



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

THE 1ST JOOUST INTERNATIONAL SCIENTIFIC CONFERENCE

THEME

***“Harnessing Science, Technology and Innovation for
Sustainable Development and Good Governance”***

PROGRAMME AND ABSTRACTS

Wednesday 24TH to Friday 26TH JUNE, 2015

**JARAMOGI OGINGA ODINGA UNIVERSITY OF
SCIENCE AND TECHNOLOGY**

***Main Campus, Bondo Town
BONDO, KENYA***

JOOUST IS ISO9001:2008 CERTIFIED / P.O. Box 210-40601 Bondo, Kenya

THE 1ST JOOUST INTERNATIONAL SCIENTIFIC CONFERENCE

THEME

*“Harnessing Science, Technology and Innovation for Sustainable
Development and Good Governance”*

Programme and Abstracts

© June 2015

Jaramogi Oginga Odinga University of Science and Technology (JOOUST)

P.O. Box 210 - 40601 Bondo – Kenya.

Tel: 057 – 2058000, 057-2501804, 0707 - 058000

Fax: 057 2523851

E-Mail: vc@jooust.ac.ke

Website: www.jooust.ac.ke

TABLE OF CONTENTS

Welcome message from Vice Chancellor.....	vi
Conference programme.....	vii
Abstracts.....	i
Sub theme 1 - Renewable Energy, Environment and Climate Change	2
Sub theme 2 - Agriculture, Food Security and Biodiversity.....	16
Sub theme 3 - Emerging Issues in Health Science and Impact Pathways in Science Research.....	31
Sub Theme 4 – Education and Entrepreneurship	41
Sub Theme 5 – Governance, Culture and Indigenous Knowledge	56
Conference Organising Committee.....	63

WELCOME MESSAGE FROM VICE CHANCELLOR JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

I take this opportunity to welcome you all to the 1st JOOUST International Scientific Conference starting from 24th to 26th June, 2015 at Jaramogi Oginga Odinga University of Science & Technology (JOOUST), Bondo Main Campus.

JOOUST as one of the nationally designated Science and Technology institution recognizes its important role in the enhancement of science and technology to complement the national efforts of spurring economic growth. The conference theme “Harnessing science, technology and innovation for sustainable development and good governance” provides a forum for a cross-sectional multidisciplinary discourse among scientists thereby advancing progress in areas that have potential to advance livelihoods, both locally and internationally.

The conference brings together research peers from local and international institutions to discuss, share and disseminate research outputs and innovations under five sub-themes namely:

1. Renewable Energy, Environment and Climate Change
2. Governance, Culture and Indigenous Knowledge
3. Agriculture, Food Security and Biodiversity
4. Education & Entrepreneurship
5. Emerging Issues in Health Sciences and Impact Pathways for Science Research

This forum is expected to create a platform for the University and like-minded institutions and their researchers to disseminate their ongoing findings and contributions for the advancement of society. Additionally, the conference will create a forum for constantly improving the University’s approach to development-oriented scientific research. It is my hope the deliberations of this conference will provoke policy makers to appreciate the need for substantial and long-term investments in scientific research, innovation and industrialization.

I therefore encourage you to be proactive in the conference deliberations and make your earnest contributions for the success of this very important event in the JOOUST calendar. You are also invited to enjoy the serene environment and hospitality of this University community and its environs. Once again, I warmly welcome you all to this inaugural JOOUST Scientific conference and look forward to interactive and enjoyable sessions.

Prof. Stephen G. Agong’, Ph.D, FAAS

Vice Chancellor

Jaramogi Oginga Odinga University of Science & Technology (JOOUST)

CONFERENCE PROGRAMME

THEME

“Harnessing Science, Technology and Innovation for Sustainable Development and Good Governance”

HOST

Jaramogi Oginga Odinga University of Science and Technology
(JOOUST)

VENUE

Jaramogi Oginga Odinga University of Science and Technology Main Campus Bondo

CONFERENCE DAY ONE WEDNESDAY 24TH JUNE 2015

0800-0900	REGISTRATION: JOOUST CONFERENCE SECRETARIAT	
0800-0900	CONFERENCE OPENING SESSION	
	VENUE: ASSEMBLY HALL	
CHAIR/ RAPPORTEUR	Prof. Omolo Ongati / Dr. Lorna G. Okotto	
OPENING PRAYER		
0900-0910	OPENING REMARKS: Prof Benson B.A. Estambale Deputy Vice-Chancellor, Research Innovation Outreach (JOOUST)	
0910-0920	WELCOMING REMARKS: Prof. Stephen G. Agong' Vice Chancellor (JOOUST)	
0920-0940	SPEECH BY GUEST OF HONOUR Dr. Moses Rugut Director General NACOSTI	
0940-1010	GROUP PHOTO / HEALTH BREAK	
KEYNOTE SPEAKER VENUE: ASSEMBLY HALL		
CHAIR/ RAPPORTEUR	Prof. Francis Angawa / Dr. Darius Andika	
1015-1045	Keynote Sub Theme I	
1045-1055	QA Session with Keynote Speaker	
BREAKOUT SESSION SESSION ONE		
VENUE / SUB-THEME	ASSEMBLY HALL: <i>Renewable Energy, Environment and Climate Change</i>	EACII: <i>Agriculture, Food Security and Biodiversity</i>
CHAIR/ RAPPORTEUR	Dr. Patrick Hayombe / Mr. Jasper Ondulo	Prof. Adrian Mukhebi / Dr. Pamela Were-Kogogo

1055-1110	Okebiro GN Wind Energy and Sustainable Development through Technology and Innovation in Kakuma Region, Turkana County	Onyango B, Anyango B, Nyunja R, KoechPK, SkiltonRA & Francesca S Genetic and symbiotic characterization of root nodule symbionts of bambara groundnuts (<i>Vigna subterranea</i> L. Verdc) and soybeans (<i>Glycine max</i> L. MERR) from selected sites in Lake Victoria basin, Western Kenya
1110-1115	Arudo E. Okara&Kennedy Munyole Options for sustainable energy generation in Kenya: Distributed energy generation	Evans Manyara Nyakeri, Ogola Henry, Ayieko Monica & Amimo Fred Black Soldier Fly larvae (<i>Hermetia illucens</i>) organic waste bioremediation potential
1115-1130	Odhiambo, K On the verification that the operation of a machine is dependent on the power supplied	Maithya J & NM Mbithi A review of fisheries management systems in Kenya: Good ideas, strategic management, and production estimates
1130-1145	Bonface Jiveri, Adhiambo Brendah& Sylvester Anami Potential of lubricating oil (MGALO) and organic bio-fertilizer production from marine green algae (Patent Number, KE/UM/2012/00295)	Adero OA Food safety compliance among food handlers working in pre-primary schools and daycare centers in Kasarani District, Nairobi
1145-1200	Korofia I. Gabriel, Job K. Ngetich, Mwasi Benjamin & D. V. Odenyo Incorporating an Integrated Solid Waste Management (ISWM) approach in solid waste management plan for the University of Eldoret Main Campus	Balah O.E.B, Ouma G.O& Ogalo L The effect of different levels of NPK fertilizers on the yield and yield components of mango (<i>Mangifera indica</i> L)
1200-1215	Michael Oloko, María José Zapata Campos, Nicholas Odhiambo, Stephen Agong, Jaan-Henrik Kain, Patrik Zapata & Belinda Nyakinda Best practices to solid waste management within informal settlement - The case of Kisumu	Mary Akinyi Orinda, Monica Ayieko, Reuben O. Mosi & Fred A. Amimo Effects of abiotic factors on the behavior of crickets raised in a tunnel unit
1215-1230	Osika NO Adaptive capacity of small-scale farmers to climate induced vulnerability in Rachuonyo Sub-county, Kenya	Debline Kadzo Mtana, Wandera Albert Daniel & Lomodei Evans Comparative study on use of <i>Moringa oleifera</i> Lam and soyabean in rearing sex reversed <i>Oreochromis niloticus</i> in aquaculture
1230-1330	LUNCH BREAK	
BREAKOUT SESSION SESSION TWO		
VENUE/ SUB-THEME	ASSEMBLY HALL: <i>Emerging Issues in Health Science and Impact Pathways in Science Research</i>	EACII: <i>Education and Entrepreneurship</i>
CHAIR/ RAPPORTEUR	Prof. Fred Amimo / Dr. Ayodo	Dr. George Raburu / Dr. Titus Aminer
1330-1345	Pauline Winnie Orondo Comparative efficacy of organic oil derivative and microbial larvicides on	Moindi RM A comparative analysis of policy documents on technical and vocational education in Kenya in the

	malaria vectors in semi-field conditions	periods 1855 to 2013
1345-1400	Indimuli J. Maleche, Waweru Mugo & Mutuku J.N. Calibrated optoelectronic circuit for instrumentation applications	Omiemo K. Kelvin, Raburu George & Raburu Pamela A Usability Maturity Framework on Internal Quality of VLS
1400-1415	Ng'etich, N & Fred A Amimo The case of pandemic cancer in Kenya: a preventive and corrective measure model.	Muriithi Alice N The role of writing for undergraduates in science and technology
1415-1430	Onyango, D. O. & Aloo B. N. Evaluation of the sensitivity and specificity of Widal and <i>Salmonella typhi/paratyphiA</i> antigen duo test in typhoid diagnosis.	Sabasi Omaoro & N. B. Okelo On numerical radius attainability for normal self-adjoint operators
1430-1445	Omari Phanice Kerubo, Yaw Afrane & Peter Ouma Birth preparedness among women attending antenatal care clinic in health facilities within Bureti subcounty of Kericho County, Kenya	Dickson S.O. Owiti & Omolo Ongati On shift of mindset: The importance of change of mindset in helping students get better at getting better in mathematics
1445-1500	Ondiba I.M, Oyieke F, Ong'amo G, Njaanake K, Nyamongo I & Estambale B. Diversity and distribution of mosquitoes transmitting malaria and Rift Valley fever in Baringo County, Kenya	Gudo CO Influence of students' diversity on quality of education in universities in Kenya: a case of JOOUST
1500-1515	Damaris Ochanda, Fred Amimo, Daniel Onguru & Susan Ontiri Investigating knowledge attitude and practice of sexual and reproductive health issues among Jaramogi Oginga Odinga University Of Science And Technology students	Omiemo K. Kelvin & Mutai K. Elisha Effective adoption indicators of management information systems in the Kenya's economy
1515-1545	HEALTH BREAK	
1545-1600	Syagga E Evaluation of the implementation of community midwifery model of care in Siaya county	P.O. Mogotu, J. Kerongo, R. K. Obogi & N. B. Okelo Certain properties of normaloid operators
1600-1615	Dolphine C. Anyango & Reuben Mutai Evaluation of water and sanitary conditions in relation to prevalence of diarrhoeal diseases in Belgut and Sigowet constituencies, Kericho County	Ibrahim N. Gekonde, Maria Anyango & N. B. Okelo Influence of leadership styles on staff retention in state corporations in Kisii county, Kenya
1615-1630	Adem JA An automatic teller machine for HIV test based on digital image processing techniques	Obogi Robert Karioko Conditions for complete positivity of operators and their convergence in C^* -algebras
1630-1645	Jane Owenga Adhiambo Perception of Cervical Cancer Patients on their Health Related Quality of Life and Palliative Care Needs in Western Kenya	Samuel Wanyera Use of School Readiness Screening Tool for Learners with Special Needs

1650-1730 POSTER PRESENTATIONS
VENUE: ASSEMBLY HALL

1830	NETWORKING COCKTAIL VENUE: JOOUST CAFETARIA GROUNDS	
<i>END OF DAY ONE</i>		
CONFERENCE DAY TWO THURSDAY 25TH JUNE 2015		
0800-0840	REGISTRATION: JOOUST CONFERENCE SECRETARIAT	
KEY NOTE SPEAKER VENUE: ASSEMBLY HALL		
CHAIR/ RAPPORTEUR	Prof. Reuben O. Mosi / Ms Damaris Ochanda	
PRAYERS		
0840-0910	Keynote Speaker II	
0910-0920	QA Session with Keynote Speaker	
CROSS-CUTTING PAPERS		
0920-0935	Rose A. Nyanga & Josephine Waudu Research and development challenges and R&D funding options available in Kenya	
0935-0950	Abagi Okwach Entrepreneurship education in Kenyan universities: Status, challenges, and prospects for innovations	
0950-1005	Ayieko Monica Rearing and processing crickets (<i>Achita domestica</i>) at household level for food security	
1005-1030	HEALTH BREAK	
BREAKOUT SESSION SESSION THREE		
VENUE/ SUB-THEME	ASSEMBLY HALL: <i>Renewable Energy, Environment and Climate Change</i>	EACII: <i>Agriculture, Food Security and Biodiversity</i>
CHAIR/ RAPPORTEUR	Dr. Michael Oloko / Dr. N. B Okello	Dr. Gor C.O / Mr. Alfred Ochieng
1030-1045	C.N. Shikali, W.J. Ambusso & M.K. Munji Radionuclide content of sands used for construction in Kakamega County, Kenya and associated indoor radon diffusion fluxes	Odongo S. Adongo The concentrations of zinc, magnesium and iron in some selected medicinal plants used by the Chuka community in Kenya
1045-1100	Ali AA Environmental and climate change education as a strategy for promoting good governance and sustainable development	Ngo'nga' C Small scale production of cricket and black soldier fly for sustainable food and feed
1100-1115	Nyangueso S. O., Hayombe P.O. & Nyadawa M. O. Geospatial technologies in climate change resilience: opportunity for local SDI interventions in Kenya	Machira J. Mwangi Role of gender equality in the enhancement of tea quality and quantity in Kenya - a survey of farmers served by Gathuthi Tea Factory, Nyeri County
1115-1130	Isaac M. Nyamweno, Andrew C. Soi,	Maithya J, R. Abila & NM Mbithi

	George Omondi, & Joshua Birundu Beyond research and teaching: The role of higher public educational institutions in management of forests in the era of climate change	Ecological evolution of Lake Sare: The need to develop and manage Kenya
1130-1145	Victor A.O. Odenyo, Julien Verdonck, & Susan M. Wagner Environmental impacts of population and cultivated ecosystems on the water resources of the Lake Victoria Basin – a review in relation to water resources planning and management.	Gor CO & Ackello-Ogotu Policy implications to the socio-economic analysis of adoption determinants of new agricultural technologies in Kenya: The case of South Western Kenya region
1145-1200	Kwanya T The role of indigenous ecological knowledge in environmental conservation in Kenya	Maithya J & NM Mbithi Growth performance of <i>Oreochromis variabilis</i> larvae: A case study of effect of live and formulated diets on growth and survival rates
1200-1215	Waswa GW, China SS & Makhanu SK Is infiltration a triggering factor of shallow landslides that occur during intense rainfall events	Wangila PT The effect of <i>Olea africana</i> and <i>Cassia didymobotrya</i> and aging period, on the level of heavy metal residues in fermented milk- A case of Kabianga Division
1215-1230	Isaac M Nyamweno, Lorna G Okotto, Kipkorir Tonui & Titus K Chepkwony Socio-economic, environmental and institutional dimensions of micro-scale traditional gold mining in Vihiga County, Kenya	Were-Kogogo Pamela & Anyango Dolphine Caroline Status of phytoplankton community of Kisumu Bay, Winam Gulf, Lake Victoria, Kenya
1230-1245	Omwakwe FW & Waswa GW Impact of eucalyptus tree on stream flow discharges in Kisii Central Sub-county	Akuno W, Akhaukwa P.J & Osika N.O And Muchelle F. Community based-sorghum seed multiplication as a strategy for enhancing sorghum production for improved small-holder incomes and livelihoods in Siaya County
1245-1300	Ochieng PO Mathematical analysis of tip speed ratio of a wind turbine and its effects on power coefficient	Debline Kadzo Mtana, Wandera Albert Daniel & Lomodei Evans Effect of brood stock size on hatch rate of African catfish, <i>Clarias gariepinus</i> , (burchell 1822) eggs at the University of Eldoret Hatchery
1300-1400	LUNCH BREAK	
BREAKOUT SESSION SESSION FOUR		
VENUE/ SUB-THEME	ASSEMBLY HALL: <i>Emerging Issues in Health Science and Impact Pathways in Science Research</i>	EACII: <i>Education and Entrepreneurship</i>
CHAIR/ RAPORTEUR	Prof. Maria Onyango / Dr. Otula Nyakinda	Prof. Michael O. Okwara / Mr. Samuel Oyieke
1400-1415	Edna Mutua, Salome Bukachi, Isaack Nyamongo & Bernard Bett Community adaptation to malaria and rift valley fever in Baringo County	Aduda D Service quality guidelines are necessary to ensure good governance of technology
1415-1430	Ochieng A, Gachie T, Ondiba I M, Nanyingi M, Olago D, Amimo F &	Ogara S Mobile device security: Proposing framework for

	Oludhe, C Ecological niche modeling in Kenya and spatial distribution of Rift Valley fever vectors in Baringo County, Kenya	securing mobile devices
1430-1445	Ondulo J Improving Health Care Service Delivery in Public Health Facilities by use of an Integrated E-Health System for Optimal Management of Patients' Throughput	Job K. Ngetich, Ben Mwasi, Grephas P. Oyata, D.V Odenyo & Peris C Korir Analysis of the impacts of land reforms on urban land development in Kenya
1445-1500	Richard Omollo, Omolo-Ongati & George Raburu Analysis of fully homomorphic encryption schemes in enhancing data security in cloud computation	Mogoria NA Gender and environmental knowledge in natural resources management in Kisumu county, Kenya
1500-1515	Fred Amimo & Edward Walker Monitoring Interactions of Female <i>Anopheles Gambiae</i> S.S. Giles with Insecticide-Treated Nets Using a Wind Tunnel Set-Up	Nyaluke Kiprono Wesley, N. B. Okelo and Omolo Ongati Norms and Numerical Radii Inequalities for $(\alpha\beta)$ - Normal Transaloid Operators
1515-1545	HEALTH BREAK	
1545-	EXCURSION AND BONDING TRIP	
	Visit to Jaramogi Oginga Odinga Musoleum (Ka Jaramogi Kango)	
	END OF DAY TWO	
	CONFERENCE DAY THREE FRIDAY 26TH JUNE 2015	
0800-0830	REGISTRATION: JOUST CONFERENCE SECRETARIAT	
	KEY NOTE SPEAKER VENUE: ASSEMBLY HALL	
CHAIR/ RAPPOREUR	Prof Monica Ayieko / Dr. Henry Ogola	
	PRAYERS	
0830-0900	Keynote Speaker III	
0900-0910	QA Session with Keynote Speaker	
	BREAKOUT SESSION SESSION FIVE	
VENUE/ SUB-THEME	ASSEMBLY HALL: <i>Governance, Culture and Indigenous Knowledge</i>	EACII: <i>Education and Entrepreneurship</i>
CHAIR/ RAPPOREUR	Prof. Mildred Ndeda / Dr. Alice Nakhumicha	Dr. Calleb Gudo / Mr. Jack Abibo Adem
0915-0930	Khaemba JM Hegemonic masculinities in Kumuse ritual narratives of the Bukusu of Kenya	Jackline B. Barongo, Maria Anyango & N. B. Okelo Influence of entrepreneurship on small and medium enterprises: A case study of SMEs owned by females in Kisii town, Kisii County, Kenya
0930-0945	Warkach K. Tonui, Naila G. Napoo & Charles Otieno	Cecil Onyango & Paul Oleche Norm estimates for convexoid operators

	<p>Magic and natural phenomena in communication with supernatural powers among communities in Kenya</p>	
0945-1000	<p>Ntinyari V. The critical role of technocrats in operationalising devolution in Kenya</p>	<p>Oyieke S Government spending in agriculture and financing and private investment in Kenya: 1970-2012</p>
1000-1015	<p>Gilbert N. Okebiro & Robert Kakai Simiyu Demystifying the relationship of technology, governance and development in African countries</p>	<p>Ouma Ochola Moses, Omolo Ongati & N. B. Okelo Norms of derivation associated with idempotents and unitary operators</p>
1015-1030	<p>Mariah Onyango Policy Issues in Integrating Indigenous Knowledge in Building Community Resilience to Climate Change Risk</p>	<p>David M. Areri, Maria Anyango & N. B. Okelo Effects of strategic planning on organizational efficiency of tea factories in Kisii county-Kenya</p>
1030-1100	HEALTH BREAK	
1100-1115	<p>Gilbert N. Okebiro Ethics and management of street families in county towns in Kenya</p>	<p>Okelo N. B., Moses Ochola, Willy Kangogo & Wesley K. Nyaluke Tensor products and norms of norm-attainable self-adjoint operators in C^*-algebras</p>
1115-1130	<p>David A. O. & Samuel Liyala Njoga Reconceiving online whistleblowing tools in the Kenyan public sector</p>	<p>Getrude Malala, Henry Onderi & Jack Ajowi Effect of enrollment on performance of chemistry in public day secondary schools in Bondo Sub-County</p>
1130-1145	<p>Owino Rew Integrating language and sacred knowledge in conservation of indigenous trees in Siaya county</p>	<p>Kati R The contribution of teachers' qualifications on students' performance in mathematics</p>
1145-1200	<p>Mamboh R Educating the Kenyan voter for the ballot box</p>	<p>Okelo N. B., Moses Ochola, Willy Kangogo & Wesley K. Nyaluke On norm preserving conditions for local automorphisms of commutative Banach algebras</p>
1200-1215	<p>Ogotu JN Language and the making of Kenya: a case for dialogue as a tool for better governance</p>	<p>Onjoro V Safaricom is the biggest bank in Kenya</p>
1215-1230	<p>Ooko S., J.B. Okeyo-Owuor, Odipo Osano & Beru. F Knowledge, attitude and practices on endod (<i>Phytolaccado decandra</i>) in three counties in Western Kenya</p>	<p>Elijah Museve, Joel Tenai & Philip Nyangweso A stochastic model of relationship between board demographics and firm diversification strategies in emerging markets: NSE, Kenya</p>
1230-1245	<p>Obiero Ogone Language as resource in the preservation of biodiversity: An ecologicistic perspective</p>	<p>Job K. Ngetich, Ben Mwasi, Grephas P. Oyata & D.V Odenyo The Impact of Devolution on Agriculture Development in Kenya; The Case of Moiben Sub-County in Uasin Gishu County</p>
1230-1245	<p>Makori Alice Nyangara, Napoo Naila & Hezekiah Obwoye An Analysis of the Phenomenon Ime Y'omwana Movement in Kenyena Sub-County, Kisii County, Kenya</p>	

1245-1345		LUNCH BREAK	
BREAKOUT SESSION SESSION SIX			
VENUE/ SUB-THEME		ASSEMBLY HALL: <i>Renewable Energy, Environment and Climate Change</i>	EACII: <i>Agriculture, Food Security and Biodiversity</i>
CHAIR/ RAPPORTEUR		Prof. Maurice Nyadawa / Dr. Obiero Ogone	Prof. Beatrice Anyango / Dr. Asito Amolo
1345-1400		Odhiambo K The rate of carbon emission in relationship to the temperature change	Lomodei Evansa & Albert Wandera Daniel Demand and supply of Nile perch (<i>Lates niloticus</i>) and tilapia (<i>Oreochromis niloticus</i>) as compared to selected alternative protein sources within Kimumu sub-location, Kabitoi-A village, Kenya.
1400-1415		Monicah N. Mukhwana, Wandera Albert Daniel & Lomodei Evans Effect of flower farm effluents on diversity and composition of macroinvertebrates in Marura wetland	Nahshon N. Mutua, George O. Ouma, Wilfred O. Odadi Factors influencing sorghum production by smallholder farmers in Waia Division, Makueni County, Kenya
1415-1430		Aduda Ken O Analysis and prediction of battery operating state in Kenyan solar home systems	Anyango AI Genetic diversity of Kenyan cowpea and response of selected cultivars to cowpea aphid borne mosaic virus (CABMV)
1430-1445		Otieno G.W., A.S. Merenga & C.M. Migwi Mechanical and degradation characterization of recycled low density polyethylene and cellulose composites	Lomodei Evans & Kerengo Leah Evaluation of growth and survival rate of goldfish fry (<i>Carassius auratus</i>) fed on different zooplankton feed forms
1445-1500		Michael Oloko, Amos Omamo, Lorna G. Okotto, Francis Angawa, Pamela Were, Regina Nyunja & Oscar Osika Development of decision support system for sustainable participatory sub-catchment water resources management in the face of deteriorating climatic conditions	Musah S. M., Kamau A. W., & Munene M Use of varietal resistance in the control of red spider mite <i>Tetranychus evansi</i> (baker and pritchard) in tomato <i>Lycopersicon esculentum</i> (Mill) production in Kenya
1500-1515		Lorna G. Okotto, Michael Oloko, Francis Angawa, Amos Omamo, Pamela Were-Kogogo & Regina Nyunja Functionalities and capacities of the decentralized institutions in water resources management in Kenya: the role of water resource users associations (WRUAs)	Otieno E. O., R.O. Mosi & J.O. Amimo Mortality, culling and replacement rates and causes of herd exit in a Kenya Boran herd in the lowland tropics
1515-1530		Andrew Tarus, Wandera Albert Daniel & Lomodei Evans Comparing survival rate of <i>Clarias gariepinus</i> fry (0.7g) reared under dark and light conditions	Evans Manyara Nyakeri, Henry JO Ogola¹, & Hamadi Boga A culture dependant biodiversity study of extreme haloalkaliphilic bacteria from Lake Magadi Kenya
1530-1545		Okebiro GN Climatic change and pastoralism farming	Ndung'u Amos & Robert Olendi The effects of organic and inorganic fertilization on

	in arid and semi-arid areas	zooplankton productivity in earthen fish ponds at University of Eldoret Fish Farm, Kenya
CLOSING CEREMONY VENUE: ASSEMBLY HALL		
1545-1600	CLOSING SPEECH Prof. Joseph Bosire , Deputy Vice Chancellor (Academic Affairs)	
1600-1610	<u>VOTE OF THANKS</u> Prof, Omolo Ongati , Chairman, Scientific Conference Organizing Committee	
1610-1630HEALTH BREAK		
	<i>END OF CONFERENCE</i>	

ABSTRACTS

SUB THEME I - RENEWABLE ENERGY, ENVIRONMENT AND CLIMATE CHANGE

Wind Energy and Sustainable Development through Technology and Innovation in Kakuma Region, Turkana County

Gilbert Nyakundi Okebiro✉

[Asst. Lecturer, PhD student, Development Studies]

Faculty of Arts and Social sciences and Education, Kisii University-Kitale Campus

✉Email: okebirog@gmail.com

Abstract

Wind energy is renewable and which is not utilized through innovation and technology in Arid and Semi-arid areas [ASALS]. Wind is a natural and universal feature of the earth's environment and represents the circulation of the atmosphere because of the local global energy imbalances. The research paper focuses on how wind energy is not utilized in Kakuma region in Turkana County to pump water from the ground for irrigating the fertile land in Gold centre. Although wind blows "everywhere", there is a known physical geography to the best locations for generation and Kakuma is suitable for its exploitation through innovation and technology. The aim is study the best strategy to be applied for installation of turbines for pumping water for irrigation leading practising of horticultural farming and sustainable food supply in the area. The research would apply theoretical–analytical method. The key findings are wind blows in very high speed in Kakuma [Turkana County] and cannot be tapped for pumping water to be used in irrigation in the fertile land in Gold Centre. It is concluded that generation wind energy is less expensive than electrical, oil and gas exploitation. The advantages of using wind turbine technology for generating electricity include; there is no cost for the wind itself; no pollution and any discovery and extraction needed and there are no release greenhouse gases. It is recommended wind energy should be exploited in Kakuma for sustainable development; therefore county government should take the initiative to implement.

