgina

Department: Chemistry

Team Members*: Dr S. Nyandoro (CoNAS), Dr. O. Kibazohi (CoAF), Dr. M. Manoko (CoAF), Dr L. Kaale (CoAF), Dr. L. Rweyemamu (CoAF), Dr. Mwenegoha (UDSoL), Prof. A. Ishumi (SoED), Prof B. Rutinwa (UDSoL).*

Abstract

Fukiza UDANOL is a product of the work by a team appointed for traditional knowledge emergency response to COVID – 19 for the University of Dar es Salaam. The main objective was to find out traditional remedies and procedures known to effectively bring relief to various acute respiratory diseases.

Due to the severity of the pandemic and the fact that there were no obvious and direct standard cure or vaccines, the team focused on coming up with a Rapid Response to the symptomatic ailments of COVID-19. This was an emergence response phase. Within this phase the committee focused on highly renowned to effectively and straightforwardly remedies for acute respiratory infections

The fast tracked response produced **Fukiza UDANOL**which is a medicinal product formulated from extraction and chemical analysis of essential oils from a number of plant sources. The essential oil plants were analyzed in order to determine their chemical profiles. The chemical profiles revealed various compounds with various biological/ pharmacological properties. The compounds which were found to exhibit antimicrobial, antiviral, anti-inflammatory, anticoagulant and antioxidant properties were considered desirable for formulation. A number of candidate oils were then shortlisted as constituents of interest to prepare a suitable formulation for treatment of acute upper respiratory diseases associated with COVID-19. This product is used for inhalation and/or

drinking mixed with tea.

The product has been certified by the Chief Government Chemist as safe for human consumption and has fulfilled all the required specification of the National Council for Traditional and Alternative Medicines Registration Council.

Fukiza-UDANOL has become very popular country wide and beyond due to its effectiveness. It is produced in vials of 10, 15 and 20 ml to cater for different demands and purchasing powers of users. project is currently capable of producing over 3,000 vials of different volumes per day.

From and initial investment of **T. Sh. 10,000,000** in 2020, Fukiza UDANOL Project is currently running at over **T. Sh. 172,000,000/-**

This innovative research is a lesson on the impact of traditional knowledge intervention in response to COVID-19 and for future similar interventions.

Category 8: Best Postgraduate Student Project

Progress Towards High Efficiency Solar Cells

***Student Name**: Eva T. Shana*

***Supervisors**: Nuru R Mlyuka– University of Dar es Salaam*

Margaret E Samiji– University of Dar es Salaam

***Research area**: Material Science and Solar Energy*

***Department**: Physics*

Abstract

This work investigated the effects of deposition parameters on conductivity and reflectance of Mo tri-layers back contact for Kestrite thin film solar cells. Mo tri-layer samples with different thickness schemes (Low/Medium/Large and Large/Medium/Low) were deposited on Soda Lime Glass (SLG) substrates by magnetron DC sputtering at room temperature. Sputtering power was varied from 100 W to 250 W. Structural and morphological properties were characterized using X-Ray Diffractometer (XRD), Scanning Electron Microscope (SEM) and Atomic Force Microscope (AFM) while Jandel RM3-ARfour-point probe and

UV/VIS/NIR Lambda 9/19 Spectrophotometer were used to determine electrical conductivity and spectral reflectance, respectively. XRD spectra for all films showed Mo primary peaks at 2 = 39.96^{o} and 2 = 73.07^{o} corresponding to (110) and (211) characteristic planes, respectively. For the two thickness schemes investigated, samples deposited using Large/ Medium/Low scheme did not peel off the glass substrate as determined by tape test. Samples with 600/250/150 nm thickness scheme deposited at 150 W recorded the largest grain size of 66 nm, higher conductivity of 1.78 X 10^{6} $\Omega^{-1}m^{-1}$ and high average reflectance of 32%.

Category 9: Best Undergraduate Student Project

Production of Single Cell Protein (SCP) Using Kitchen Food Waste

Department: *Molecular Biology and Biotechnology*

Student names: *Hans Quadrat and Ms. Diana Orembe*

Supervisor: *Dr. Ally Mahadhy*

The Innovation Service Area: *Industrial Biotechnology and Innovation*

Abstract

Single-cell proteins are dried cells of microorganisms which are used as protein supplement in human food or animal feed. Microorganisms such as algae, fungi, yeast and bacteria utilize inexpensive feedstock and wastes as sources of carbon and energy for growth to produce biomass, protein concentrates or amino acids. Since protein accounts for quantitatively important part of the microbial cells, these microorganisms, also called single cell protein as natural protein concentrate. With increase in population and worldwide protein shortage the use of microbial biomass as food and feed is more highlighted. It is estimated that by 2050 the global population reaches to ~9 billion which demands ~60% extra food from the present. In the case of protein, there is a need to produce ~1250 million tonnes of meat and dairy products to even meet the demand. However, growing demand for protein will not be met sustainably by increasing meat and dairy production because of the low efficiency of converting feed to meat and dairy products. Farmers currently utilize

huge amount of chemical fertilizers and pesticides to enhance food crops production and disease management. These chemical fertilizers not only affect the texture and productivity of soil but also the health of plants, humans, and environment. The utilization of food waste into products like single cell protein is an alternative solution to global protein shortage and to alleviate pollution problems

Category 10: Best Public Service/Consultancy

Science Camp for Female Students

Project Investigators: *Dr. Margaret Samiji, Prof. Eunice Mureithi, Dr. Nuru Mlyuka*

Departments: ***Physics and Mathematics***

Abstract

The women in the STEM related subjects in Tanzania are generally lower in number and in performance compared to their men counterparts. The situation is even worse in Physics and Mathematics due to the stereotype perception that the subjects are too difficult to be handled by women. Women's participation in tertiary education or research is dependent on access to education at lower levels. The number of women in Physics at the University level is highly associated with their number in secondary school level as well as their performance.

In order to address this gender imbalance, the Departments of Physics and Mathematics, University of Dar es Salaam, with the support of International Science Programme (ISP), and the University of Dar es Salaam, decided to launch a Science Camp project for high school girls. This project adopted a secondary school intervention approach targeting age groups between 17-19 years in order to facilitate their capacity and performance in their examinations. The project started in 2016, with advance level female students from government schools in Dar es Salaam, Tanzania, with the hope of expanding to other regions in the country.

The main objective of the project is to increase the number of female students joining University level to study STEM related subjects or

professions. Specifically, the project aims to strengthen their Physics/ Mathematics knowledge in topics in A-level syllabus; strengthen their practical skills through hands-on demonstrations and practical sessions; enlighten the female students about the career path opportunities for those studying mathematics and physics; provide mentors for these students in order to build their interest and confidence; and to strengthen the capacity of A- level teachers in mathematics and physics.

We have so far organized five one-week science camps (2016-2021). A total of 154 girls and 33 physics/mathematics teachers have benefitted. Teachers and students select topics to be covered during the science camp week. These are topics which they find challenging to teach or understand. During the science camp week the subjects are conducted with a lot of demonstrations to raise the interest and understanding of the participants. In addition the students get to do practical sessions in the Physics laboratories. The participating teachers take part in the learning process and hence improve competence in the topics that they find difficult in teaching. The teachers are also given handouts on those topics.

Out of 154 students participated, 60 female students joined higher learning institutions taking engineering and science related degree programs.

Formulation and production of Instant Hand Sanitizers

***Principal Investigator**: Dr. Kessy F. Kilulya (PI)*

***Co-Researchers**: Godfrey P. Matiku, StakiwilZ.uberi King, Emmanuel Benedict Sindatuma, Jofrey P. Ndossi, OpheryIlomo, FortunatusSunghwa*

Chemistry Department

***Innovation service area**: Formulation and production of Instant Hand Sanitizers.*

Abstract

The formulation and production of hand sanitizers aimed to ensure that UDSM Community and other members outside the University are assisted in protecting themselves against the infection of Corana Virus (Covid-19). The production of hand sanitizers is performed according to the WHO and

TMDA guidelines. The produced hand sanitizers contain Ethanol (80%), hydrogen peroxide, glycerol and distilled water as the main ingredients with some minor additives like colour (blue) and perfume. The produced sanitizer, which is registered by TMDA with registration number; TZ 20 AD 0117 is packaged and distributed in different sized containers; i.e., 5 L, 500 mL, 250 mL, 100 mL and 50 mL

The methodology involved mixing of the required ingredients at an appropriate ratio with a focus to have a product of 80% ethanol. The amount mixed depends on the volume one needs to produce at that batch. Here is an example for production of 10 L of hand sanitizer:

Ingredients	**Composition (% v/v)**	**Amounts (mL) e.g. for 10 L preparation**
Ethanol 96%	80%	8333 mL
Hydrogen peroxide 3%	0.125	417 mL
Glycerol 98%	1.45	145 mL
Distilled Water	Up to the volume mark	Up to 10 L

The produced hand sanitizers are of high quality and therefore, UDSM community should always use UDSM Instant Hand Sanitizer for assured protection against Corona Virus.

The main impact of the formulated instant hand sanitizer to UDSM and general community include the successful protection against the spread of Corona Virus.

Physics Teachers Training

Project Investigators: *Dr. N. Mlyuka (PI), Dr. M. Mazunga. Others Ms Eva Shana, Mr. Justine Tibaijuka, Mr. H. Sawa, Mr. W. Kessy, Mr. SungiGilya, Ms. M. Lungo (MSc. Student), Mr. H. Ussi (MSc. Student)*

Departments: ***Physics***

Abstract

Small numbers of students are studying physics at university and beyond; having a negative effect on the countries STEM pipeline and preparing the nation to fulfil the government's aspirations of becoming an industrial nation. It is thought that the problem begins in form two with low pass rates in the national physics exam and therefore, few being eligible to continue with physics in form three. Wehypothesized that increasing students' understanding and enjoyment of the subject will positively impact this situation. As a result, the intervention focuses on understanding and enjoyment of physics subject.

The programme works with physics teachers specifically to support them to develop alternative teaching methods that include greater student participation and simple demonstrations and modelling to teach physics concepts, as per the curriculum. The programmeinvolves 12 schools; Jangwani, Mugabe, Manzese, Chang'ombe, Relini, YusuphMakamba, Kibamba, AboudJumbe, Makurumla, Mizimbini and Mabibo.A total of 23physics teachers from these schools are being trained. The intended outcome is to increase the enjoyment and understanding of physics amongst form one and two students with the view to campaign for change and/or scale up of the programme.

COLLEGE OF SOCIAL SCIENCES (CoSS)

Category 1: Best Multidisciplinary Research Group Project

Everyday Humanitarianism in Tanzania (EveryHumanTZ)

Research members: *Prof. Lisa Ann Richey (PI); Dr. Opportuna Kweka, Dr. Daudi Mukangara, Dr. Herbert Hambati, Dr. Peter Kragelund, Dr. Line Engbo Gissel; Dr. Simon Turner, Prof. Hamudi Majamba, Prof. Claire Mercer, Dr. Asubisye Mwamfupe, Dr. Consolata Raphael Sulley, and Prof. Mogens Kamp Justesen.*

Abstract

Everyday Humanitarianism in Tanzania (EveryHumanTZ) is a joint research project between Denmark and Tanzania aiming to explore and understand the practices of everyday humanitarianism and the attitudes that ground them. The project is based at Copenhagen Business School and at the University of Dar es Salaam, also including Roskilde University, University of Copenhagen and London School of Economics. ***EveryHumanTZ project seeks to understand how people interacting in everyday situations respond to crisis situations (emergencies/ disasters) outside of the formal structures of humanitarian assistance in Tanzania.*** Such quotidian humanitarian acts have too often been overlooked, with humanitarianism being frequently explored in a North-South perspective, based on the assumption that humanitarianism is carried out as acts of 'rescue' in the Global South by organisations funded and dominated by the Global North, with the focus being often placed on the recipient. Challenging these assumptions, EveryHumanTZ project engages with the concept of ***Everyday humanitarianism*** (Richey, 2017) offering three central contributions. First, it explores the everyday humanitarian actions of ordinary citizens, outside of institutional and formal structures and documenting the increasing diversity of actors undertaking interventions in development and humanitarianism contexts. Second, the project explores these responses in a Southern context, not though the typical Northern perspective. And third, EveryHumanTZ focuses explicitly on the givers as well as the receivers. Our project thus emerges as the first study to ***focus on the multitude of private Southern givers, not only receivers of humanitarianism*** with explicit attention given to the agency of the Tanzanians as givers who shape relationships, local economies and politics.

For more information visit: https://www.everydayhumanitarianismintanzania.org/

Octopints Research Project: Navigating the Complexity of Small-Scale Fishery Interventions: An Intersection of Agent-Based Modeling And Participatory Empirical Research

Researchers: Emilie Linkvist (SU) Rosemarie Mwaipopo (UDSM), Tim Daw (SU), Liz Drury-O'Neil (SU), Maja Schulter (SU), Andrew Wamukota (PUK),

Abstract

This research project aims to improve our understanding of fishery interventions, such as octopus closures, and why in some cases or situations they can be seen as successful and in others not. The research recognizes earlier identified factors like strong leadership, unity in the community or supportive legal frameworks can help people collaborate in managing their natural resources, but it is not clear how such factors interact over time for obtaining successful management, at the same time within a changing social and economic environment. This is a complex question surrounding not only the nature of coastal communities, but also the methodological aspects involving decisions on what type of data/information would be desirable to address this question in all its complexity. The goal of this project is thus 1) to address this methodological gap through combining qualitative fieldwork and agent-based simulation models, and 2) to move towards a generalized understanding of how fishery interventions can have successful outcomes over time, identifying what is success for whom, and possible trade-offs - in the case of octopus closures in the Western Indian Ocean (WIO). The research uses the conceptual understanding of an 'agent-based model' which will illustrate how agents interact with other agents or resources, how their actions inform different levels of decision making and actions; and the relationships between these actions/influences and outcomes (eg gender in/equalities that can be measured and/or perceived).

Research Questions: (1) How is the success of fishery management interventions defined by different groups in society? (2) How do fishers and fish workers perceive the closures? At different points in time? How does this influence their decisions? (3) How do the actors and factors interact to lead to successful outcomes and what are trade-offs between those outcomes in the short- and long-term? (4) How can interventions like the octopus closures benefit communities, but also help communities to deal with changes in the future e.g. a climate change event like bleaching?

Methodology: Stakeholder workshops and fieldwork, using local expertise to explore what successful outcomes mean for different groups in society e.g. fishermen, fisherwomen, exporters, fishery organizations, government actors, business, and academia.

Fieldwork: One community in Zanzibar and one community in mainland Tanzania, Mafia.

Category 4: Researchers who have attracted Large Amount of Research Funds

Tanzania Electoral Process Observation (TEPO)

Researchers: Prof. Rwekaza Mukandala (Team Leader/PI), Prof. Bernadeta Killian, Dr. Rasul Minja and Dr. Lupa Ramadhan

Department of Political Science and Public Administration, University of Dar es Salaam

Abstract

In the 2020, General Elections the National Electoral Commission (NEC) granted accreditation to the Research and Education for Democracy in Tanzania (REDET). REDET was set out to observe the 2020-2021 electoral processes in order to establish the extent to which they were credible, free, fair and peaceful in light of national legislation and international standards for genuine democratic elections. In order to promote transparency and accountability, build confidence and enhance public trust in the integrity of the entire electoral processes and outcomes, REDET set out to observe the 2020 General Elections in order to: (i)

to observe the 2020 Tanzania (Union) and Zanzibar General Elections in order to determine the degree to which they adhered to the national legislation and universal principles and qualities of genuine democratic elections; (ii) to observe and assess the fairness of the administration of the elections in general, especially the impartiality of the legal infrastructure (the electoral laws, regulations and directives), the EMBs, and the state machinery for law and order; (iii) to assess the fairness in the allocation and use of relevant state resources by the contending political parties; and (iv) to assess the extent to which the elections can be said to have been credible, free and fair. REDET's observation prioritized several areas, including but not limited to: (i) legal and institutional frameworks for the General Elections; (ii) demarcation of constituencies; (iii) intra-party nominations; (iv) nomination of candidates; (v) campaigns; (vi) voting, vote counting and declaration of results; (vii) post-election events; (viii) role of the media; (ix) voter education, and; (x) participation of women, youth and people with disabilities. However, REDET prepared a separate report on updating of the Permanent National Voters' Register (PNVR), as NEC concluded this exercise several months ahead of the launch of nomination and election campaigns. In order to arrive at an objective analysis of the 2020 Tanzania General Elections, REDET employed a scientific approach. The approach combined the use of acceptable open and transparent strategies and methods of election observation and the deployment of competent, credible and efficient election observers who worked diligently and meticulously guided by detailed instruments and checklists. Five types of observation checklists were prepared: (a) Pre-election day checklist (which focused on campaigns); (b) election-day checklist; (c) post-election episodes checklist; (d) critical incidents checklist; and (e) Regional Election Observers' (REOCs) checklist. These checklists were connected to the Open Data Kit (ODK) software.

The program was set to achieve five key results during the planned period of implementation. The key expected results are: (a) deployment of LTOs to 200 constituencies (out of the 264 constituencies, which is equivalent to 76 percent coverage). Out of these 150 were deployed in Tanzania Mainland constituencies and 50 were deployed in Zanzibar (which is equivalent to 100 percent); (b) On the voting day, REDET deployed 2,353 STOs in sampled polling stations; (c) Production of both an interim observation report and a comprehensive final report; (d) Dissemination of the interim observation report, comprehensive final observation report,

newsletters, press briefings, and online mediums such as website and social media platforms; and (e) Submission of well-informed recommendations to the NEC and ZEC, the government and other electoral stakeholders, specifically on how to improve the management and quality of future elections.

The TEPO project was jointly funded by the U.S. Agency for International Development (USAID) & Danish International Development Agency (DANIDA). This eight month project (July 20, 2020- April 30, 2021**)** received a grant amounting to TZS 4,107,145,750. Prof. Rwekaza Mukandala from the Department of Political Science and Public Administration served as the principal investigator (PI). Other principal researchers were Prof. Bernadeta Killian; Dr. Rasul A. Minja and Dr. Lupa Ramadhani all from the Department of Political Science and Public Administration.

Category 8: Best Postgraduate Student Project

Gendered Participation in Forest Management and Its Implications on Socio-Economic Outcomes in Kilwa

Name of student: *Pilly Silvano*

Department: *Geography*

Abstract

This study assessed whether the formation of Community-based Forest Management (CBFM) that combines forest certification and Reduced Emission from Deforestation and Forest Degradation (REDD+) leads to better and more gender equality in participation in forest management than the state-controlled management. The study combined theoretical insights from Feminist Political Ecology and participatory approaches to forest conservation to assess the extent to which forest management interventions address gender inequality in participation in forest management activities and their possible socio-economic outcomes. Using a gender dimension to assess participation, it compared villages with CBFM, namely Kisangi and Kikole and the villages under state-controlled management, namely

Mavuji and Ruhatwe. Data were collected using in-depth interviews with 37 key informants from the selected organizations and 60 local individuals as forest resource users, 12 focus group discussions and a survey of 173 sampled households. The interviews were complimented by observations made at the village level and review of secondary data. The findings show that the implementation of gendered interventions in CBFM villages has resulted to a greater increase of men's and women's participation in forest management than in state-controlled village, though there are still some variations on gendered participation across sub-villages and on how men and women are involved. Findings show that the increase on gendered participation in CBFM villages has resulted into many positive outcomes especially in the CBFM than the state-controlled villages. The outcomes include improved knowledge and skills, equity in benefits sharing, increased social networks, reduced gender related conflicts, increased financial flow and management as well as positive attitudes, and higher levels of satisfactions. However, the findings show that the economic benefits were mostly at the community and not the individual level. Based on the findings it is concluded that the implementation of CBFM interventions that consider gender perspective and other socio-cultural and geographical factors is the key for achieving better socio-economic outcomes to men and women. Thus, for achieving more equitable and sustainable outcomes, both the government and NGOs need to ensure that there is an effective participation of men and women in forest management projects.

DAR ES SALAAM UNIVERSITY COLLEGE OF EDUCATION (DUCE)

Category 1: Best Multidisciplinary Research Group Project

Impact of Sanitation and Hygienic Practices on Vegetable Parasite Load in Dar es Salaam, Tanzania

Dr. Jared Sylivester Bakuza

Department of Biological Sciences, DUCE

Email: bakuzajared@yahoo.co.uk; Phone: +255 658 216 381

The research/innovation/ service area: *Food Security and Health*

Abstract

Vegetable farming is one of the main activities for many people in Tanzania, despite the fact that cultivation of these plants faces many challenges especially in urban areas due to soil and water contamination in or around farms and unhygienic handling of the crops after harvest. This study is using standard techniques to establish the levels of microbial contamination in vegetables from small-scale farms in Dar es Salaam. Specifically, the study is investigating if cultivation in polluted and non-polluted environment can influence vegetable parasite loads, and also whether on-site washing can significantly flush out pathogens. The study's key objective is to determine the variation of parasite intensity and prevalence between vegetables grown in clean and polluted sites and establish if there is a significant variation in parasite burden between washed and unwashed vegetables. From March 2020 to February 2021 over 400 samples or bundles of four types of vegetables namely African spinach (*Amaranthus* sp., "mchicha"), pumpkin leaves (*Curcubita maxima*), sweet potato (*Ipomea batatas*) and chinese cabbage (*Brassica chinensis*) were collected and examined for parasites. Vegetables were collected from five polluted sites (Ukonga Banana, Bughudadi Mtoni Temeke, Davis Corner Tandika, Tazara Mchicha and Buguruni Kisiwani) and five unpolluted sites (Veterinary Magorofani, Mbagala Mission, Zingiziwa, Msongola Kilimo and Majumba Sita Road-Kwa Mchina) and analyzed for variation of parasite intensity with levels of pollution. Washed and unwashed vegetables were also compared to establish if on-site washing has significant effect on parasite load. Preliminary results

have indicated the presence of parasites of major public health importance in the vegetables including hookworms, *Ascaris* and *Strongyloides*. Of these, hookworm eggs and larvae were the most common across the board regardless of the quality of sites where vegetables were cultivated and whether or not they had been washed. Almost all parasites diagnosed in the vegetables are capable of infecting humans. Given that the vegetables are regularly consumed, they thus pose potential health risk if they are not thoroughly washed or cooked before eating. Hookworm infection in humans can cause blood loss and ultimately anaemia while *Ascaris* parasites can cause malnutrition and poor body condition. This study provides baseline data on the magnitude of parasitic contaminations on vegetables and it indicates the risks associated with the consumption of unwashed or improperly washed vegetables in Dar es Salaam and possibly in other urban areas in Tanzania. Therefore, interventions to improve sanitation and hygiene should be implemented across the supply chain from cultivation, harvesting and washing, transport to markets, storage and preparation before meal.

Assessing and modelling the Quality of Handwashing Water and Sanitizers Used for COVID-19 Prevention in Dar es Salaam, Arusha and Zanzibar.

Project Investigator: *Dr. Jared Sylivester Bakuza*

Department of Biological Sciences, DUCE

Email: bakuzajared@yahoo.co.uk; Phone: +255 658 216 381

The research/innovation/ service area: *Health*

Abstract

Handwashing water and sanitizers have widely been used as major tools for COVID-19 prevention especially in developing countries like Tanzania where other intervention measures such as physical or social distancing and vaccinations are not easily implemented or available. Unfortunately, water in these areas may contain biological and toxic chemicals that can cause harm to people's health. Some of the water comes from unimproved

and untreated sources such as wells, springs, and surface water that make it susceptible to waterborne diseases. Moreover, the sanitizers used for Covid-19 prevention are produced indiscriminately due to high demand, which is likely to put users' health at risk. These issues need to be studied to understand the quality of handwashing water and the safety of sanitizers and their usefulness for control of COVID-19 and other infections. The World Health Organization recommends that, handwashing water for COVID-19 prevention should be of highest quality possible. This study is using standard methods to determine the quality of handwashing water at various user points in Dar es Salaam, Arusha and Zanzibar and assess the implications for COVID-19 prevention and public health in general. It is also assessing the safety of alcohol-based sanitizers used for COVID-19 prevention and use mathematical models to estimate the effect of current and simulated handwashing practices and sanitizers used in tackling the pandemic. Preliminary findings indicate presence of large number of faecal coliform bacteria in handwashing water, which is a sign that the water is contaminated with human or animal waste. The presence of bacteria coliform indicators is also a sign that other disease-causing organisms such as viruses, fungi and parasites are likely present in the water and it is thus unsuitable for human consumption and handwashing. The study will generate essential data for enhancing prevention and management of COVID-19 and other water-borne diseases in Tanzania such as diarrhea, cholera, and typhoid. Information obtained will be shared with participating organizations and other institutions overseeing maintenance of the quality of public water supplies. Participating communities like food vendors (Mama Ntilie) and institutions such as major bank branches of CRDB and NMB, religious organizations including Lutheran Church and Kichangani Mosque at Magomeni and major hospitals who provided water samples for analysis have indicated huge interests in the project and are eagerly waiting for the results. They also indicated willingness to adhere to recommendations to improve the quality of their water in case it is contaminated. So this is a project of great interest to the public and will have huge impact by encouraging positive behavioural change on the importance of personal hygiene and the need for using clean and safe water for better life.

Digitalizing Our Schools for Success (DOSS): An Intervention Approach for Reducing School Dropout through Improved Communication System between Teachers' and Students' Parents in Tanzania

Budeba, Mlyakado, Cresencia Masawe, Mabula Nkuba, Hezron Onditi, Edna Kyaruzi, Salmini Singano, Laurian Wajimila, Beatha Rwimo.

Abstract

School dropout has been identified as a serious challenge both in developed and developing countries. Different global studies and reports indicate that the majority of children joining schools are not completing their studies due to different reasons including family conditions, personal factors and school conditions (UNICEF, 2014). Research shows that rather than being a single event, dropping out of school is generally a process that takes place over several years and begins long before the child actually drops out of school (Parkes & Heslop, 2013). Research also shows that there are warning signs that predict that students are at risk of dropping out. This study project about Digitalizing Our Schools for Success(DOSS) focus at developing a mechanism for facilitating easy teacher and parents communication, in line to that the study intended to make teacher and parents communication effective to the level of identifying early enough the possible indicators for drop out before the students drop from school. The project finally needs to reduce school dropout by encouraging teachers to take actions before the students leave school due to different reasons. To implement the study, the study project included all class teachers in two schools in Dar es salaam region which were purposefully selected to act as pilot. Baseline assessment was done to assess the needs then short training was conducted which aimed at orienting teachers on the procedures and necessary skills to use DOSS in their daily behavioral recording and intervention at school. The immediate results show that, DOSS project is very relevant innovation project in reduction school dropout in schools. The finding were evidence from teachers' comments who emphasized that "DOSS is coming at the right time where by our schools in Tanzania are facing serious students' dropout problem". Therefore, DOSS project is a very good solution for documenting the current serious dropout in Tanzania. It is recommended that, stakeholders in collaboration with the government should support such initiative so as to help in resolving dropout problems in Tanzania

schools.

Category 5: Researcher of the Year

Researcher: Prof. Amani Lusekelo
Department: Linguistics

Profile

Amani Lusekelo, Associate Professor of Linguistics at Dar es Salaam University College of Education (University of Dar es Salaam) in Tanzania, attained a doctoral degree from the University of Botswana in 2012. Prior to the Ph.D., he studied bachelor and master degrees at the University of Dar es Salaam between 2001 and 2007. Since 2006 at DUCE, he teaches undergraduate courses, LL 101 Introduction to Linguistic Structure and LL 202 Morphology, as well as graduate courses, ML 632 Advanced Morphology and ML 640 Contact Linguistics. For less than a decade between 2012 and 2021, he has supervised nine doctoral degrees to viva voce defence and/or graduation at UDSM and University of Dodoma; and over twenty masters' students at Ruaha Catholic University, UDSM and University of Dodoma. Currently he mentors five doctoral students at UDSM and two masters' students at DUCE. His research interests include morphosyntax of Bantu languages, tense and aspect system in Bantu languages, outcome of language contact in Africa, linguistic landscape of Tanzania, and ethnobiology and ethnolinguistics in African languages. Most of his researches are conducted among the speakers of Datooga, Hadzabe, Maasai, Nyakyusa, Nyamwezi, Sukuma, and Swahili. Lusekelo's publications surround topics of noun phrase and lexical categories, e.g. The structure of the Nyakyusa noun phrase. *Nordic Journal of African Studies* 18(4): 305-331 (2009) and Properties of the adjective category in Runyambo. *South African Journal of African Languages* 40 (1): 120-129 (2020); lexical borrowing into local languages, e.g. Education-induced borrowing in Tanzania: Penetration of Swahili nouns into Maa (Maasai) and Hadzane (Hadzabe). *Language Matters* 48 (1): 3-26 (2017) and ; social identity theory and onomastics and language

contact, e.g. The Hadzabe society of Tanzania: Contacts, sociolinguistics and onomastics. Ibadan: John Archers; An account of intercultural contact in Nyakyusa personal names. *African Study Monographs* 39(2): 47-67 (2018); Linguistic and social outcomes of interactions of Hadzabe and Sukuma in north-western Tanzania. *Utafiti Journal of African Perspectives* 15(2): 348-373 (2020), and many more.

Category 8: Best Postgraduate Student Project

Influence of Heteroatoms on the Optoelectronic Properties in Tripenylamine-Based Dyes for DSSCs Application: A Computational Approach

Student Name: *Peter Kirenga*

Department of Chemistry

Dar es Salaam University College of Education (DUCE)

Abstract

Energy is one of crucial components for the development of a country. More than 85% of the global energy demands is derived from non-renewable sources like oil, coal and natural gas which are either problematic to environment or on the verge for depletion. Therefore, there is a need for a more environmental friendly and sustainable sources of energy. Researchers are currently focused on ways to maximize the utilization of renewable energies to cater the depleting non-renewable energies. The amount of energy delivered to the earth from the sun in a day is enough to cater the current global energy demand in a year. Thus, technologies to harness and store solar energy are crucial for the survival of the planet.

Dye-sensitized solar cells are promising emerging technologies in the harvest and storage of solar energy. Low fabrication costs, availability, uncomplicated manufacturing process, tunable absorption, and excellent coverage in the UV-Vis and near-infrared (NIR) spectra are some of the reasons for this novel technology's preference. However, these cells are still in the research and development phase; therefore, more investigation

is done on various components to support its commercialization.
This work employed both density functional theory and time-dependent density functional theory to investigate optoelectronic properties of 10 organic dyes. The dyes were constructed from triphenylamine-based unit as donor moiety and systematic investigation on the variation of heteroatoms on both p-linkers (benzothiadiazole and thiophene) in a D-p-p-A system was performed. Cyanoacrylic acid and hydantoin were the acceptor groups used alternatively. The heteroatoms used in the study were O, NH, S, Se, and Te. Various properties were determined and analysed to investigate the application of the modified dyes in DSSCs. Geometrical properties showed that all ten dyes have good candidacy in the DSSC application. However, chalcogen (S, Se, and Te) were revealed as more preferred heteroatoms as they improved the UV-Vis and NIR absorption spectra coverage and narrowed the energy bandgap. All dyes except NH substituted dyes displayed red-shifted absorption spectra. On top of that, all dyes showed desired energy alignments and spontaneous charge injection and dye regeneration processes. Therefore, all ten proposed dyes were good candidates to improve efficiency and stability of DSSCs towards commercialization.

Category 9: Best Undergraduate Student Project

Automatic Car Accident Reporting System

Student names: *Getruda Charles Magesa, Charles Gumalija and Kalunde Florian F*

Department: *Physics Mathematics and Informatics*

Abstract

The Rapid growth of technology has made our livelihood easier. This advancement in technology also increased traffic hazards. Hence the ratio of road accidents that take place frequently increases that causes huge loss of life and properties due to poor to limited emergency facilities.

The main causes behind these road accidents include lack of training institutes, unskilled drivers, poor road conditions, use of mobile phones

during driving, overloading, and poor governmental plans in this regard. This project provides a solution for accident detection and reporting for human life safety and quick responses. It enables intelligent detection of an accident at any place and reports about the accident on predefined numbers.

Our system consists of two parts, the alarming part and messaging part. The hardware includes

Vibration sensor (SW-42), Arduino UNO Microcontroller (ATMEGA326P), GSM modem (SIM 900D), and an Alarm (Buzzer). When moving the vibration sensor will keep on detecting normal vibrations but when the accident occurs, the abnormal vibration will be sensed and the microcontroller will identify it and quickly sending an alert message through the GSM modem indicating that such an event has occurred to the specific vehicle.

Our designed system has been tested and found to be effectively working by sending alert messages to a designated mobile phone user**.**

Category 10: Best Public Service/Consultancy

Interaction Competencies with Children for Caregivers (ICC-C): A toolkit for improving Care and Preventing Maltreatment of Orphans

Mabula Nkuba, Tobias Hecker, Getrude Mkinga, Anette Kirika & Katharin Hermenau

Abstract

Background: Many orphans in East Africa are living in institutional care facilities where they experience low quality parental care and exposed to maltreatment. We report an extension of a cluster randomized controlled trial aiming to discover the long-term effects and to replicate and show 12-months sustainability of the previous found effects of the intervention *Interaction Competencies with Children – for Caregivers* (*ICC-C*).

Methods: Conducting a robust 2x3 analysis of variance, we investigated the changes over time in the waitlist orphanages (n = 75, 62.7% female, M_{age}= 37.63 years, SD_{age}= 11.81), which participated in the intervention after first follow-up and in the initial intervention orphanages (n = 81, 61.7% female, M_{age}= 38.73 years, SD_{age}= 11.94).Trial registration: ClinicalTrials.gov, NCT03594617. Registered on 20 July 2018.**Results:** The caregivers in the waitlist orphanages reported less use of maltreatment (d = −0.09), fewer positive attitudes towards violent discipline (d = −0.44) and increased childcare knowledge (d = 1.26). These effects were also maintained in the initial intervention orphanages. Furthermore, we found long-term improvements in negative caregiver-child relationship (d = –0.83), caregivers' stress level (d = −0.98) and their mental problems (d = −0.61).**Conclusions:** The replication and maintenance of the intervention effects as well as first hints to additional long-term effects substantiates the effectiveness of ICC-C.As long as alternative care cannot be provided for all children in need, compact caregiver trainings can make an important contribution to increase the opportunities for many children in accessing improved institutionalized care which are characterized by less maltreatment.

Production of Alcoholic Hand Sanitizers amid CoViD-19 at DUCE

Dr. Dativa Shilla

Department of Chemistry,

Dar es Salaam University College of Education (DUCE)

Co-PIs: *Abela I. Pemba, Salum A. Ndembo, Fransisco Olambo, Aldo Kitalika, and Sixberth Mlowe*

Abstract:

At the beginning of 2020, a new corona virus, namely SARS-CoV-2, started to spread worldwide leading to the so called CoViD-19 pandemic. Considering that SARS-CoV-2 is an air-born pathogen, but can also spread through surfaces, hand sanitisation has become a primary infection prevention measure. Thus CoViD-19 pandemic caused a sudden spike in demand and production of hand sanitisers. As health agencies around

the world, the use of alcohol-based hand rubs, the demand and sale of such products shoot up, leading to sudden shortages of this commodity in most markets. The base of all/most hand sanitizers is alcohol which is an essential, and germ killing ingredient in hand sanitizers. The most feasible explanation for the antimicrobial action of alcohol is denaturation of proteins. Alcoholic hand sanitizers is therefore clearly effective and thus this project aimed at making alcoholic based sanitizers to combat the pandemic CoViD-19 for use to College and general public.

In conclusion, we demonstrated that the formulated and tested alcoholic sanitizer products fulfil the regulatory requirements recommended by health agencies for infection prevention (The product was certified by TMDA and was given licence registration number TZ 20 AD 0121).

In the era of the CoViD-19 pandemic, when hand disinfection was deemed as a crucial infection prevention measure, the general public had access to our product inexpensively.

As recommended by WHO this formulated alcoholic hand rub sanitizer can be used both for hygienic hand antisepsis and for presurgical activities.

At present, alcohol- based hand sanitizers are the only known means for rapidly and effectively inactivating a wide array of potentially harmful microorganisms on hands.