Key words: *Wind, Energy, Sustainable development, Green house gases*

Options for Sustainable Energy Generation in Kenya: Distributed Energy Generation

Arudo E. Okara^{1,✉} & Kennedy Munyole²

¹School of Engineering, Moi University,

²School of Engineering, Kibabii University, Email- kmsitati@yahoo.com Tel: 0732 607 647

✉E-mail- arudo.okara@gmail.com, Tel: 0731 345 001

Abstract

Rising concerns about environmental pollution, global warming and climate change due to emissions of greenhouse gases resulting from the combustion of fossil fuels have strongly increased interest in renewable energy development. These concerns have also coordinated a reaction towards the global focus on a clean development mechanism, a basic strategy endorsed in the Kyoto Protocol framework. The use of renewable energy (RE) for distributed generation of power offers immense hope to rural dwellers, who have limited access to electricity from centralized grid systems. Emerging and developing countries have 80% of the world's population but consume only 30% of global commercial energy; creating a need to expand access to energy in order to bridge this divide. Increased recognition of the contribution that RE can make to energy independence, climate change mitigation, rural development, improved health and lower health costs, is shifting RE from the fringe to the mainstream of sustainable development. Like other sustainable sources of energy, renewable distributed-generation systems that are an efficient, reliable and environmentally friendly alternative to the centralized energy system will play a critical role in the future of electrical power demand and energy generation planning. This article presents the wide-ranging potential of RE resources available in Kenya for distributed generation. It explicates the poor energy situation in the country and highlights different categories of RE that can be exploited to tackle the energy deficiency in many rural communities. The study concludes with a discussion on the significance of distributed-generation using renewable

resources for rural energy supply, including brief discussions on the technologies for renewable power utilization.

On the Verification that the Operation of a Machine is Dependent on the Power Supplied

Kelvin Odhiambo✉

The Kenya Power and Lighting Company (KPLC), Nairobi, Kenya.

✉E-mail: kelvin12@rediffmail.com

Abstract

In this paper power supply is examined in relation to the energy consumption in the operation of a machine. An analytical experiment is conducted to show the state functioning of a machine with respect to time. Their correlation is expressed graphically with supportive data.

Potential of Lubricating Oil (MGALO) and Organic Bio-Fertilizer Production from Marine Green Algae (Patent Number, KE/UM/2012/00295)

Bonface Jiveri^{1,2,✉}, Adhiambo Brenda² and Sylvester Anami³

¹Laboratory of Plant Genetics and Systems Biology, Department of Pure and Applied Sciences, Technical University of Mombasa, P.O.BOX 90420-8100 Mombasa Kenya

²Department of Botany, Maseno University. P.O BOX 333-40105 Maseno, Kenya.

³Institute for Biotechnology Research, Jomo Kenyatta University of Agriculture and Technology. P.O.BOX 62000-00200 Nairobi, Kenya.

✉Email: jkhajezo@gmail.com, Tel: +254710503638/+254726685528

Abstract

Green seaweed *Euchuma rhodophyta*, *Ulva lactuca* and *Enteromorpha flexuosa* harvested from the Indian Ocean (Kenya) were characterized as feedstock for the production of lubricating oil and bio-fertilizer. *Euchuma rhodophyta* had the highest oil yields of 10.5% (g/g) followed by *Ulva lactuca* with 6.3% (g/g) and *Enteromorpha flexuosa* with 3% (g/g) from 100 g of algal biomass respectively. The average kinematic viscosity from all the three algae was 32 cst at 40°C suggesting a potential industrial application of the oils as lubricating base stock. Oil from the three marine algae had similar densities of 0.9132, 0.9136 and 0.9151 kg/L at 20°C though the oils were denser than the stipulated range of Shell Tellus Lubricating oils ranging between 0.8850kg/L-0.870kg/L. After oil extraction, the biomass was further converted into bio-fertilizer containing 10% potassium which is absent from many commercial fertilizers and rich in nitrogen (10%) and phosphorus (8%). We conclude that the three marine algae are potential source of bio-energy and bio-fertilizer and that industrial processing of the algae will be of significant economic and environmental advantage.

Key words: Algae, Bio-fertilizer, Lubricating oil, Marine.

Incorporating an Integrated Solid Waste Management (ISWM) Approach in Solid Waste Management Plan for the University of Eldoret Main Campus

Korofia I. Gabriel✉, Job K. Ngetich, Mwasi Benjamin, & V.O Odenyo

School of Environmental Studies, University of Eldoret, Department of Environmental Monitoring, Planning and Management. Eldoret Kenya

✉E-mail: gabrielkorofia@yahoo.com Tel: 0711140454

Abstract

Waste management is a global challenge in securing a sustainable environment. The educational institutions face the challenge of solid waste management which does not provide for a conducive environment for learning. With the expansion of university education in Kenya, waste management is increasingly becoming a problem hence the need to provide pragmatic solutions. University of Eldoret is one of the public universities

in Kenya with a population 16,000 students. Its growth and development is hindered by its inability to manage solid wastes. The study focused on ways and means of incorporating an integrated solid waste management plan. The objectives of the study were to assess the existing solid waste management systems, identify the solid waste generating areas and quantify the solid waste generated and to develop a sustainable solid waste management plan for the University. The methodology adopted for study involved weighing of solid waste, interviews, documentary analysis and direct observation. It University of Eldoret generates 166 tons per year and per capita generation was 0.37 kg per day. Solid waste collection within university is an eyesore and the effects are manifested in blockage of sewers, pollution of soil, air and water. The Study therefore recommends the adoption of an Integrated Solid Waste Management Plan.

Key words: *Integrated, Solid waste, Management, Biodegradable*

Best Practices to Solid Waste Management within Informal Settlement - The case of Kisumu
Michael Oloko¹, María José Zapata Campos², Nicholas Odhiambo³, Stephen Agong⁴, Jaan-Henrik Kain⁵, Patrik Zapata⁶, Belinda Nyakinda⁷

^{1,3,4}*School of Engineering and Technology, Jaramogi Oginga Odinga University of Science and Technology*

²*Copenhagen Business School & GRI, University of Gothenburg, mj.zapata@gri.gu.se*

⁵*Chalmers University of Technology, Sweden, kain@chalmers.se*

⁶*School of Public Administration, University of Gothenburg, patrik.zapata@spa.gu.se*

⁷*Department of Environment, Kisumu City, Kenya, bnyakinya@gmail.com*

Email: moloko@jooust.ac.ke

Abstract

Kisumu City generates about 437 tons of solid waste per day, 63% of which is organic in nature. With a collection efficiency of 20%, most of the solid waste remains uncollected especially within the informal settlements where 65% of the residents stay. The uncollected waste is left in the in open spaces, back streets and road sides, sometimes blocking local drainage channels and mixes with polluted waste from flooded latrines and flows in open areas, leading to appalling conditions especially in poor neighbourhoods. Solid waste management is a major concern in the city despite several initiatives that have been put in place to ensure an effective management system. This study seeks to identify best solid waste management (SWM) practices resulting from these initiatives, which are being implemented and have succeeded in some parts of the City, and transfers them to other areas. Field observations of waste management systems, administration of questionnaires to residents, In-depth interviews with waste collectors, Focus Group Discussions with key stakeholders, private waste collectors, scavengers, residents and document analysis have been used to collect data. In understanding the process of initiating these best practices, establishing them to grow, and be owned and supported by the residents, critical stages and requirements are noted for modifications to allow for transfer to other areas. The first stage identified is the realization of the need for waste collection services by the residents that creates an opportunity for any attempt for the service provision. An initiative that is likely to succeed must emerge through a local structure or institution to win confidence of the residents and be recognized by the city council. The neighborhood associations within the residential areas can provide this opportunity as a well known existing structure to act as a spring board for a private waste collection group. Support of the City council is necessary to provide recognition, any form of training and coordination to ensure cleanliness of the whole city environment. This study has used this approach to transfer best practices in solid waste management from the settlements of Manyatta and Migosi to Obunga which had no organized waste collection service. Currently, a private Waste collection group with a recognition letter from the City of Kisumu has been formed and is operational. It coordinates with the City Council Environment Department to evacuate waste from an identified temporary transfer point.

Key words: *Private waste collectors, Residents needs, Residents support, Best practices, Transfer*

Adaptive Capacity of Small-Scale Farmers to Climate Induced Vulnerability in Rachuonyo Sub-county, Kenya

Osika N.O.^{1,✉}

¹Division of Research, Innovation and Outreach, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210 Bondo

✉Email: nosika@jooust.ac.ke

Abstract

Environmental degradation reduces plant cover leading to increase in concentration of greenhouse gasses in the atmosphere that ultimately leads to climate change. One effect of climate change is an increase the intensity in flooding and drought which negatively affects the small-scale farmers. The farmer needs to adapt to the new climatic conditions if they are to successfully continue with their farming activities. This study assesses the adaptive capacity of small-scale farmer in Rachuonyo District to climate change as a result of the changing land cover. It accesses traditional coping mechanism used by the small-scale farmers and explore ways of using land use planning to improve adaptive capacity of these farmers in the face of changing climate. Specifically the study: identified land use changes that have taken place in Rachuonyo District over the past 30 years due to land activities; evaluated community based adaptation mechanism by small-scale farmers to climate change; and, explored ways of using land use planning to improve the adaptive capacity of small scale farmers to climate change. The study was conducted through a cross-sectional survey design which is one type of observational study that involves data collection from a population, or a representative subset, at one specific point in time. The study used a population size of 307,126 which is the population of Rachuonyo District (Census 1999). The sample size was 210. This sample size is determined based on an equation $n = \frac{N}{1 + N(e)^2}$. Both primary and secondary data was subjected to descriptive analyses to determine descriptive statistics such as mean, frequencies, percentages, modes, range, median, maxima and minima. The result was then be presented in the form of percentages, bar-charts, dialogue boxes and table. Qualitative data from Focus Group Discussion was organized and clustered into themes then results used to triangulate the other findings. These findings will be generally used by planners and specifically by the small scale farmers to improve their farming practices.

Key words: *Adaptive Capacity, Climate Induced Vulnerability, Land-Use Planning*

Radionuclide Content of Sands used for Construction in Kakamega County, Kenya and Associated Indoor Radon Diffusion Fluxes

C.N. Shikali[✉], W.J. Ambusso and M.K. Munji

Department of Physics, Kenyatta University, P.O. Box 43844, Nairobi, Kenya

✉Email: cshikali@gmail.com Tel: 0723 730 466

Abstract

Studies have been carried out to determine the natural radioactivity in construction sand and their associated radiation hazard in the old gold mining belt of Kakamega County, Kenya. The radioactivity concentrations of ²²⁶Ra, ²³²Th and ⁴⁰K were measured using a gamma ray spectrometer with a NaI(Tl) detector. The results of concentrations of naturally occurring radionuclides were as follows: ²²⁶Ra ranged from 36.79±8.89 to 185.21±5.89 Bqkg⁻¹, ²³²Th ranged from 322.38±2.56 to 158.92±7.95 Bqkg⁻¹ and ⁴⁰K ranged from 322.38±16.12 to 960.53±48.03 Bqkg⁻¹. The radium equivalent activities and the radiation hazard index associated with the natural radionuclides were calculated. A computer program was developed and applied to estimate the diffused indoor radon concentration by solving a simple transport equation. The indoor radon was assumed to originate from the walls of a room constructed from sands rich in uranium minerals found in this region.

Environmental and Climate Change Education as A Strategy for Promoting Good Governance and Sustainable Development

Ali Adan Ali✉

School of Sharia & Islamic Studies, Umma University, P.O Box 713-01008, Kajiado, Kenya

✉Email: aadan@umma.ac.ke

Abstract

Demands for food, water, energy, health and education are increasing in every corner of the world as communities become more and more aware of their indigenous and constitutional rights. As if these are not enough problems, humanity are presently also challenged by climate change, environmental degradation, poverty, terrorism and corruption threats. All these myriads of problems have seriously affected national infrastructure, technology, security, social welfare systems and economics of the families, organizations and governments. Despite, the presence of the above life forcings, there are little efforts being made to increase levels of environmental and climate change education, awareness and initiatives among Kenyan communities. Inadequate environmental and climate change education, knowledge and disseminations gaps has therefore resulted to creating more vulnerabilities, inequalities and uncertainties at local levels. History has taught man that impoverished societies in environmental and climate change education frequently suffers from poverty, insecurity, poor health, low level of educational achievements, gender violence and environmental risk as their ability to resist life forcings are weaken. For the same reasons why Kenyan rural and isolated communities do not exhibit sufficient entrepreneurial, financial and technical capacities to manage the risks associated with environmental and climate change. Under such scenario, the opportunity provided by social pillar of Kenya Vision 2030 and devolution may become delayed or remain never delivered. Therefore, this paper is intended to rekindles debates on the significance environment and climate change education can play in advancing efforts to effectively harness science, technology and innovation for the achievement of Kenya Vision 2030 and in support of constitutional devolution.

Key Words: *Environment, Climate change, Education, Science, Good governance*

Geospatial Technologies in Climate Change Resilience: Opportunity for Local SDI Interventions in Kenya

Nyangueso S. O. ^{1,✉}, Hayombe P.O.¹ and Nyadawa M. O.²

¹*School of Spatial Planning, Natural Resources and Management, Jaramogi Oginga Odinga University of Science and Technology*

²*School of Engineering and Technology, Jaramogi Oginga Odinga University of Science and Technology*

✉Email: ouma.sam@gmail.com

Abstract

Climate change is a challenge of our times, with devastating negative impacts in absence of prompt and realistic interventions. Combating negative impacts of climate change and building resilience arguably require application of current spatial data and information. That is to say, climate change is a spatial phenomenon, and thus effective interventions are subject of Spatial Decision Support Systems (SDSS). Geospatial technologies enable spatial data capture, processing, analysis and presentations to support intervention decisions. Lately Spatial Data Infrastructure (SDI), emerged to enhance spatial data inventory, exchange and sharing; thus improving access and availability. The paper aims to explore SDI readiness for County of Siaya and how its status affects climate change resilience interventions at local level in Kenya. The research involved application and adaptation of SERVIR program developed tools for SDI readiness and participant surveys to achieve its aims. Literature reviews on SDI role in climate change, status and challenges of National Spatial Data Infrastructure (NSDI), nationally and regionally, were reviewed. Results show that devolved governance provides great opportunity for local SDI despite the fact that SDI readiness is low. It also reflects situational analysis, to among others, a USAID-Funded project titled, "Resilience to Climate Change through Building Capacities in SDI for Uptake by Selected County Governments in Lake Victoria Region in Kenya".

Key Words: SDI readiness, Climate Change Resilience, SDSS, Access to spatial data, SERVIR Program

Beyond Research and Teaching: The Role of Higher Public Educational Institutions in Management of Forests in the Era of Climate Change

Isaac Mamboh Nyamweno^{1,✉}, Andrew Cheruyot Soi², George Omondi³ and Joshua Birundu¹

¹*School of Spatial Planning and Natural Resource Management, Jaramogi Oginga Odinga University of Science and Technology*

²*Kenya Forest Service, Siaya County*

³*Kabianga University*

✉Email: isaac.nyamweno@gmail.com

Abstract

Climate change is one of the most important long-term environmental issues of our time and requires both mitigation and adaptation. Interventions in forest establishment and management are some of the proven mechanisms for climate change mitigation through carbon sequestration. Higher public educational institutions have the potential and capacity to actively participate in climate change mitigation through management of forests but it is not clear to what extent such potential has been harnessed. Public higher educational institutions are associated with vast tracks of land some of which are under active forest management. However, there is a glaring knowledge regarding management of institutional forests in the context of climate change. It is not clear what proportion of institutional land is devoted to forest establishment and what types of forests exist in various institutions of higher learning. A total of eight higher educational institutions from Kenya's Lake Basin region were purposively sampled for this survey. Various techniques were used to collect primary data including semi-structured questionnaire, interviews, in-depth discussions, observation and photography. Secondary data was collected from existing records and document analysis. The study revealed that higher educational institutions manage both indigenous and established forests but there is room to do better. These institutions have however not taken advantage of the clean development mechanisms. The private institutional forests are not being utilized to promote forest-based ecotourism either and other forms of tourism. This study argues that higher educational institutions can contribute towards realization of sustainable development through planned interventions in institutional forests while working in partnership with other research and development partners.

Environmental Impacts of Population and Cultivated Ecosystems on the Water Resources of the Lake Victoria Basin – A Review in Relation to Water Resources Planning and Management

Victor A.O. Odenyo^{1,✉}, Julien Verdonck² and Susan M. Wagner³

¹*School of Environmental Studies, University of Eldoret, P.O. Box 1125-30100, Eldoret*

²*BRlingenierie 1105 avenue Pierre Mendes France, BP 94001-30001 Nimes, Cedex 5, France, Email: julien.verdonck@brl.fr*

³*Don Consult Ltd, P.O. Box 4218 Dar-es-Salaam, Tanzania, E-mail: susanwagnertz@gmail.com*

✉Email: odenyo@lycos.com or odenyo@lycos.com Tel. 0733-748317

Abstract

The Lake Victoria Basin (LVB) spreads over the 5 countries of the East African Community: Burundi, Kenya, Rwanda, Tanzania and Uganda. The study aimed to assess the major environmental impacts of the basin population especially as expressed in the cultivated ecosystems of the basin with respect to future contribution to the quantity and quality of water in the basin as it was part of a preliminary study leading to the formulation of a water resource management plan for the LVB. It involved mainly document review and limited field observations. Population estimation was based on 2012 estimated or reported district population, proportioning for the part of the district within the LVB. The basin population was estimated to be 40.4 million as of 2012, and projected to reach 88.8 by 2040 with constant growth rate; and population density

was estimated to be 204 people/km² in 2012 and projected to reach 449 people/km² with constant growth rate by 2040. The population was found to be predominantly young, with people 14 years and younger accounting for 45% of the total. Three types of cultivated ecosystems were recognized: Mixed lowland smallholder subsistence rainfed cultivated systems, Mixed highland smallholder cultivated systems and Larger scale cultivated systems, all of which, together, covered about 13.9 million ha, or 70% of the terrestrial area of the basin. Smallholder subsistence rainfed system was found to be predominant, accounting for nearly 75% of the cultivated ecosystem. The study concluded that poverty was the defining driver, and that reducing environmental degradation requires a global integrated approach targeting poverty: it is clear that any effort to reduce ecosystems degradation may be nullified in the medium-term if it is not accompanied by a reduction in the growth of the population using agricultural land. Without this the quality of the basin's waters and livelihoods will be in jeopardy.

Key words: *Lake Victoria Basin, environmental impacts, population, cultivated ecosystems*

The Role of Indigenous Ecological Knowledge in Environmental Conservation in Kenya

Tom Kwanya[✉]

Senior Lecturer, Department of Information and Knowledge Management, The Technical University of Kenya, P.O. Box 52428 – 00200, Nairobi, Kenya

[✉]Email: tom.kwanya@gmail.com

Abstract

Climate change is one of the greatest and most complex challenges facing the world today. Studies have shown that about ninety percent of natural disasters result from severe weather and extreme climate change phenomena. Furthermore, climate change researchers predict that if its current trends are not reversed then over the next decade, billions of people will face greater life and health risks emanating from water and food shortages. Developing countries, like Kenya, are the most vulnerable to climate change impacts because they lack adequate social, financial and technological resources to adapt to or mitigate it accordingly. Available evidence indicates that environment-unfriendly human activity such as unsuitable agricultural practices, poor soil and water management, deforestation, overgrazing, and pollution constitute the most forceful drivers of environmental degradation in Kenya. This study will investigate the role indigenous ecological knowledge can play in leveraging environmental conservation efforts as a means of adapting to or mitigating the consequences of climate change in Kenya. This study is designed as a survey to explore indigenous ecological knowledge epistemologies in Kenya; the extent to which indigenous ecological knowledge is used to enhance environmental conservation; the challenges which hamper the effective application of indigenous ecological knowledge in environmental conservation; as well as the strategies which can be used to increase the impact of indigenous ecological knowledge on environmental conservation. Primary data will be collected through key informant interviews and focus group discussions with environmental scientists, indigenous community leaders and relevant government officers identified through purposive and snowballing sampling techniques. Additional secondary data will be collected through documentary analysis. The findings of the study will be used to develop relevant policies and other interventions so as to mainstream indigenous ecological knowledge in environmental conservation in Kenya.

Keywords: *Indigenous knowledge, indigenous ecological knowledge, environmental conservation, Kenya*

Is Infiltration a Triggering Factor of Shallow Landslides that Occur During Intense Rainfall Events?

Waswa GW^{1,✉}, China SS² And Makhanu SK³

¹Department of Disaster Preparedness and Engineering Management

²Department of Disaster Management and Sustainable Development

³Department of Civil and Structural Engineering, Masinde Muliro University of Science and Technology, Kakamega, Kenya

✉E-mail: waswageorge@gmail.com; gwaswa@mmust.ac.ke)

Abstract

Most rainfall-triggered shallow landslides are initiated by a spike in rainfall intensity, which does not usually occur at the beginning of a critical rainfall, within which the slide is triggered, but after several minutes of the rainfall. The critical rainfall is also usually not positioned at the beginning of a rainfall season, but after several days of antecedent rainfall. Rainfall triggers landslides via rapid increase in pore water pressure, commonly associated with increase in moisture content. Consequently, many previous studies indicate that the rapid increase in pore water pressure is as a result of rainfall infiltration. However, based on: (1) reported incidences of rainfall triggered shallow landslides; (2) published studies; (3) the above timings of landslide occurrences; and (4) the knowledge that infiltration rate decays with the soil wetness, this paper argues that, the rapid increase in pore water pressure that triggers shallow landslides is as a result of rapid introduction of additional energy into the tension saturated soil profile by the intense rainfall at the ground surface, without (or with insignificant) infiltration. The antecedent and critical precipitations are significant in creating tension-saturated conditions, necessary for rapid transmission of the introduced energy from the ground surface to the lower soil horizons during the critical rainfall. These arguments are supported by a newly derived one-dimensional diffusion mathematical model, which, when solved for the appropriate boundary conditions, can yield pore water pressure at any time and depth of a tension-saturated soil profile. A combination of the new diffusion model and the infinite slope model can predict the stability of a shallow slope as a result of transient pore water pressure.

Key Words: *Critical rainfall; Intense rainfall; Shallow landslide; Tension saturation*

Socio-Economic, Environmental and Institutional Dimensions of Micro-Scale Traditional Gold Mining in Vihiga County, Kenya

Isaac Mamboh Nyamweno¹✉, Lorna Grace Okotto¹, Warkach Kipkorir Tonui² and Titus Kipkoech Chepkwony²

¹*School of Spatial Planning and Natural Resource Management, Jaramogi Oginga Odinga University of Science and Technology*

²*School of Humanities and Social Sciences, Jaramogi Oginga Odinga University of Science and Technology*

✉Email: isaac.nyamweno@gmail.com

Abstract

The fact that Kenya is poorly endowed with precious minerals such as gold is not in dispute! However, insignificant quantities of gold exist in various parts of the county in general and western part of Kenya in particular. Micro-scale traditional gold mining by local communities as a means of livelihood has been going on in Vihiga County, Western Kenya since the colonial era but the practice has received limited attention from researchers and scholars. This cross-sectional and descriptive study was mounted to identify and profile the socio-economic, environmental and institutional dimensions of this anthropogenic activity and make evidence-based suggestions for sustainable utilization of the non-renewable resource. A total of 80 questionnaire respondents were randomly sampled from two focal mining sites- Muingi and Shaviringa Locations. The study relied heavily on primary data collected with the help of semi-structured questionnaires, Focus Group Discussions, interviews, observations and photography. Specific locations of mining operations were picked with the help of Global Positioning Systems (GPS). The Statistical Package for Social Sciences (SPSS) was used to run frequencies for easy analysis of data. It was established that traditional gold mining is practiced by the male gender of various age groups using labour-intensive approaches aided by rudimentary tools. The lithosphere is mostly affected due to existence of open scars that keep water during rain season. Such open holes enhance pollution of underground waters sources and trap poisonous methane gas. Insecurity is also widespread due to false assumption that gold miners have money. The practice with negative impacts on

human health has also lured the youth to drop out of school. It is not regulated at all despite the existence of relevant laws and poverty is the norm among the miners. This study suggests that traditional gold mining has negative long term implications on the society and the environment. It is not sustainable. Only organized and licenced groups should be allowed to practice gold mining in particular sites with the help of modern equipment.

Impact of Eucalyptus Tree on Stream Flow Discharges in Kisii Central Sub-County

Omwakwe FW¹ and Waswa GW^{1,✉}

¹*Department of Disaster Preparedness and Engineering Management, Masinde Muliro University of Science and Technology, Kakamega, Kenya, Tel: +254-56-30871 Mobile: +254- 711-816 866 1720-669 488, Fax: +254-56-30153*

✉E-mail: waswageorge@gmail.com; gwaswa@mmust.ac.ke

Abstract

Eucalyptus was introduced in Kisii Central Sub-County in 1902 to increase forest cover and for commercial purposes. However, there have been concerns over the years regarding behavior of water levels in relation with eucalyptus plantation in the region. The impact of eucalyptus tree on water resources in Kisii Central sub-County has never been quantified. The objective of the present, therefore, was to quantify the impact of Eucalyptus tree plantation on water resources in Kisii Central Sub-County. Stream flow discharges were obtained from the Water Resource Management Authority (WRMA) offices in Kisii town, for a 10-year period, 2010 to 2014. Area coverage of Eucalyptus plantation in Kisii Central Sub-County, for a 15-year period, 1990 to 2014, was obtained from the Kenya Forest Service (KFS) offices in Kisii town. Rainfall data for the study period was also obtained from the Kenya Meteorological Station, in Kisii town. Results indicated that that the area coverage of Eucalyptus plantation has increased by over 700% over a period of 15 years. Annual stream flow discharges have reduced by over 70% over a period of 10 years. Although other factors were not investigated, these results indicate that Eucalyptus plantation is negatively impacting on stream flow discharges.

Mathematical Analysis of Tip Speed Ratio of a Wind Turbine and its Effects on Power Coefficient

Ochieng Peter Owuor[✉]

School of Mathematics, Maseno University

✉Email: ochiengpeter82@yahoo.com

Abstract

The use of green energy as an alternative source of energy has gained preference all over the world. Unlike burning of fossil fuel which emits gases such as carbon dioxide into the atmosphere, wind power is a green renewable source of energy that is environmental friendly. Wind energy is generated using specially designed turbines. For effective competition with other sources of energy, the production cost must comparatively be lower. Thus any factors that lead to decrease in cost of energy such as turbine design, construction, and operation can significantly make wind power more competitive. The power output of a turbine is determined by the area of the rotor blades, wind speed and the power coefficient. The power coefficient is achieved at a particular tip speed ratio which is specific to the design of the turbine. In this paper we estimate the value tip speed ratio of a wind turbine and evaluate its effects on power coefficient. The power coefficient is achieved at a particular tip speed ratio, which is specific to the design of the turbine. The power output variations for the different control techniques for a change in the input wind velocity and a constant desired power output reference are compared. The methods are evaluated based on the response time and the magnitude of change in the power output. This is also compared to the desired power output which is also compared by simulation. The results of this study may be useful in aiding in the efficient production of electricity in a wind energy conversion system.

The Rate of Carbon Emission in Relationship to the Temperature Change

Kelvin Odhiambo✉

United Nations Environment Programme (UNEP), Nairobi, Kenya

✉E-mail; kelvin12@rediffmail.com

Abstract

In this paper, carbon emission are discussed and applied in studying their relationship to global warming. A linear correlation, which essentially measures their trends, is also defined. Results indicated an increase in carbon emission would lead to increased temperature change over time.

Effect of Flower Farm Effluents on Diversity and Composition of Macroinvertebrates in Marura Wetland

Monicah Nanjala Mukhwana¹✉, Wandera Albert Daniel² and Lomodei Evans²

¹Undergraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: m.mukhwana91@gmail.com; Tel: +254700231779

² Postgraduate Student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: dawandera@gmail.com; Tel: +254717883619; lomodeievans@yahoo.com Tel: +25472540662

✉Email: m.mukhwana91@gmail.com Tel: +254700231779

Abstract

Wetlands are important sites for biological conservation due to their rich biodiversity and present high productivity. However, biodiversity in wetlands has been reduced due to rapid human activities and pollution. Water quality parameters (temperature, dissolved oxygen, DO, Biological Oxygen Demand, BOD, pH, Total Dissolved Solids, TDS and Total Suspended solids, TSS) and macroinvertebrates richness was investigated at four different stations (S1, S2, S3, S4) which are adjacent to Equator flower farm along the Marura wetland. S2 had the highest temperature (22.6°C) whereas S4 had the lowest temperature (19.6°C). The pH value did not vary a lot along the stations (8.3-6.3). The DO fluctuated along the river with station S1 having 3.6m/l and lowest station had 0.8mg/l, the TSS and TDS did not have high variations along the wetland, with BOD levels differing at different stations. The Nutrients level also differed at various station with S3 having high rate of nitrite (0.325) compared to all other 3 stations. 10 orders, 30 genus and 30 families were identified. The orders; *Odonata*, *Coleoptera*, *Hemiptera* and *Diptera* were the main macroinvertebrates found in all station, while the orders; *Ephemeroptera*, *Trichoptera*, *Oligochaeta*, *Mollusca*, *Gnathobellidae* and *Isopoda* were few in all sampling stations. Station S2 and S4 had the highest species diversity compared to station S1 and S3 which had the lowest diversity. The Flower Farm had an effect on the Marura Wetland and thus affecting macro-invertebrates community of the wetland thus need for flower plants along the wetland to reduce the level of pollution

Key words: *Biodiversity, macroinvertebrates*

Analysis and Prediction of Battery Operating State in Kenyan Solar Home Systems

Kenneth W. O. Aduda✉

Senior Research Fellow, Centre for Research, Innovation and Technology, Jaramogi Oginga Odinga University of Science and Technology

✉Email: adudakenwo@gmail.com

Abstract

Solar power is a valuable source of electrical energy for users in the developing countries, yet many solar home systems are working at indeterminate conditions, much to the dissatisfaction of the users. Lead acid

batteries are extensively used in the Kenyan standalone solar home systems (SHS). Batteries experience a wide range of variable operational conditions in PV applications which make it very difficult to accurately predict battery performance and lifetime in PV systems. Premature failure and lifetime prediction of batteries have become major concerns within the PV industry and amongst the users. Given the highly variable operating conditions of many of these SHSs, no battery model has achieved a good compromise between the complexity and precision. This study seeks to analyze and develop simplified mathematical model(s) for predicting lead acid battery operating states in Kenyan standalone solar home systems to assist in determining the mean time to failure under stated conditions. Several factors that affect battery behaviour will be considered, such as the rate and efficiency of charging, the self-discharge rate, discharge rate, including the battery capacity.

Mechanical and Degradation Characterization of Recycled Low Density Polyethylene and Cellulose Composites

G.W. Otieno[✉], A.S. Merenga and C.M. Migwi
Department of Physics, Kenyatta University, Nairobi
[✉]Email: wereggeorge@gmail.com

Abstract

Recycled Low Density Polyethylene waste pollutes the environment since it is non-biodegradable. This work investigates the enhancement of disposal of these wastes without compromising their tensile strength and permeability by blending Recycled Low Density Polyethylene with Cellulose. Injection molded blends of Recycled Low Density Polyethylene and Cellulose were prepared in percentage ratios of 100:0, 95:5, 90:10, 85:15 and 80:20. Creep, diffusion and biodegradation measurements were carried out on the molded samples. Creep testing and creep recovery testing were carried out at 30 °C, 40 °C, 50 °C and 60 °C by applying a constant stress. Creep strain increased moderately with increasing loading intakes. Incorporation of cellulose decreased recovery. The influence of water environment on the sorption characteristics of RLDPE-CEL blend was studied by immersion in water at room temperature. The effects of cellulose loading on the sorption behavior were also evaluated. Water uptake was found to increase with cellulose loading. Weight change profiles for the blends at room temperature indicated that the diffusion is Fickian. Thermo-gravimetric analysis (TGA) was carried out on the blends using Lindberg Blue tube furnace (TF 55035C-1) from 80 to 620 °C at a heating rate of 5 °C/ minute. The decomposition trend shifted from one stage to two stage with increasing cellulose intake. Biodegradation was determined by burial technique. After designated times, the degraded sheets were taken out of soil, rinsed carefully with water, and then dried at 50 °C until the consecutive weights obtained were the same. Creep strain, thermal degradation and biodegradation were enhanced with cellulose intake.

Key words: Recycled low density polyethylene (RLDPE), Cellulose (CEL), Thermo-gravimetric analysis (TGA), Creep.

Development of Decision Support System for Sustainable Participatory Sub-catchment Water Resources Management in the Face of Deteriorating Climatic Conditions

Michael Oloko^{1,✉}, Amos Omamo², Lorna Grace Okotto³, Francis Angawa⁴, Pamela Were⁵, Regina Nyunja⁵, Oscar Osika⁶

¹School of Engineering and Technology, Jaramogi Oginga Odinga University of Science and Technology

²School of Information and Innovation Systems, Jaramogi Oginga Odinga University of Science and Technology

³School of Spatial Planning and Natural Resource Management, Jaramogi Oginga Odinga University of Science and Technology

⁴School of Humanities and Social Science, Jaramogi Oginga Odinga University of Science and Technology

⁵School of Biological and Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology

⁶Centre for Research Innovation and Technology, Jaramogi Oginga Odinga University of Science and Technology

Abstract

Kenya has put in a lot of effort to enhance water resources management for the last 20 years. This is evident in the review of the National Policies on Water Resources Management to focus on separation of functions, decentralization of services, commercialization of services, and community and private sector participation. Water Act 2002 outlined the water sector reforms and provided the legal framework for the implementation of the new water policies including establishment of new institutional structures. At the bottom end and at sub catchment level, Water Resources Users Associations (WRUAs) are established all over Kenya to conserve, protect and manage the water resources. The water sector reforms and the emerging policies place a lot of responsibilities on the WRUAs raising their expectations beyond their ability. This paper seeks to respond to the increasing concern with the 'knowing-doing' gap that exists between water reforms and policy goals and how they are achieved in practice. It narrows the gap that exists between the responsibilities given to the WRUAs and their capacity by developing a decision support tool for sustainable participatory sub-catchment water resources planning and management. It involves training WRUA members to configure their respective sub catchment water resources characteristics within Water Evaluation Model Framework to assess impacts of various management options to facilitate decision making. The study involved review of tools available to the WRUAs, field visits, workshops and interviews to collect information for sub catchment modelling. Awach Tende and Nyangores WRUAs from Lake Victoria South Catchment Area were used for the pilot study.

Key words: *Water resources users, Sub catchment, Configuration, Modelling, Decision support*

Functionalities and Capacities of the Decentralized Institutions in Water Resources Management in Kenya: The Role of Water Resource Users Associations (WRUAs)

Lorna Grace Okotto¹, Michael Oloko², Francis Angawa³, Amos Omamo⁴, Pamela Were-Kogogo⁵ and Regina Nyunja⁵

¹*School of Spatial Planning and Natural Resource Management, Jaramogi Oginga Odinga University of Science and Technology*

²*School of Engineering and Technology, Jaramogi Oginga Odinga University of Science and Technology*

³*School of Humanities and Social Science Jaramogi, Oginga Odinga University of Science and Technology*

⁴*School of Information and Innovation Systems, Jaramogi Oginga Odinga University of Science and Technology*

⁵*School of Biological and Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology*

✉ Email: lgokotto@yahoo.com Tel: 0733779630

Abstract

Functionalities of the decentralized institutions of water resources management particularly the capacities of the newly created institutions to deal with management of water resources at each level is crucial to the success of all water sector reforms and hence water resources management. This paper looks at the outcome of water sector reforms in Kenya with reference to the ability of local level institutions (Water Resource Users Association -WRUAs) to implement their mandates. The responsibilities given to local level institutions is conceptualized in the context of devolution of natural resource management, in this case water. Desk study review, unstructured interviews and a workshop were used to collect data from a sample of WRUAs and key informants. Content and thematic analyses were used in data analysis. Results show that Kenya seem to have adopted a devolution with mixed elements of deconcentration as seen in the establishment of lower level offices like those of regions and sub-regions and also decentralization. The paper argues that while the local level institutions seem to understand the roles and mandates given to them to manage water resources within their areas, the responsibility given to them has not been matched by the tools they have. The WRUAs are required to execute some mandates like contribute to decision making by WRMA in providing permits for abstraction of water, however, what is supposed to inform decisions made for such comments appears to be lacking. There is need to empower WRUAs to be able to handle their

mandates and make informed decisions. The study recommends the use of simple water resource management models that communities can easily understand and operate.

Key words: Water Resource Management, Devolution, Functionalities, Water Resource Users Associations, Mandates, Capacities/Tools.

Comparing Survival Rate of *Clarias gariepinus* Fry (0.7g) Reared Under Dark and Light Conditions

Andrew Tarus^{1,✉}, Wandera Albert Daniel² and Lomodei Evans²

¹Undergraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: andrewtarus09@gmail.com Tel: +254726472123

²Postgraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: dawandera@gmail.com Tel: +254717883619; lomodeievans@yahoo.com Tel: +254725450662

✉Email: andrewtarus09@gmail.com Tel: +254726472123

Abstract

The main constrain in the production of African catfish (*Clarias gariepinus*) seeds is low survival rate due to their strong cannibalism. In a way to reduce the cannibalism and improve the survival rate, a study was conducted to compare survival rate of catfish fry reared under dark and light conditions and at different stocking densities. *Clarias gariepinus* fry whose average size was 0.7g were stocked in different troughs. 6 of them were covered with black polythene to hinder light penetration “dark conditions” while the other six troughs were left in normal light conditions “light conditions”. Three troughs in dark conditions and another three troughs in light condition were stocked at a rate of 1500 fry/m³. Another three troughs in dark and three in light condition were stocked at a rate of 3000 fry/m³. Replication was done in the setting of experiment. Troughs were completely randomized. Dark condition increases the survival rate in catfish fry rearing. Further, stocking fish in low densities enhances survival rate. There was no significant difference in growth of fry in dark and light condition $P>0.05$. However difference in growth was seen at the different stocking densities. Therefore it was concluded that rearing catfish fry in dark conditions increases survival rate. Also fry stocked in low densities gives better survival rate than high densities. The study recommends that Catfish fry be reared in dark condition and in lower stocking densities.

Comparing Survival Rate of *Clarias gariepinus* Fry (0.7g) Reared Under Dark and Light Conditions

Andrew Tarus^{1,✉}, Wandera Albert Daniel² and Lomodei Evans²

¹Undergraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: andrewtarus09@gmail.com Tel: +254726472123

²Postgraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: dawandera@gmail.com Tel: +254717883619; lomodeievans@yahoo.com Tel: +254725450662

✉Email: andrewtarus09@gmail.com Tel: +254726472123

Abstract

The main constrain in the production of African catfish (*Clarias gariepinus*) seeds is low survival rate due to their strong cannibalism. In a way to reduce the cannibalism and improve the survival rate, a study was conducted to compare survival rate of catfish fry reared under dark and light conditions and at different stocking densities. *Clarias gariepinus* fry whose average size was 0.7g were stocked in different troughs. 6 of them were covered with black polythene to hinder light penetration “dark conditions” while the other six troughs were left in normal light conditions “light conditions”. Three troughs in dark conditions and another three troughs in light condition were stocked at a rate of 1500 fry/m³. Another three troughs in dark and three in light condition were stocked at a rate of 3000 fry/m³. Replication was done in the setting of experiment. Troughs were completely randomized. Dark condition increases the survival rate in catfish fry

rearing. Further, stocking fish in low densities enhances survival rate. There was no significant difference in growth of fry in dark and light condition $P>0.05$. However difference in growth was seen at the different stocking densities. Therefore it was concluded that rearing catfish fry in dark conditions increases survival rate. Also fry stocked in low densities gives better survival rate than high densities. The study recommends that Catfish fry be reared in dark condition and in lower stocking densities.

SUB THEME 2- AGRICULTURE, FOOD SECURITY AND BIODIVERSITY

Genetic and Symbiotic Characterization of Root Nodule Symbionts of Bambara Groundnuts (*Vigna subterranea* L. Verdc) and Soybeans (*Glycine max* L. MERR) from Selected Sites in Lake Victoria Basin, Western Kenya.

Onyango Benson^{1,2,3,✉}, Anyango Beatrice², Nyunja, Regina², P. K. Koech¹, Robert A. Skilton^{3,4} and Stomeo Francesca³

¹Department of Biological Sciences, Chuka University, P. O. Box 109-40600, Chuka, Kenya.

²School of Biological and Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo.

³Biosciences Eastern and Central Africa – International Livestock Research Institute (BeCA-ILRI) Hub, P.O. Box 30709-00100, Nairobi, Kenya.

⁴African Insect Science for Food and Health, P. O. Box 30772-00100, Nairobi, Kenya.

✉Email: benboyih@gmail.com

Abstract

Low soil nitrogen (N) is the most limiting soil factor for sustainable high crop yields in smallholder farming systems in East Africa. Inorganic fertilizers are rarely used due to high costs and inaccessibility. Judicious application of alternative soil management practices, such as harnessing biological nitrogen fixation (BNF) is necessary. This study genetically characterized 106 root nodule bacteria which freely nodulate soybeans (*Glycine max* L. MERR) and bambara groundnut (*Vigna subterranea* L. Verdc) in four soil types of Lake Victoria basin, Western Kenya. Isolate influence on nodulation and crop productivity was examined under field and glasshouse conditions. There was marked heterogeneity in 16S rRNA, *atpD*, *recA*, *nodC* and *nifH* gene analysis of isolates identified as *Rhizobium* sp., *Agrobacterium* sp., *Burkholderia* sp. and *Bradyrhizobium* sp. at above 97% sequence identity. Soil pH and available phosphorus had a significant effect on isolate distribution. The two legumes have greater symbiotic preference to *Bradyrhizobium*-type isolates under inoculation. Lateral transfer of *Sym* plasmids presumably conferred nodulation and N-fixation ability to one *Agrobacterium* sp. The findings provide new opportunities for selection of effective symbionts of soybeans and bambara groundnuts for improved soil fertility, commercialized agriculture and reduced food insecurity in the region.

Black Soldier Fly Larvae (*Hermetia illucens*) Organic Waste Bioremediation Potential

Evans Manyara Nyakeri^{1,2,✉}, Ogola Henry¹, Ayieko Monica^{1,2}, Amimo Fred³

¹School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

²GREEiNSECT Project

³School of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology

✉Email: evans.nyakeri@gmail.com, Tel. +254721750390

Abstract:

The world faces an imminent shortage of proteins to cater for a rising demand, which in turn will result in price rise of the few protein diets available in the market because of the scarcity and high cost of fishmeal and fish oil. The result of this is devastating as it has led to arise in diseases associated with protein and energy malnutrition. Insects that have ability to recycle and transfer nutrients of organic wastes into their biomass have been identified as an alternative protein and energy source in animal feeds, which have become too expensive. The production of insects such as the Black Soldier Fly can be combined with the reduction of organic wastes, whose collection and disposal in most developing countries including Kenya, is a well-known and documented problem. Their larvae have been utilised to manage organic wastes such as the faeces of poultry, pigs and cows in many parts of the world such as the Americas, Asia, and Europe. Various trials also indicate the potential of the larvae to be a sustainable alternative replacement of fishmeal and oil in fish feeds. This article reviews various bioremediation studies on the black soldier fly larvae, economic benefits of the

insect, rearing methods that have been developed and explores the likelihood of importing this biotechnology into Africa's developing countries to solve the twin problems of wastes, and protein supply for animal feeds.

Key words: *Organic wastes, Protein, Black soldier fly, Larvae, Fishmeal, Insects, Bioremediation, Nutrients.*

A Review of Fisheries Management Systems in Kenya: Good Ideas, Strategic Management, Production Estimates

Maithya J¹✉ and N.M. Mbithi²

Department of Natural Sciences, Garissa University College

✉Email: maithya.jacob@gmail.com

Abstract

This paper examines the fisheries management systems in Kenya with a view to suggesting better management options that may scale up the overall production of the fisheries sector. Management practices are reviewed and the current production estimates analyzed against a trajectory of previous yearly production models. The study reveals good fish farming ideas that are poorly implemented, serious challenges facing capture fisheries and a stagnated production. Suggestions are offered on strategic management, the role of supportive research and on environmental impacts so as to increase Kenya's fisheries production and improve the quality of fish reared or harvested for national food security.