Enhancing Pre-service Teachers' Competence-based Teaching through School Attachment

Venance Timothy1 , Florence Kyaruzi2 , Rehema J. Mwakabenga3 & Nyanjiga Rukondo4 University of Dar es Salaam, Dar es Salaam University College of Education Department of Educational Psychology and CurriculumStudies

Abstract

When pre-service teachers are attached to schools and offered with meaningful mentorship can certainly improve their competence-based teaching (CBT). Such a practice in Tanzanian teacher education has been relatively rare. This study intended to find out how pre-service science and mathematics teachers improve their CBT when engaged in the

school attachment intervention. Forty undergraduate pre-service science and mathematics teachers from one university in Tanzaniaparticipated in the study. Quasi-experiment and case study designs were employed to assess the changes in CBT as demonstrated by the pre-service teacher participants. The findings indicate thatthe attachment program enhanced pre-service teachers' knowledge and skills in CBT in the areasof lesson preparation, assessment and evaluation, and teaching approaches. Based on this study, implications and recommendations are made to teacher training colleges, researchers and policy makers in Tanzania to promote CBT for pre-service teachers through school attachment.

Keywords: Competence-based teaching, school attachment, pre-service teachers, science and Mathematics.

INSTITUTE OF DEVELOPMENT STUDIES (IDS)

Category 4: Researchers who have Attracted Large Amount of Research Funds

Examining Effects of Decision-Making Space and its Practices on Health System Performance in Tanzania

Prof. Stephen Maluka (Lead Researcher), Prof. Peter Kamuzora and Dr. Lilian Mtasingwa, Dr. Ntuli Kapolongwe, Prof. Anna-Karin Hurtig and Prof. Miguel San Sebastian

UDSM Registration number: *IDS20069*

Sponsors*: UMEA University*

Amount*: 1,680,860,331 TZS*

Abstract

This project is hosted by the Institute of Development Studies (IDS) and was assigned a registration No. IDS20069. The total project fund is GBP 522,000.00. The project commenced in June 2023 and will end in May 2023. The project is conducted in the following regions in Tanzania: Kilimanjaro, Geita, Mbeya, Mwanza, Singida, Shinyanga, Kigoma, Ruvuma, Rukwa, Tanga, and Morogoro.

The project design

The project uses a multiple case study design in order to examine variations in the use of decision-making space and health systems performance.

Preliminary findings

i. The government of Tanzania has since 2017 further transferred authority to plan, budget and manage financial resources to the health facilities (hospitals, health centres, and dispensaries)

ii. Health facilities have now been granted wide decision-making space in identification of priorities, planning, budgeting and management of financial resources

iii. There have been little efforts to strengthen the capacity of the health facilities and community to handle new responsibilities in the context of current decentralization.

iv. Consequently, priority setting and begetting process are mainly driven by the health care workers, based on historical documents, and rarely informed by the local evidence.

v. Similarly, there are weak accountability mechanisms at the community and local levels.

Conclusion

Decentralization will only improve health system performance if increased decision-making authority is accompanied by capacity building of the decentralized local level institutions. Efforts need to be made to reinforce capacity of the health facility governing committees (HFGC) to strengthen relationships between these committee and health providers, health managers, and community leaders, and sensitize communities on the role and responsibilities of HFGC members.

Category 6: Best Innovator of the Year

Innovation Through Improvisation

Principal Innovator: *Ms. Happines Michael*

Department*: Institute of Development Studies*

Abstract

This project is about innovation in using various things around us that in the eyes of many people seem to have no value anymore. These items include bottles of beverages such as water, alcohol and various soft drinks. But ordinary woods, leaves, and beads are also part of the raw materials used to make various products. This innovation has been adding value to items that have been used and discarded and eventually reused in another way. Our products include table mates, table runners, handbags, sofas, chairs, dustbins, treys, chains, earrings, necklaces, etc.

INSTITUTE OF KISWAHILI STUDIES (IKS)

Category 2: Units/Departments that have Excelled in Attracting Large Amount of Research Funds

Udurusu wa Kamusi (Kiingereza-Kiswahili)

Name of Lead Researcher: Dr. Mussa Hans

Sponsor: Institute of Kiswahili Studies **Amount**: TZS 20,000,000

Ikisiri

Lengo kuu la Mradi huu ni kudurusu *Kamusi ya Kiingereza – Kiswahili,* ambayo mbali na mambo mengine itatumika pia kama malighafi ya kuundia *Kamusi za Kiswahili – Kireno – Kiswahili* na *Kiswahili – Kifaransa – Kiswahili*. Matokeo ya Mradi huu ni kuwa na *Kamusi ya Kiingereza – Kiswahili* toleo la nne lenye matamshi na msamiati unaohusu nyanja anuwai kama vile majina ya nyadhifa na vitengo vya CKD, msamiati unaohusu Ugonjwa wa Virusi vya Korona (UVIKO-19) na istilahi za utafiti na maneno husiani. Mradi huu utasimamiwa na Dkt. Mussa M. Hans na kugharimiwa na Taasisi ya Taaluma za Kiswahili.

Category 4: Researchers who have A ttracted Large Amount of ResearchFunds

Barua Za Shabaan Robert-Toleo La Pili

UDSM Registration number:

Name of Lead Researcher: Prof. Mugyabuso Mulokozi

Sponsors: Institute of Kiswahili Studies

Amount: TZS 15,000,000

Ikisiri

Lengo kuu la Mradi huu ni kukusanya nyaraka, kupangilia, kuhariri na kuchapisha mswada wenye mkusanyiko na maelezo ya barua anuwai za Shaaban Robert. Huu ni mwendelezo wa mradi wa awali ambao matokeo yake ilikuwa ni kutoa kitabu cha *Barua za Shaaban Robert* toleo la

kwanza. Matokeo ya mradi huu ni kuiwezesha Taaluma ya Kiswahili kupevuka na kuimarika; maarifa kuhusu Shaaban Robert na maendeleo ya fasihi ya Kiswahili kuongezeka. Aidha, kitabu cha *Barua za Shaaban Robert* toleo la pili kitachapishwa. Msimamizi Mkuu wa Mradi huu ni Prof. Mugyabuso Mulokozi ambapo utagharimiwa na Taasisi ya Taaluma za Kiswahili.

Category 6: Best Innovator of the Year

Mtihani wa Kimataifa wa Ujuzi wa Kiswahili (MKUKi)

Department: Kiswahili Language and Linguistics

Principal Innovator: Dr. Rajab Chipila

Ikisiri

Mtihani huu unalenga kupima ujuzi wa Kiswahili wa wajifunzaji wa Kiswahili kote duniani ili kuwawezesha kupata ithibati rasmi ya ujuzi wao katika stadi nne za lugha ambazo ni kusoma, kuandika, kusikiliza, na kuzungumza. Kukamilika kwa mtihani huu kutawawezesha wajifunzaji wa Kiswahili katika maeneo mbalimbali ulimwenguni kupata fursa ya kuthibitisha ujuzi wao wa lugha ya Kiswahili. Aidha, mtihani huu utakuwa chanzo endelevu cha mapato kwa Chuo Kikuu cha Dar es Salaam na taifa kwa ujumla. Mradi huu utagharimiwa na Chuo Kikuu cha Dar es Salaam na kuratibiwa na Dkt. Rajabu A. Chipila kutoka Taasisi ya Taaluma za Kiswahili na Prof. Joel Mtebe kutoka Ndaki ya Teknolojia ya Habari na Mawasiliano.

INSTITUTE OF MARINE SCIENCES (IMS)

Category 1: Best Multidisciplinary Research Group Project

Designating Mangrove Research and Training Forest in Rufiji Delta, Tanzania

[East Africa Mangrove Carbon Project]

***Mwita M. Mangora*[1] ,** *Carl C. Trettin*[2] *and Mwanahija S. Shalli*[1]

[1]*Institute of Marine Sciences, University of Dar es Salam*

[2]*Center for Forested Wetlands Research, Forest Watershed Science, Southern Research Station, USDA Forest Service*

Abstract

Mangroves have been undermined as they continue to be marginally considered by most regulations, and receive comparatively little attention in terms of scientific research and conservation. As such, there is limited available body of literature, which is fragmented, dispersed and often difficult to locate and obtain. Accordingly, there is considerable knowledge gaps and uncertainty at the local level of the importance of mangrove forests and its resources, lack of information on the implications of continued loss of mangrove resources to humans and the environment in general. This warrants a major redirection of research towards comprehensive understanding of the mangrove ecosystem functions in order to provide a sound ecological basis for effective utilization and management, hence the concept of a research and training forest site. Accordingly, an active research, education and technology transfer facility has been designated through a comprehensive institutional consultations, coordination and networking to provide needed information and enhance local capacity in the science and management of mangroves. The designated Rufiji Delta Mangrove Research and Training Forest (MRTF), which approximate 10,000 ha in the northern block of the delta, and administratively, coordinated in collaboration between the Institute of Marine Sciences and Tanzania Forest Service has three core objectives:

i. To improve, share and apply scientific knowledge on assessment of carbon stocks, restoration and sustainable use to support the conservation of mangrove ecosystems;

ii. To strengthen and build capacity for integrated mangrove management institutions and strategies, and empower

dependent local communities to engage in decision-making and management that conserves, restores and sustainably uses mangrove ecosystems;

iii. To enhance mangrove forest resource governance by encouraging integrated management programs and conservation investments that are ecologically and socio-economically sound.

This project is supporting three PhD candidates and one MSc candidate:

Emmanuel Japhet. Primary Productivity, Phenology and Succession in the Natural Mangrove Forest of Rufiji Delta, Tanzania. PhD Marine Sciences, University of Dar es Salaam.

Elinasi Monga. Patterns of Mangrove Forest Cover, Land use, Carbon Stocks and Restoration Potential in the Rufiji Delta, Tanzania. PhD Marine Sciences, University of Dar es Salaam.

Baraka Paul Nyangoko. Local communities' perception towards dependence on mangrove ecosystem services and adaptation strategies in Pangani, Kilwa and Rufiji Delta, Tanzania. PhD Geography, Stockholm University.

Loyce Nathan Ntibona. Livelihood and Conservation in Rufiji Delta: bridging the mismatch MSc Marine Sciences, University of Dar es Salaam.

The project has produced five publications so far:

Nyangoko, B.P.; Berg, H.; **Mangora, M.M.**; Gullström, M.; Shalli, M.S. (2021). Community Perceptions of Mangrove Ecosystem Services and Their Determinants in the Rufiji Delta, Tanzania. Sustainability 2021, 13, 63. https://dx.doi.org/10.3390/su1301 0063

Kairo J.G and **Mangora M.M.** [UNEP-Nairobi Convention/USAID/ WIOMSA] (2020). Guidelines on Mangrove Ecosystem Restoration for the Western Indian Ocean Region. UNEP, Nairobi, 71 pp. A digital copy of this report is available at: www. nairobiconvention.org/; www.wiomn.org; www. wiomsa.org

Japhet E., **Mangora M.M.**, Trettin C.C., Okello J.A. (2019). Natural recovery of mangroves in abandoned rice farming areas of the Rufiji Delta, Tanzania. WIO Journal of Marine Science 18(2): 25-36.

Lagomasino, D., Fatoyinbo, T., Lee, S., Feliciano, E., Trettin, C., Shapiro, A., **Mangora, M.M.** (2019). Measuring mangrove carbon loss and gain in deltas. Environmental Research Letters 14 (2019). https://doi.org/10.1088/1748-9326/aaf0de

Monga, E., **Mangora, M.M.**, Mayunga, J.S. (2018). Mangrove cover change detection in the Rufiji Delta in Tanzania. WIO Journal of Marine Science 17 (2): 1-10.

Designing Sustainable Community-Based Mangrove Harvesting and Restoration Models in Rufiji Delta, Tanzania

Mwita M. Mangora. *Mwanahija S. Shalli, Saleh S.A. Yahya, Daudi J. Msangameno, Margareth S. Kyewalyanga, Kelvin J. Kamnde*

Abstract

The overall goal of the project is to nurture sustainable co-existence of the coupled human-mangrove ecosystem in Rufiji Delta and provide demonstrated lessons for up-scaling over the country and the WIO region at large. Expected project outcome is: Appropriate tools and methodologies are used to manage mangrove habitats in Rufiji Delta to enhance their resilience and long-term sustainability. Expected project outputs are two-fold: i) Developed and demonstrated participatory mangrove harvesting scheme and guideline for the Rufiji Delta; and ii) Developed and demonstrated model of collaborative mangrove ecosystem restoration and sustainable utilisation strategy in the Rufiji Delta. This project leverages the designated 10,000 ha Mangrove Research and Training Forest (MRTF) and update of the management plan for the delta undertaken by Tanzania Forest Service with support from Wetlands International through its Mangrove Capita Africa project. Project activities to realize these outputs include: stakeholders analysis and mapping; community sensitization and awareness raising; analysis and mapping of land use/land cover change; validation of ecological, socio-economic and governance data; designation of community-based harvesting blocks and guideline; designated demonstration sites for community-based mangrove restoration; development of community agreements to support implementation of the harvesting and restoration

schemes.

The project is supporting two PhD and one MSc candidates

Baraka Paul Nyangoko. Local communities' perception towards dependence on mangrove ecosystem services and adaptation strategies in Pangani, Kilwa and Rufiji Delta, Tanzania. PhD Geography, Stockholm University.

Kelvin J. Kamnde. Mapping of Ecosystems in the Lower Rufiji Floodplain and Delta for Sustainable Management. PhD Marine Sciences, University of Dar es Salaam.

Loyce Nathan Ntibona. Livelihood and Conservation in Rufiji Delta: bridging the mismatch MSc Marine Sciences, University of Dar es Salaam.

Larval Fish Production and Dispersal In Critical Habitats of Coastal East Africa

*James Mwaluma[1] (PI), **Margareth S. Kyewalyanga[3]**, Monika Winder[2], Mwanahija Shalli [3], Barnabas Tarimo[3], Rushingisha George[4], Melckzedeck Osore [1], Jacob Ochiewo[1], Stephen Mwangi [1], Lillian Daudi[1], Charles Muthama[1], Noah Ngi'siange[1], Fadhili Malesa[5]*

[1]Kenya Marine and Fisheries Research Institute (KMFRI)

[2]Stockholm University (SU)

[3]Institute of Marine Sciences, University of Dar es Salaam (IMS-UDSM)

[4]Tanzania Fisheries Research Institute (TAFIRI)

[5]School of Aquatic sciences and Fisheries technology (SoAF)

Overall summary

Larval fish production and dispersal in critical habitats of coastal East Africa (FLAPSEA) is ongoing project which has started since 2019, which has attracted a fund of about USD 330 000. The project is composed of three collaborators which are Kenya Marine and Fisheries Research Institute (KMFRI) as a Lead Institution, Institute of Marine Sciences (UDSM-IMS) and Stockholm University (SU-Sweden) whereby

the overall PI (Dr. James Mwaluma) comes from KMFRI while Dr. Margareth Kyewalyanga is a PI for the IMS-UDSM. The project partners from KMFRI, TAFIRI and UDSM are mostly postgraduate student, who are benefiting from the project in terms of capacity building and research skills for the young scientists. At the end of the project we expect several outputs which will benefit the societies, conservationist and fisheries resources managers in East Africa and the Western Indian Ocean (WIO) region include: scientific publications, seagrass habitat maps, Policy briefs, models for seagrass fish larvae and effects on overall fisheries, 2 MSc students and 2 PhD students are partially supported student by the project in Tanzanian part.

Abstract

Fish larvae in nearshore vegetated habitats such as seagrass contribute significantly to sustainable fish stocks. However this essential nursery habitats are under threat due to human activities and they are declining at an accelerating rate. Therefore the aim of this project was to understand to what extent fish larval production and dispersal are threatened by habitat degradation and fragmentation, and how production of this natural resource is related to climate change and development in the coastal East African region. Various approaches were applied such as field sampling, laboratory analyses, community surveys and reviews to gather the information about larval fish production and dispersal in health and degraded seagrass meadows. The preliminary findings showed seasonality to be a key influence to plankton productivity in both Tanzania and Kenya with high chlorophyll a in the South East Monsoons. Ultimately, the chlorophyll a concentration and plankton density in healthy seagrass meadows seems to have influenced distribution and abundance of fish larvae which was abundantly found in heathy sites. Additionally, the distribution and abundance of fish larvae in healthy seagrass sites was a clear indication of the role that seagrass plays a role as nursery and habitat for fish. Seagrass cover and shoot density varied between seasons and sites but most importantly revealed sites with stable crop of species and those with pioneer species that indicated the disturbance/degradation. The results opens a possible emphasis on conservation strategies of seagrass meadows for protection of fish larvae in order to maintain the sustainability of coastal stocks in East Africa region and beyond.

Category 5: Researcher of the Year

Researcher: Dr. Mwita M. Mangora

Department: Institute of Marine Sciences

Resume'

Dr. Mwita M. Mangora is Senior Lecturer at the Institute of Marine Sciences - Zanzibar. Dr. Mangora conducts research, training and consultancy on mangrove ecosystems protection, management, restoration and their role in safeguarding environmental integrity and supporting local, national and global economies and development. Specifically, Dr. Mangora's current research focuses on understanding the ecological functions and processes of mangrove ecosystems, their exposure to the impact of both natural (especially climate change) and anthropogenic pressures; consequent ecological fragility and impact on livelihoods of dependent communities. He also conducts studies on functional existence, management and socio-political-ecological of marine protected areas. For this, Dr. Mangora currently lead two complementary projects in the Rufiji Delta: (i) Designating Mangrove Research and Training Forest (MRTF) aiming to serve as a long term research, education and technology transfer facility to provide needed information and enhance local capacity in the science and management of mangroves, and (ii) Designing Sustainable Community-Based Mangrove Harvesting and Restoration Models aiming to nurture sustainable co-existence of the coupled human-mangrove ecosystem and provide demonstrated lessons for up-scaling over the country and the region at large. The two projects have attracted a sum of USD 232650. In addition, Dr Mangora has recently lead a regional team of mangrove experts to receive a grant amounting to USD 174820 for a book project on Mangrove Ecosystem Restoration in the Western Indian Ocean Region: lessons and experiences towards the UN Decade on Ecosystem Restoration 2021-2030. Dr. Mangora's projects are supporting four PhD and one MSc candidates working on: (i) Mangrove Cover Change in Rufiji Delta: Pattern, Impacts and Responses, (ii) Succession and Productivity of Mangroves in the Rufiji Delta, Tanzania, (iii) Managing Mangrove Ecosystem Services for Livelihoods and Local Adaptations in Rufiji Delta, Tanzania, (iv) Mapping of Ecosystems in the Lower Rufiji Floodplain and Delta for Sustainable Management, (v) Livelihoods vs

Mangrove Conservation in Rufiji Delta: Options for Sustainability. On extra curricula, Dr. Mangora is a founding Regional Secretary of the Western Indian Ocean Region Mangrove Network, registered under the Laws of Zanzibar as a regional forum which inter alia facilitate expertise sharing, capacity development, methodological standardization, and publication of scientific and policy research to raise the profile of mangroves as a critically important ecosystem supporting livelihoods and development in the region.