Key words: *Good ideas, Strategic management, Production Estimates, Aquaculture, Food security, Livelihoods, Challenges*

Food Safety Compliance among Food Handlers Working in Pre-Primary Schools and Daycare Centers in Kasarani District, Nairobi

Olivia Akoth Adero ✉

Thika School of Medical and Health Sciences, PO Box 429-01000, Thika

✉Email: oliok83@yahoo.com Tel: 0725-551-518

Abstract

Food borne diseases remain a major problem in the World, including in Kenya. The most affected are the vulnerable groups including children under the age of five years since their immunity is not fully developed. This study was conducted at Kasarani District among food handlers in preprimary schools and daycare centers to establish their compliance to food safety measures. The objectives of the study were: to find out the knowledge, attitude and practices of food handlers, compliance to food safety measures at various critical control points and presence of *E. coli* or *Salmonella* in food or work surfaces as indicator organisms. To achieve these objectives, the study utilized cross sectional study design. Data was collected by use of a structured questionnaire and analyzed using Predictive Analytical Software. In addition, food samples and surface swabs were collected and analyzed in the laboratory. The study found out that while food handlers showed adequate attitude (mean= 69%) and practices (77.3 %) on food safety and hygiene, their knowledge on food safety and hygiene fell below average (mean= 6.7%). The inadequate knowledge on food safety and hygiene was linked to lack of training of food handlers with 75.9% not having attended any food safety training and only (32.4%) had attended refresher courses in the past five years. *E. coli* was isolated from 14.4 % of food samples and 13% of swab samples collected from work surfaces. There was no *Salmonella* in both food and work surfaces. Contamination of food was attributed to inadequate knowledge among food handlers, cross contamination, time and temperature abuse between the periods of cooking, service and handling of left over food.

The Effect of Different Levels of NPK Fertilizers on the Yield and Yield Components of Mango (*Mangifera indica* L)

Balah O.E.B¹, Ouma G.O² and Ogalo L.¹

¹Great Lakes University of Kisumu, P.O Box 2224-40100 Kisumu-Kenya

²School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

Email: balaoyata53@gmail.com

Abstract

To maintain productivity of trees in the long term and sustain production capacity of mango trees, application of nutrients, particularly of nitrogen, phosphorus and potassium (NPK) based on its availability in the soil and plant requirement is necessary management practice in mango orchard. Nutrients are required for fruiting, while at the same time trees are allowed to grow and maintain sufficient vigour for producing high yields in the following season. This study aimed at finding out the effect of various levels of N.P.K fertilizers on the yield and yield components of two conventional mango varieties in Kenya and specifically: (I) evaluate the influence on fruit yield of the two varieties under different NPK regimes; (2) examine the effect of various N.P.K levels on the various yield components; (3) evaluate the influences of NPK levels on the internal and external qualities of the two varieties; and (4) examine and detect the optimum dose of fertilization source. A field experiment conducted in Ajigo sub-location, Bondo Township location, Maranda division of Bondo district in Siaya county on a sandy-clay soil of low fertility, with NPK at 0.05% 0.34%, 0.36% respectively, to study the effects of different rates of NPK application on the yield of two sets of conventional mango varieties. In randomized complete block design replicated three times, each plot (represented by one mango tree) received 40Kg of farm yard manure. Twenty four trees of uniform size and vigour under similar cultural conditions were selected for this study. Composite soil sample was analyzed for physico-chemical composition and leaves sampled for chemical analysis. Data were collected for yield, fruit size and numbers, flowering density trunk cross-sectional circumference and laboratory analysis of fruits for B-carotene, vitamin C, calcium and iron. The data on yield and yield components parameters were individually subjected to the analysis of variance while those on internal quality parameters will be compared with those established elsewhere, as affected by leaf NPK contents. Results indicated that: (I) positive and significant relationship between NPK rates and yield per tree and number of fruits per tree for both varieties; (II) non significant relationship between of NPK rates and flowering density; (III) contents of fruits was positively and significantly influenced by NPK rates in both cultivars, while in Apple cultivar, NPK rates influenced vitamin C content of fruit; and (IV) positive and significant relationship between NPK rates and fruit weight in Apple variety. In conclusion, high levels of N.P.K resulted into improved fruit numbers per tree and give rise to high yield per tree. In certain varieties, fruit weight may also increase with higher levels of NPK levels also improve the internal qualities of the resultant fruit by improving the contents of B-carotene and lutein.

Effects of Abiotic Factors on the Behavior of Crickets Raised in a Tunnel Unit

Mary Akinyi Orinda^{1,2,✉}, Monica Ayieko^{1,2}, Reuben O. Mosi¹ and Fred A. Amimo³

¹PhD Student, School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science & Technology

²GREEiNSECT Project

³School of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology

✉Email: maryakinyi2010@gmail.com Tel: +254 727 410 858

Abstract

The aim of the study is to explore the suitability of a tunnel unit for cricket rearing in terms of temperature, humidity and light intensity. The use of a tunnel was necessitated by the fact that cricket rearing is a new and novel idea and a suitable housing is not in place. Moreover, large scale production needs a dependable and abiotic-controlled environment. A tunnel unit measuring 8m by 15m was used as a housing unit. The crickets were reared in plastic buckets of a 100ml capacity with egg trays and toilet paper rolls used as hide outs. Temperature, humidity and light intensity profiles were monitored by the HOBO data logger installed in the tunnel. The effects of temperature, humidity and light intensity on cricket behavior was observed and

recorded. At temperatures $\leq 25^{\circ}\text{C}$, the crickets were less active, laid few eggs, ate and moulted less translating to slow growth while at temperatures between 28°C and 35°C , they were very active, laid more eggs, ate more, moulted more which translated to higher growth rate. However, at temperatures $\geq 40^{\circ}\text{C}$, the crickets were weak and sluggish in their movement. High humidity (60-70%) coupled with moderate temperature (35°C) encouraged high moulting translating to increased growth rate. Crickets ate and laid more eggs at night than during the day time indicating that too much light affects their laying and feeding behavior. Developmental and physiological characteristics of cricket are dependant on the abiotic factors.

Key Words: Abiotic Factors, Behaviour, Cricket, Tunnel Unit

Comparative Study on Use of *Moringa oleifera* Lam and Soyabean in Rearing Sex Reversed *Oreochromis niloticus* in Aquaculture.

Deblin Kadzo Mtana¹, Wandera Albert Daniel¹ and Lomodei Evans³

¹Undergraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret

²Postgraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret. Email:

dawandera@gmail.com; lomodeievans@yahoo.com

³Email: deblinemtana@gmail.com Tel: +254715623925

Abstract

Nile tilapia (*Oreochromis niloticus*) is one of the first fish species cultured. Fish feeds have posed a great problem to the aquaculture industry and it accounts a large percentage in production cost. The study aims to find an alternative and cheap feed to be used in Aquaculture. Two months old sex reversed fingerlings were subjected to three different feeds, *Moringa oleifera* Lam, Soyabean meal and Fish meal as a control, for a period of 42. The feed was administered at 10% body weight twice a day 9am and 4pm. Fingerlings fed on Fish meal had highest mean weight gain of 5.614 g compared to those fed on *Moringa* meal and Soyabean meal which had a mean weight gain of 5.091g and 4.63g respectively, ($p=0.163$). The specific growth rate of fingerlings fed on Soyabean meal, (0.662 ± 0.948) was slightly higher compared to Fish meal (0.593 ± 0.269) and *Moringa* (0.447 ± 0.447). There was significant difference between the specific Growth Rate of fish fed on *Moringa* meal and Soyabean meal ($p=0.001$), while Fish meal and *Moringa* meal showed no significance difference ($p=0.368$). There was no significance difference in the Condition Factor of fingerlings fed on Fish meal (1.451 ± 0.361), *Moringa* meal (1.329 ± 0.425) and Soyabean meal (1.476 ± 0.276), $p=0.016$. The length and weight of fish showed no significance difference during the experimental period ($p=0.499$) and ($p=0.191$) respectively. Thus *Moringa oleifera* Lam can be used as trial for alternative dietary protein source in the culture of Nile tilapia.

Key words: Nile tilapia, *Moringa oleifera* Lam, Fishmeal

Rearing and Processing Crickets (*Achita domestica*) at Household Level for Food Security

Monica A. Ayieko[✉]

Centre for Food Security and Biodiversity, School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

[✉]Email: monica_ayieko@yahoo.com

Abstract

Acceptance of certain edible insects as human food among different communities of the world differs widely. When one insect is eaten as a delicacy in a village, the same is not acceptable in another community. In Kenya, there are several species of crickets which can be reared for consumption and the locals are gradually embracing the insect as a mini-livestock. This research project was designed to introduce *Achita domestica* as a mini-livestock to farmers around the Lake Victoria region in Kenya. Convenient sample

selection was used to identify 25 farmers as a pilot group. After training the farmers on cricket rearing, they were then each supplied with starter kits. The farmers were instructed on how to build secure cricket houses to carry at least 8 cricket cages. Clean cricket breeding stock (eggs or pinheads), were supplied from Jaramogi Oginga Odinga University of Science and Technology demonstration project. The farmers were also trained on harvesting and post-harvesting skills. From the pioneering project, there are now more than 40 farmers producing crickets, trading with neighbors and able to serve cricket dishes at family meals. It was concluded that farmers are readily available to adopt innovative food security ideas, be creative with feed options and ready to learn simple home processing methods and serving cricket-based dishes. Cricket production for market has steadily reached maturity in Kenya. Strategic largescale production and processing for a market chain development is in order. Meanwhile, the available smallscale farmers can sustain small entrepreneurship projects in the rural areas with limited support from trained extension agents.

Key words: Consumption, Crickets, *Acheta domestica*, Household, Processed Products

The Concentrations of Zinc, Magnesium and Iron in Some Selected Medicinal Plants used by the Chuka Community in Kenya

Odongo S. Adongo

Department of Physical Sciences, School of Biological and Physical Sciences, Jaramogi Oginga Odinga University Of Science and Technology, P.O. Box 210-40601 Bondo

Abstract

Medicinal plants are essential components of primary health care, especially for rural communities in developing countries. The medicinal plants contain mineral elements that are beneficial therapeutically. In this study, concentration levels of Zn, Mg and Fe in *Tagetes minuta*, *Senna didymobotrya*, *Bidens pilosa*, *Caesalpinia volkensii*, *Iboza riparia* and *Commiphora zimmermanii* were analysed using Flame absorption spectroscopy (AAS) was used to determine the levels of Mg, Fe and Zn. Mean levels of Mg in the medicinal plants ranged from 6.00-164.00 mg/Kg. *A. secundiflora* (leaves) had the highest mean levels of Mg ($163.00 \pm 1.00n$ mg/Kg) while *S. incanum* (roots) showed the lowest mean levels ($6.33 \pm 0.29a$ mg/Kg). Levels of iron ranged from 1.45-9.54 mg/Kg. Leaves and stems combined of *T. minuta* had the highest level of Fe (9.43 ± 0.110 mg/Kg) while leaves of *C. volkensii* had the lowest levels of Fe ($1.47 \pm 0.02b$ mg/Kg). The mean levels of Zn ranged from 0.67-4.29 mg/Kg. *A. secundiflora* (leaves) had the highest mean levels of Zn ($4.24 \pm 0.06n$ mg/Kg) while stem bark of *C. zimmermanii* had the lowest levels ($0.67 \pm 0.00d$ mg/Kg). Concentration levels of minerals in these medicinal plants may be responsible for their medicinal properties.

Key words: Medicinal plants, Chuka community, Zinc, Magnesium and Iron.

Small Scale Production of Cricket and Black Soldier Fly for Sustainable Food and Feed

Ng'ong'a[✉]

Undergraduate Student (BSc. Agribusiness Management), School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

[✉]Email: ngongacharles@yahoo.com

Abstract

It is estimated that by the year 2050, the world population will reach 9 billion. With the current global food insecurity, there is likelihood that the situation may worsen. The poster presentation illustrates the simple methods that have been used on campus for the rearing of crickets (*Acheta domesticus*) and the black soldier fly (*Hermetia illucens*) for food and feed, as a way of contributing towards food security. Crickets from the wild were caught and fed on fresh kales, chicken mash and clean water in 100ml plastic buckets for one month. Attraction of adult BSF to lay eggs was done by use of rotting food collected from the campus restaurant. The collected crickets laid eggs that have hatched to produce a population of about a million

while the eggs of BSF hatched, the larva were fed on different food types and the resultant prepupa transferred to a rearing net cage in containers containing pupation media for emergence. Crickets were processed into human food and livestock feed whereas Black soldier fly were used as poultry and fish feed. There is a lot of potential in the rearing of these insects a way of boosting food security and generating income.

Role of Gender Equality in the Enhancement of Tea Quality and Quantity in Kenya a Survey of Farmers Served by Gathuthi Tea Factory, Nyeri County

Machira J. Mwangi✉

PhD Student Entrepreneurship, Jomo Kenyatta University of Agriculture and Technology and Lecturer, Mt Kenya University.

✉Email: majmwa2009@yahoo.com

Abstract

Studies have shown that gender equality has a crucial part to play in the improvement of any situation that has faced human being. However its role in the tea sector is not well known. This study sought to identify the role of gender equality in enhancement of tea quality and quantity. The study assessed the most important aspects of gender equality, the extent of its use, the factors limiting its use and the relationship between gender and tea quality and quantity. The study was a census of all tea farmers served by Gathuthi tea factory in Nyeri County. Primary data was collected using semi-structured questionnaires with the aid of a questionnaire guide. Analysis was done using descriptive statistics and then presented in tables charts, in percentages and frequencies. The research found that Gender equality is an important component in the improvement of tea quality and also quantity. The respondents clearly stated that what was most important is the issue of involving everybody in the family in decision making concerning money and any other resource that are used in process of tea production. The research identified the factors related to gender that limited the production of better quality and also quantity. These included among others, lack of honest among family members, one person decision, dictatorship in the family, miss use of financial resources and other resources etc. The findings were that there are a direct positive relationship between gender equality and enhancement of tea quality and quantity. The study also made some recommendations that are geared towards improving on tea quality and quantity for future consideration.

Key words: *Gender equality, Financial resources, Quantity, Dictatorship, Honest*

Ecological Evolution of Lake Sare: The Need to Develop and Manage Fisheries Resources of the Small Water Bodies in Kenya

Maithya J^{1,✉}, R. Abila² and N.M. Mbithi¹

¹*Department of Natural Sciences, Garissa University College*

²*Department of Fisheries Management & Aquaculture Technology, South Eastern Kenya University*

✉Email: maithya.jacob@gmail.com

Abstract

Lake Sare is one of Kenya's satellite small water bodies in the Lake Victoria basin that is categorized as a high priority ecological site for conservation and management of the resources of the basin as it has direct link with Lake Victoria. This study investigated and inventoried the potential exploitable fish species of the lake as well as ecological changes that have occurred in the past two and half decades when it was last studied. Results revealed significant changes in environmental parameters in the last 24 years. Invasion by noxious macrophytes was observed, presenting slow ecological succession that may gradually invert the lake to become completely terrestrial in years to come. Although it lacks active commercial fishery due negligence and poor or no management, it can be used as a launch site for restocking Lake Victoria with juveniles of endangered indigenous fishes. Besides, under concerted, well-managed research efforts, active fisheries of this

small waterbody can be realized. There are over 65 small waterbodies around the Kenyan part of Lake Victoria Basin and, over 250 in Kenya, both natural and man-made. While our efforts have been concentrated in the exploitation of fisheries resources of the small water masses, very few or no management programmes have been designed and implemented for rehabilitation and sustainable development of these resources whose strong base must definitely increase food security of Kenyan populace. This paper outlines the importance of small water bodies for fisheries resource base development in Kenya, with the contrasting examples of Lake Sare case in Kenya and Kariba Dam in the SADC region.

Key words: *Fish species, fisheries resources, sustainable resource development, small water bodies*

Policy Implications to the Socio-Economic Analysis of Adoption Determinants of New Agricultural Technologies in Kenya: The Case of South Western Kenya Region

Gor C.O.^{1,✉} and Ackello-Ogotu²

¹*Department of Agricultural Economics and Extension, School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology, Box 201 – 40601, Bondo-Kenya*

²*University of Nairobi, Box 30197 – 00100, Nairobi*

✉Email: cogor@jooust.ac.ke Tel: +254-722768745

Abstract

Effective agricultural development requires equal contributions from research, extension, and the farmer. A growing concern among agricultural development researchers is that the farmer has often been side lined with many development strategies considering the farmer as more of a recipient than a contributor in the technology adoption process. The overall objective of the study was to classify smallholders in South Western Kenya using the farming systems approach and then analyse factors influencing adoption of new agricultural technologies in order to determine simultaneity of technology adoption among smallholders in South Western Kenya. In all cases, a sequential random sampling was used to select potential respondents of 90 farmers in each of the designated regions for a total of 270 respondents. Contingency tables and odd ratios of technology adoption in South Western Kenya were calculated. The results of the study showed that the least adopted technology regionally was Artificial Insemination (AI) and grade livestock breeds. The following relationships within the equations were statistically significant: income of previous year; financial remittance in the current year; and regional disparity. An important finding of the study was that deciding to adopt hybrid maize; pesticides, and fertilisers simultaneously implied that farmers in the study area respond to extension services available in the region. This indicated that smallholder farmers in the study area were open-minded and would be influenced to adopt various technologies at the same time provided positive attributes can be gleaned.

Key words: *Smallholders, Farming Systems, Simultaneity, Technology adoption*

Growth Performance of *Oreochromis variabilis* Larvae: A Case Study of Effect of Live and Formulated Diets on Growth and Survival Rates

Maithya J[✉] and N.M. Mbithi

Department of Natural Sciences, Garissa University College

✉Email: maithya.jacob@gmail.com

Abstract

Oreochromis variabilis Boulenger (1906) is an indigenous but endangered fish species of Lake Victoria. It is among the species targeted for stock enhancement and restoration in Kenya. Such mass stock enhancement requires knowledge and maximization of larviculture of this fish species. This study investigated the growth potential of *O. variabilis* fry using diets formulated from locally available feed materials and under uncontrolled local environment in the larviculture. Fish fry reared on formulated diets incorporating *Rastrineobola argentea*

Pellegrin and *Caridina nilotica* Roux as protein source and cassava as basal feed gave higher growth and survival rates than those maintained on plankton live feed. The study concluded that viability of larviculture of *O. variabilis* using formulated artificial diets may be achieved, and that this provides important breakthrough in the propagation of seed stock of *O. variabilis* for mass culture of the species for purposes of stock enhancement, restoration and sustainable fisheries development programs of endangered fish species so as to boost food security in Kenya.

Key words: *Oreochromis variabilis*, Endangered species, Larviculture, Stock enhancement, Restoration, Fisheries development

The Effect of *Olea afrikana* and *Cassia didymobotrya* and Aging Period, on the Level of Heavy Metal Residues in Fermented Milk - A Case of Kabianga Division.

Wangila Tsikhungu Phanice[✉]

University of Kabianga, School of Science and Technology, Department of Physical Sciences, P.O box 2030, Kericho, Kenya

[✉]Email: tsikhungu@yahoo.com Tel: +254721405111

Abstract

Indigenous plant materials have been harvested for use as food additives by different communities. The present study gives findings on the aging period and use of ash from *Cassia didymobotrya* (*senetwet*) and *Olea afrikana* (*emitiot*) on the levels of sodium and heavy metals lead, chromium, iron and cadmium in fermented milk from selected households within Kabianga division, Kericho County. Lead, chromium, iron and cadmium were determined using an atomic absorption spectrometer (AAS) while a flame emission photometer was used in the determination of sodium. From a survey carried, 52.6% of the sampled respondents were male and 47.1% female, 95% take fermented milk and 90.4% of the respondents take fresh milk, with 19.5% of this taking fresh milk with herbs. Of those who take fermented milk, 28.4% take fermented milk without herbs. The average pH of the milk during processing decreased from 6.67 to 4.14 from 0 day to 6th day for *Cassia didymobotrya* (*senetwet*) ash and 6.61 to 4.37 for *Olea afrikana* (*emitiot*) herb. Fermented milk with *Cassia didymobotrya* (*senetwet*) ash recorded a higher pH of 4.65 than 3.96 of *Olea afrikana* (*emitiot*). Showing that the later is generally better for acidity reduction. Cd, Cr, Pb, Fe and Zn were detected in all milk samples at the initial stage of 0 days, in the order of Pb>Zn>Cr>Fe>Cd (3.75, 1.25, 0.30, 0.168 and 0.03 ppm respectively). *Olea afrikana*(*emitiot*) herb is better for removal of lead which is toxic to human body while retaining Fe and Zn. In addition, *Olea afrikana* (*emitiot*) retained upto 100 % zinc compared to *Cassia didymobotrya* (*senetwet*) that retained only 60 % of zinc.

Status of Phytoplankton Community of Kisumu Bay, Winam Gulf, Lake Victoria, Kenya

Were-Kogogo Pamela^{1,✉} and Anyango Dolphine Caroline²

¹School of Biological and Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology, P.O Box 210- 40601 Bondo, Kenya

²Department of Biological Sciences, University of Kabianga, P.O Box 2030-20200 Kericho, Kenya

[✉]Email: werepj@yahoo.com

Abstract

Lake Victoria has undergone remarkable and diverse ecological perturbations which are as a result of physical, chemical and biological processes, together with human activities that take place in the watershed area and within the lake itself. The most observed effects include increases in phytoplankton biomass and frequent algal blooms. In this study species composition, abundance, spatial and temporal distribution of phytoplankton as well as total phytoplankton biomass of Kisumu Bay, (Winam Gulf), Lake Victoria, Kenya was

studied for six months in the wake of climate change. Sampling was done every two weeks using a Van Dorn Water sampler to take water samples and algal cells were counted under an inverted microscope with the help of a Sedge-Wick Rafter Cell in order to determine density. Phytoplankton biomass indicated by chlorophyll-content was determined through cold extraction in acetone and subsequent quantification by spectrophotometry. Physico-chemical parameters were measured insitu using respective meters, while plant nutrient levels were determined by spectrophotometric methods following standard methods of APHA 1985 and Gems (1992) Handbook. ANOVA test was used to determine any temporal and spatial variability in the biological factors. Regression and Pearson's correlation analyses were done to establish relationships between these factors. LSD test was done to determine means which were significantly different. The results indicated that a total of 36 genera of algae belonging to Cyanophyta, Bacillariophyta, Chlorophyta and Pyrrophyta were present, with dominance of the classes in terms of number of species being in that order. *Chroococcus* species was the most abundant and its density was significantly different from all the others. Most algal species were more or less homogenously distributed in the bay ($p=1.0000$) and over the study period ($p=1.0000$), but their densities varied significantly between different species ($p<0.0001$). From these results, it can be concluded that the phytoplankton community within the bay is becoming very dynamic and could possibly portray the status in the whole lake. Diatoms are becoming increasingly dominant. There is continual increasing trend in physico-chemical factors. The information obtained from this work contributes to the understanding of ecological changes in the bay in response to climate change and variability and thus the threat to biodiversity. This information is therefore important for ecological and management purposes of the lake and understanding effects of climate change on ecosystem structure, functioning and productivity.

Key words: *Phytoplankton, Algae, Lake Victoria, Biodiversity, Climate change.*

Community Based-Sorghum Seed Multiplication as a Strategy for Enhancing Sorghum Production for Improved Smallholder Incomes and Livelihoods in Siaya County

Akuno W.^{1,✉}, Akhaukwa, P.J.¹, Osika N.O.¹ and Muchelle F.²

¹*Division of Research, Innovation and Outreach, Jaramogi Oginga Odinga University of Science and Technology, PO Box 210 Bondo*

²*Kenya Agricultural Productivity Project, County Service Unit, P.O. Box 777, Siaya*

✉Email: wakuno@jooust.ac.ke

Abstract

A significant proportion of the Kenyan population experiences food insecurity and malnutrition. The most affected are children and expectant mothers who depend on maize meal for food. Maize is a staple food in Kenya with over 90% of the population depending on the crop both for food and cash. However, with the unpredictable global climate change coupled with outbreaks of maize lethal necrosis disease in the high potential maize zones, sorghum is one of the best options for food security. The production of sorghum is hampered by the unavailability of seeds suitable for appropriate agro-ecological and socio-economic needs of small-scale farmers. The farmers are faced by a scenario whereby seed companies supply only hybrid varieties which cannot be recycled meaning farmers have to purchase fresh seeds every planting season. Over the last two years there has been a deliberate effort by farmer groups, courtesy of the KAPAP project, to bulk an Open Pollinated Variety (OPV) known as Mercia in Siaya County, a variety that is now available to farmers for replanting. The community seed bulking and farmer-farmer sharing of seed has not only increased the number of farmers involved in sorghum production but has enhanced the availability of sorghum seed to other farmers who could hitherto not afford good seed. The objectives of the study were to identify sorghum common interest groups to promote growing of high yielding variety of sorghum and to avail high yielding variety and evaluate its acceptability. It involved a baseline survey to identify the groups, training on sorghum production, growing of the high yielding seed by the farmer groups and evaluation of its acceptability by the farmers. The study revealed that smallscale farmers continue to experience lack of good seed variety

to plant and that this project not only brought in a viable seed variety but also sensitized them on other uses of sorghum.

Key words: *Community, Seed Multiplication, Open Pollinated Variety*

Effect of Brood Stock Size on Hatch Rate of African Catfish, *Clarias gariepinus* (Burchell 1822) Eggs at The University of Eldoret Hatchery

Deblin Kadzo Mtana^{1,✉}, Wandera Albert Daniel² and Lomodei Evans²

¹Undergraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: deblinemtana@gmail.com Tel: +254715623925;

²Postgraduate student, Department of Fisheries and Aquatic Sciences, University of Eldoret, Email: dawandera@gmail.com Tel: +254717883619; lomodeievans@yahoo.com Tel: +254725450662
Email: deblinemtana@gmail.com Tel: +254715623925

Abstract

Clarias gariepinus (Burchell 1822) is a good species for aquaculture, characterized by fast growth, higher dress-out content, and ability to feed on diverse food materials, and tolerate a wide range of environmental variables. Study to investigate the effect of size of brood stock on hatch rate and time for optimal hatching of eggs of *clarias gariepinus* for a period of four weeks was conducted. Completely randomized design (CRD) was used for the experiment, where 3 treatments with 9 replicates from 3 brooders weighing 209g, 269g and 327g sampled and used in ratio of 1:1. Water quality parameter (D.O, temperature and p.H) were kept constant across all treatments. Correlation coefficient of regression and Kruskal-Wallis test was used to analyse the data. The number of eggs incubated across all the three treatments was 6000 eggs. The mean hatch rate was 0.525 from the larger brooder, moderate brooder with a mean of 5.91 while the smaller brooder had a mean of 3.76. There was a strong positive correlation between incubation and hatch rate in all treatments (A, B, C) ($r=0.75$, $r=0.353$, $r=0.353$) respectively. There was a positive correlation between hatch rate and water quality parameter. Treatment A ($r=0.554$ in D.O, temperature $r=0.723$ and p.H $r=0.408$), B of ($r=0.710$ in D.O, temperature $r=0.786$ and p.H $r=0.785$). The optimal time for hatch rate was at 25th hour of the day after incubation. The present study therefore advanced the thought that a smaller catfish brood stock is better for breeding activities.

Demand and Supply of Nile Perch (*Lates niloticus*) and Tilapia (*Oreochromis niloticus*) as Compared to Selected Alternative Protein Sources within Kimumu Sub-Location, Kabitoi-A Village, Kenya

Lomodei Evans^{1,✉} and Albert Wandera Daniel¹

¹Postgraduate student, University of Eldoret. P.O Box: 1125-30100, Eldoret. Email: lomodeievans@yahoo.com; dawandera@gmail.com Tel: +254725450662; +254717883619

✉Email: lomodeievans@yahoo.com Tel: +254725450662

Abstract

The study investigated factors influencing consumers' preference for Nile perch, Nile tilapia, beef, chicken and mutton within Kabitoi Avillage in Uasin Gishu County. It generally aimed at finding out the most preferred animal protein source in Kabitoi-A village. The village was divided into strata; A, B, C and D based on the settlement pattern and questionnaires were administered randomly. Logistic regression for logit1 (Nile perch/Tilapia) and logit 3 (chicken/Tilapia) showed no significance to conclude that factors affect preference from Nile perch and chicken to tilapia, respectively. Logit 2 (Mutton/Tilapia), price (odds ratio of 10.22 and $p=0.004$) and nutritional factor (odds ratio of 0.08 and $p=0.005$) showed significance to conclude that, their changes did affect preference from mutton to tilapia, respectively. Logit 4 (Beef/Tilapia), price (odds ratio of 18.19 and $p=0.003$) and nutritional factor (odds ratio of 0.01 and $p=0.0001$) showed significance to conclude that, their changes did affect preference from beef to tilapia, respectively. Analysis

showed that beef (34.3%) was most preferred, mutton and chicken followed (23.2%) with the same preference level, tilapia (18.2%) ranked fourth while Nile Perch (1.1%) ranked last. Therefore, price of different protein sources determined the perceived demand and beef was cheaper and thus highly demanded and the study recommends a “eat more fish campaign” to be carried by the County department of Fisheries so as to increase fish consumption rates and boost people’s nutrition as a whole.

Key Words: *Consumer Preference, Protein sources, Demand and supply and Fish*

Factors influencing Sorghum Production by Smallholder Farmers in Waia Division, Makueni County, Kenya

Nahshon N. Mutua^{1,✉}, George O. Ouma², Wilfred. O. Odadi³

¹Jaramogi Oginga Odinga University of Science and Technology P.O. Box 210-40100 Bondo-Kenya

²Jaramogi Oginga Odinga University of Science and Technology P.O. Box 210-40100 Bondo-Kenya

³Egerton University P.O. Box 536 Njoro -Kenya

✉Email: mutua_ngau@yahoo.com

Abstract

Smallholder farmers in arid and semi arid lands in Kenya are frequently affected by drought and famine which lead to starvation and malnutrition especially of children, women, the aged and disabled. Maize being the most preferred staple crop has low yields and of low quality due to drought. This has led to abject poverty among smallholder farmers. Therefore food security measures are urgently needed especially the choice of crop to salvage the situation lest smallholder farmers in these regions suffer serious food shortage. This study was carried out in Waia Division, Mbooni East District, Makueni County. The specific objectives of the study were; to find out the influence of socio-economic factors on sorghum production, to investigate the government policy influence on sorghum and to determine the influence of climatic factors on sorghum production. Descriptive research design was used in this study while descriptive survey method was used to collect data using questionnaires which were administered to smallholder farmers. Data collection was done on April/May 2013 in the four sub-locations of Waia division. A sample of three hundred and forty four smallholder farmers were selected using stratified proportionate random sampling and were interviewed. Descriptive statistics namely frequencies, percentages, cumulative percentages were used to analyze the data using Statistical Package for the Social Sciences (SPSS) software version 16. Null Hypothesis; socioeconomic factors do not influence sorghum production was tested using the chi-square method. The study observed that socio-economic factors (age, gender, land size, level of education, level of income, methods of sorghum production and land system) significantly influenced sorghum production. Climate change and government policy significantly influenced sorghum production. The study concluded that there is a great potential of sorghum production in Makueni. The study recommended that the smallholder farmers needed support from financial advisory services, sorghum production extension services and marketing by government, non-governmental organizations and private investors.

Key words: *Smallholder farmers, choice of crop, food security, drought and famine, Makueni*

Genetic Diversity of Kenyan Cowpea and Response of Selected Cultivars to Cowpea Aphid Borne Mosaic Virus (CABMV)

Irene Akoth Onyango

Jomo Kenyatta University of Agriculture and Technology

: onyangoirene22@gmail.com

Abstract

Cowpea (*Vigna unguiculata*) is one of the important food legumes cultivated commercially in the tropics and sub-tropics. Cowpea makes a significant contribution in human food and livestock fodder. The dual purpose

has made the plant very attractive particularly in areas where land scarcity is an issue. However, the most important constrain to cowpea production can be attributed to the predominance and persistent of virus disease infections particularly, *cowpea aphid born mosaic virus (CABMV)*. CABMV is one of the most economically significant virus to cowpea due to devastating effects in all the cowpea growing regions. This study investigates genetic diversity of Kenyan cowpea and reaction of selected cultivars to *cowpea aphid borne mosaic virus*. The study characterises 40 cultivars available in Kenya using about 15 SSR markers. Seeds of the various cultivars were planted in treys in glass house. DNA was extracted from the young leaves harvested after 2 weeks. The extracted DNA was quantified using bio spectrophotometer by measuring the optical density at an absorbance ratio. PCR process were carried out using the SSR markers known for cowpea and will be used to screen 40 cowpea DNA samples. The PCR reaction products were analysed on KB^{PLUS} 6.5 denaturing polyacrylamide gel, the gel was then air-dried and DNA profiles scanned with a scanner. Data was be scored with 1 and 0 used to represent band presence while absence of bands will be scored with the value 0. A dendrogram for the 40 cultivars was developed and 2 cultivars from each group was selected according to their genetic association closeness. The selected cultivars were grown in house and infected the CABMV at the second trifoliolate leaf stage and their reaction to the virus observed for a period of one month to determine resistant and susceptible cultivars. AMOVA (Analysis of Mol. Var.) was used in the genetic distance analyses. Subsequently, SSR markers linked to CABMV resistance in the cowpea cultivars was determined by mapping the sequences against the parent plant genome IT90K-48-1. From the study, it was possible to develop SSR markers linked to CABMV resistance in cowpea and also determine the cultivar lines that are resistance to the virus.

Evaluation of Growth and Survival Rate of Goldfish Fry (*Carassius Auratus*) Fed on Different Zooplankton Feed Forms

Lomodei Evans^{1,✉} and Kerengo Leah²

¹Postgraduate student, University of Eldoret, School of Natural Resources Management, Department of Fisheries and Aquatic Sciences. P.O Box 1125-30100, Eldoret, Email: lomodeievans@yahoo.com Tel: +254725450662

²Lecturer, University of Eldoret, School of Natural Resources Management, Department of Fisheries and Aquatic Sciences. P.O Box 1125-30100, Eldoret, Email: ckerengo@yahoo.com Tel: +254722430566

✉ Email: lomodeievans@yahoo.com Tel: +254725450662

Abstract

The study evaluated the effects of feeding different forms of zooplankton on the growth and survival of goldfish fry at the University of Eldoret fish farm and aimed at determining the effects of feeding different forms of zooplankton (live, frozen and dried form) on growth of and survival of goldfish fry. One week old goldfish fry (0.03mg and 0.8 cm initial weight and length respectively) were studied in nine plastic tanks (100 liter) with 40 litres water full at a stocking density of one larva per liter to determine the suitability of frozen, dried and live zooplankton as their diet. At the end of the four weeks' study, the mean weight of fry fed on frozen, dried and live zooplankton diet were 578mg, 308mg and 773mg respectively. Fry fed on live zooplankton recorded the highest growth rate ($p < 0.05$) as compared to those fed with dried and frozen zooplankton diets. The weight of the fry fed on live, frozen and dried zooplankton diet forms differed significantly ($p < 0.05$). Treatment where fry were fed live diets recorded 100% survival while frozen diet and dried diet had survival rates of only 11% and 61% respectively. The study shows superiority of live zooplankton diet over preserved diets for goldfish fry rearing in terms of growth and survival rates. Therefore life zooplankton diet form exhibited the best growth and thus would be preferable as goldfish fry feed due to ease of collection and direct feeding without loss of nutrients as a result of preservation.

Use of Varietal Resistance in the Control of Red Spider Mite *Tetranychus Evansi* (Baker and Pritchard) in Tomato *Lycopersicon esculentum* (Mill) Production in Kenya

Musah S. M.^{1,✉}, Kamau A. W.², Munene M³

¹Ministry of Agriculture, Livestock and Fisheries, Nakuru County, Kenya

²Department of Crop, Horticulture and Soil Sciences, Egerton University, Njoro, Kenya.

³Kenya Agricultural and Livestock Research Organisation (KALRO), Njoro, Kenya.

✉ Email: msmatika@yahoo.com

Abstract

Red spider mite *Tetranychus evansi* (Baker & Pritchard) is most important dry season pest of tomatoes in Eastern and Southern Africa. It is probably native to South America and was introduced accidentally into Southern Africa in 1980. Since then the species has spread and was recorded for the first time in Kenya in 2001. Control of *T. evansi* has mainly been by chemicals sprays, which has resulted in problem of pest resistance and pollution of the environment. This study was therefore an attempt to look into alternative environmentally friendly ways of controlling *T. evansi* in tomatoes. To determine the effect of *T. evansi* on tomato varieties, an experiment was conducted in Greenhouse using Randomized Complete Block Design (RCBD) replicated four times in Kenya Agricultural Research Institute, Njoro, Kenya. The tomato varieties assessed for host plant resistance were: Cal J, Onyx, Roma VFN, Riogrande, Moneymaker, Eden F1, Anna F1, and Wild type. The lowest and highest total average number of Red spider mite *T. evansi* population was recorded on Wild type (2.6/leaf disc-10mm diameter) and Variety Money Maker (12.2/leaf disc-10mm diameter) respectively. The highest leaf damage was recorded in tomato variety Moneymaker (4.0) while the lowest was recorded on the wild variety (1.8). There was no significance difference ($P < 0.05$) in leaf damage between Anna F1, Riogrande, Roma VFN and Onyx. Least (11.3%) percent reduction in the number of dead flowers and flower buds due to mite infestation was recorded on wild type (182). This was not significantly lower than variety Moneymaker at $p = 0.05$. Lowest average percent webbing (17.5%) and yield loss (19%) due to mite infestation was recorded in the Wild type. Tomato variety, Moneymaker was highly susceptible and Wild tomato was most resistant. Since only eight tomato varieties were evaluated, there is therefore need to evaluate more tomato varieties to identify high yielding and less susceptible varieties that can be recommended to farmers. Varietal resistance could become an integral part of an Integrated Pest Management (IPM) programme.

Key words: IPM, *Lycopersicon esculentum*, *Tetranychus evansi*

Mortality, Culling and Replacement Rates and Causes of Herd Exit in A Kenya Boran Herd in the Lowland Tropics

E. O. Otieno^{1,✉}, R.O. Mosi² And J.O. Amimo³

¹Homa Lime Company Limited, P.O. Private Bag, Koru, 40104, Kenya. E-mail: erick02ke@yahoo.com

²Department of Plant, Animal and Food Sciences, School of Agriculture and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology, Box 210 – 40601, Bondo, Kenya. E-mail: oyoomosi@yahoo.com

³Department of Animal Production, Faculty of Veterinary Medicine, University of Nairobi, P.O. Box 29053, Nairobi, Kenya. E-mail: Amimo.josh@gmail.com

✉ E-mail: erick02ke@yahoo.com

Abstract

The Kenya Boran breed (KB) is the improved type of the Boran cattle whose origins are the Northern Frontier Districts of Kenya and the Oromo Region of Southern Ethiopia. The breed, which is characterized by good fertility, growth and longevity under arid conditions, is recognized as one of the world beef breed. A total of 1348 birth records made over ten years, from 2000 to 2009, by the Kenya Boran cows kept at the Homa Lime Company Limited in the Lowland Tropics were used to study causes of herd exit, and mortality, culling and herd replacement rates. Consistently, more calves were born in low rainfall season than in high rainfall season, except in the year 2001 when roughly the same number (about 118) calves were born in the

two seasons. Trends in culling and replacement rates were mirror images of each other. Culling rate ranged from 82% in 2000 in the foundation stock to 3% in the tenth year (2009). In the same period, replacement ranged from 3% to 93.9%. Overall mortality was highest between 2002 and 2004 (range=14.2-15.5) when there was lumpy skin disease in the herd. The lowest annual mortality rates were recorded in 2008 and 2009 at 3.7% and 3% respectively. There were seasonal variations in overall herd mortalities, with the highest rate recorded in high rainfall season in 2006. There was a gradual rise in pre-weaning mortality rate from the lowest (5%) in 2000 to the highest (10%) in 2004, after which there was a general decline. The main reasons for herd exit were culling, sales for slaughter and breeding, mortality and disappearance. Implications of the results on sustainable herd management are discussed.

Key words: Kenya Boran, Herd exit, Mortality, Culling, Replacement

A Culture Dependant Biodiversity Study of Extreme Haloalkaliphilic Bacteria from Magadi Soda Lake Kenya

Evans Manyara Nyakeri^{1,✉}, Henry JO Ogola¹, and Hamadi Boga²

¹School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

¹Taita Taveta University College

✉Email: evans.nyakeri@gmail.com Tel. +254721750390

Abstract:

The present study that aimed at studying the microbial ecology of Lake Magadi, isolated 37 isolates from Lake Magadi using mineral and carbon rich media types. They were characterized by cultural, biochemical and molecular approaches and screened for the ability to produce useful biotechnological enzymes and biomolecules. Screening was done by plating on basal media supplemented with the respective substrate. 34 of the isolates were Gram positive, one was Gram negative and two were Gram variable. Most of the isolates grew well at pH ranging from 6.0 – 11.0, (optimum 9.0-10.0), temperature range of 20-45°C (optimum of 30-35°C) and salinity range of 5- 30 %, optimum growth was noted at 10-15% salinity, showing that they are true haloalkalophiles. 15 isolates produced various extracellular enzymes such as amylases, lipases and proteases. Partial sequence blast analysis showed that the bacteria belonged to genera *Bacillus*, *Clostridium* and *Halomonas*, with relative abundances of 54%, 38% and 8% respectively. The similarity values of some of the isolates to their closest neighbours (78% 80%, 84%, 85%, 88% and 94-97%) show that they may represent new species or novel genera respectively within the lake ecosystem. The study results show that Lake Magadi harbours ecologically important micro-organisms which also have the potential for application in the biotechnology industry.

Key words: Haloalkalophiles, Lake Magadi, hypersaline, biotechnology, *Bacillus*, *Clostridium*, *Halomonas*,

The Effects of Organic and Inorganic Fertilization in Zooplankton Productivity in Earthen Fish Ponds at University of Eldoret Fish Farm, Kenya.

Ndung'u Amos^{1,✉} and Robert Olendi¹

Department of Fisheries and Aquatic Sciences, University of Eldoret, P.O Box 1125, Eldoret. Email –

ndungumburu@gmail.com, Email – rjolendi@yahoo.com

✉Email: ndungumburu@gmail.com

Abstract

This study was conducted to evaluate the effects of organic and inorganic fertilizers on the abundance and diversity of zooplankton in fish ponds for a period of twelve weeks. Two treatments and control were replicated using Poultry Manure (PM) and Urea plus Di-ammonium phosphate (UD) in earthen ponds of 100m² each. The application rate of PM was 1000kg/ha while that of UD was 30kg urea plus 20kg DAP/ha in A₁ and B₂ respectively with similar content of nutrients. Application of fertilizers and sampling of zooplankton

and water quality parameter were done on weekly basis. Four groups of zooplankton such as Cladocera, Copepoda, Rotifera and Ostracoda were encountered. The mean abundance of zooplankton ($17.33 \pm 0.88 \times 10^4$ cells/L) was significantly higher ($P < 0.05$) in fish ponds which received PM. The mean Shannon-Weaver diversity indices of zooplankton in the PM and UD treated ponds were 2.599 ± 0.14 and 2.446 ± 0.27 respectively and showed no significant difference ($P > 0.005$). Among the water quality parameters, Dissolved Oxygen (DO), temperature and transparency were found to be significantly different ($P < 0.05$) with both treatments showing an increase in nutrients (phosphorus and nitrates). The results of the study showed that poultry manure is significantly superior ($p < 0.05$) to urea plus DAP. Therefore, poultry manure is recommendable to fish farmer for better pond productivity that could enhance fish production in ponds.

Key words: *Zooplankton, Organic and inorganic fertilizers, Fish ponds, Water quality*

SUB THEME 3 - EMERGING ISSUES IN HEALTH SCIENCE AND IMPACT PATHWAYS IN SCIENCE RESEARCH

Comparative Efficacy of Organic Oil Derivative and Microbial Larvicides on Malaria Vectors in Semi-Field Conditions

Pauline Winnie Orondo✉

Jomo Kenyatta University of Agriculture and Technology

✉Email: paulineorondo@gmail.com. Tel: 0721214563

Abstract

Malaria is a major cause of ill health and mortality around the world especially in Sub-Saharan Africa. This debilitating parasitic infection is transmitted to the human population by female mosquitoes of the genus *Anopheles*. Malaria control strategies involve mechanisms targeting both the larval and adult stages under integrated vector management programs. Prior knowledge and understanding of the effects of any vector control measure on the target population is essential for its success when adopted as a control strategy. The objective of the current study was to determine the efficacy of two larvicides, Larvex®100 and *Bacillus thuringiensis* var *israelensis* (Bti) in semi-field conditions in Jaribuni Village of Kilifi District. The larvicides were tested for efficacy in artificial habitats consisting of plastic-made basins set on an open level ground. The two larvicides and untreated controls were tested in five replicates each and the entire experiment repeated twice. Into each basin 30 wild collected *Anopheles* mosquito larvae were introduced and their survival monitored longitudinally to record the mortality resulting from the treatments. A new set of *Anopheline* larvae was introduced into each habitat when all the larvae in the various habitats died to test for the residual effect of the larvicides. The time taken by each cohort to die out and the time since the introduction of the larvicide and the efficacy was calculated. The pupae collected were allowed to emerge into adults that were identified morphologically to species. Generally there was no significant difference in the efficacy of the two larvicides although Bti was most effective in the first 2 days post-treatment causing 98% larval reduction compared to 15-38% reduction for Larvex®100 in the same period on all the instars with high mortalities against the late instars producing 78% mortality of all the mortalities recorded. Out of the 208 adults that emerged from 318 pupae collected, 147 were identified to species. The *Anopheline* species identified consisted of *A. gambiae* s.l (97.5%) and *A. funestus* (2.5%). In conclusion, this study showed that the use of the organic oil derivatives and microbial larvicides can be adopted as an effective malaria vector control measure to boost the overall success of Integrated Vector Management (IVM).

Calibrated Optoelectronic Circuit For Instrumentation Applications

Indimuli J. Maleche✉, Waweru Mugo and Mutuku J.N.

Department of Physics, Jomo Kenyatta University of Agriculture and Technology (JKUAT)

Box 6200 – 00200, NAIROBI

✉Email: malecheji@gmail.com Tel: +254 726 001 803, +254 774 304 814

Abstract

Design and control of optical – instrumentation are critical to the optical properties of the photo detector and amplifier. The sensitivity of the detector and precise amplification of the transmitted information are very fundamental in electronic circuit instrumentation. Many new generation instrumentation products have been developed due to emergence of integrated circuits in optical fiber systems and wireless communications technologies. In this study, an optoelectronic circuit was developed using a photo transistor and an op amp in order to investigate the change in light intensity of incident radiation on the photo transistor. The experiment was first designed and simulated in electronic workbench. The output signal of the op amp was found broadly proportional to the signal applied at the base of the transistor. In order to test for effectiveness, the design was developed on a solder-less breadboard for real circuit analysis. This circuit exhibited a similar trend to that of the synthetic transistor. The collected data was analyzed through plotted line graphs and simple bar

charts. The calibrated circuit was found to correlate well with the theoretical design work indicating that it was effective and appropriate for detecting on different light intensity. The calibrated circuit was found to be very accurate and cheaper in cost than the commercial optoelectronic meters.

Key words: *Calibrated, Optoelectronic, Circuit, Instrumentation*

The Case of Pandemic Cancer in Kenya: A Preventive and Corrective Measure Model. Nancy Ng'etich¹✉, and Fred A. Amimo¹

¹Jaramogi Oginga Odinga University of Science and Technology, School of Health Science.
P.O BOX 210-40601, BONDO

✉Email: ngetichchichi@gmail.com, P.O BOX 3062-30100, +254-710305124.

Abstract

Cancer is a global pandemic. According to the World Health Organization (WHO) the number of new cases will rise by about 70% over the next two decades yet this can be prevented. In Kenya, cancer is now rated third among causes of death according to the 2014 Economic Survey. Our changed local dietary habits are to blame for the rising death toll in our part of the world due to increasing and unwarranted consumption of rabble-raising foods and less and less tendencies towards vegan-cum-vegetarian inclusions in our daily food consumption. The potential cancer victims are eating their way to the sure infected end-points whereas the fewer and fewer non-prone cancer people are eating their way into cancer free lives. This study presents a preventive and corrective measure model as a superior remedy to our current health disaster attributed to cancer. It presents a dietary formula that minimizes inflammation, insulin resistance and oxidative stress as well as improved immunity. It also suggests a trend that reduces dietary habits which have been specifically linked to modifiable risk factors to cancer occurrence. For the cancer patient it recommends a release of suffering and contributes to improved quality of life eventually impacting positively against cancer recurrence and progression through consumption of a novel dietary inclusion and habit. The model delivers both through preventive and corrective measures.