During the past year Dr. Mangora has published five journal papers and one book.

More information on publications can be viewed at:

Web of Science ID: AAV-9406-2020

GoogleScholar: https://scholar.google.com/citations?user=FkogRr8AAAAJ&hl=en

ResearchGate: https://www.researchgate.net/profile/Mwita_Mangora/research

ORCID: https://orcid.org/0000-0002-9504-2718

Category 8: Best Postgraduate Student Project

Quality Tilapia Seed Production for Improvement of Aquaculture in Tanzania

Levinus Leonard Mapenzi[1],[2] (Student), Aviti John Mmochi[2], Matern S. Mtolera[2] and Dirk Jan de Koning[3]

[1]*Department of Biology, The University of Dodoma, Dodoma-Tanzania*
[2]*Institute of Marine Sciences, University of Dar es Salaam, Zanzibar*
[3]*Swedish University of Agricultural Sciences (SLU), Ulls Vag Uppsala*

Abstract

Fish farming is a livelihood and commercial activity. It contributes to animal protein supply, employment and provides alternative to fish supply while reducing dependency on capture fisheries production. Available tilapia seeds used in aquaculture are imported while locals do not perform

better all of which are mainly hormonal sex reversed to obtain all-males for culture. Initiatives have been made by the Institute of Marine Sciences to produce quality local seeds for improving aquaculture production in Tanzania. The breed that has already been produced is an all-male hybrid between Rufiji tilapia (males) and Nile tilapia (females). The hybrids have better growth performance when grown in brackish waters than in fresh water. Molecular investigation has proved that the hybrids' parental populations have high genetic diversity therefore are potential to be involved in a selective breeding programme. Prior to upscaling a study is underway to investigate the genetic performance of hybrids produced from various crosses of different populations of Rufiji and Nile tilapia collected from their natural habitats (Rufiji River and Lake Victoria). The better performing resulting hybrids' parental lines will be selected for inclusion in the selective breeding programme. Furthermore, the institution will be in position to communicate with the Ministry of Livestock and Fisheries on procedures to be followed to release the seed to farmers.

Category 9: Best Undergraduate Student Project

TBioplastic Production from Seaweeds

Hamisi A.H. and Yahya S.A.S.

Abstract

The use of plastic materials has been a source of pollution on land, and in aquatic environments, because they can stay hundreds to thousands of years undestroyed by microorganisms. Problems of using plastics materials is that they are long lasting pollutants in environments, some animals mistake them with foods and consume them leading to death e.g. sea turtles frequently swallow plastic bags mistaking them for jellyfish. Macro and microplastics have been found in fish, sharks and even whales. Microplastics in the ocean leads to bioaccumulation, result in effectual transmission of toxic substances in the food chain, and can lead to cancer. weakened immune system and impair reproduction. There is a need of

complementing degradable materials because we cannot completely replace fuel-made plastics. Seaweeds are macroalgae which grow in the ocean along generally attached to the bottom or other solid structures in the sea water. In Tanzania, seaweeds grow naturally but some species are also farmed for export, usually as raw (unprocessed) materials and at a low price. The seaweed farmers are mostly females, despite seaweed farming being a hard and time consuming activity. Cellulose, carrageenan alginate and agar in seaweeds are essential and promising natural polymers in solving the problems due to fuel based plastics. Bioplastics are plastic materials made from biologically-based polymers which are easily decomposed by bacteria when dumped, and are therefore environmentally friendly. This study proposes using polymers from locally available seaweeds especially *Eucheuma cottonii* and *Gracilaria* species to produce bioplastics. This will help in reducing the environmental damage and health risks caused by our current use of plastics, raise the income of seaweed farmers by establishing a local market for seaweeds, pave the way for industries for processing of seaweed products, and contribute to the blue economy.

INSTITUTE OF RESOURCE ASSESSMENT (IRA)

Category 1: Best Multidisciplinary Research Group Project

Vulnerability, Resilience, Rights and Responsibilities: Capacity Building on Climate Change in Relation to Coastal Resources, Gender and Governance in Coastal Tanzania and Zanzibar (2013 – 2019)

Prof. Pius Z. Yanda (PI); Prof. Ian Bryceson, Prof. Chris Maina, Prof. Faustin Maganga, Dr. Emma Liwenga

Abstract

This project was funded by NORAD through NRHED I program. The project intended to enhance capacity building on climate change in relation to vulnerability and resilience of coastal ecosystems and communities with an explicit focus on coastal resource governance, community access, control, and rights to coastal resources, participation in decision-making, and gender roles in coastal Tanzania and Zanzibar. This will encompass the following activities:

Masters and PhD programmes on climate change was established at SUZA and UDSM respectively. Masters programme on Climate Change at SUZA and PhD programme on Climate Change related discipline at UDSM promoted capacity building among collaborating institutions. Seven (7) PhD students receive scholarships supported by the project. In addition, 14 Master students were supported annually to pursue their studies at UDSM, and 20 Master students from were supported to pursue their studies at the newly established Masters programme at SUZA. This amounts to a total of 56 MSc students for UDSM; and 20 students for SUZA. Those who benefited from the support were members of the university academic staff.

Institutional development measures entailed putting in place infrastructures and facilities for enhancing capacities of the newly established centres for climate change and natural resources research and education. This includes putting rehabilitating office space for the centre to support Masters programme on Climate Change and Sustainable Development as well as PhD programme. Support on instrumentation of office space such as purchase of assorted instruments and facilities and running of the Centre.

Information generated through research has been disseminated to the

scientific community, government at the local, regional, national and international scales, communities and other key players. The information creates a benchmark for developing recommendable adaptation options for strengthening resilience of local communities through community empowerment and capacity building as means to strengthen governance and sustainability of coastal ecosystems.

Tanzania Partnership Program for Sustainable Community Development Public Service Project

Dr. Joel Nobert, Dr. Victoria Moshi

Abstract

Tanzania Partnership Program (TPP) is a long-term collaborative alliance of local and international organizations dedicated to improving local livelihoods in two Rural Tanzania communities. The partnership includes Michigan State University (MSU), University of Dar es salaam (UDSM) -Institute of Resource Assessment (IRA) and Dar es salaam University College of Education (DUCE); Sokoine University of Agricultural (SUA), Milola Village, Lindi Municipal Council, Naitolia Village, and Monduli District, Tanzania. TPP is founded by MSU alumni couple Jerry and Karen A, Kolschowsky who have been committed to support TPP since 2008 to date.TPP strives to find long-term solutions, build capacity and create collaborations that promote sustainable community development and resilience while also creating a model for sustainable prosperity. Furthermore, TPP unites development, education and research that boldly push the frontiers of knowledge and the role university play in transforming local communities and the lives of individuals. TPP's main approach focuses on acknowledging interdependencies and creates long term partnership among local communities, governments, non-governmental organizations, private corporations, Universities and invested individuals to address local challenges and respond to emerging opportunities in economic development, food security, public health, education and community empowerment. Grounded on the Theory of Change, TPP work has been focusing on development activities, research and implementation of Study Abroad Program that involves students

from partnering universities. Until FY 2019/20, TPP work focused on six thematic areas: Educational Access and Quality, Water Access and Quality, Human Health, Animal Health, Agriculture and Economic Development, and Community Empowerment and Capacity Building. To further embrace the six TPP Principles and Values, these thematic areas have been consolidated into three Core Programs during FY 2020/21: Community Health and Food Security; Community Education, Economic Development and Youth Empowerment; and Water Resources Management and Environmental Issues. TPP continues to witness both progress and challenges related to processes of building sustainable and resilient communities in Naitolia and Milola villages in Tanzania.

Category 3: Units/Departments/Groups which have Attracted Large amount of Innovation Funds

Vulnerability, Resilience, Rights and Responsibilities: Capacity Building on Climate Change in Relation to Coastal Resources, Gender and Governance in Coastal Tanzania and Zanzibar (2013 – 2019)

Sponsors: Norwegian Agency for Development Cooperation

Amount: TZS 5,044,412,126

Prof. Pius Z. Yanda (PI); Prof. Ian Bryceson, Prof. Chris Maina, Prof. Faustin Maganga, Dr. Emma Liwenga

Abstract

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Information generated through research has been disseminated to the scientific community, government at the local, regional, national and international scales, communities and other key players. The information creates a benchmark for developing recommendable adaptation options for strengthening resilience of local communities through community empowerment and capacity building as means to strengthen governance and sustainability of coastal ecosystems.

Category 8: Best Postgraduate Student Project

The Effects of Fast-Growing Monoculture Trees Plantation on Ecosystem Services in Southern Highlands of Tanzania

Ms. Luth Mligo, Dr. Catherine Masao & Prof. Pius Yanda

Postgraduate Project

Abstract

This study provides part of the field work about the effects of fast-growing monoculture trees plantation on ecosystem services conducted in Southern Highlands of Tanzania particularly Njombe region. The ecosystem services studied were based on the provision of habitat, supporting soil formation, regulation of water cycling as well as cultural values. The study areas were randomly selected based on the existing exotic trees grown by individual communities, the government and private companies, crop cultivations and the presence of reserved natural forests and grassland. The selected wards for this study were Yakobi, Uwemba, Utalingolo, Lugenge, Luponde, Ramadhani and Matola located in Njombe urban District, Madope ward locate in Ludewa District and Igima ward located in Wangingombe District. Njombe urban district was put into preference with many study sites since it is one of the leading exotic tree growers with more than 25,882 hectares and it is highly populated compared to other districts (Mankinen *et al.,* 2017). The study involved detailed literature review, field observation, focus group discussion, household questionnaire and stake holder's consultations. Key exotic trees plantations that have been identified in the study areas pines, Eucalyptus and Black Wattle. It has been observed that, large area of shrubland, grassland and some natural forests have been replaced by exotic trees especially pines leading to disappearance of number of indigenous plants. Pine trees is badly killing the understory plants compared to eucalyptus and wattle since it makes a bed of undecomposed litter of up to 30cm depth inhibiting the growth of other plants with exceptional of few species which are found to co-exist. This has reduced the provision of wild medicine, wild food and habitat of living creatures. Due to shortage of land for trees planting, some individuals have used the crop land for tree planting. There are some cases of decrease in quantity and quality of water in streams due to

exotic plantations especially eucalyptus although there are unpredictable rainfall and temperature variability which is associated with global climate change. It is recommended that, village land use planning and regular training should be taken into consideration for the aim of nature conservation.

Category 10: Best Public Service/Consultancy

Ecosystem-Based Adaptation in Rural Resilience (EbARR) Project in Tanzania

Development of Training Manuals & National wide Stakeholders Training on Ecosystem based Adaptation

Dr. Emma T. Liwenga, E.T., Dr. Catherine A. Masao, Dr. James G. Lyimo & Prof. Amos E. Majule

Abstract

The Institute of Resource Assessment has been engaged in development of Training Manuals for Ecosystem Based Adaptation under Vice President's Office (VPO), Division of Environment (DoE), Tanzania. Accordingly, a Handbook on Ecosystem Based Adaptation in Rural Resilience was produced. The aim of this publication is to enhance capacities among policymakers and practitioners on EbA (Ecosystem Based Adaptation) and to support institutions in successfully taking action on promoting EbA. This course therefore provides an introduction to the theory and to the practical aspects of EbA. The training package is primarily intended for professionals responsible for the planning and management of terrestrial and marine areas and their natural resources, not only from the environment sector, but also from other sectors (e.g. fisheries, coastal protection). It is particularly beneficial for participants working at the planning level and being actively involved in development and/or adaptation planning. Basic notions of climate change, adaptation and resilience are advantageous. The Institute of Resource Assessment (IRA), was accordingly engaged in training of national wide stakeholders on Ecosystem Based Adaptation.

Development of the Monitoring and Evaluation Strategy for the Ecosystem Based Approach for Rural Resilience (EbARR) Project.

Prof. Amos E. Majule, Dr. Emma T. Liwenga, E.T., Dr. Catherine A. Masao, Dr. James G. Lyimo

"**Ecosystem Based Adaptation for Rural Resilience in Tanzania**" (EbARR) is a project implemented under the VPO in collaboration with the Ministry of Agriculture, the Ministry in charge of Fisheries and other relevant stakeholders. The project intends to increase resilience to climate change in rural communities of Tanzania by strengthening ecosystem resilience and diversifying livelihoods. The project adopts a multi-regional focus in order to cover multiple agro-ecological zones and livelihood zones and to support several up-scaling strategies tailored to each zone. The program works closely with the communities to explore their challenges regarding climate change impacts and involving them to propose best solution against challenges before project interventions. The project sites include: Simanjiro District, Mvomero District, Mpwapwa District, Kishapu District in Tanzania Mainland and Kaskazini – A in Zanzibar. The project contributes to the overarching goal of reducing the vulnerability of rural populations. Specifically, the project has three main components that aim to:-

- Improve stakeholders' capacity to adapt to climate change through EbA approaches and undertake resilience building responses;
- Increase resilience in project sites through demonstration of EbA practices and improved livelihoods; and
- Strengthen information base on EbA supporting an up-scaling strategy.

The Institute of Resource Assessment (IRA) was engaged in the Development of M&E Strategy for EbARR project. IRA is currently responsible for conducting Participatory Monitoring and Evaluation of EbARR project activities in its 5 sites during its the project implementation period.

MBEYA COLLEGE OF HEALTH AND ALLIED SCIENCES (MCHAS)

Category 8: Best Postgraduate Student Project

Identification of Sickle Cell Patients in Chunya: Endeavors for Active Case Finding in Mbeya, Tanzania

Aman Twaha, Deocles Donatus, Khanafi A. Said, Moshi Moshi Shabani, Marygladness Ngeme, Maryjesca Mafie, Stamily A. Ramadhani, Abdulrahman Hussein, Bernard Mbwele

Background

World Health Organization estimated that over 5% of the world population carries genes of

hemoglobinopathies. Approximately 23 out of 10,000 people are affected with sickle cell disease (SCD), with the highest prevalence in African countries, 110 out of 10,000 people (Modell & Darlison, 2008).

Tanzania is the fourth country in the world to have the highest prevalence of SCD (*WHO.*, 2018.) 11,000 children being born with sickle cell disease annually and 90% of them don't reachto see their 5th birthday (Makani et al., 2018). However, very few SCD patients are identified in Tanzania.

The WHO (2005) observes that "chronic diseases can cause poverty in individuals and families, and draw them into a downward spiral of worsening disease and poverty". Many people in African populations are having traits for SCD with a higher risk of transmitting a gene to newly born babies (Wonkam et al., 2020).

Sickle cell disease patients are facing low quality of life, (Kluwer, 2019), financial burden (Tluway et al., 2017), psychological torture and stigmatization (Salih, 2020) mainly caused by demographic factors and knowledge of SCD (Madani et al., 2018). These are the main factors suspected to be the key contributing parameters of little detection rate. Little is known regarding strategies to identify patients with sickle cell disease.

The main objective of the study was to assess the opportunities for improving the identification of people with the risks of having a child affected by Sickle Cell Disease in Mbeya, Tanzania.

Methods

The cross-sectional study to identify knowledge and risk for sickle cell disease was conducted in Chunya district, Mbeya Region from 21st

February to 22nd February 2020. A special campaign was done in the secondary schools, hospitals and in the community on the availability of screening activity and blood testing for Sickle cell traits and Sickle cell disease. All participants who volunteered were asked for consent and accent (Parent or guardian) to be interviewedwere tested for Sickle Cell traits and Sickle Celt Disease using Sickle Scan Rapid test devices. Descriptive and analytical analysis were done using STATA version14. Multivariable regression was done using demographic factors and knowledge on sickle cell disease with outcomes of Sickle cell traits and SCD.

Results

A total of 523 participants were studies in Chunya by February 2020. The parlance of SCD (HbSS) was 10 out of 523 (1.91%) and the prevalence of Sickle Cell trait (HbAS) was 44 out of

523 (8.41%). There were 282 (53.92%) female and 282 (46.08%) males. In general, therespondents age ranged from 4 days to 64 years. A total of 49 tribes were studied (48 mother tribes and 49 father's tribes) from four facilities (Chunya District Hospital, Chalangwa Health Centre, Chalangwa Secondary School and Kiwanja secondary school). The tribes were grouped

into 3 main zones lake zone, southern zone and other zones (Eastern, Northern and central). There were 3 main factors associated with having sickle cell traits identification. These are, Mother's zonal tribe (χ^2 (2) = 69.98 p value < 0.001), Fathers zonal tribe (χ^2 (2) = 63.85 p value <0.001), Having a sibling with SCD (χ^2 (2) = 22.7 P value < 0.001. Having a father or a sibling with SCD was a serious risk for SCD inheritance.

Conclusion

There is a high prevalence of SCD and higher risk of SCD transmission in Mbeya, Southern highlands. There is a need for further screening the children in remotest areas so that to link them to sickle cell unit at Mbeya Zonal Referral Hospital for effective management and counseling.

Category 10: Best Public Service/Consultancy

Anomaly Detections Systems for Modelling Temporal Patterns Associated with Rift Valley Fever Disease Epidemics

Clement N. Mweya[1,2]*

[1]University of Dar es Salaam, Mbeya College of Health and Allied Sciences, Mbeya, Tanzania

[2]National Institute for Medical Research, Mbeya Medical Research Centre, Mbeya, Tanzania

Abstract

Background

Recent advancements in technology have made it possible to collect and simulate enormous amounts of disease data. However, timely prediction of vector-borne disease epidemics such as Rift Valley Fever (RVF) has paused many challenges.

Objective

The objective of this study is to identify unusual temporal patterns within previously simulated data that can be associated with disease epidemics and extend the model application for real-time epidemics detection.

Methods

Anomaly Detection Systems (ADS) algorithm was implemented in MATLAB R2015b to detect patterns in population dynamics of vectors and other variables associated with RVF epidemics. Data were trained to fit a model to estimate the parameters (μ, $\sigma 2$) of a machine learning (ML) Gaussian distribution algorithm implemented to select the threshold epsilon; ε using the F1 score values on a cross-validation set to determine low probability being more likely to be epidemic.

Results

Findings show that ADS to be effective in detecting epidemics. For a

daily period from 01 January 1994 to 30 December 1999, ADS was able to identify 85 epidemic days associated with previously recorded disease epidemic dates in Tanzania. Model testing on larger dataset had the best epsilon on cross-validation of $1.189075x10^{-5}$ with the best F1 on cross validation set found to be $9.52381x10^{-1}$

Conclusion and recommendations

ADS provide an alternative technique to identify temporal epidemics correctly based on a few true epidemics in simulation data. These findings underlie basis for additional studies on application of more advanced machine learning and artificial intelligence algorithms applied to high dimension dataset and improving epidemic detection performance.

Options for Improving the Outcomes of Caesarian Sections: Learning From the Factors Affecting the Maternal Hospital Stays

Bernard Mbwele, Cholela Bryson, Amni Twaha, Moshi Shabani, Deocles Donatus, Adovich Rivera, David Liss

Background

It is estimated that Caesarian sections (CS) in Africa attribute maternal deaths rate which is 50 times higher than in high-income countries. The unjustified variations of quality of CS by anesthesia type, timing of CS, type of CS, qualifications for surgeons are affecting the length of maternal hospital stays.

Methods

The cross-sectional study to review the quality of CS at Mbeya Zonal Referral Hospital (MZRH) was conducted in April 2020 using hospital data for CS from January 2019 to December 2019. Data were analyzed by STATA focusing on quality of CS, Complication of CS and presence of chronic diseases covariates in relation to maternal hospital stays. Chi squares and p-values were used to determine the presence of association and then odds ratios z test and confidence interval were used to determine the levels of significance in logistic regressions

Results

A total of 509 eligible mothers aged 27.8 ± 6.1 years and operated at the gestation age of 37± 2.6 weeks were studied. Maternal age, weight, gravidity, parity and number of children are the key demographic characteristics that affect the maternal hospital stays ($p<0.001$). Absence of haemorrhage records presents AOR 14.0; p value <0.001, Absence of delays of extraction records 0.1 p value =0.004, CS perfumed by obstetrician AOR 6.3 p value = 0.047, Registrar 2.8 p value = 0.046. The timing of CS had no significant association. The type of CS; Emergency and Urgency CS at AOR 0.1 and 0.15 p values at 0.01 and 0.04 respectively. Maternal indications AOR 11.7, $p<0.001$ and fetal indications AOR =5.1 p value = 0.005.

Conclusion

The quality and type and are important parameters to be monitored before, during and after surgery for improving the hospital stays and general CS outcome. The maternal and fetal indications and the complications of CS during and after surgery provide the best guidance to improve the outcome of CS.

MKWAWA UNIVERSITY COLLEGE OF EDUCATION (MUCE)

Category 1: Best Multidisciplinary Research Group Project

Antimicrobial Investigations of Tephrosia *vogelii Hook.* f From Hai District in Tanzania Towards Development of Antifungal Agents

Stephano Hanolo Mlozi, Musa Chacha and Juma A. Mmongoyo

Abstract

Infectious diseases are global health challenges. Fungal diseases is among of infectious that affect many people worldwide whereby more than 1.5 million people die of such diseases every year (Bongomin, *et al.*, 2017). The *Candida albicans* significantly contribute to deadly fungal infections to humans (Rodrigues and Albuquerque, 2018). The *Candida albicans* is opportunistic fungi, which cause fungal life-threatening diseases: skin infections, oral infections, lung infections and central nervous system (CDC, 2019). The synthetic fungal drugs such as fluconazole are increasingly becoming less effective due to resistance developed by the pathogenic fungi. Moreover, antibiotic resistance is pronounced globally, hence need mitigation. Thus, searching for alternative antimicrobial agents is inevitable. Medicinal plants are promising natural resources against fungal and bacterial diseases as they have been used since medieval times for treatment of human diseases. *Tephrosia vogelii* used traditionally for management of fungal and bacterial diseases is potential source of antimicrobial agents. It is in this vein this study aimed to investigate the antimicrobial activity of *T. vogelii* as trajectory to fight against prevailing fungal diseases.

Category 6: Best Innovator of the Year

Compounds for Inhibition of Fungal Mycotoxin and Sporulation

Dr. Juma Mmongoyo

Abstract

Diospyros mafiensis F. White is a medicinal shrub or small tree (6 m tall) widely distributed in the Zanzibar Inhambane regional mosaic and traditionally used to treat leprosy, diarrhoea, and skin fungal infections in Tanzania and Mozambique. Our objective was to determine the anti-aflatoxigenic properties of compounds from D. mafiensis root bark against vegetative growth, sporulation and aflatoxin production by Aspergillus flavus and Aspergillus parasiticus. Bioassay-guided extraction, fractionation, and isolation of bioactive compounds using A. parasiticus B62 were employed. The bioactive compounds were elucidated using 1H and 13CNMR and LC-MS. Growth inhibition was determined by measuring the colony diameter of A. flavus AF3357 and A. parasiticus SU-1 ATCC56775. Inhibitory effects on sporulation were estimated using a haemocytometer. Total aflatoxin was quantified by direct competitive enzyme-linked immunosorbent assay (ELISA). Bioactive compounds diosquinone (DQ) and 3-hydroxydiosquinone (3HDQ) were identified. DQ weakly inhibited A. flavus and A. parasiticus vegetative growth (MIC50 >100 µg/mL) and 3HDQ strongly inhibited A. flavus (MIC50 = 14.9 µg/mL) and A. parasiticus (MIC50 = 39.1 µg/mL). DQ strongly reduced total aflatoxin production by A. flavus from 157 to 36 ng/plate, and by A. parasiticus from 1,145 ng/plate to 45 ng/plate at 100 µg/mL. 3HDQ reduced total aflatoxin production by A. parasiticus from 1,145 to 32 ng/plate; stimulated production by A. flavus from 157 to 872 ng/plate at 12.5 µg/mL but reduced to 45 ng/plate at 100 µg/ mL. In summary, DQ and 3HDQ could be used as natural antifungal compounds to prevent mould growth and aflatoxin accumulation in food and feed.

Category 8: Best Postgraduate Student Project

GC-MS-Guided Determination of Chemical Composition and Bioactivity Potential of Extracts of *Diospyros Capricornuta* F. White

Name of student: *Princess William Ngowi*

Department: *Chemistry*

Princess William Ngowi[a, b,], Juma A. Mmongoyo[b], Lillian Daniel Kaale[a]*

Abstract

Diospyros capricornuta is an endemic species widely distributed along the coast of Tanzania that is used as a source of food condiment and traditional medicine. The aim of this study is to establish potential information on chemical compositions and bioactivity potential of *Diospyros capricornuta* from its leaves, stem and root bark extracts by using the gas chromatography mass spectrometry (GC-MS). The extracts were prepared by hydrodistillation, Soxhlet and maceration. A total of 36 compounds were identified among which; 2, 4-Di-tert-butylphenol and Octahydro-1H-Indole were found most abundant in the all types of extracts: leaves, stem and root barks of *D. capricornuta*.

Keywords: *Diospyros capricornuta*; GC-MS; Hydrodistillation; Soxhlet extraction; Maceration

Category 9: Best Undergraduate Student Project

Preparation of Charcoal Briquette by Using Waste Materials

Department: *Mathematics, Informatics and Physics*

Student names: *Robert Salum*

Robert Salum, Berwa Erick, Kulwa Shibela B, Mwaka Theresia Joseph, Mr. Emmanuel Chanai (Supervisor)

Abstract

Wood charcoal has been a primary fuel for cooking in Tanzania because

it is cheap and easily available. However, using wood charcoal has consequences on health, pollution in an environment because of smoking and deforestation. This study aims at providing charcoal briquette as an alternatively to wood charcoal using waste materials. These materials are: dry leaves, maize cobs and cassava flour as the binding agent which converted into charcoal briquette to provide much needed source of cheap fuel that is cleaner in burning. The wastes materials were burned under a limited supply of oxygen separately to form black ashes. The black ashes of the dry leaves and maize cobs and mixture of dry leaves with maize cobs were mixed with cassava flour in hot water separately. The mixture passed in the compressing bar to obtain the good shape of charcoal briquettes, the obtained charcoal briquettes were dried at sunlight to about 72 hours. After preparing each charcoal briquette, their densities, relative densities, ashes contents, moisture contents and temperature were determined. It was found that charcoal briquette of maize cobs contained less density of 0.79 compared to other charcoal briquettes. It was found that the maize cobs briquette contained ashes content of 16.04% and the moisture content of 13.24%. The charcoal briquette from mixture of leaves and maize cobs was found to have a temperature of 60°C and density of 1.03 the ashes content and moisture content were 24.47% and 15.5% respectively. Also the charcoal briquette from leaves was found to a temperature of 45°C and density of 1.01, the ashes content and the moisture content were 17.6% and 12.04% respectively. In this project we have noticed that charcoal briquette from maize cobs were good charcoal briquettes because it was ignited with higher temperature than other charcoal briquettes. The charcoal briquettes were tested and found that it ignites and burn with high efficiency without any negative effects to the surrounding environment and the people. Basing on this project work we recommend further studies to go beyond from where we have reached so as to obtain most efficiency charcoal briquettes.

Category 10: Best Public Service/Consultancy

Mwanzo Mzuri Project

Jacquline Amani and Daniel Fussy

Abstract

Mwanzo Mzuri (Good Start) project is an innovative **Action Research Project** intends to ensure that pre-school pupils will be enrolled in high quality and safe pre-primary education, which improves school readiness and supports them to reach their full potential. Under this innovative **Action Research Project intends to i*mprove School Readiness and Learning Outcomes for 3000 Children aged 3-6. The project is carried through:*** First, to conduct a baseline study on the status of teaching and learning conditions in 35 pre-schools in Tanzania. Second, to attend trainings and transmit the acquired skills by training the selected key participants in Iringa as key facilitators.

SCHOOL OF JOURNALISM AND MASS COMMUNICATION (SJMC)

Category 1: Best Multidisciplinary Research Group Project

Yearbook on Media Quality in Tanzania 2019

Principal Researcher: *Mr. Abdallah Katunzi*

Project budget: USD 209,806

Abstract

For the past five years, the quality of media reporting in Tanzania has been significantly deteriorating, with parrot reporting dominating media spaces and airtime. To understand and subsequently improve the quality of media reporting, the School of Journalism and Mass Communication (SJMC), with funding from the Switzerland Embassy in Tanzania, engaged media stakeholders in the country (editors, journalism trainers, representatives from media support organisations and representatives from the government–TCRA and the Tanzania Information Services—*Maelezo*) to deliberate on the quality criteria for use in assessing the reporting quality of the country's media. Using the agreed-upon quality indicators, we assessed the reporting quality of 28 media houses (10 newspapers, 5 national radio stations, 8 local radio stations, 5 national televisions and 1 online platform) on Tanzania Mainland and Zanzibar. With a sample of 2,007 media pieces, the study established that the overall Media Quality Index for all the media reviewed had dropped from 28% in 2018 to 26.8% in 2019. Media houses relied on even fewer sources than in 2018, with the overall multiple sourcing dropped by 5%. Worryingly, sources were unwilling to express their honest opinion, as the Yearbook's indicator "number of viewpoints and opinions" expressed in the media shrunk considerably compared to 2018. The inclusion of opposing viewpoints in media pieces, an essential element for fostering public debate, had also declined. The same decline applies to the number of viewpoints critical of the government. Implicitly, such decline signals a serious impediment to public discourse in 2019. On average, only 2.8% of media stories provided opposing viewpoints. Compared to 2018, media reporting has generally become more superficial. Indeed, the media did not critically elaborate on the news or programme's perspective. Mostly, bare and superficial facts were provided without reporting on the topics in-depth. Nevertheless, some improvements emerged, particularly on the provision of root causes, contextualising figures and in the number

of media houses using their initiatives to find stories than just relying on official calendar stories. Media stakeholders have attributed these professional lacunae to three major challenges: The current restrictive political environment that has led to excessive self-censorship within and outside of the media, tough economic environment, and lack of professional enforcement mechanism within newsrooms. To improve the quality of media reporting, the project has designed three approaches: It has created a Media Trainer Group (MTG)–a team of training editors drawn from media houses, media support organisations and training institutions, who are trained and thereafter tasked with training others, particularly in newsrooms and colleges; media visits whereby researchers visit media houses and share research findings with media managers and journalists; and incorporating the journalism quality indicators used in the study into journalism training curricula. The project has a webpage and reports can be accessed from https://sjmc.udsm.ac.tz/yearbook2019/.

Category 10: Best Public Service/Consultancy

'Earth our Home' Project

Facilitate Youth Reporters for 3 years on Earth Our Home Project (Using youth radio dialogues on Climate Change and Sustainable Livelihoods) in Kinondoni District Dar es Salaam

Project Coordinator: *Swaum M. Manengelo; School of Journalism and Mass Communication (SJMC), Mlimani Radio, Dar es Salaam, Tanzania*

Collaborating institutions: *The Children's Radio Foundation (CRF) from Mwanza.*

A three years project to facilitate Youth Reporters using youth radio dialogues on Climate Change and Sustainable Livelihoodsin Kinondoni District, Dar es Salaam.

Abstract

Despite projections that many parts of Africa will be severely affected by climate change impacts, many young Africans are disconnected from international climate action. Many feel powerless to mitigate climate

change or protect the natural resources in their communities.

While national contexts vary radically across Africa, rapidly growing African cities are being targeted by multinational corporations for market expansion, and youth are often the focus of this campaign to expand the consumer base. Unfortunately, there has been little consideration of the contribution of this accelerated consumption to climate change and environmental degradation -problems that are likely to drastically worsen the burden on communities in lower-income countries.

This project kick-starts transformational discussions around climate change and consumption across five African countries (South Africa, Zambia, Tanzania, Ivory Coast and Democratic Republic of Congo) through enabling youth to produce and broadcast outreach programmes from 50 local radio stations.

The project integrates the programs with social media and will create platforms to support the adoption of sustainable, low-impact ways of living among communities not traditionally involved in environmental protection.

Through this project, CRF aims to:-enable African youth to open up conversations about climate change and consumption through radio programmes that engage their local communities. Also support local communities to adopt low-impact lifestyles in line with deeper consideration of their needs in relation to their consumption and climate change in their local area. Run long-term, local campaigns that collectively raise the issue to national-level policymaking forum.

In Tanzania CRF partners also with Mwanza Youth and Children Network (MYCN) to execute the project across nine radio stations in five regions including Mlimani Radio (106.5 FM). This project expands on 5years of partnership with the aim of including climate change and sustainable livelihoods in the radio shows over a 3-year initiative.

Communicating in local languages, the reporters will drive long-term campaigns to: develop effective communication strategies to mobilise communities to map out their needs and shift unsustainable consumption patterns; share information and inspiring stories with new audiences; shift perceptions to encourage behaviour change; and collectively elevate these issues to the policy level using their own local experiences.

Activities include conducting monthly outreach and advocacy events and campaigns for maximum community, stakeholder and authorities'

engagement around the topics with implementing partner organizations, facilitate weekly production of climate change/sustainable living radio programs at all participating stations, Facilitate sharing of audio/ video content and outreach ideas and encourage collaboration across projects and platforms, Provide ongoing mentoring, capacity building, and program. Support to all project sites to create the radio shows and outreach campaigns.

SCHOOL OF AQUATIC SCIENCES AND FISHERIES TECHNOLOGY (SoAF)

Category 1: Best Multidisciplinary Research Group Project

Assessment of the Ecological Aspects of Microplastic Pollution in Dar es Salaam, Zanzibar and Mombasa Coastal Marine Environments (MICROMARINE)

Daniel A. Shilla[1], Charles M. Kosore[2], Yvonne Rose Shashoua[3], Farhan R. Khan[4], Oduor Nancy Awuor[2] and Dativa Joseph[5]*

[1]Department of Aquatic Sciences and Fisheries, University of Dar es Salaam, Dar es Salaam, Tanzania.

[2]Kenya Fisheries Marine Research Institute (KMFRI), Mombasa

[3]The Environmental Archaeology and Materials Science (M&M) group of the National Museum of Denmark (NMD)

[4]Department of Science and Environment, Roskilde University

[5]Dar es Salaam University College of Education, Chemistry Department

Countries covered: Tanzania (Dar es Salaam and Zanzibar) and Kenya

Period: November 2020 (2020-2021 FY)

Abstract

The three major aims of MICROMARINE project are: 1) to assess microplastic pollution in sediment, water and biota samples collected from Dar Es Salaam, Zanzibar and Mombasa (Kenya) coastal marine environments; 2) to identify the major polymers, organic polymer additives and organic pollutants present in microplastics in coastal marine environments of the participating member states; and 3) to investigate the interactions of microplastics and Persistent Organic Pollutants (POPs) with marine biota.

The preliminary results reveal the presence of surface water microplastics (MPs) in surface water, seabed sediments and *L. harak* in nearshore and territorial marine waters of East Africa. However, some analysis still going on in order to provide reasonable conclusions. Preparation of manuscripts will commence once the final results are complete. A manuscript entitled ***"Microplastic Pollution on the Surface Water Dar es Salaam and Zanzibar Marine Environment"*** is currently in its final state of preparation. Reconstruction of microplastics pollution history in sediments of intertidal areas by radiometric dating technique is

currently being carried out albeit it has been delayed by the COVID-19 pandemic. Part of this objective addresses issues on the examination of the stratigraphic and spatial trends of microplastics in sediment cores and determination of the sediment geochronology in marine coastal environments, as well as evaluation of the anthropogenic impacts and the associated risks of microplastics on sediments of marine coastal environments.

Experiments on the uptake, tissue distribution, final fate and effects of microplastics in organisms representing pelagic and benthic ecosystems, as well as the investigation on the interactions of microplastics and Persistent Organic Pollutants (POPs) with marine biota have just been started in November 2020. Experiments in this objective will cover: 1) determination of the impacts of microplastics ingestion on survival and reproduction of adult Artemia Spp, 2) effects of ingested waterborne polyethylene microspheres on growth (length, weight and condition index) and survival of *O. urolepis urolepis* Juveniles, 3) influence of microplastics on the reproductive (fecundity) energy deficit in adult *O. urolepis urolepis*, 4) assessment of microplastic transfer from Artemia Spp to *O. urolepis urolepis*, 5) examination of microplastic vector effect on bioavailability of organic pollutants to *O. urolepis urolepis* juveniles through food chain.

Objectives on fostering the development of a diverse scientifically trained workforce through coastal and ocean education programs and raising public awareness of the risks that microplastics pose to marine ecosystems and, eventually, human health will mainly be done in the next phase of this project. Initial steps such as development of tools have already started. This work will be executed in the next phase of the project.