Evaluation of the Sensitivity and Specificity of Widal and *Salmonella typhi/paratyphi*A Antigen Duo Test in Typhoid Diagnosis

Onyango, D. O.¹✉ and Aloo, B. N.¹

¹Univeristy of Eldoret, Department of Biological Sciences, P. O. Box 1125-30100, Eldoret, Kenya

✉Email: aloobecky@yahoo.com/oluoch_d@yahoo.com Tel: +254 0723 305 606; +254 0714 760 069

Abstract

Typhoid is a life threatening disease that has been reported to claim about 600,000 lives each year worldwide. For effective management of enteric fever, diagnoses need to be done with speed and accuracy. Laboratory diagnosis of enteric fever in endemic areas requires isolation and identification of *Salmonella typhi* and *paratyphi* A. The most commonly used diagnostic methods for these pathogens are the Widal test and *S. typhi/paratyphi* A Antigen Duo test. The major objective of this study was to evaluate the sensitivity and specificity of these two rapid tests in enteric fever diagnosis. This study was carried out in Kenya Medical Research Institute (KEMRI) in Alupe, Western Kenya. One hundred and one patients suspected to have enteric fever enrolled in KEMRI – Alupe clinical wing were investigated using stool culture, Widal test and *S. typhi/paratyphi* A Antigen Duo test. There were 26 cases of enteric fever (11 paratyphoid and 15 typhoid fever). Out of these, Widal test showed positive results to 38.6% while *S. typhi/paratyphi* A Antigen Duo test showed positive results to 7.7% and there were no cases of false positive results for *S. typhi/paratyphi* A Antigen Duo test. The two diagnostic tests were found to be less sensitive with Widal test being non-specific and *S. typhi/paratyphi* A Antigen Duo test very specific. Despite the *S. typhi/paratyphi*A Antigen Duo test's specificity. The study recommends that this test be used in diagnosis of enteric fever because of its rapidness, ease in usage and specificity.

Key words: Enteric fever, Salmonella, Widal test, Salmonella Antigen Duo test, Specificity and Sensitivity

Birth Preparedness Among Women Attending Antenatal Care Clinic in Health Facilities Within Bureti Sub County of Kericho County, Kenya

Omari Phanice Kerubo[✉], Yaw Afrane¹, Peter Ouma²

¹School of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology

²Centre for Global Health Research, KEMRI-CDC, Kisumu

³KEMRI-CDC Public Health Program

✉Email: phanicekerubo@gmail.com P.O Box 818-40500, Nyamira

Abstract

Maternal mortality remains a major public health problem in Kenya with 488 deaths per 100,000 live births. Birth preparedness and complication readiness is one of the recommended strategies by the major global initiatives and implemented by the Kenyan government to reduce maternal mortality. It is the process of planning for normal birth and anticipating the actions needed in case of an emergency during pregnancy, delivery and post partum period. Little is known about the status of Birth Preparedness of pregnant women in Kenya especially those in rural regions. The study aimed at assessing Birth Preparedness and Complication Readiness and the associated factors among women attending antenatal care clinic (ANC) at health facilities within Bureti Sub County. A facility based cross sectional study was carried out among pregnant women attending health facilities within the Sub County. Results from 149 respondents showed that large proportion of the women 70.5 % (n=105) were prepared for birth while 90.6% (n=135) reported readiness for complications. Majority of the respondents 87.9% (n= 139) had identified a place of delivery, 72.5 % (n=108) knew the expected date of delivery. Only 4.7% of the respondents were able to mention at least two danger signs in all the three phases namely pregnancy, delivery, and post partum. Vaginal bleeding was most mentioned danger sign in all the three phases. Women who recognized vaginal bleeding as a danger sign in pregnancy were 3 times more likely to be prepared for birth than those who did not know (OR=3.00, $p=0.004$). Knowledge of vaginal bleeding was also associated with complication readiness (OR=3.47, $p=0.046$). The study revealed that a greater proportion of women attending ANC clinic within Bureti Sub County were well prepared for birth and ready for obstetric complications. However, the low awareness of obstetric danger signs may lead to the first and second delays in seeking health care during obstetric emergencies. It is important therefore to intensify ANC health education on obstetric danger signs to all women attending ANC irrespective of their demographic characteristics.

Diversity and Distribution of Mosquitoes Transmitting Malaria and Rift Valley Fever in Baringo County, Kenya

Ondiba I, M.^{1✉}, Oyieke F.¹, Ong'amo G.¹, Njaanake K.¹, Nyamongo I.¹, Estambale B.²

¹University of Nairobi

²Division of Research, Innovation and Technology, Jaramogi Oginga Odinga University of Science and Technology

✉Email:

Abstract

Vector borne diseases, like malaria and Rift Valley Fever (RVF), have been linked to climate change. They are transmitted to humans and animals by pathogen-infected mosquitoes. The distribution and population dynamics of these mosquitoes are affected by climatic factors. It is, therefore, important to monitor changes in diversity and distribution of these vectors with the aim of preventing outbreaks of vector-borne diseases.

The study was conducted in Baringo County of Kenya. Twenty four sampling sites spread across three sub counties were identified and sampled monthly. Standard dipper and pipette were used to sample mosquito larvae from habitats. Adult mosquitoes were collected outdoors by CDC light trap and indoors by pyrethrum spray catch method. Taxonomic keys were used to identify species morphologically under dissecting microscope. *An. gambiae*, *An. funestus* and *An. pharoensis* previously reported as vectors of malaria in Baringo were collected from different sampling sites within the study area. Three *Aedes* species which transmit arboviruses were represented by immature forms of *Ae. taylori*, *Ae. aegypti* and *Ae. africanus* from high and low altitude zones. Adults of *Mansonia uniformis*; vectors of RVF virus were mainly collected from low altitude zone. It can be concluded that the presence of *Anopheles* species across all study zones indicates that entire county is at risk of malaria. *Aedes* species and *Mansonia uniformis* from lowlands around L. Baringo show potential transmission of viruses in case of RVF outbreak. These vectors should, therefore, be screened for pathogens to determine their infection status and establish the danger posed to humans and livestock.

Investigating Knowledge Attitude and Practice of Sexual and Reproductive Health Issues Among Jaramogi Oginga Odinga University of Science and Technology Students

¹Damaris Ochanda¹✉, ¹Fred Amimo, ¹Daniel Onguru and ²Susan Ontiri

¹Jaramogi Oginga Odinga University of Science and Technology, School of Health Science.
P.O BOX 210-40601, BONDO

²Ipas Africa Alliance. FAWE Hse, 1st Flr, Chania Ave. P.O.Box: 1192-00200 CITY SQUARE.
✉P.O BOX 210-40601, BONDO, +254-710305124.

Abstract

This survey was guided by the millennium development goal on the improvement of maternal health with the overall aim of increasing access to sexual and reproductive health information and services among university students. Specifically, the study was conducted among the Jaramogi Oginga Odinga University of Science and Technology, Main Campus students who were on campus during the period of January to April 2014. The specific objectives of the survey were to investigate the knowledge and attitudes of young university students on sexual and reproductive health, to examine the practice of young university students on sexual and reproductive health, and to investigate factors influencing young university students to seek sexual and reproductive health information and services. Nine Focus Group Discussions were conducted. Each group consisted of 12 to 14 students. Three Key Informant Interviews were conducted with a representative each of Dean of Students, University Health Center, and Janitors. Findings indicated unplanned pregnancies and abortions as common. Among reasons for abortion was the desire to continue with education, stigmatization and single motherhood. Sexual Reproductive Health services were found to be extremely limited at the University Health center. In addition, participants voiced negative attitudes towards the use of the University Health services. It was also apparent that students sought contraceptive and other RH services outside of the university, including at pharmacies, private clinics including Bondo Sub-County Hospital. As an intervention measure, the study proposed strategies including greater and proactive involvement of the University Administration, developing a relationship with other health facilities, sensitization, peer education and outreach.

Evaluation of the Implementation of Community Midwifery Model of Care in Siaya County

Edwinah Atieno Syagga¹✉

¹School of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology

✉Email.com: eddysyagga@gmail.com

Abstract

Worldwide, nearly 600 000 women between the ages of 15 and 49 die every year as a result of complications arising from pregnancy and childbirth due to conditions which could be avoided if preventive measures were taken and adequate care were available while many more suffer from serious conditions that can affect them

for the rest of their lives. Most of the deaths result from lack of skilled attendance during childbirth. The new Reproductive Health Policy released in October 2007 outlines priority actions for maternal and neonatal health, which includes increasing access to skilled attendance for poor and hard to reach women (NHSSP II). The first edition of the community midwifery guidelines was developed in 2007 and has been revised in order to standardize the implementation of community midwifery services as a strategy for improving skilled attendance in the provision of maternal and new-born health care at the community level. The Model or approach discussed in these guidelines focuses on linking retired or out of work nurse midwives to health facilities and the community and work as a team in improving the quality of Maternal and Neonatal Health in the community. Many nurse midwives working in rural facilities were to be encouraged to provide antenatal, intra-partum and postpartum services. This would mean that a sustainable Community Midwifery model of care should consider the specific communities for purposes of acceptability, hence the need to address the sustainability of the community midwifery model for equitable access to skilled attendance. The objective of the study was to assess the Community Midwifery model of care in Siaya County. The study was carried out in Ugenya, Ugunja, Gem and Siaya sub-Counties of Siaya County, in western Kenya. It was a cross-sectional study that used both quantitative and qualitative data. A convenient sampling method was used to sample the study facilities as well as select the community respondents. It involved skilled attendants in the health care facilities of the primary levels of the health care system providing maternity services, the sub-county public health nurses in charge, the community health workers, the mothers within the community, who were served by the sampled health facilities. The expected outcome was to be a community midwifery model of care that is sustainable and which involves the community at all levels of operation. The study instruments included, mainly, questionnaires, checklists, FGDs and key informant interviews. Data analysis was done using statistical package of social sciences (SPSS). Provisional results so far show that the level of implementation of the model is poor (48%) with some midwives not even aware about its rollout and the presence of the community midwives practicing in the community. However, there is a modification of community involvement in all the four sub-counties. In conclusion the originally intended community midwifery model of care is not practiced in Siaya County.

Evaluation of Water and Sanitary Conditions in Relation to Prevalence of Diarrhoeal Diseases in Belgut and Sigowet Constituencies, Kericho County

Dolphine C. Anyango[✉] and Reuben Mutai¹

¹University of Kabianga

✉Email: anyangodc@yahoo.com

Abstract

Over one million people suffer from water related diseases, such as diarrhoea as a consequence of unsafe water and inadequate sanitation worldwide. Diarrhoeal diseases are a major cause of morbidity and mortality worldwide particularly in developing countries where poor sanitary and hygienic conditions exist. Contamination of water can occur between the source and mouth as shown by studies where there is a variation in quality of water at source and the point of use. This study evaluated water and sanitary conditions in relation to the prevalence of diarrheal diseases in Belgut and Sigowet constituencies of Kericho County. A baseline survey was conducted in the two constituencies. Households were selected as the units of sampling and analysis. A structured household questionnaire was used to collect quantitative data on water and sanitary conditions. Secondary data from health records of the Kericho District Hospital and two Sub-District hospitals were used to evaluate the prevalence of diarrhoeal diseases. The data was analyzed using SPSS statistical package. Improving domestic hygiene practices is potentially one of the most effective means of reducing the burden of diseases. The findings will help stakeholders in reviewing strategies and policies that can be used to mitigate the prevalence of diarrheal diseases in Kericho County.

Key words: *Water contamination, Diarrhoea, Domestic hygiene, Sanitary conditions*

An Automatic Teller Machine for HIV Test Based on Digital Image Processing Techniques

Jack Abibo Adem¹✉

¹Department of Physical Sciences, School of Biological and Physical Sciences, Jaramogi Oginga Odinga University of Science and Technology

✉Email: jackadem@yahoo.com Tel: 0722420671

Abstract

Many kinds of HIV testing kits have recently become available to be used in determining whether an individual's blood contains HIV virus or not. In the determine method of the HIV rapid test procedure, when a drop of blood is introduced at the lower testing region of the test kit, a red horizontal line appears on the test section indicating the presence of the HIV virus. The absence of the red line shows that the blood does not contain the virus. However, a similar red line must appear at the control section of the kit to show that the test procedure is successful and complete. The reading, interpretation and confidentiality of the HIV test result has often been abused by the medics and the counselors. There has been an immense widespread of HIV due to people's ignorance of their status. The spread can be curbed by introducing a human friendly, confidential, automatic and reliable testing system that has been developed by this study. In this study, an electronic system that automatically acquires the red color signals that appear on the test kits has been developed. The system analyses the color signals, processes them, displays and relays the test result to the client. The main objective of the study was to design and develop a real-time HIV test analyzer based on computer aided image processing technique. An image processing software in a client/server system using Graphics Device Interface plus (GDI+) Library tool was created. The system used *Complementary metal-oxide-semiconductor* (CMOS) digital camera to capture the image and the programmed software, developed in C#, processes the captured image and sends the testing results to the display unit. This technique will not only eliminate the human error associated with the use of HIV testing kits, but will also improve the testing productivity in comparison to those achieved by the trained technicians. It will also enhance the confidentiality of the test result hence reducing the stigma associated with the disease and encourage more people to know their HIV status. The system can be installed in our medical facilities and at the Voluntary Counseling and Testing (VCT) to aid the medical personnel in HIV screening and Testing. The system has been tested successfully and the testing results show a high degree of efficiency and reliability.

Perception of Cervical Cancer Patients on their Health Related Quality of Life and Palliative Care Needs in Western Kenya

Jane Owenga Adhiambo¹✉

¹School of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology

✉Email: jowenga@jooust.ac.ke

Abstract

Cervical cancer is the third most common female cancer worldwide and causes approximately 275,000 deaths annually worldwide, of which 88% occur in low income countries. In Kenya cervical cancer is the leading female cancer in both incidence and mortality rates at 40.1 and 21.8 respectively. Eighty percent of reported cases of cancer in Kenya are diagnosed at advanced stages, leading to many patients who need palliative care services to improve their quality of life. For a long time the focus has been on clinical management of cancers but now Health Related Quality of Life (HRQoL) is emerging as an important health outcome which requires to be incorporated in the holistic management of patients. There are few studies in Africa that have investigated HRQoL issues. This study set out to determine quality of life and palliative care needs of cervical cancer patients in western Kenya. The study was conducted at Jaramogi Oginga Odinga teaching and referral hospital in western Kenya. Study population was estimated to be 2454 and sample size was 365. A HRQoL assessment tool FACT-Cx Version 4, a structured questionnaire, and in-depth interview guide were used to collect data. Reliability was tested using test-retest and internal consistency was computed using Cronbach's coefficient while validity was achieved through expert review. Data was analyzed using SPSS version 20.

Descriptive statistics, Pearson correlations, chi-square and regression analysis were conducted to examine the relationship between the independent variables and dependent variable. Statistical significance was tested at $p \leq 0.05$. The results showed that the mean HRQoL was 35.35 (SD=13.21). More than half of the respondents experienced poor functional and physical wellbeing 221 (66.2%) and 201 (60.2%) respectively and no patient experienced good functional and physical wellbeing. While 189 (56.6%) experienced fair overall quality of life. There was a statistically significant relationship between cervical cancer stage and physical wellbeing of cervical cancer patients. Regression analysis between age, marital status, level of education and religion was used to determine their influence on overall quality of life. All the independent variables showed positive influence on overall quality of life. Age, level of education and religion had statistically significant relationship with overall quality of life. Only marital status did not have statistically significant relationship with overall quality of life. The study concluded that, cervical cancer patients experience poor functional and physical wellbeing though they do fairly better with emotional and social wellbeing. Therefore, more needs to be done in improving functional and physical wellbeing of these patients.

Research and Development Challenges and R&D Funding Options Available in Kenya

Rose A. Nyanga¹✉ and Josephine Waudu²

Research Officer, Department of Science and Technology, Kenya Email: rosenyanga@gmail.com Tel: +2540721575380

Senior Assistant Director, Department of Science and Technology, Kenya

✉ Email: josephine.waudu@gmail.com Tel: +2540722459528

Abstract

The Kenyan economy has enjoyed both periods of great advances and downturn incidences with poverty and unemployment that has negatively affected its per capita income. To cope with these challenges, the economy will have to consistently grow in order to create wealth through viable enterprises. Research and Development has been identified to be crucial especially in the transformation of Kenya's economy from a factor-driven economy to an innovation-driven economy. Lots of research findings exist especially in the areas of agriculture, health, engineering, basic sciences, forestry and environmental sciences but the benefits accrued from these research results have not been quantified effectively yet research findings are supposed to transform the lives of the citizens. A survey conducted by the Ministry of Education, Science and Technology in 2014 on funding of public research concluded that public research projects were worthwhile ventures as there were outputs and outcomes from the investments that had an impact on national development. On the contrary, the report also indicated that the research environment in many institutions was marred with a wide range of challenges and to some extent, still dominated by donor funding that affect the focus on locally beneficial research. The whole scenario therefore, calls for better understanding, of and improvement in the state of research in the country, in order to attain the desired status stipulated. One major challenge that still remains in all the discussions on R&D is inadequate funding in Kenya. The survey identified the extent to which Government has been striving to fund research from the exchequer through its agencies such the public universities and the National Commission for Science, Technology and Innovation (NACOSTI). With the Government's commitment to fund R&D to the tune of 2% of the GDP in the ST&I Act 2013, has been set for improving the benefits of R&D. The paper presentation therefore discusses the Research and Development challenges and the avenues through which the main challenge of research funding can be alleviated in Kenya.

Key words: *Research and Development, transformation, Factor driven, Innovation driven*

Community Adaptation to Malaria and Rift Valley Fever in Baringo County

Edna Mutua^{1,2}✉, Salome Bukachi¹, Isaack Nyamongo¹, Bernard Bett²

¹Institute of Anthropology, Gender and African Studies, University of Nairobi

²International Livestock Research Institute

✉Email:

Abstract

Malaria and Rift Valley Fever (RVF), are mosquito borne diseases with potential to cause morbidity, mortality and loss in productivity in humans and animals. In Baringo County, malaria is endemic while RVF, which is zoonotic, occurred for the first time in 2006-2007. Data on socio-cultural practices in malaria control and livestock production was collected through focus group discussions and key informant interviews among the Tugen and Ilchamus communities of Baringo County. Preliminary findings on malaria control show that both communities rely heavily on government and relief distributed bed nets for vector control. Treatment of suspected malaria cases is done with both traditional and conventional medicines at home and health facilities, respectively. Malaria risk remains high due to limited use of mosquito nets, non-adherence to malaria medication regimes and outdoor resting behavior of community members during peak biting time for mosquitoes. On risk of exposure to RVF, both communities largely depend on livestock for their livelihoods and exhibit vulnerability based on their low level of awareness of the disease; consumption of meat from animals that die of diseases and unknown causes; cultural patterns of disposal of dead animals; close contact with both healthy and sickly livestock; and management of human febrile illnesses. Community practices increase their vulnerability to Malaria and RVF. There is need for targeted awareness creation on the occurrence, transmission and prevention of both diseases in order to increase resilience to human and livestock infections.

Ecological Niche Modelling and Spatial Distribution of Rift Valley Fever Vectors in Baringo County, Kenya

Ochieng A¹✉, Gachie T², Ondiba I M³, Nanyingi M⁴, Olago D³, Amimo F¹ and Oludhe, C³

¹School of biological and physical Sciences, Jaramogi Oginga Odinga University of Science and Technology, ²EHCD project,

³University of Nairobi

✉Email: alfred.ochieng@gmail.com

Abstract

The Rift Valley fever (RVF) is a vector-borne zoonotic disease that has an impact on human health and animal productivity. It is caused by the Rift Valley Fever Virus (RVFV) which is primarily transmitted by flood water *Aedes* mosquitoes. *Culex* spp and *Mansonia* spp are secondary vectors which pick up the RVFV from domestic animals and amplify the infection to other domestic animals and humans. This study used ecological niche modelling algorithms to predict the effect of climatic variables on habitat suitability and the spatial distribution of RVF vectors in Baringo County. We ran the Boosted Regression trees and Random Forest algorithms to model the spatial distribution of *Culex* spp. using species occurrence data and AFRICLIM climate data. The species occurrence data was obtained from longitudinal sampling of mosquito larvae in four strata within the study area between June and December 2014. The AFRICLIM climate data consisting of 21 variables was downloaded from <https://webfiles.york.ac.uk/KITE/AfriClim>. Preliminary results indicate that rainfall, moisture and temperature ranges are the key factors that affect the spatial distribution of *Culex* spp in Baringo County. *Culex* spp. is likely to be found in the riverine zone along Kerio River and in the lowlands around Lakes Baringo, 94 and Bogoria.

Key words: Rift Valley Fever, *Aedes*, *Culex*, Ecological Niche Modeling, AFRICLIM.

Improving Health Care Service Delivery in Public Health Facilities by Use of an Integrated E-Health System for Optimal Management of Patients' Throughput

Jasper Ondulo[✉]

School of Informatics & Innovative Systems, Jaramogi Oginga Odinga University of Science and Technology, Box 210, Bondo, 40601, Kenya

[✉]Email: opiyo7@yahoo.com, Tel: 0727716382

Abstract

The challenge of communicable and non-communicable diseases is placing a heavy burden on health and social care systems in the developing nations (Kenya included). Currently, public healthcare systems have scarce resources to provide high-quality care and service delivery. In response to these challenges posed by both chronic and acute diseases, new models of, or approaches to, health care delivery needs to be designed to achieve efficient, timely, cost-effective and better coordination of services across the continuum of care required by people with diverse diseases. Integrating services is a necessary part of improving patient care and efficiently using scarce resources. Public Health care facilities are often characterized by long queues (long wait time and delay), which are mainly due to disease burden, inefficiency and scarcity of resources. Other studies have been able to address the challenge of patients' flow within a health facility by applying different technologies like Real Time Location System (RTLS). This study main focus however is on understanding patients' flow requirements and the application of an integrated e-health system within a healthcare facility. This is envisaged, to help ease these long queues, use optimally the scarce resources, improve patients' satisfaction and hence improved revenue flow. An integrated e-health system that is patient centered; timely, efficient, and cost-effective, results into an improved well managed and coordinated healthcare service delivery.

Analysis of Fully Homomorphic Encryption Schemes in Enhancing Data Security in Cloud Computation

Richard Omollo^{1✉}, Omolo-Ongati² and George Raburu³

^{1,3}School of Informatics and Innovative Systems, Jaramogi Oginga Odinga University of Science and Technology, Email: graburu@hotmail.com, richard.otieno@gmail.com

²School of Mathematics and Actuarial Sciences, Jaramogi Oginga Odinga University of Science and Technology, PO Box 210-40601, Bondo-Kenya, Email: nomoloongati@gmail.com,

[✉]Email: richard.otieno@gmail.com Tel: +254-(0)-735431503

Abstract

Cloud computing is an emerging technological paradigm in the field of digital resource management where such in cloud environment, it involves processing critical data hosted under preferred deployment model. A computational requirement on such cloud data is to adequately address security concerns for both cloud users and providers. Fully Homomorphic Encryption (FHE) has been used to introduce computational complexity while processing data in the cloud without compromising its security. Earlier implementations of fully homomorphic encryption scheme have enabled successful operations on such encrypted data without compromising its secret key. However, this scheme introduce computational defect since the encrypted data becomes very large causing heavy burden onto computing assets in question. In this paper, we appreciate this implementation weakness and address it by incorporating a new technique whereby we defined addition-composition operation such that $\psi \oplus \varphi: N \rightarrow \mathbb{O}$ where \mathbb{O} is a composite function. Our approach not only improves the security requirement on the processed data but also reduces computational overheads, which make it ideal for cloud computation. Again, we are able to demonstrate superiority of our approach against previous variants of fully homomorphic encryption that has been implemented.

Key words: Cloud computation, Fully homomorphic encryption scheme, Data security, Technique

Monitoring Interactions of Female *Anopheles Gambiae* S.S. Giles with Insecticide-Treated Nets Using a Wind Tunnel Set-Up

Fred Amimo¹✉ and Edward Walker²

¹*School of Health Sciences, Jaramogi Oginga Odinga University of Science & Technology, P.O. Box 210-406010, Bondo, Kenya*

²*Department of Entomology, Michigan State University, East Lansing, MI, USA*

✉Email: amimofa@gmail.com

Abstract

Monitoring of interactions of *Anopheles gambiae* S.S. females with Insecticide Treated Nets (ITNs) was carried out using a wind-tunnel where air flow was controlled, enhancing the ability to characterize the behavioral mechanisms mediating ITN effects in the presence of simulated host cues. Detailed behaviors in a pull-push situation of permethrin- and deltamethrin-impregnated ITNs versus carbon dioxide, lactic acid and body heat source were made. Each female mosquito was introduced in the arena during the last 2 hour of photophase and observed continuously for 30 minutes. Frequencies, durations, and locations of behavior were recorded using the Observer software (Noldus, <http://www.noldus.com>). Comparisons for untreated and fully-treated Permanet, and Olyset ITN screens at the upwind end of the wind tunnel were made. When the upwind screen contained Permanet, females on average spent 48% of the total time sitting, of which 26% occurred on the upwind screen. When Olyset was present, females spent 42% of the total time sitting, of which 28% was spent on the upwind screen. The overall transition and kinematic analysis results show neither Permanet nor Olyset diminished the frequency of flying upwind and subsequent behaviors in air flowing over these insecticides implying the absence of repellency.