Category 4: Researchers who have Attracted Large amount of Research Funds

Assessing the Biodiversity of Eels (Anguillidae and Congridae) of Tanzania: Promoting Sustainable Fisheries and Habitat Protection through Environmental Monitoring and Capacity Building (BIOEELS-TZ).

UDSM Registration number: *CoAF-AQF21010*

Name of Lead Researcher*: Dr. Lydia Gaspare Kanyairita*

Department*: Aquatic Sciences and Fisheries Technology*

Sponsors*: German Society for International Cooperation (Deutsche Gesellschaft für InternationaleZusammenarbeit GmbH, GIZ).*

Amount*: Euro 140,224 approximated TZS 350,560,000*

Abstract

BIOEELS-TZ project will apply an interdisciplinary approach that combines fishers' ecological knowledge and conventional sciences to bridge knowledge gaps through understanding the socio-ecological system dynamics of eel biodiversity and related artisanal coastal and estuarine fisheries in Tanzania. The main objectives are 1) to assess species composition, distribution, abundance of migratory eels and associated fish communities in selected coastal ecosystems and define ecosystem parameters 2) to reconstruct the dynamics of abundance and catch trends of eels 3) to evaluate socio-cultural and economic factors affecting the sustainability of eel fisheries and habitat quality 4) to develop concepts and applications for effective knowledge transfer and capacity building for biodiversity conservation and sustainable use. Diverse methods will be applied to meet the project objectives, fisheries surveys, market inspections, including interviews with fishers and their families as well as discussions with local communities and stakeholders involved in biodiversity conservation. The findings will provide knowledge on the status of eels to support efforts on ensuring sustainable fisheries and sound governance. It is expected that this work will contribute to the Tanzanian biodiversity initiatives of the Vice President's office on the implementation of the national biodiversity strategies and action plans. Furthermore, the BIOEELS-TZ project aims at a long-term research cooperation between the involved partner institutions in fisheries ecology

through knowledge transfer and capacity building. The project involves a Postdoctoral position hosted at the University of Dar es Salaam to provide training for involved early career scientists (students and MSc. candidates) and coordinate the work with national and international collaborators.

Billfish Interactions, Livelihoods, and Linkages for Fisheries Sustainability in the Western Indian Ocean (BILLFISH - WIO)

UDSM Registration number: *CoAF-AQF210018*

Name of Lead Researcher*: Dr. Lydia Gaspare Kanyairita*

Department*: Aquatic Sciences and Fisheries Technology*

Sponsors*: Western Indian Ocean Marine Science Association (WIOMSA) - Marine Science forManagement (MASMA)*

Amount*: USD 28721 approximated TZS 66,431,673*

Abstract

Large apex predators such as billfish are increasingly becoming vulnerable due to human-induced activities such as fishing. Yet, there exists a dearth of information on their catch dynamics, ecological and socio-economic aspects, and stock structure in the Western Indian Ocean (WIO) region. This challenge in turn impacts the sustainable utilization, conservation, and effective management of billfish across the WIO. On a broad scale, lack of data on billfish and related fisheries has implications on on-going efforts to achieve the transboundary national priorities, the goals of the Blue Economy Initiative, and key Sustainable Development Goals (SDGs) such as (i) improving food security and nutrition, (ii) promoting wellbeing of communities through equal resource allocation, and (iii) sustainably utilizing and conserving ocean resources, and (iv) assessing quantity of catch for growth of fishing capacity, and (v) restoring productivity of depleted fish stocks among others.

This first-ever comprehensive regional study in five countries (Kenya, Tanzania (including Zanzibar), Mozambique, Madagascar, and South Africa) aims to: (i) assess the historical and present status of billfish species; (ii) evaluate the socio-economic contribution and governance of billfish;

(iii) evaluate the genetic structure of key species; and (iv) determine the spatial and temporal distribution of billfish species. The BILLFISH -WIO project apply an interdisciplinary approach to bridge knowledge gaps through understanding billfish interactions (socio-ecological), associated livelihoods (socio-economic characteristics) and linkages (governance) which has manifold implications on overall species health, ecosystem functioning, food and economic security, and multiscale management given the transboundary nature of these species. Consequently, the project addresses several MASMA priority research themes including socio-ecological approaches for the sustainable use of marine living resources, contribution to food security and safety, and understanding biodiversity and its change. The BILLFISH-WIO initiative brings together a team of experts, researchers and stakeholders, including MSc. studentship which provide training for early career scientist, and enable documentation of in-country knowledge through reports and publications. Acknowledging the limited studies in the WIO on billfish and associated fisheries, the findings will provide significant knowledge to support efforts on ensuring sustainable fisheries, and food and economic security. In addition, this work complement on-going work by the Indian Ocean Tuna Commission (IOTC), National Fisheries Institutions, regional projects on improving data collection, management and assessments of vulnerable billfish stocks that are subject to overfishing. Overall, it supports the formation of recommendations for a management plan for billfish for the WIO.

Category 5: Researcher of the Year

Researcher: Dr. Samwel Mchele Limbu
Department: Aquaculture Technology

Short Profile

Dr. Samwel Mchele Limbu is a Lecturer of Aquaculture Nutrition and Environmental Health at the University of Dar es Salaam. Dr. Limbu has contributed significantly on research on aquaculture by publishing a total of 67 peer reviewed journal articles in international reputable journals. He has also published four chapters in two books. The knowledge generated has contributed significantly to awareness creation and improved

aquaculture production at local and international communities. Evidently, last year (2020-2021 academic year) Dr. Limbu advanced the field of aquaculture by publishing 16 articles in peer reviewed international journals and a book chapter in Springer. Of the 16 articles, 10 were published in Elsevier, 5 in Wiley and 1 each in Springer and Oxford Academic Press. Dr. Limbu's discoveries/innovation/ knowledge is visible in google scholar by the names Samwel Limbu. He is also registered on ORCID, Publons (Web of Sciences), Scopus and ResearchGate by using the same names. Dr. Limbu is currently contributing to the University funds through his two projects amounting 10,000 USD and 30,000 TZS. Dr. Limbu is currently a member of several international organizations such as Research Network for Sustainable Marine Aquaculture in Africa (AfriMAQUA), Sustainable Aquaculture Research Networks in Sub Saharan Africa (SARNISSA) and Western Indian Ocean Marine Science Association (WIOMSA).

Based on his research performance, Dr. Limbu has obtained several local and international awards during his career. His selected awards include the Best African Student in China awarded by the Pride of Asian Pacific Awards 2019 and Winner at the University Level as the Best Researcher with the highest number of Publications during the fifth University of Dar es Salaam Research week held between 6th to 8th May, 2019. Recently, Dr. Limbu was awarded as one of the Best Graduating Students with good academic records and outstanding performance for 2020 East China Normal University Graduating Students. He was also appointed as an Alumni Messenger of 2020 graduates of East China Normal University.

Dr. Limbu's outstanding research achievement has enabled him to be nominated as a Tanzanian Young Academy of Science under Tanzania Academy of Sciences (TAAS). Moreover, he has also been nominated as an Associate Editor for the Journal of Applied Aquaculture (Taylor & Francis), Review Editor for Frontiers in Animal Science and Production - Product Quality and Frontiers in Tropical Diseases - Antimicrobial Resistance, both from Frontiers Media SA.

Dr. Limbu's published materials are highly used by researchers globally. He currently has 1025 Google scholar citations and 19 *h*-index, 662 citations and 16 *h*-index in Scopus and 555 citations and 14 *h*-index in Publons based on 18/05/2021 information. From January 2020 to 26th April 2021, Dr. Limbu published 16 articles and one chapter in a Book.

Category 6: Best Innovator of the Year

Improved Fishing through Development of Eco-Friendly Multi-Entranced Durable and GPS Based Fishing Traps

Principal Innovator: *Hemed Shaame*

Authors: Hemedi Shaame, Walid Omari, Changoma Francis Marco

Abstract

Fisheries activities in Tanzania are dominated by artisanal fishermen to approximately 90%. They are practicing fishing using local fishing gears such as Dema traps for subsistence and livelihood wellbeing. These fishing traps used by the artisanal fishers have low catchability efficiency leading to poor catches and are also poorly deployed leading to theft or being lost in the ocean. Moreover, the local fishing traps are made of non-durable wooden materials which threaten trees biodiversity and sustainability. Thus this project designed a durable fish trap made of handmade nylon gill net, supported with the detachable iron frames and having multi entrances for enhancing fish catchability. The prototype is also fitted with artificial grasses at the base of the prototype to mimic the environment that lures the fish and become easily trapped.The trap prototype is painted with green color that matches with the benthic environment. In order to improve safety and prevent theft of the deployed traps, this prototype is GPS installed and can only be located using Digital GPS device. These improvements in the structures of this prototype increase catching efficiencies, contribute to reductions in the cutting down of trees for local traps making, improving the livelihoods of the artisanal fishermen through increased catches and encourage further technological improvements of the local fishing gears and fishing practices for the potential growth and development of the fisheries industry and blue economy in Tanzania. This is the first prototype designed and linked with technology aiming at improving artisanal fisheries in Tanzania.

Improving Shelf life and Acceptability of Nile Perch Fish Fillets through Value Addition Technology

Principal Innovator: *Vanessa Yaled*

Department*: Aquatic Sciences and Fisheries Technology*

Authors: Shadia Nagunwa Ruben, Vanessa Baguma Yaled, Nusra Mfikilwa, LydiaGaspare Kanyairita, Pazi Semili

Department of aquatic sciences and Fisheries Technology

Abstract

Fresh Nile perch fish are poorly consumed along the coastal regions geared by individual perceptions, smell and appearances. In order to discourage under consumption and utilization, this project aimed at increasing acceptability, palatability and shelf life of Nile perch fillets through improved processing and

development of different value added products. Value products were produced by deboning, cutting into designed shapes, breading, buttering and deep frying. To enhance palatability and increase shelf life of the products, garlic, green chili, common salts and vinegar were introduced into different concentrations (w/w). Value added Nile perch products have shown to have improved and extended shelf life of six days from the day of manufacture. These products provide small scale business and employment opportunities to the community through adoption of innovative value addition techniques. This project will contribute to the improvement of per capital fish consumptions and awareness to the utilization potential of low value and undervalued fish species of marine and fresh water origin.

Category 9: Best Undergraduate Student Project

Using Chicken and Duck Heads for Propagation of African Sharptooth Catfish: Sustainable, Innovative and Cheaper Approach for Increased Fish Production

Student names: *Arnold Amon Shoko*

Authors: Shoko Arnold Amon[1], Samweli Mchele Limbu[2]

Department of aquaculture technology

Abstract

The African sharp tooth catfish is an ideal species for aquaculture in Africa. It does not reproduce in captivity and thus its propagation necessitates the need to sacrifice of up to three catfish as a source of pituitary gland for induced ovulation. This study aimed at reducing catfish sacrifices by using Chicken and duck heads as alternative sources of pituitary gland for African sharptooth catfish propagation, which are cost effective, easily available and acceptable byconsumers as food. Chicken and duck heads were obtained from a nearby commercial poultry farm. The top part of the head skulls of each head was removed by using sharp knife. Then the pituitary glands will be extracted and collected from the brain mass after removing the top skull. A single dose of 4 ml of pituitary extracts were injected intraperitoneal and preliminary results showed that chicken pituitary extracts induced ovulation.

SCHOOL OF EDUCATION (SoED)

Category 2: Units/Departments that have Excelled in Attracting Large Amount of Research Funds

Implementation of Research on Satellite INSET Models for Improved Equitable Access and Quality Early Learning in Tanzania

***Name of Lead Researcher**: Dr. Richard Shukia*

***Department**: Educational Foundations, Management and Lifelong Learning*

***Sponsor**: UNICEF*

***Amount**: TZS 452,580,000*

Abstract

Tanzania seeks to use education as an instrument to achieve its development goals. While pre-primary education expansion is lauded, the increased demand for pre-primary education far outstrips supply as there are still a large number of children, particularly in marginalised localities who do not have access to education, much less to quality early learning opportunities. This project seeks to further pre-primary school access to young children who could not access 'formal' school for various reasons including long distance to school, through satellite centres model. Consistent with satellite initiative, the government of Tanzania is committed to improving the quality and professionalism of pre-primary and early grades teachers, and teaching and learning through INSET. The implementation research aims to generating evidence of how the satellite and INSET models lead to improved foundational learning outcomes at pre-primary and early primary so that they could be effectively used to scale up access to quality early learning nationally. It is an 18 months research project informed by qualitative and quantitative methodologies involving researchers of multidisciplinary background. It is implemented in 7 districts off Tanzania Mainland (Mbeya DC, Mbarali, Mufindi, Kondoa, Mpwapwa, Ukerewe, Sengerema and Biharamulo). Preliminary findings are suggestive that the satellite model is timely and relevant. It has promoted access to pre-primary education for children in geographically deprived areas. Despite off the challenges in the implementation, the satellite centres are likely to transform to become primary schools and can sustain.

Category 4: Researchers who have Attracted Large Amount of Research Funds

Physical Activity Mediates, Fear, Anxiety and Depression Associated with the COVID-19 Pandemic

***Name of Lead Researcher**: Dr. L. Malete*

***Department**: Physical Education and Sport Sciences*

***Researchers:** Team from UDSM for Tanzania; Dr Joyce Ndabi - Co PI Tanzania. Dr Mabagala S, Dr Pangani I, Mr Alfa Simwanza, Mr Daudi Massima ,Mr Materu P, Mr Mgosho M and Ms Wellu Kiula*

***Sponsors**: Africa Rapid Grant Fund- South Africa*

***Amount**: TZS 36,000,000*

Abstract

This research study focuses on analysis of speech through mobile devices, combined with online physical activity survey to examine if level of physical activity mediates the level of fear, anxiety, depression, and coping associated with Covid-19 in the general population in Ghana, Botswana, Tanzania, and Nigeria.

There are concerns that the COVID-19pandemic is having a significant impact on mental health of populations across the globe. This could have dire consequences on African populations because of under-resourced health systems, especially in the area of mental health. Research evidence has demonstrated that regular Physical Activity (PA), especially moderate to low intensity exercise is associated with low levels of depression and improved well-being. Furthermore, regular exercise has been found to be predictive of improved cognitive functioning and overall mental health. COVID-19 lockdowns, quarantines, and travel restrictions are likely to have negatively affected regular PA and exercise. Investigating the pandemic's impact on mental health of African populations and if PA in mediates these effects is urgent and key to developing targeted and effective strategies to address the challenge.

An online survey will be administered to assess general well-being, anxiety depression and coping comprising: Demographic information items, the novel non-linguistic speech analysis app, International Physical Activity Questionnaire (IPAQ), General Anxiety Disorder-7 (GAD-7),

and Patient Health Questionnaire-9 (PHQ9). Data collection will be done in multiple sessions over ten months. In the first six weeks, phase one participants from the health care system and universities will be asked to complete online assessments once a week. Thereafter they will complete the assessments every other week for three months. Monthly assessments will be done for an additional 5 months. These assessment periods are designed to monitor changes in PA, anxiety, depression, and coping related to COVID-19 restrictions, the period under restrictions (a period when a second surge lockdown occurs), and the period after government restrictions have been fully lifted. The lockdowns and reopening are expected to vary from one country to the next. The survey will be extended to the public in phase three.

Early detection of disease risk factors, and impact on physical and emotional health provides key information for crafting appropriate mitigation strategies. This study is expected to demonstrate increases in levels of fear, anxiety and depression and inactivity as a result of Covid-19 and lock downs in countries.

Category 5: Researcher of the Year

Researcher: Dr. George Kahangwa

Department: Educational Foundations, Management and Lifelong Learning

Resume'

George Leonard Kahangwa (PhD.) is a Senior lecturer in Educational Management/Leadership and Policy Studies at the University of Dar es Salaam, School of Education where he has been employed since 2007. He is also currently a Director of the Centre for Educational Research and Professional Development, at the University. Dr. Kahangwa is also a former Chairperson of the University of Dar es Salaam Academic Staff Assembly (UDASA) and has been a member of the University Council from 2016 to 2020. He holds a PhD (2013) in Education from the University of Bristol, United Kingdom; Master of Arts in Education (2007) and Bachelor of Arts with Education (2004) from University of

Dar es Salaam, Tanzania. He has researched and published on issues that influence education policy making and development. His work also touches issues related to education quality, higher education and knowledge-based economy. In 202/21 academic year he has taken part in an Impelemtation research on Inservice training and Satelllite school models in Tanzania; Examining School Performance Disparity in Lushoto District; Assessment of Headteachers' Training Needs in Zanzibar; Education Marketing Strategies in Dar es Salaam; as well as The Patterns of Lower Respiratory Tract Infection in Relation to Hematological Thrombotic Indices in Mbeya. Apart from undertaking research and lecturing, he has been involved in several consultancies that include development of policy and plans for education, policy reviews, and facilitating continuous professional development for educators.

Category 8: Best Postgraduate Student Project

Recruitment Practices and Quality of Recruited Teachers in Dodoma Municipality Government Secondary Schools

Name of student: Mr. Daudi Norbert Massima

Department of Educational Foundations, Management & Lifelong Learning

Abstract

For the young generation to be able to take over on various responsibilities they ought to be prepared and trained effectively. The facilitation of young people to reach their full potentials needs competent and committed teachers. Despite the fact that teachers are very crucial for the running of secondary schools in Tanzania, there are evidences that teachers that are recruited in schools lack qualifications. Reports show that among five commercial teachers, two of them were either not competent in all commercial topics or not conversant in using English as a medium of instruction. Also there are some teachers working in government schools cannot prepare professional documents such as scheme of work, lesson plan and lesson notes. Besides, it is reported that government schools

are staffed with teachers who are not committed and who cannot deliver relevant knowledge on particular subjects. Thus, in this regard the researcher wanted to establish whether or not recruitment practices had something to do with the quality of recruited teachers. As such, the current study wanted to assess recruitment practices and the quality of recruited teachers in government secondary schools. The study was conducted in Dodoma Municipality covering 12 secondary schools. The study employed qualitative research approach with descriptive case study research design to collect and analyze data. The study had sample size of 28 participants comprising of 1 PO-RALG director of Education Administrative Division, 1 zonal secondary school Quality Assurer, 1 MED, 1 MSEO, 12 HoSS and 12 teachers. The study revealed that secondary school teachers in Tanzania were recruited either direct from colleges and Universities or through applying following the advertised teaching posts to the ministry of education science and technology. However, there was neither campus nor advertisement leading to involve screening-interviews in choosing teachers for government secondary schools. Three criteria (valid academic certificates of both ordinary and advanced secondary school, birth certificates and profession certificates granted from registered and authorized colleges and Universities) out of six proposed by Teachers' Service Commission Regulation (2016) were mainly considered in recruiting new teachers for government secondary schools. The other three criteria are demonstrating high degree of professional competence, teaching experience and showing good character that were found normally not adhered to.

SCHOOL OF MINES AND GEOSCIENCES (SoMG)

Category 1: Best Multidisciplinary Research Group

Discovery of Oil Seeps in the Rukwa Rift Basin, Tanzania

Principal Investigator: Name: Prof. Evelyne Mbede
Department: Petroleum Science and Engineering
Contact address: Geosciences, SoMG,

Abstract

The Rukwa Rift Basin (RRB) of southwestern Tanzania was first subjected to hydrocarbon exploration during the 1980s regional exploration activities that were influenced by the oil discoveries in the South Sudan rifts. Although very limited exploration activities were conducted in the Rukwa Rift, preliminary analyses of the data indicated the presence of a working petroleum system in the basin. The likely oil-prone source conditions are believed to have developed during the late Oligocene—Miocene, and are linked to rapid rift initiation phase and development of lacustrine environments with deposition fresh-water algae. The geothermal gradient deduced from the Galula-1 and Ivuna-1 wells temperature logs indicated the source rock maturation into the oil-window at a depth of 2591 m. Furthermore, analysis of gravity and aeromagnetic data as well as the subsequent geologic studies in the last two decades have revealed the presence of thick potential clastic reservoir units with fairly good porosity, ranging from 10% to 28% in Red Sandstone Group and 8—18% in the Lake Beds strata. These findings, along with discoveries of hydrocarbons in the similar, co-evolved Albertine Graben (Uganda) and Turkana rift (Lokichar Basin) of northern Kenya, prompted a renewed exploration activity in the RRB by oil companies in recent years. Despite the potential for hydrocarbons exploration and similarity in structure and basin development history to hydrocarbon-bearing basins in Kenya and Uganda, no discovery ofany hydrocarbon indications, let alone economically relevant accumulations, has been reported in the RRB to date. This study report newly discovered oil seeps in the Rukwa Rift Basin, identified in two remote localities south of Lake Rukwa. Gas chromatography mass-spectrometry (GC-MS) analysis of extracts of two hydrocarbon-impregnated rock and soil samples reveal a normal alkanes pattern, which indicate the occurrence of hydrocarbons. This is the first direct indication of a working hydrocarbon system in the

basin. Both samples show high predominance distribution of odd to even normal alkane, with maxima at C29, which suggest terrestrial sourced organic matter and/or low maturity level of the organic matter.

Category 5: Researcher of the Year

Researcher: Prof. Shukrani Manya

Department: Geosciences

Hon. Prof. Shukrani Manya (MP – Deputy Minister for Minerals)

Introduction

Prof. Shukrani Manya is one of the famous persons in Tanzania, both locally and internationally especially following his role in leading the Mining Commision Committee for Investigating Composition of Mineral Concentrates from Mines in Tanzania –'the Makinikia saga'- and their Trading Systems. The findings of this Committee revealed significant short-falls in Mineral Act, regulations, and overall handing of mineral sector, and led to amendment of the Mineral Act, aimed at safeguarding public interests in mineral agreements. Prof. Manya received both of his first and second Degrees from the University of Dar es Salaam. He also attained his PhD from Japan (Misasa University). As a staff of the University of Dar es Salaam, Prof. Manya excelled through several ranks in the academic arena up to Full Professor of Geology at the University of Dar es Salaam. He has held a number of posts in academic leaderships at the University of Dar es Salaam and Universities in the region, from Head of Department of Geology of the University of Dar es Salaam for 6 years and Director of Research for 3 years before his presidential appointment to the Ministry of Minerals. He served as an editor in the Journal of African Earth Sciences to-date. He has served in a number of UDSM committees and boards during his service at this University. Along with lecturing, consultancy and researching, Prof. Manya has managed and coordinated major projects including Sida-SAREC, NORAD, PITRO and World Bank funded projects, he has also successfully supervised 5 MSc,

and published more than 40 research articles in internationally recognized Journals, and wrote more than 5 technical reports. Professor Manya has been an exemplary Earth Science Scholar and has engineered transformation of the Mining sector into a reputable, modern and up-to-date with quality services. The University of Dar es Salaam recently recognised Prof. Manya as one of researchers that have published in cutting-edge, internationally reputable journals.

Prof. Manya's Curriculum Vitae is attached with the nomination.

Category 8: Best Postgraduate Research Group Project

The Combined Impact of Urbanization and Climate Change Variability on Food: A Case Study of Msimbazi Watershed in Dar es Salaam,Tanzania

Name of the student: *Befrina Igulu*

Department: *Geosciences*

Name: Befrina Igulu Contact address: Department of Geosciences, School of Mines and Geosciences

Abstract

This study aimed to analyse and predict the combined impact of urbanization and climate change variability on flooding disaster within the Msimbazi watershed Dar es Salaam. Urbanisation is measured by the change in impervious surface area (ISA) which was assessed through Landsat images collected in 1989, 1995, 2009 and 2015. The ISA was analysed by the minimum noise fraction in combination with the linear spectral mixture analysis method and projected to future 30 and 50 years using the Markov chain cellular automata method. Daily rainfall data from 1985 to 2015 were used to analyse total annual, seasonal and extreme rainfall events variation using non-parametric Mann Kendal. Rainfall-runoff of Msimbazi watershed was simulated by hydrological modal of HEC-HMS to the understanding trend of flood peak flows and discharge volumes from 1985 to 2015 based on soil conservation service curve number. The impact of urbanisation on

flood was assessed using a comparison of sub-watersheds and impervious surface area impact index. The result indicated that urbanisation within the Msimbazi watershed has increased from 11% in 1989to 53% in 2015 and expected to increase to 60% by 2050. The total annual rainfall has decreased at a rate of 5.8 to 8.6 mm/year meanwhile extreme rainfall event are significantly increasing at a rate of 0.2 to 0.87mm/ year within the Watershed. The curve number 5 indicating the runoff potential of the watershed has increased from 1985 to 2015 with a spatial distribution of 70 to 90 in 2015. The overall trend of surface runoff was found to significantly increased from 1985 to 2015 as a result of the ongoing urbanisation reducing the surface area for infiltration and increases the concentration time. Urbanisation increased loods peak discharge by 24% in W820, 337% in W630, 164% in W480, 60% in W510 and590 from 1985 to 2015. Impervious Surface Area Impact index varies from 4 to 107% among sub-watersheds with the highest in downstream sub-watersheds that are highly urbanised. The multiple regression modal of floods prediction developed for sub-watershed can be used in the prediction of future floods peak discharges in events of climate change and increased urbanisation. The modal indicate rainfall as a primary cause of flood amplified by urbanization. Finally, the finding indicates that the effect of urbanisation on the flood decreases with an increase in catchment-scale size and therefore smaller watershed are affected more.

Category 10: Best Public Service/Consultancy

Geological, Hydrogeological and Geophysical Investigations of the Source and Cause of Flowing Water Inside the Moshi International Bus Terminal at Ngangamfumuni and Surrounding Areas Moshi Municipal, Kilimanjaro Region

By

Majura Songo, Dr. Simon Melchioly and Dr. Remigius Gama

Department of Geosciences

Abstract

The artesian flowing waters at the newly constructed Moshi International Bus Terminal and surrounding areas in Moshi Municipal, Kilimanjaro Region compelled the Regional Commissioner for Kilimanjaro region to request the University of Dar es Salaam management to assist in exploring wide solutions to solve the problem. The Vice Chancellor of the University of Dar es Salaam decided to fund the study as part of the community services. A team of three scientists mentioned above were sent in Moshi for the study for three weeks their role was to come up with a permanent solution for preventing the flowing water. The main objective was to investigate the source and cause of the flowing water in and outside the Moshi International Bus Terminal site and propose measures to be taken to permanently avoid adverse impacts such as land and structure subsidence and to make sure that the flowing waters will not hinder the proposed economic activities at the site.

To achieve this objective, an interdisciplinary approaches were applied. The approaches included a desk work study, combination of airborne magnetic data interpretations, reconnaissance survey, geological and hydrogeological mapping. Two geophysical methods namely Electrical Resistivity Tomography (ERT) and Vertical Electrical Sounding (VES) were deployed in the area to map structural features such as weathered formations, fractures and faults which are the sources of both shallow and deep aquifers. These methods are very powerful tools for the investigation of the subsurface structures. The preliminary resulting analyses of the data collected during surveys have been used as supportive data for the lithologic log and geological cross-section for identifying the size of the aquifers and structural features. A total of 15 ERT profiles and 7 VES

were surveyed. The locations of surveys stations were determined using Garmin GPS receiver.

Communities and local leaders were fully involved in the study by providing past and present historical background of the problem through interviews. Tapping into the experience and knowledge of local communities provided valuable insights into the hydrological and hydrogeological environments as well as land use. Communities contributed local knowledge about groundwater occurrence that were usefully supplemented to the data provided by the formal investigation techniques. They were also ready to work with the team to gain new scientific knowledge on the problem, as well as environmental protection techniques during such disasters. The gained knowledge changed their perceptions on handling the situation.

The results indicated presence of aquifer zones that are structurally controlled at shallow depths below 20 m from the surface in and outside the proposed bus terminal. The building is constructed at the intersection of two fractures running N-S and NW-SE. It was established that the source and cause of flowing waters in the proposed bus terminal and nearby areas is the over saturation of water in the rocks, rock matrix and existing faults that are passing at the site as well as aquifer rejuvenation. The replenishment of water has exceeded the carrying capacity of the aquifers hence build up pore pressure that cause the water to be under pressure.

The following measures were proposed to permanently avoid the flowing water in such a way that the terminal building and water should be there without affecting each other:

- Excavation/construction of slope drainage trenches of 5 meter width and depth in all areas that have sufficient gradient to allow flow of water under gravity.
- Installation of one sided and gravel packed screened plastic pipes at all areas where emerging springs can be seen and these pipes should be connected to the slope drainage trenches in order to drain the water into the excavated drainage trenches.
- For short term measures, three boreholes were drilled and pumped to reduce the hydrostatic pressures, later automatic sensors should be installed to monitor the water level.
- Undertake detailed studies to map and identify all the recharge

areas.

The results were orally presented to the RC and other invited stakeholders. Final report was also presented for implementation.

Hydrogeological and Geophysical Survey for Horohoro Border Village and Nearby Areas, Mkinga District Council, Tanga Region

By

Majura Songo, Dr. Simon Melchioly and Dr. Remigius Gama

In collaboration with

Regional Rural Water Supply Authority (RUWASA) and Pangani River Basin Water Office (PRBWO)

Abstract

Lack of fresh water supply at the Horohoro Border village compelled the Tanga Regional Commissioner (RC) to explore wide solutions, which included groundwater prospects. The RC requested the University of Dar es Salaam to conduct the groundwater studies. The Vice Chancellor of the University of Dar es Salaam decided to fund the study as part of the community services. A team of three scientists mentioned above were sent in Tanga region for the study for two weeks, their role was to come up with a permanent solution for water supply shortage in the area in order to: provide an alternative to income generation during drought period; improve quality and quantity of water, promote health betterment and sanitation; reduce conflicts between cultivators and pastoralists in water usage; improve women's and children social life and give them more time to engage into more progressive programmes. The main objective of the study was to explore and identify sites that could have fresh groundwater as the area has been regarded as a saline water zone. Sources that can provide adequate, safe and clean supply of water to the community was one of the prerequisites for the study.

Although groundwater is not visible from the surface, there are methods that can be employed to locate it from the surface. Such methods are often used in the initial reconnaissance, because they work out much cheaper

than sinking of bore holes in search for water. The hydrogeological and geophysical methods proved to be successful tools for groundwater investigation in the area. The scope of work were conducted in four routine phases: Collection of existing data records and analyzing them (desk work and literature review); Hydrogeological mapping/field reconnaissance; Geophysical surveys –electrical resistivity surveys, Data processing, interpretation, report writing and presentation; Client`s decision on the drilling of exploratory boreholes as per recommendations. Twenty four (24) geoelectric profiles were carried out at different parts of the study area to determine the groundwater development potential zones.

This assignment was successfully accomplished in collaboration with the Rural Water Supply Authority (RUWASA), Tanga Regional Office and the Pangani Basin Water Board Office (PBWBO) for Zigi and Umba River Catchment office in Tanga. Local leaders and villagers in four villages having a total of about thirty thousand people were fully involved in site selections and investigations. The involvement of local communities provided more opportunity to identify, assess, use or adapt local knowledge, e.g. in understanding user preferences, and local indicators of water availability (vegetation, topography, etc.). Involving communities helps in building community ownership of the water source and acceptance of follow-on responsibilities. Local people were likely to know their environment well, and provided the history of water development within their villages – successes, failures, and the reasons behind them. Older members of the community particularly women were rich source of information, not least because the burden of water collection typically falls on them.

UNIVERSITY OF DAR ES SALAAM BUSINESS SCHOOL (UDBS)

Category 4: Researcher(s) who have Attracted Large Amount of Research Funds

Sustainable Resources Management and Food Supply

Principal Investigator: Dr. Tumsifu Elly

***Department**: General Management*

Total Research Funds: Euro 1,100,000 approximated TZS 2,544,300,000

Aim: To create an African Center of Excellence for Sustainable Resource Management and Food Supply at the University of Dar es Salaam Business School

Duration: 5 years (2021-2025)

Funder: DAAD- Germany

Partner Institutions: University of Dar es Salaam Business School, Kuehne Foundation, and Kühne Logistics University

Project Value: Approx. Euro 1,100,000

Project Activities (Abridged)

- Training of at least 48 Master Students
- Training of at least 6 PhD
- Staff and Students exchange
- Joint Research between KLU and UDBS Academic Staff
- Develop two master Program

Project Coordination

Dr. Tumsifu Elly- Project coordinator/Manager

Prof. Ulingeta Mbamba: Project Lead academic programs

Category 5: Researcher of the Year

Name of the Researcher: Prof. Dev Jani

Name of Department: Marketing

Dev Jani

Short Biography

Dev Jani is an Associate Professor at the University of Dar es Salaam Business School within the Department of Marketing. He obtained his PhD from Dong-A University, South Korea specializing in tourism management. He has a MBA (marketing) from the University of Dar es Salaam and a B.Sc (Animal Science) from the Sokoine University of Agriculture. His research revolves around sustainable tourism development and management. He has published more than 40 papers in reputable peer-reviewed international journals including top notch Q1-SSCI journals. Some of his publications have been globally applauded; in 2013 his paper titled "Personality, social comparison, consumption emotions, satisfaction, and behavioral intentions: how do these and other factors relate in a hotel setting?" emerged as an outstanding paper of the year in the *International Journal of Contemporary Hospitality Management* (IJCHM) 25 (7). In 2011, his paper was awarded as the best paper (Personality and tourists' Internet behavior) during the ENTER tourism conference that focuses on Information and Communication Technologies in tourism. His current research focuses on inclusive and equitable aspects of sustainable tourism in developing countries aiming an enhancing the resilience of emerging destinations.

ORCID: 0000-0002-3760-6714

Category 6: Unit/Department/Group that has Attracted Large Amount of Research Funds

Sustainable Resources Management and Food Supply

***Researchers**: Dr. Tumsifu Elly*

***Department**: General Management*

Amount of Research Funds: Euro 1,100,000 approximated TZS 2,544,300,000

Principal Investigator: Dr. Tumsifu Elly

Department: General Management

Total Research Funds: Euro 1,100,000 approximated TZS 2,544,300,000

Aim: To create an African Center of Excellence for Sustainable Resource Management and Food Supply at the University of Dar es Salaam Business School

Duration: 5 years (2021-2025)

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Project Value: Approx. Euro 1,100,000

Project Activities (Abridged)

- Training of at least 48 Master Students
- Training of at least 6 PhD
- Staff and Students exchange
- Joint Research between KLU and UDBS Academic Staff
- Develop two master Program

Project Coordination

Dr. Tumsifu Elly- Project coordinator/Manager

Prof. Ulingeta Mbamba: Project Lead academic programs

Category 8: Best Postgraduate Research

Critical Internal Firm's Factors Influencing Export Performance of Manufactured Wood Furniture in Tanzania

Name of the Student: Edmund Augustino

Department: General Management

Edmund Augustino

Master of Business Administration Dissertation

November, 2020

Abstract

The objective of this study was to determine the critical internal firm's factors influencing the export performance of manufactured wood furniture in Tanzania. Specifically, the study intended to assess the influence of the firm's export strategy, firm's internal resources, and firm's export procedure knowledge on the export performance of manufactured wood furniture. The study adopted an explanatory research design. The data was collected by using a questionnaire from 60 randomly sampled wood furniture manufacturers located in Dar es Salaam. Findings show that: firm's financial assets, human resources, knowledge of financial and non-financial incentives, are significant contributor to export performance of manufactured wood furniture. In contrast, firm's physical assets, technological assets, knowledge of export laws and regulations, and export procedure knowledge showed little significance in the export performance of manufactured wood furniture. To enhance the export performance of manufactured wood furniture. The study recommends the establishment of furniture sector specific export development fund and outreach programs for awareness creation on available financial and non-financial incentives. Also, wood furniture manufacturing exporting firms' management should ensure critical firms' internal resources identified in this study, as a significant contributor to export performance of manufactured wood furniture, are adequately available for smooth operations of export activities.

Category 10: Best Public Service/Consultancy

Participatory Innovation Videos for an Inclusive and Sustainable Waste Management

Project Investigator: Prof. Goodluck Charles and Dr. Fred P. Okangi

Project Value: TZS. 58,000,000

Funder: Gothenburg University

Project Objectives

This project aims at diffusing the grassroots innovations developed by these WPO (in terms of technology, gender, governance, finance, and market) through 1. participatory video production and 2. a policy brief targeting WPO and local governments. 1) First, the innovation videos will be produced by local teams, instructed by a Communicator, with the participation of WPO in Argentina, Brazil, Kenya and Tanzania.

Expected Outputs:

Production of Videos Related to Recycling and Waste Management from the Researchers, Waste Organization Pickers, and Local Government Officials to be used in dissemination of the findings related to recycling to be used as self-educational materials, the videos will be spread out world-wide.