SUB THEME 4 – EDUCATION AND ENTREPRENEURSHIP

A Comparative Analysis of Policy Documents on Technical and Vocational Education in Kenya in the Periods 1855 to 2013

Rose Meroka Moindi✉

Kisii University

✉Email: moindirose@gmail.com Tel: 0726 718 626

Abstract

Education in a dynamic society is changing its meaning. For education to be abreast with the dynamics in the society its purpose should allow for its dynamism. The dynamism is provided in Technical and Vocational Education. Technical and Vocational Education is viewed as a springboard in the gearing of students education towards a particular skill thus preparing them for jobs or vocations. Countries like Southern Korea, Thailand and Malaysia are shifting from general to specialized Education. The specialized education is provided in the upper secondary level. Kenya provides specialized education in the colleges and universities. Specialized education in the form of Technical and Vocational Education in Kenya has had a number of transitions made by a number of policy papers and reports transcending thought the colonial to the post-colonial period. This paper therefore tries to highlight the changes in Technical and Vocational Education in the periods 1855 to 2013. The study adopted a Darwinian approach which entailed a systematic transformation of technical and vocational education in transect of periods. From the analysis it was concluded that there was need for Kenya to transform TVET in her education system in order to realize Vision 2030.

Key words: *Technical and Vocational Education, Education, Policy, Work, and Economy*

A Usability Maturity Framework on Internal Quality of VLS

Omeno K. Kelvin¹✉, Raburu George² and Raburu Pamela³

¹*Department of Computer Science, Masinde Muliro University of Science and Technology*

Kakamega, Kenya komiemo@mmust.ac.ke

²*School of Informatics and Innovative Systems, Jaramogi Oginga Odinga University of Science and Technology, Bondo, Kenya*

³*School of Education, Jaramogi Oginga Odinga University of Science and Technology
Bondo, Kenya*

✉Email: komiemo@mmust.ac.ke

Abstract

User-centered designs are gaining recognition among virtual learning system (VLS) community. However, many design scenarios still do not incorporate usability as one of their primary goals. Accordingly, many individuals believe that if VLS was more usable, its popularity would increase tremendously. Although there are strong usability models for information systems, there is still potential to improve the usability of VLS. The usability assessment of virtual learning systems is an area where relatively little research has been conducted, and, accordingly, the main contribution of this work is a methodology that evaluates the usability maturity on internal quality of VLS in universities. Consequently, the study presents a Virtual Learning System Usability Maturity Framework that is aimed at usability-related issues for VLS in universities.

Key words: *Usability, Virtual Learning Systems, Maturity framework*

The Role of Writing for Undergraduates in Science and Technology

Alice Nakhumicha Muriithi^{1,2}✉

¹African Director, IURS

²School of Agricultural and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology, Box 210-40601, Bondo- Kenya

✉Email: muriithi.alice@gmail.com Tel: +254-722-326501

Abstracts

Writing assists a young scientist to communicate effectively using science language and reasoning. It is an effective tool for learning as well as a tool to communicate ideas and writing for a variety of purposes and audiences. This paper discusses the role of writing in science and technology especially for undergraduate students. Early mentoring is expected to lead more innovative researchers. It explores how scientific inquiry is enhanced leading to excellence and innovative research by engaging in argument from evidence offering different perspectives on the same complex and unfolding issues. Writing in science and technology inspires reading science and provides models for creating own writings. A scientific community should be involved in substantial discussion of readings and writing workshops in which there is constructive criticism from peers. Mentoring young researchers can be done in various fora including creative writing, developing and using models and scientific interaction and collaboration among students and the research community. One such forum is the International Undergraduate Research Symposium (IURS), it augments the undergraduate students' research experience with a platform to present their research projects and meet other young scientists from different countries and continents in poster presentations. Posters are judged by a panel including scientists from the industry to increase interaction with real issues and steer them towards outstanding and innovative research projects relevant to the industry. Rewards may include an internship at the research and development division of the local company or a scholarship or a monetary gift. The added benefit of IURS is that it exposes students to different cultures and promotes peace.

Key words: *Mentoring, Research, Science, Undergraduate, Writing*

On Numerical Radius Attainability for Normal Self-Adjoint Operators

Sabasi Omaoro¹✉ and N. B. Okelo²

¹Department of Mathematics, Kisii University, P.OBox 408-40200, Kisii-Kenya

²School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo-Kenya, Email: bnyaare@yahoo.com

✉Email: omaoro69@yahoo.com

Abstract

The numerical range and numerical radius are very useful in studying linear operators acting on Hilbert spaces. The operators include normal, hyponormal, normaloid, transaloid, self-adjoint, subnormal, compact and unitary. Norm attaining and numerical radius attaining operators have been studied by many mathematicians including Acosta, Paya, Ruiz, and Cardassi among others. The question of whether the numerical radius is attainable for normal operators has not yet been fully investigated, especially for self-adjoint operators. The question arising from Kittaneh is whether the numerical radius is attainable for normal self-adjoint operators. If so, what are the necessary and sufficient conditions for numerical radius attainability for normal self-adjoint operators? The objective of this paper is to establish necessary and sufficient conditions for numerical radius attainability for normal self-adjoint operators. We have the results on conditions for numerical radius attainability and denseness for Hilbert space operators. We have considered normal and self-adjoint operators. The methodology involved the use of the technical approach of tensor products in our calculations. The obtained results are important in investigating the relationship between numerical radius attainable normal operators and other norm attainable operators.

Key words: *Numerical radius attainable operators, Normal operators and Self-adjoint operators.*

On Shift of Mindset: The Importance of Change of Mindset in Helping Students Get Better at Getting Better in Mathematics

Dickson S.O. Owiti¹✉ and Omolo Ongati²

¹Department of Science & Mathematics Education, Masinde Muliro University of Science & Technology

²School of Actuarial Sciences & Mathematics, Jaramogi Oginga University of Science & Technology

✉Email: owitidick@yahoo.com

Abstract

That mathematics is important in enhancing creativity, innovativeness and technological development is undisputable. Kenya like any other African country is endowed with reach human resource yet less competitive globally partly due to students' fear of mathematics and poor performance at almost all levels. A number of measures have been put in place to remedy the situation yet the score card has been poor over the years. There is no such thing as a "math person". Everyone can and has a capacity to learn mathematics welltoat least improve in it provided they could be helped to overcome the fear for failure. This paper presents and discusses the importance of a shift in mindset for students of mathematics where working on challenging work and making mistakes enhances learning potential. It also proposes some of the interventions by teachers of mathematics that could help students change from fixed mindset to a growth mindset in the 21st century.

Key words: *Mathematics, Innovativeness, Creativity, Change of mindset, Competitiveness, Growth mindset*

Influence of Students' Diversity on Quality of Education in Universities in Kenya: A Case of JOOUST

Calleb Owino Gudo[✉]

School of Education, Jaramogi Oginga University of Science and Technology

✉Email: callebgudo@yahoo.com

Abstract

Kenya government has clearly set out national goals of education to be achieved at all levels. To play their expected role, universities have had to consider increasing access to eligible students and providing quality education. In recent years, university education in Kenya has become increasingly diverse. Many secondary school graduates and the working class, who would otherwise miss admission at a university, continue to look for opportunities to pursue university education. The result is a rapid rise in student enrolment and a diverse entry behavior of university students. The purpose of this study was to consider the extent to which Jaramogi Oginga Odinga University of Science and Technology (JOOUST) offered quality education in an environment of surging demand for university education and diverse learners. The variables of diversity tested in the study included gender, age, tribe (ethnicity), geographical region, preferences and opinions of the students. Data was collected from Bachelor of Education students. It was found out that there were areas of quality gaps that require attention of University leadership.

Effective Adoption Indicators of Management Information Systems in the Kenya's Economy

Omieno K. Kelvin¹, Mutai K. Elisha²

¹Department of Computer Science, Masinde Muliro University of Science and Technology, Kenya

²Jomo Kenyatta University of Agriculture and Technology, Kenya

Email: komiieno@mmust.ac.ke

Abstract

The world today, Management Information System (MIS) is a buzz in all aspects of our economy in managing people and organizational processes; this is aimed at enhancing economic competitiveness and guaranteeing customer satisfaction. Whereas there is consensus that MIS has huge effect on a firm's productivity, the effects are only realized if and when, MIS is accepted and used. It is essential therefore to understand the determinants of MIS adoption so as to appreciate the enormous benefits attached to it. An understanding of how MIS adoption theories can be beneficial to the attainment of the said benefits is important and especially in all the sectors of the economy be it bank, small and medium sized enterprises among others. It's in view of this that the paper sought to determine the effective adoption indicators of management information systems in Kenya. The study is guided by four objectives which include: to establish the influence of task characteristics on adoption of MIS by organizations, to examine the influence of technology characteristics in ascertaining adoption by organizations, to assess the influence of the individual characteristics in adoption of MIS by organizations and to establish organizational management expectations that influence adoption of MIS by organizations. The study findings could be used by software developers in designing information systems that work best for overall benefits to organizations in Kenya.

Key words: Management Information Systems, Adoption indicators

Certain Properties Of Normaloid Operators

P.O. Mogotu¹, J. Kerongo¹, R. K. Obogi¹ and B.N Okelo²

¹Department of mathematics, Kisii University, Box 408-40200, Kisii-Kenya

²School of Mathematics and Actuarial Sciences, Jaramogi Oginga Odinga University of Science and Technology, Box 210-40601, Bondo-Kenya, Email: bnyaare@yahoo.com

Email: omokepriscah@yahoo.com.

Abstract

In this paper we establish new conditions for contractivity of normaloid operators. We employ some results for contractivity due to Furuta, Nakomoto, Arandelovic and Dragomir. A particular generalization is also given.

Key words: Normaloid operators, Contractive operators, Cauchy-Schwarz inequality and Tensor product.

Influence of Leadership Styles on Staff Retention in State Corporations in Kisii County, Kenya

Ibrahim Ngoge Gekonde¹, Maria Anyango¹ and N. B. Okelo²

¹School of Business and Economics, Jaramogi Oginga Odinga University of Science and Technology

²School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P.O. Box 210-40601, Bondo-Kenya

Email: ibrahimgekonde@gmail.com

Abstract

Leadership is the most important aspect of the management. It is the trust and faith leaders should have in the staff to build the air of harmony and peace for smooth state corporation operations. In Kisii County, there is low productivity and employee performance in most of the state corporations. Further, a large number of managers operate in the organizations without keen interest on their actions on retention of staff in the state corporations. The purpose of this study has been to determine the influence of leadership styles

on retention of staff in state corporations in Kisii County, Kenya. The specific objectives of the study are: to find out the leadership styles used in state corporations, to determine the level of staff retention in state corporations and to establish the influence of leadership styles on staff retention in state corporations in Kisii County. This study seeks to employ a conceptual framework in which the independent variable is the leadership styles used in state corporations whereas retention of staff in state corporations becomes the dependent variable. The study adopts a descriptive survey design. The target population consists of seven state corporations in Kisii County; seven (7) managers/ principals, seven (7) HODs and 726 employees in the state corporations. The study employs purposive sampling and simple random sampling techniques to select the sample. Purposive sampling is also used to sample key informants like the managers/principals and HODs of the institutions. Simple random sampling is used to select the employees in the state corporations. Sample size for the employees can be determined in accordance with Morgan matrix. Questionnaires and interview schedules is used to collect data from respondents. The reliability and validity of the outcome of this study can be ensured. In this study both qualitative and quantitative data has analyzed. The data is organized, presented, analyzed and interpreted using descriptive statistical techniques. The findings may assist policy makers to come up with strategies of sensitizing other stakeholders and managers on successful management. The study findings enable managers and their HODs to improve on their leadership styles to retain the staff.

Key words: *Influence, Leadership, Staff retention, State corporations*

Conditions for Complete Positivity of Operators and their Convergence in C^* -Algebras

Obogi Robert Karioko [✉]

Department of Mathematics, Kisii University, P.O Box 408-40200, KISII.

[✉]Email: krobertobogi@yahoo.com

Abstract

In this note, we present new results on necessary and sufficient conditions for complete positivity of operators and their convergence in C^* -algebras. The main results show that positive operators in non-unital C^* -algebras are completely positive.

Key words: *C^* -algebra, Positivity, Non-unital C^* -algebra, Convergence*

Use of School Readiness Screening Tool for Learners with Special Needs

[✉]Samuel Wanyera

School of Education, Jaramogi Oginga Odinga University of Science and Technology, P.O. Box 210, Bondo, Kenya

Email: sawanyera@yahoo.com

Abstract

The School Readiness Screening test Tool is important because it is used by Educational Assessment and Research Centres, Professionals in the Educational Assessment Centres determine school placement and intervention strategies for learners with Special Needs in Pre-school programmes. The tool has been in use in the Educational Centres in Kenya since 1984 up to date and yet its efficacy is still in doubt. The purpose of this study was to find out the use of School Readiness Screening Tool for Learners with Special Needs in Kenya. The study adopted a descriptive survey design. The study involved 25 Educational Assessment professionals who were the coordinators of the Centres purposefully sampled from City, Urban, Rural and Semi-arid areas in Kenya. Data was collected by interview schedule, observation schedule and document analysis guide. The study revealed that; the School Readiness Screening Tool does not screen all kinds of disabilities The study recommended that additional test content should be incorporated to the School Readiness Screening Tool to screen the contemporary Special Needs.

Key words: Use, School Readiness, Screening Tool, Learners with Special Needs

Entrepreneurship Education in Kenyan Universities: Status, Challenges and Prospects for Innovations

Okwach Abagi

Director, OWN and Associates

Email: okwach.abagi@ownresearch.org

Abstract

In the last decade, the Government of Kenya and investors have identified small and medium size enterprises (SMEs) as key in the achievement of Vision 2030. The Human resources development (human capital) and science, technology and innovations (STI) are key enablers in effective SMEs. With increase market demand for relevant human capital, the Government and private sector stakeholders have challenged universities to produce the required human capital for entrepreneurship development. This paper examines the role of Kenyan universities in promoting entrepreneurship education and research. It also identified challenges/gaps the existing 'entrepreneurship education programs' in Kenya universities face. An exploratory approach was adopted. The methodology included a review of literature, review of universities academic programmes and interview of purposively selected academicians and entrepreneurs in Nairobi. The analysis shows that the last 5 years has witness strong emergence and massification of 'entrepreneurship education' in Kenyan universities'. The paper argues that most of such courses are "business education" (including MBAs) and too academic. The programmes are not effectively focusing on building entrepreneurship knowledge /skills and "enterprise culture". The existing 'entrepreneurship education' programs face major challenges including lack of proper conceptualization and practical orientation of "entrepreneurship education", limited qualified academic staff (faculty) and poor pedagogical approaches, limited research and publication, limited application and adoption of technology, and limited incubations and internship programs for university students and graduates from such programs. The paper provides recommendations that could be used by universities, private sector stakeholders and the government in enhancing entrepreneurship education and research. This will promote innovations and competitiveness in SMSEs, and therefore create more jobs across the country. The paper concludes that prospects for effective entrepreneurship education and research in Kenyan universities are great. But universities need to move away from the current trend and 'massification' of business schools. There is need to invest heavily in entrepreneurship university-Industry linkages is critical.

Service Quality Guidelines are Necessary to Ensure Good Governance of Technology

Dickens S. Omondi Aduda✉

School of Clinical Services and Optometry, University of Kabianga, Kenya

✉Email: omondisda@yahoo.com. Tel. +254 – 722 38 52 91

Abstract

To review key parameters of service quality guidelines as instruments of good governance to ensure adopted health technologies are sustainable within constrained resource settings. Service quality is a multidimensional production variable. Implementation guidelines are necessary to ensure delivery of program components comply with safety, efficiency and quality requirements across diverse settings. However, in the majority of cases, there is lack of adherence to guidelines. This has adverse implications on resource allocation and use. Robust data tools enhance opportunities to obtaining objective/strategic quality information for identifying technology performance progress, plan improvement efforts and revise guidelines. Additionally, difficulties occur in relation to conceptualizing comprehensive measures; conducting appropriate evaluations; aggregating and reporting assessment information; attributing variability to specific service quality measures and; applying the results to improve program goals. Furthermore, there is need for contextualized parameters for tracking and evaluating technology development, implementation and use in Kenya's health care system. Indigenous toolkits and guidelines which are relevant to local contexts are lacking yet they are critical to providing appropriate data for improvement interventions. Understanding and adopting key service quality parameters

essential to ensure sustainable health technology development and uptake. Conventional dimensions of service quality provide the primary structure for developing local toolkits relevant to the Kenyan contexts.

Mobile Device Security: Proposing Framework for Securing Mobile Devices

Solomon Ogara✉

School of Informatics and Innovative Systems, Jaramogi Oginga Odinga University Of Science And Technology, P.O. Box 210 Bondo 40601 Kenya

✉Email: solomon.ogara@gmail.com

Abstract

As the number of mobile devices accessing corporate networks increases, there is growing concern regarding the security of corporate data. The rate at which new malware and malicious apps are being introduced into the app stores is alarming. The level of sophistication of these malicious threats poses a major security issue with mobile devices. Additionally, more mobile devices are either getting lost/stolen. The goal of mobile security is to support the following security objectives: confidentiality, integrity and availability. Attaining these objectives is critical in creating an effective mobile security environment. This proposal therefore examines the inherent security concerns prevalent in mobile technologies and proposes a framework that organizations may use to mitigate these concerns.

Key words: *Security, Mobile devices, Malware, Confidentiality, Integrity, Availability*

Analysis of the Impacts of Land Reforms on Urban Land Development in Kenya

Job K. Ngetich✉, Ben Mwasi, Grephas P. Opata, Victor O. Odenyo and Peris C Korir

School of Environmental Studies, University of Eldoret, P.O Box 1125-30100, Eldoret, Kenya

✉Email: ngetichjob@yahoo.com Tel: 0722804524

Abstract

Land reform is an emotive cross-cutting subject in Africa. Land reform is viewed in the context of establishment of secure and formalized property rights in land and redistribution of property rights. The road to land reforms has been long and detours in Kenya starting from pre-colonial, colonial and post-colonial periods. Over the last two decades, Kenya has carried out a number of land reforms touching on urban land, which is considered more valuable than rural agricultural land. The major milestones in the Country's land reform strategies include; the formulation of land policy and its entrenchment in the Constitution; establishment of an independent National Land Commission (NLC) and curtailing of land leases from 999 years to 99 years. However despite huge investment made in land reform processes, not much has been achieved in the improvement of the welfare of its citizens especially in the urban areas, as evidenced by over 70% of the population languishing in poverty and living in informal settlements. The proposal to issue out 3 million titles by 2017 is a clear pointer that landowners will have to wait for long to access resources for development due to lack collateral security. The paper analyses the impacts of land reforms in Kenya and its implications on urban land development. It gives suggestions on what needs to be done to make land reform process succeed and be beneficial to all.

Key Words: *Land Reforms, Land Tenure, Property Rights*

Gender and Environmental Knowledge in Natural Resources Management in Kisumu County, Kenya

Naomi Apali Mogoria

School of Spatial Planning and Natural Resource Management, Jaramogi Oginga Odinga University of Science and Technology. P.O Box 210-40601 Bondo, Kenya

✉Email: namogoria@yahoo.com, +254 722645288.

Abstract

Environmental knowledge acquired by local communities over time as they interact with the environment is a vital asset in environmental conservation. However, few studies have been conducted to examine the local knowledge endowment accrued from interactions between men and women as they get involved in environmental activities. The main objective of this paper was to determine the level of environmental knowledge for men and women towards the environment within Kisumu County. Out of a total of 16860 households, a survey of 376 households was carried out using simple random sampling. Data was collected using questionnaire survey and literature reviews. Descriptive methods of data analysis were used to analyze the data. The results of the paper showed that both men and women considered tree planting to have very positive impact on the environment, while drawing water from the lake was considered not to have any impact on the environment, but washing in the lake was considered to have a very negative impact on the environment. The findings on the local community knowledge on various environmental impacts of activities are of importance to policy makers and project implementers because they can use the information to carry out environmental awareness campaigns. In conclusion, local communities have environmental knowledge on level of impact activities have on the environment. This paper recommends up scaling of environmental knowledge for men and women through formulation of an appropriate framework for integration of gender perspective in environmental management activities. Also relevant institutional actors should involve local communities at all stages of projects for improved local community livelihoods.

Key words: *Gender, Environmental knowledge, Local community, Natural resources, Environmental management*

Norms and Numerical Radii Inequalities for $(\mathcal{R}, \mathcal{S})$ - Normal Transaloid Operators

Nyaluke Kiprono Wesley✉, N. B. Okelo and Omolo Ongati

School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo-Kenya

✉Email: nyalukekiprono@hotmail.com

Abstract

The studies on Hilbert spaces for the last decade has been of great interest to many mathematicians and researchers, especially on operator inequalities related to operator norms and numerical radii for a family of bounded linear operators acting on a Hilbert spaces. Results on some inequalities for normal operators in Hilbert spaces for instance numerical ranges $W(T)$, numerical radii $w(T)$ and norm $\|.\|$ obtained by Dragomir and Moslehian among others due to some classical inequalities for vectors in Hilbert spaces. The techniques employed to prove the results are elementary with some special vector inequalities in inner product spaces due to Buzano, Goldstein, Ryff and Clarke as well as some reverse Schwarz inequalities. Recently, the new field of operator theory done by Dragomir and Moslehian on norms and numerical radii for $(\mathcal{R}, \mathcal{S})$ - normal operators developed basic concepts for our Statement of the problem on normal transaloid operators. M. Fujii and R. Nakamoto characterize transaloid operators in terms of spectral sets and dilations and other non-normal operators such as normaloid, convexoid and spectroid. Furuta did also characterization of normaloid operators. Since none has done on norms and numerical radii inequalities for $(\mathcal{R}, \mathcal{S})$ - normal transaloid operators, then our aim is to characterize $(\mathcal{R}, \mathcal{S})$ - normal transaloid operators, characterize norm inequalities for $(\mathcal{R}, \mathcal{S})$ - normal transaloid operators and to characterize numerical radii for $(\mathcal{R}, \mathcal{S})$ -

normal transaloid operators. We use the approach of the Cauchy-Schwarz inequalities, parallelogram law, triangle inequality and tensor products. The results obtained are useful in applications in quantum mechanics.

Key words: Norms, Numerical Radii, Inequalities, (Γ, S) - Normal Transaloid Operators

Influence of Entrepreneurship on Small and Medium Enterprises: A Case Study of SMES Owned by Females in Kisii Town, Kisii County, Kenya

Jackline Bochere Barongo¹, Maria Anyango¹ and N. B. Okelo²✉

¹*School of Business and Economics, Jaramogi Oginga Odinga University of Science and Technology*

²*School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo-Kenya*

✉Email: bnyaare@yahoo.com

Abstract

Female entrepreneurs make a substantial contribution to national economies through their participation in start-ups and their growth in small and medium businesses. United Nations 2006 stipulated that their interests and activities in the economic growth and development especially in the area of SMEs have received outstanding interest of researchers. Businesses owned by females do not grow to medium or large scale hence not clear what influences stagnation of these businesses. This could be attributed to either lack of proper planning, improper financing or, poor business management. The study is therefore set to establish the influence of entrepreneurship of women of SMEs and also find out factors that hinder their growth. The objectives of the study has been to: determine the major influences facing female in small scale business in Kisii Town; establish suitable strategies in improving the female small scale Business influences and determine the impact of a proprietor's professional improvement on the business strategy implementation. The study adopted descriptive research design. The target population has been 577 respondents. Data was collected using questionnaires and interview schedules which include both open and closed-ended and analyzed using tables and charts. The open-ended questions have been analyzed qualitatively. The results are useful to female entrepreneurs in making useful decisions regarding their SMEs.