The result of this project it is expected to improve the knowledge among municipal officers and WPO on grassroots innovations for inclusive waste management in Kenya and Tanzania as well as the development of what could be the foundation for a future network of East African WPO. Besides a number of WPO attending meetings and participating in the Global WPO Conference, communication materials will be available open-source spilling out the results of this project beyond the geographic boundaries of Kenya and Tanzania.

-Research reports

UNIVERSITY OF DAR ES SALAAM SCHOOL OF ECONOMICS (UDSE)

Category 1: Best Multidisciplinary Research Group Project

Agricultural Marketing Policies and Household Diet, Quality, and Nutrition in Tanzania

Principal Investigator: *Martin Chegere, Department of Economics, University of Dar es Salaam.*

Other Researchers: *Monica Kauky, Dar es Salaam University College of Education*

Funded by*: African Economic Research Consortium*

Amount: TZS 28,406,250.00

Abstract

Availability and accessibility of proper amount and variety of food is among important determinants of nutritional status. It is argued that promotion of consumption of a high quality, diverse diet that provides adequate energy and nutrients needed for a good health is a sustainable way of addressing malnutrition. While dietary diversity is an important determinant of nutritional outcomes, the consumption of nutrient-rich foods is very sensitive to changes in income levels and price shocks, especially for consumers with low incomes. This paper has examined the linkages between agricultural marketing , diet quality and nutrition status. We find that market orientation has a significant effect on household diet quality while marketing infrastructure measured by distance to the nearest market, distance to the nearest major road and training and extension services on marketing have insignificant effect. We also find that agricultural marketing and household diet quality has no significant impact on stunting for children. On the other hand we find strong effects of female education levels and overall income levels for diet diversity, suggesting that improvements in these are likely to be more important for improving diet quality

Unemployment Benefits amidst Covid19 Pandemic in Tanzania: A Microsimulation Model Approach

Elineema Kisanga, Lisa Mimbi and Vincent Leyaro[1]

Abstract

This paper explores the potential of introducing unemployment benefit scheme for the most vulnerable groups in our community to protect their incomes in case of any shock and hence allow for inclusive growth in Tanzania. We make use of TAZMOD, the tax-benefit microsimulation model for Tanzania, to simulate entitlement to the unemployment benefits, both conditional and unconditional, to five categories of individual base on their employment status. Our results show that when this program come into force will cost the tax payers money to the tune of 9,483,433.38 TShs millions per year, which is equivalent of 27.2 of total Government budget per year. Even though, the scheme has substantial ability in reducing level of poverty and generating employment opportunities for the disadvantaged group in the community; in addition to contributing to structural transformation. The results further reveal that introduction of such scheme will significantly reduce poverty that is critical for the policy discussions in the country. The impact is much higher for the unpaid household helper generally as it leads to 9.4 percent reduction in poverty and for women unpaid household helpers as it leads to 5.44 reductions in poverty. Overall, when implemented the entire program will lead to about 3.6 poverty reduction in the country. With the current poverty level at 26 percent the implication is that this program alone will contribute and leads to total poverty reduction to 22.4 in the country. Once introduced, the scheme in addition poverty reduction, will substantially reduce inequality, both of which will ensure inclusive growth to most people.

Fostering Voluntary Tax Compliance among Presumptive Taxpayers in Tanzania: Role of Behavioural Science in Retaining the Taxpayers

Principal Investigator: *Dr. Innocent Pantaleo**,** School of Economics, University of Dar es Salaam.*

Other Researchers: *Dr. Jehovanes Aikaeli, Dr. Remidius Ruhinduka, Dr. Martin Chegere, Prof. Razack Lokina and Ms. Winnie Muangi*

Funded by*: UK-Foreign, Commonwealth and Development Office (FCDO)*

Abstract

The Centre for Behavioural Studies (CBS) in collaboration with the Ministry of Finance and Planning (MoFP), the Tanzania Revenue Authority (TRA), the Bank of Tanzania (BOT) and the National Bureau of Statistics (NBS) applied behavioural insights and rigorous evaluation, with a view to improve voluntary tax compliance of presumptive taxpayers. Presumptive taxpayers are small businesses with a turnover of up to TZS 100 Million, which pay taxes on turnover rather than profits. Whereas the Government, through the Tanzania Revenue Authority (TRA), has recently put extra efforts into improving tax revenue collection, tax compliance among presumptive taxpayers is still low. The purpose of the research, funded by the UK Foreign, Commonwealth and Development Office (FCDO), was to: (i) examine the extent of tax compliance among presumptive taxpayers in Tanzania, (ii) Review and explore potential behavioural interventions to induce tax compliance, and (iii) experiment on the behavioural inspired intervention on compliance rate in Tanzania.

To achieve this, the CBS applied its five-stage methodology (Review, Investigate, Design, Experiment and Recommend). The Review and Investigation stages underscored the role of text message reminders as a potential behavioural intervention to induce tax compliance in the country. The stages provided inputs into the Design and Experimentation stages where a randomized controlled trial consisting of 228,058 businesses spread across seven arms was conducted. Within this, three text messages - deterrence, nation building and the TRA default were sent to different arms to test the impact of messages on assessment before the deadline of 31 March 2020. For every one of these messages, specific arms received the message twice to test the impact of reminder intensity.

The results, when compared to those who did not receive any message, showed that on average, 4.4 percentage points more taxpayers showed up for re-assessment by 31 March 2020 as a result of receiving a text message reminder. With regard to the role of framing, the findings suggest larger impact among taxpayers that received the deterrence message. In addition, the study found that sending more than one text message has a relatively larger impact than just sending a single reminder message, else being equal. The study thus recommends that TRA should use deterrence text messages to foster tax compliance of the presumptive taxpayers. The cost-benefit analysis to gauge value for money shows that the scaling up of the double-dose deterrence messages would lead to a net benefit of TZS 10.16 Billion per year, which translates to a huge 25-fold return on investment for the TRA, i.e., TZS 25 per one shilling invested.

Category 8: Best Postgraduate Research Group Project

Carrot and Stick Measure of Tax Compliance in Tanzania

Department: *Economics*

Name of student: *Ally Samiji*

Abstract

With the increasing expectation and demand for the government to supply public goods such as water, health, education and road infrastructure, the pressure to mobilize more domestic revenue amounts to governments in developing countries. Fostering tax compliance emerges as a solution to the quest, but how the government can achieve that at minimum cost remains an empirical question. This study examines the effect of carrot and stick measures in fostering tax compliance using laboratory experiment design. Using bootstrapped binary logit model, the study found that both carrot and stick measures for tax compliance have a statistically positive effect. Further, it was found that there was no statistical difference between the effect of carrot measure and stick measure on tax compliance in Tanzania. This implies that the choice between carrot measure and stick measure for tax compliance depends largely on the costs of using one over the other.

However, the literature suggests stick measures to be costly in Tanzania as compared to carrot measures. This may be due to their costs on the government to implement and externalities they impose on taxpayers such as stresses.

Category 10: Best Public Service/Consultancy

The Potential Effect of Sugar-Sweetened Beverages Tax on Obesity Prevalence in Tanzania

Martin J. Chegere[1], Jires Tunguhole[2], Fortunata S. Makene[3], Emmanuel Masalu[4], Twalib Ngoma[5], Mary Mayige[6], and Jovin A. Lasway[3]

[1]University of Dar es Salaam, [2]Sokoine University of Agriculture, [3]Economic and Social Research Foundation, [4]Institute of Tax Administration, [5]Muhimbili University of Health and Allied Sciences, [6]National Institute of Medical Research,

Abstract

Obesity has been a growing global challenge in terms of prevalence, health outcomes and economic burden. In Tanzania, the trend of obesity prevalence rate has increased drastically, for both men and females, from 5.9% in 2014 to 8.4% in 2016. Being overweight and obese contributes to high prevalence rate of people with non-communicable disease risk such as diabetes, cardiovascular diseases and cancer, and the overall health effects. Obesity is significantly attributed to the Consumption of Sugar Sweetened Beverages (SSBs) which have high sugar content that leads to high caloric intake. This study investigates the potential impact of SSBs tax on obesity prevalence in Tanzania. Survey data collected by Economic and Social Research Foundation in 2019 is combined with the third wave of the Tanzania National Panel Survey 2012-13 and used for this analysis. The mathematical model developed compares the reference population which is unchanged and a counterfactual population in which tax intervention has been introduced. Changes in price and consumption of SSBs, and subsequent change in energy intake are applied to estimate the body mass change by age groups. The change in body mass by age

groups is merged with the reference population to estimate changes in body mass index and obesity. Imposing a 20% SSB tax in Tanzania is estimated to reduce the average overall energy intake by 76.1 kJ per person per day. This change is associated with overall reduction of prevalence of obesity by 6.6%, and by 12.9% and 5.2% in adult males and adult females respectively. The number of obese people will decrease by about 47,000 among adult males and about 85,000 among adult females. It is estimated that the total tax revenue collection from SSBs will increase by about TZS 452 Billion (from about TZS 416 Billion to about TZS 868 Billion) in a year. The administration cost of this tax is estimated to be TZS 70 million which results into a cost of collection ratio (as a measure of tax administration efficiency) of 0.02%. The SSBs tax already exists and the proposed reform is essentially that of increasing the tax rates on an existing tax rather than introducing a new tax. The cost of administration to implement the proposed tax policy intervention is insignificant and the SSB tax can also potentially generate significant revenue. The imposition of SSB tax should not, per se, be seen as a solution. It should be part of a broader approach complementing other strategies to reduce obesity prevalence and related NCDs such as promotion of physical activity and increased health promotion activities. It is recommended that the revenue raised from SSB tax should be dedicated to public health promotion programs including subsidizing healthy foods such as fruits and vegetables, nutrition programs, improving the infrastructure that support increased physical activity and early detection of NCDs.

Fast Tracking Industrialization in Tanzania "the Must-Do Actions"

Edited by

L. Msambichaka, JK. Mduma, & O. Selejio

The motivation for movement struggle to end colonialism in Tanzania was to put in our own hands the development destiny of the country. The development destiny of Tanzania will be in our control through industrialization. This book is an attempt by many Tanzanian scholars and development practitioners to provide policy options on tracking industrialization and ultimately achieve the goals of Tanzania's

Development Vision (TDV) 2025. The TDV 2025 aspires a nation that is characterized by high quality and sustainable livelihoods; peace, stability and unity; good governance and the rule of law; an educated and learning society; and a strong and competitive economy.

The national framework to attain these aspirations is the Long Term Perspective Plan (LTPP), 2011/2012-2025/2026. The LTPP is sequenced in three five-year development plans (FYDPs), each with specific theme to underline its thrust and priority interventions. FYDP I (2011/12 - 2015/16) focused on "Unleashing Tanzania's Latent Growth Potentials". FYDP II (2016/17-2020/21) directs national efforts to "Nurturing an Industrial Economy". FYDP III (2021/2022-2025/2026) will be on "Realizing Competitiveness-led Export Growth".

Thus, the book is timely published to provide intellectual and professional contributions to *Tanzania ya Viwanda*. It covers wide spectrum but carefully in science, technology and innovation for the more visible and sustainable industrialization; measures to address productivity and business competitiveness across sectors, e.g. industrial clusters and SMEs development, and development of agricultural and industrial financing. The book also addresses soft infrastructure including business regulatory reforms to create stable, transparent, and free-from-corruption business environment. There are also sector specific emphases in energy and minerals, tourism, as well as transport and logistics to harness natural comparative advantages while further creating competitive advantages. The book takes note that selective green development and preparedness for effects of climate changes will be fundamental for sustainable industrialization. For all these, Tanzania needs a robust system of M&E to sanction and reward performance accordingly.

This book is the second volume in the Tanzania Socio-economic Transformation (T-SET) Book Series. The first Volume is "How can Tanzania Move from Poverty to Prosperity?" published in 2015 under the auspices of the Prime Minister's Office (PMO) of the United Republic of Tanzania. T-SET Book Series is intended to provide a platform where development experts in Tanzania and from other countries provide and share views and recommendations on the best policies and how best to implement them in the context of Tanzania. It is the intellectual testing ground of the ideas, which will be passed over, to preparation of medium term plans, cf. FYDPs as well as, the successor to the Tanzania Development Vision 2025.

Through its financial support and without necessarily subscribing to all views in this book, the PMO is once again proud to be associated with the second output in T-SET Book Series. We are looking forward to seeing the next volume with more improved, independent, and objective views on how Tanzania's development policies should be crafted and implemented.

The authors have done their part. It is now our turn to see what can be implemented today or tomorrow and what can wait while we reconstitute.

UNIVERSITY OF DAR ES SALAAM LIBRARY

Category 5: Researcher of the Year

Researcher: Kelefa Mwantimwa

Department: Library

Kelefa Mwantimwa is a Senior Lecturer in the Information Studies Unit at the University of Dar es Salaam. He has a master's degree in information studies from the University of Dar es Salaam and PhD in Library and Information Science from the University of Antwerp, Belgium. His research interests are information, knowledge and innovation systems in diverse sectors. He has conducted research and published papers in information, knowledge and innovation systems. During the period between 2019 and 2021, Mwantimwa has made 14 publications. Among these, 2 are policy briefs while 14 are research papers published in international journals.

UNIVERSITY OF DAR ES SALAAM COMPUTING CENTRE (UCC)

Category 10: Best Public Service/Consultancy

AfyaCare - Electronic Medical Records (EMR) System

Mr. Samuel Masasi & Mr. Erick Mwailunga
University of Dar es Salaam Computing Centre

Abstract

Purpose: How can we improve efficiency and effectiveness of health processes that is from Patient Registration and Scheduling; Patient Care and Health Records; and Billing and Payments in public and private hospitals?

UCC developed Electronic Medical System "EMS" also known as "AfyaCare". This is a system designed to streamline clinical, financial and Administrative operations in health facilities. It integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services.

The system has the following features: Automated patient registration processes; Billing management; Diagnosis and prescription; Laboratory tests and results handling; Patient admission and discharge management; Inventory management; Social workers exemption; Morgue management; Vertical programmes; and Reporting and DashBoard. Also, in order to meet the desired output, the system has the feature of interoperability that means it is integrated with other systems such as Government Electronic Payment Gateway (GEPG), CTC2; GOTHOMIS.

The relevance of this innovation: AfyaCare have been integrated with GOTHOMIS to handle all vertical health programs and it has been implemented at the University of Dar Es Salaam Health Centre and Milembe Hospital since 2017, Kigamboni and Buguruni Hospitals. In addition, it is being implemented to all 28 Regional Referral Hospitals (RRHs) in Tanzania. So far, Afyacare has been implemented to more than 16 RRHs. These include Manyara, Njombe, Tanga, Temeke, Singida, Shinyanga, and Mwanza. Others are Mbeya, Lindi, Mtwara, Rukwa, Ruvuma, and Tabora.

Positive changes/impact of the innovation to the society/ Benefits: Since its deployment, the system has brought impact to the society in different

ways, including Improve health services offered to patients by enhancing data integrity and confidentiality, Proper and secure maintenance of patient's medical records which make data processing fast and easy, Improve patient's confidentiality, and Maintenance of a good follow-up on patient's progress, others are Improve Hospital financial Management, Ease management of Government payments through GePG, Improved inventory management, and Provide quick and easy production of various managerial and decision-making reports (Analytical, statistical and graphical representation of vital information).

Integrated Human Resources Management Information System (iHRMIS)

Dr. Geoffrey Karokola & Mr. Obeid Kamanjenzi

University of Dar es Salaam Computing Centre

Abstract

Purpose: How could we improve efficiency and effectiveness in managing the human resource while reducing the time for payroll preparations; leave requisition and approvals; recruitments and terminations based on the latest technology, robust design architectural and highly security standards?

UCC developed a system named Integrated Human Resource Management Information System "iHRMIS". This is a web-based and fully integrated HR system with a comprehensive suite of modules for effective Human Resources Management. Its design is based on the common processes and best practices of the Human Resources functions. The system enables an HR department to respond faster to HR business needs. The iHRMS provides powerful easy-to-use features, fitting diverse personnel and payroll requirements in line with the objectives of any organization.

The system has the following features/Modules: Staff Recruitment, Leave Management, Performance Evaluation, Career Development and Staff Relations Management. Other modules are Payroll & Time Attendance, Employment Termination, and Reports & Dashboards:

The relevance of this innovation: the system is being used by the Tanzania

Bureau of Standards (TBS)

Positive changes/impact of the innovation to the society/ Benefits: improving business process of the Institutions, Improved transparent in HR management services, Improved confidentiality and integrity of staff records, and Improved staff performance management. Other benefits are Improved dashboard and flexible operation reports for decision making (Analytical, statistical, and graphical representation of vital information).

Academic Registration Information System (ARIS-3)

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Abstract

Purpose: How could we improve the efficiency and effectiveness in managing the whole cycle of managing students' academic life from point of entry to the point of exit/graduation from the Higher learning Institutions? By addressing, some issues observed in Academic Registry Information System 2 (ARIS-2), and introduce new features based on the latest technology, robust design architectural and highly security standards.

Bridging the gap, UCC developed a more robust enhanced system named **Academic Registration Information System (ARIS-3) to replace ARIS-2**. **ARIS-3** is also a web-based system designed to manage the whole cycle of managing the students' life from the point of entry to the point of exit/ graduation from the University System.

What is new in ARIS-3: the following new features have been developed:- Online Postgraduate Student Supervision, Online Student Clearance, Online ID components requests, Communication and Students Accommodation. Other features are NHIF - Online NHIF Card Application, Facts & Figures, Enhanced Security using Second Level Verification and Quick Dashboard Reports.

Thus, ARIS-3 system has the following modules for both undergraduate and postgraduate students: Academic & Online supervision, Registration, Accommodation & Allocation, Security, Graduation, Staff & Students

management, Billing & Finance, Communication, and Sponsorship management. Other modules are Facts & Figure, Attendance and Timetable & Scheduling

The relevance of this innovation: the system is currently being used at the University of Dar es Salaam (UDSM)

Positive changes/impact of the innovation to the society/ Benefits: Since its deployment, the system has brought impact to the society in different ways, including improving business process of Institutions, Enhanced Postgraduate online supervision, Improve confidentiality, Improve students' fees and financial Management and the Integration with National electronic Gateway for payment control. Other benefits are Improved dashboard and flexible operation reports for decision making (Analytical, Statistical and graphical representation of vital information).

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