Norm Estimates For Convexoid Operators

Cecil Onyango¹✉, Paul Oleche¹ and N. B. Okelo²

¹*Department of Pure and Applied Mathematics, Maseno University, Box 333, Maseno-Kenya, E-mail:*

otienopc@yahoo.com; poleche@yahoo.com

²*Department of Pure and Applied Mathematics, Jaramogi Oginga Odinga University of Science and Technology, P. O.*

Box 210-40601, Bondo-Kenya, E-mail: bnyaare@yahoo.com

✉E-mail: otienopc@yahoo.com

Abstract

Hilbert space operators are important in formulation of principles of quantum mechanics and also in other fields of applied sciences. These operators include normal operators, hyponormal operators, normaloid operators, spectraloid operators, transaloid operators and convexoid operators among others. The norm property has been investigated by several mathematicians for example Dragomir, Kittaneh, Furuta, Bonyo, Agure among others. Important results have been obtained regarding norm inequalities but this has not been fully investigated as stated by Dragomir. Therefore, the problem that persist is to determine norm estimates for convexoid operators. The objectives of this study are: To establish the necessary and sufficient condition for convexoidity of normal operators, to determine upper estimates of convexoid normal operators and to determine the lower estimate of convexoid normal operators. The methodology shall involve the use of known inequalities like Cauchy-Schwarz inequality, Minkowski's inequality and parallelogram law. We shall also use the technical approach of tensor product and numerical ranges in determining the norm estimates.

The results obtained are useful in investigating the norm property for other classes of Hilbert space operators when they are normal self-adjoint.

Key words: *Convexoid operator, Normal operator, Hilbert space*

Government Spending in Agriculture and Financing and Private Investment in Kenya: 1970-2012

Samuel Oyieke✉

School of Business and Economics, Jaramogi Oginga Odinga University of Science and Technology, P.O Box 210-40601 Bondo-Kenya

✉Email: samueloyieke@yahoo.com

Abstract

The need for efficient utilization of public resources has been the focus of government expenditure policy. The problem is with regard to where such expenditures can generate maximum benefit to the economy and how to finance this expenditure. This study sought to provide empirical evidence on the effect of government expenditure on agriculture and its financing and the growth of private investment. The study used time series data on government expenditure on agriculture, domestic debt, external debt, taxation and private investment for the period 1970-2012. The error correction model was used as the basic econometric model. To control for the investment and expenditure environments, the study included political risk and exchange rate as control variables. The study found that investment in agriculture positively and significantly affected private sector growth. A Kenya shilling invested in agriculture led to 1.265 shillings growth in private investment. Domestic debt financing was found to have a significantly negative effect on private investment. A shilling of domestic debt used to finance expenditure, led to -1.476 shilling decline in private investment. The study observes that any disruption in the private sector growth will adjust back to the growth path within one year at a rate of 65%. The study recommends that the government should intensify investment in the agricultural sector. This investment should not be financed from domestic tax revenue as this has a negative effect on private investment.

Key Words: *Government expenditure, Agriculture, Financing, Error correction model, Private investment*

Norms of Derivation Associated with Idempotents and Unitary Operators

Ouma Ochola Moses✉, Omolo Ongati and N. B. Okelo

School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo-Kenya

✉Email: musaochola@yahoo.com

Abstract

The study of operators has continued to attract the attention of many researchers. Of special interest are the calculations of norms of these operators. Johnson Stampfli wrote a paper on the norms of derivation on algebra of bounded linear endomorphisms of \mathcal{H} . Obonyo and Agure in one of their papers have given their study on the norms of inner derivations on norm ideals followed by another one on norms of derivations implemented by S-universal operators. Ivan Vidar defined a bounded operator acting in a Hilbert space as idempotent if $A^2 = A$. This study is going to concentrate on the norms of derivations induced by orthogonal idempotents and unitary operators. Let H be an infinite dimensional complex Hilbert space and $B(H)$ the algebra of all bounded linear operators on H . A generalized derivation is an operator defined by $_{A,B}(X) = AX - XB$, for all X in $B(H)$ and B fixed in $B(H)$. When $A=B$ then we have an inner derivation defined by $_A(X) = AX - XA$ for all X in $B(H)$ and A fixed in $B(H)$. A lot of studies have been done on characterization of derivations for instance Kittaneh gave commutator inequalities associated with the polar decomposition. Mansour and Bouzenada obtained norm estimates of commutator between subnormal operators but posed a problem that

states that if $A(X) = AX - XA$ is such that $A = A + iC$ and $X = B + iD$, then what are possible estimates for $A(X)$ if A, B, C, D stand taken as contractions? Moreover, can there be best estimate for other classes of operators? In this presentation therefore we consider the class of unitary operators and orthogonal idempotents and discuss the norms of derivations associated with the orthogonal idempotents and unitary operators.

Key words: Norm, Derivation, Idempotents, Unitary operators

Effects of Strategic Planning on Organizational Efficiency of Tea Factories in Kisii County- Kenya

David Maranga Areri^{1,✉}, Maria Anyango¹ and N. B. Okelo²

¹School of Business and Economics, Jaramogi Oginga Odinga University of Science and Technology

²School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P.O. Box 210-40601, Bondo-Kenya

✉Email: marangadavid88@yahoo.com

Abstract

Strategic planning may be characterized as a systematic effort to produce fundamental decisions and actions that shape and guide what a business organization is, what it does, and why it does it. This study seeks to assess the effects of organizational efficiency on tea factories in Kenya. Tea was introduced in Kenya in 1903 and the cultivation of the crop has expanded rapidly in terms of area planted and volume of Tea produced. Expansion of tea growing in different Agro-Ecological zones and under different socio-economic conditions calls for joint efforts in the tea research and development, technology and information transfer research on tea was initiated in Kenya by Brook Bond Limited in 1949, as a department within its local company, the African Tea holdings Limited. Recently revenues from Tea in Kenya have dropped significantly by KShs 16 billion in 2014 which was a 14% from the previous year. The decline was attributed to the oversupply of the cash crop in the global market and poor quality of the crop. Despite of this little has been documented regarding the extent to which strategic planning in the management of tea in terms of growth, production and distribution. This study therefore sought to investigate the effect of strategic planning on the efficiency of tea producing factories. This study employed a descriptive survey design. The total population in this study has been 624 employees of 6 Tea factories within Kisii County. The population has been sampled proportionally and each sampled employee is issued with a questionnaire. Descriptive and inferential statistics has been used to analyze data. Data has been presented in form of percentiles, weighted averages, pie charts and frequency distribution Tables. The findings from this study provides valuable insights to the Government, the stake holders, scholars and researchers can rely on in their collective endeavor of addressing the effects of strategic planning in the improvement on production and distribution of tea in Kenya.

Tensor Products and Norms of Norm-Attainable Self-Adjoint Operators in C^* -Algebras

N. B. Okelo[✉], Moses Ochola, Willy Kangogo and Wesley K. Nyaluke

School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210-40601, Bondo-Kenya

✉Email: bnyaare@yahoo.com

Abstract

The study of norms of operators forms a very important aspect in functional analysis. In this, paper we present tensor products in Hilbert spaces of operators. Moreover, we outline the theory of normal, self-adjoint and norm-attainable operators in C^* -algebras. Lastly, we give results on norms of normal, norm-attainable and self-adjoint operators.

Key words: Hilbert space, C^* -algebras, Normality, Norm-attainability, Self-adjoint operators and Tensor products.

Effect of Enrollment on Performance of Chemistry in Public Day Secondary Schools in Bondo Sub County

Getrude Malala¹✉, Henry Onderi² and Jack Ajowi³

School of Education, Jaramogi Oginga Odinga University of Science and Technology

P.O. Box 210-40601, Bondo, Kenya, Email: ¹getrudemalala@yahoo.com, ²honderi@jooust.ac.ke and

³ajowijack@jooust.ac.ke

✉Email: getrudemalala@yahoo.com

Abstract

Siaya County is among the counties that perform well in the national examinations. However, Bondo Sub-County is one among its Sub-Counties with low student performance in national examinations in Science subjects in general and in Chemistry in particular. A report by the Kenya National Examinations Council in 2013 reveals that this could be as a result of insufficient inputs in the schools such as inadequate Chemistry teachers and laboratories, inadequate teaching and learning materials in the subject and increased enrollment levels in the subject. In these schools however, enrollment levels might not be uniform and so it cannot be concluded that it is only the increase in enrollment that affects the performance in the subject in national examinations. The purpose of this research paper therefore, was to determine the effect of enrollment on academic performance of Chemistry in national examinations in public day secondary schools in Bondo Sub-County.

Key words: *Enrollment, Academic Performance, Chemistry, Public day secondary schools*

The Contribution of Teachers' Qualifications on Students' Performance in Mathematics

Kati Robert[✉]

✉Email: omkati@yahoo.com

Abstract

The purpose of this study was to investigate the contribution of teachers' qualification on high school students' achievement in mathematics. A comparison was made between teachers holding a master's degree in mathematics education and those with other qualifications in western Kenya. The study was conducted through an ex-post facto research design. All form four students and their mathematics teachers during the 2014 academic year in the region formed the target population. The study employed multistage sampling. A total of 12 teachers who were holders of Masters in mathematics education and 12 teachers who were non-holders of masters in mathematics education as well as 480 form four students constituted the sample. Data from teachers was collected using a Mathematics Teachers Questionnaire (MTQ) while students achievement was assessed using a Mathematics Achievement Test (MAT). The MTQ comprised of two parts, the first part was on the profile of the respondents and the second part was on respondents' attitude and extent of preparedness for the classroom by teachers with a Master's degree in mathematics education and those who have other degrees. A pilot study was carried out in 4 schools outside the county. The reliability of the MAT was calculated using Kuder Richardson formula 20(KR-20) it yielded a coefficient of 0.92, an indicator that the MAT was a highly reliable tool. The reliability of the MTQ was calculated using Spearman-Brown formula it yielded a coefficient of 0.83, an indicator that the MTQ was a highly reliable tool. Mathematics educators also reviewed the questionnaire for content, face and construct validity. The statistical analysis utilized independent samples t-test. Correlation coefficients were also determined to support conclusions after primary analyses had been completed. The findings of the study showed that there was a significant difference in achievement of students taught by teachers with a master's degree in mathematics education and those who had other qualifications in western Kenya.

On Norm Preserving Conditions for Local Automorphisms of Commutative Banach Algebras

Kangogo Willy✉, N. B. Okelo and Omolo Ongati

School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, P.O. Box 210-40601, Bondo-Kenya

✉Email: Kangogowll@gmail.com

Abstract

The history of commutative algebra first appeared in 1890 by David Hilbert which was then followed by Banach spaces in 1924 since localization reduces many problems of geometric special case into commutative algebra problems of local ring. So far, many studies on preserver problems have been focusing on linear preserver problems (LPPs) especially LPPs in matrix theory. Also in consideration has been the characterization of all linear transformation on given linear space of matrices that leave certain functions, subsets and relations invariant. Clearly, we also have spectrum preserver problem or transmission. Kadison and Sourour have also shown that the derivation of local derivation of Von Neumann algebra R are continuous linear maps if it coincides with some derivation at each point in the algebra over C . We employ the concept of 2-local automorphisms introduced by Serml that if we let A be an algebra, then the transformation $W : A \rightarrow A$ is called a 2-local automorphism if for all $x, y \in A$ there is an automorphism $W(xy)$ of A for which $W(x) = W_{x,y}(x)$ and $W(y) = W_{x,y}(y)$. In this paper, we characterize commutativity of local automorphism of commutative Banach algebras, establish the norm preserver condition and determine the norms of locally inner automorphisms of commutative Banach algebras. We use Hahn-Banach extension theorems and the great ideas developed by Richard, and Sorour to develop the algebra of local automorphisms, then integrate it with norm preserver conditions of commutative Banach algebras. The results of this work have a great impact in explaining the theoretical aspects of quantum mechanics especially when determining the distance of physical quantities.

Key words: Preserver, Norm, C^* -algebra, Automorphisms

Safaricom is the Biggest Bank in Kenya

Veronica Onjoro✉

PhD Student, Mount Kenya University

✉Email: onjoroveronica@yahoo.com

Abstract

Mobile money subscribers transacted 2.37 trillion in 2014, a 24.7 per cent increase over Ksh1.90 trillion in the previous year. The growth has been attributed to increased public uptake of mobile cash transfer and acceptance by more merchants, "Including payment outlets like gas stations and super markets". Mobile money transfer clocked 911.3 million in 2014 from 732.6 million transactions in the previous year, a 24.4 per cent growth. Withdrawal of money from mpesa is a 24 hour business and safaricom workers are on 24 hour clock. A Person can bank money, request for a loan, pay a loan, and open an account 24 hours a day. The average number of active mobile money agents per month increased by 17.6 per cent in the review period to 120,472 compared to 102,471 monthly in 2013. Banks emerged the biggest losers in payment systems, as more of their customers turned to mobile phones. Safaricom M-Pesa commands the largest market share safaricom is the biggest bank in Kenya, customers can bank with M-Shwari, save with M-Shwari, deposit with M-Pesa, withdraw any time day and night, send to people money and buy goods and services. No other bank in Kenya is operational every at night. A person can be ask a query and be answered on anything concerning banking any time. Safaricom controls 66.7 per cent mobile money of the three players in the business – orange, Airtel and Safaricom – Safaricom is the only one that has consistently reported profits. Safaricom is document player controlling about three quarters of the market share.

A Stochastic Model of Relationship Between Board Demographics and Firm Diversification Strategies in Emerging Markets: NSE, Kenya

Elijah Museve¹✉, Joel Tenai² and Philip Nyangweso³

¹Assistant Lecturer School of Business & Economics, Department of Accounting & Finance, JOOUST- and PhD Student (Business Management-Finance Option), School of Business & Economics, Moi University, Kenya.

²Department of Accounting & Finance, School of Business & Economics, Moi University, Kenya.

³Department of Agricultural Economics and Resources Management, School of Business & Economics, Moi University, Kenya.

✉Email: elijahmuseve@yahoo.com

Abstract

Several researches have been conducted examining or interrogating dividend policies, diversification strategies, and corporate governance in firms. Empirical studies have also shown that agency problem continue to exist where there is lack of alignment of managers interest with those of the shareholders in terms of resource management and returns on the investment. The literature review has revealed that there is no single study that has specifically looked at the board demographics on relationship between firm diversification strategies and dividend payout. This research will be carried out on all firms listed at Nairobi Securities Exchange for the period 2004 to 2014. NSE is targeted since it is a regional investment hub with the highest number of listed firms (63) comparable to other East Africa Region Countries and perfectly fit the definition of emerging markets by Kumar and Tsetsekos, (1999). Firms trading at NSE are regulated by the Capital Markets Authority(CMA),an independent public agency charged with the responsibility of regulating and facilitating the development of orderly, fair and efficient capital markets in Kenya. The study will use panel data relating to the firms' and which will be obtained from the CMA. The study will focus on moderating role of board demographics on relationship between diversification strategies and dividends pay-out in emerging markets: NSE, Kenya. Causal research design will be used in the research. Data will be analysed using hierarchical linear modeling (HLM) for measuring structural differences in financial behavior of firms' and vector autoregression analysis (VAR) a system of dynamic linear relations for aggregate effect of independent variables on the dependent variable. This study will be guided by agency theory, free cash flow hypothesis and RBV theory.The study findings will be important to the managers of listed corporate organizations as it will provide a basis of converging the interest of managers with those of shareholders when pursuing value maximization strategies, to the academic field, it will generate new knowledge to the existing theory of finance and form the basis for future research while to the investors to make informed decision of buying into diversified firms. In addition it will illuminate on the role of corporate governance on adoption of investment opportunities and their effect on dividend pay-out. Lastly it will help the policy makers at CMA and NSE in formulating sound proactive governance policies on the diversification strategies pursued by listed firms in line with the shareholders wealth maximization principle and the realization of government's 2030 vision of making Kenya a middle income economy.

The Impact of Devolution on Agriculture Development in Kenya; The Case of Moiben Sub-County in Uasin Gishu County

Job K. Ngetich[✉], Ben Mwasi, Grephas P. Oyata and D.V Odenyo

School of Environmental Studies, University of Eldoret, P.O BOX 1125-30100, Eldoret, Kenya.

✉Email: ngetichjob@yahoo.com Tel: 0722804524

Abstract

Agriculture continues to be the mainstay of Kenya's socio-economic development as over 80% of its population is engaged in agriculture. According to the Constitution of Kenya 2010, agriculture is a devolved function and every citizen has a right to be free from hunger, and to have adequate food of acceptable quality. This can only be realized through rapid spatial planning starting from the grassroots. Moiben-Sub-County is one of the six Sub-Counties comprising Uasin Gishu County which is considered as a bread basket of Kenya. The paper examines the performance of agriculture sector under a devolved system, highlighting its

challenges and proposes an agriculture-led development plan for Moiben-Sub -County. Data was collected through interviews of; 58 sampled farmers, the Sub-County Administrator and the County Ministry of Agriculture, with one Focus Group Discussion being conducted. The land in the Sub-County has been utilized for crop production (30%), livestock production (25%), Settlement (10%), Forestry(5%) and others (30%). Agriculture is beset by a number of problems including, disease incidences, prolong drought, diminishing land holdings, poor roads, increased soil acidity, high cost of inputs and poor pricing of agricultural produce. Devolution has had a rejuvenating effect in the agriculture sector in the Sub-County as evidenced by 57 % of the respondents strongly agreeing and agreeing with the statement that devolution has been a success, with 43.1% of the farmers indicating that they had participated in the Sub-County development meetings. The farmers have benefitted from subsidized inputs, free training, soil testing and road improvement initiatives leading to improved production. The County Government and other stakeholders should put as priority programmes in such areas as motivation of farmers not to subdivide their farms, provision of infrastructure and agro-support activities on value addition, in their development agenda.

Key Words: *Spatial planning, Devolution, Sub-County*

SUB THEME 5 – GOVERNANCE, CULTURE AND INDIGENOUS KNOWLEDGE

Hegemonic Masculinities in Kumuse Ritual Narratives of The Bukusu of Kenya

Josephine Mulindi Khaemba✉

Egerton University, Box 536 Egerton

✉Email: kmulindi@yahoo.com Tel: 0722265757

Abstract

Ritual narratives in Bukusu community play an important role in the construction of hegemonic masculinities. The narratives perpetuate the social structures and masculine ideologies that subordinate the status of women. Discursive practices produce unequal power relations through the ways in which they position people as evidenced in Bukusu ritual *kumuse* narratives. The aim of this study was to bring to light the imaginary character of ritual narratives and to sharpen awareness of dogmatic and naturalizing conceptions of their content which make difficult equal coexistence of gendered groups. The objectives were to establish how hegemonic masculinities manifest themselves in Bukusu *kumuse* narratives and to identify the various discursive strategies employed in the construction of social gendered roles. The study was informed by the Discourse Historical Approach (DHA) which is committed to Critical Discourse Analysis. The study was ethnographic which used qualitative analysis. The population of the study was the Bukusu community, a sub-ethnic group of Luhya people found in Bungoma County in Kenya. Purposive sampling technique was used to select two oral artists involved in two *kumuse* rituals. The tools of data collection were observation and video recording. The analysis highlighted elements of power, beliefs and ideologies which contribute to the restoration and legitimization of a social status quo in Bukusu community. Findings revealed that hegemonic masculinities are discursively constructed in ritual narratives, and male power remains dominant in gender relations. Exposing the uneven power structure in Bukusu *kumuse* ritual narratives is indeed one way of addressing discriminatory messages which in turn is an important step towards the emancipation of women.

Magic and Natural Phenomena in Communication with Supernatural Powers among Communities in Kenya

Warkach K. Tonui✉, Naila G. Napoo and Charles Otieno

Jaramogi Oginga Odinga University of Science and Technology. P.O. Box 210 – 40601, Bondo, Kenya

✉Email: kwtonui@yahoo.com Tel: 0725473275

Abstract

Magic is a word connected in use and action with witch and sorcery and practice of both “Simple” and “High” magic or sorcery is associated with diabolic witchcraft and continues to be a paradox, practiced by many communities in Sub-Saharan Africa, its objective by witches/ wizards to cause misfortune or kill the targeted victims, humans, livestock or plants. Despite teachings, inculturation and governments teachings of good societal morals geared for social change for development and progress, witchcraft has persistently continued to spread among African communities and has caused psychosomatic suffering and poverty among African people. The objective of this paper is to identify prevalence, beliefs, knowledges and magical- witchcraft practices, meckamzma, and natural phenomena in communication with supernatural phenomena among communities in Kenya. There is the problem, Who? How? and by what means natural powers interlinked with witches/ wizards to cause or reverse outcome of witchcraft? The answer as we shall demonstrate in this paper is communication identifies by relating with each other or with supernatural powers if any, to cause harm by exchange of messages. It is indispensable to social changes, human negative influence in the direction of social and economic development and leads to increasing poverty levels among communities in Kenya. The paper will demonstrate that the preference and practice of magic/ witchcraft among majority of ethnic and classes of communities in Kenya is high.

Key words: Magic, Witchcraft Sorcery, Supernatural Powers, Communication, Communities

The Critical Role of Technocrats in Operationalizing Devolution in Kenya

Ntinyari Vivian[✉]

LL.B student, University of Nairobi, Kenya – School of Law, P.O. Box 30197-00100, Nairobi, Kenya

[✉]Email: vivian.ntinyari@gmail.com Tel: +254-718 201746

Abstract

Following the promulgation of the constitution of Kenya, 2010, Kenya adopted the devolved system of government; decentralizing executive and legislative power from the national government to 47 county governments. This formulation put County Governments in yield of certain powers and responsible for certain functions specified in schedule IV of the Constitution. For reasons whose an in-depth analysis does not belong in this paper, despite being promulgated three years before a new government was elected, devolution was poorly planned for, and is taking longer than necessary to implement. In this paper, I critically analyze the hurdles County governments are facing in executing their powers and carrying out their functions; with keen focus on the execution of the legislative function. This paper advances the hypothesis that enlisting technological experts to single-handedly, and, as part of commissions, draft laws that are suited not only for each County's unique strengths and weaknesses, but, opportunities; including the cognizance and incorporation of diverse cultures and customs among the Kenyan people will make the devolution process easier and County Governments more effective. The methodology used in this research gathers relevant data from primary and secondary sources in order to analyse the material and arrive at a complete understanding of the legislative challenges facing County Governments. The findings of this study suggest that, as an important issue, County Governments need to employ the services of technocrats to come up with tailor-made County legislation considering the weaknesses of and threats faced by each county and leveraging on the opportunities and strengths each county is endowed with. The objective is to create laws that mould the County Government into a well-oiled machine that effectively runs the County. Broad reference is made to the use of technocrats in drafting laws and policies by the National Government. The intention of this reference is to present a case study detailing the work and successes of technocrats in operationalising Kenya's legal system.

Demystifying the Relationship of Technology, Governance and Development in African Countries

Gilbert Nyakundi Okebiro[✉] and Robert Kakai Simiyu

¹Asst. Lecturers & Ph.D student (Development studies), Schools of Arts and Social Sciences and Education, Kisii University-Kitale Campus

[✉]Email: okebirog@gmail.com/+254727309990

Abstract

It is vital to justify that there is a strong relationship between technology, governance and development. Technology has played a key role in development in African countries through innovative governance. Introduction of technology is often cited as one of the justifications for development of interactions between education and productive work in Africa. These justifications are based on the increasing interest taken in the study of the impact of technology on all levels of the environment, on the appearance of new concepts such as those of alternative, intermediate, soft, appropriate and other technologies, and on the problems raised by the transfer [carton, 1984], through innovative governance leading to development in Africa. The problem of the study is most countries in Africa this century are still lagging behind in development because of poor governance, through dictatorship and power struggles among the leaders in such countries. The objective of the study is first to what role does technology play in delivering innovative governances in Africa? Second, how does the emergence of technology and information access help galvanize political change in Africa? The research is theoretical-analytical survey of data in text books, journal and newspapers. The key finding is some African countries do not apply innovative governance leading to poor economic development. It is

concluded low innovative governance in Africa leads to poor development. The research recommends African leaders should use innovative governance to facilitate development so as to be at par with other countries of the world globally.

Key words: *Justification; Technology; Governance; Development*

Policy Issues in Integrating Indigenous Knowledge in Building Community Resilience to Climate Change Risk

Maria Onyango✉

School of Business and Economics, Jaramogi Oginga Odinga University of Science and Technology. P.O. Box 210 – 40601, Bondo, Kenya

✉Email: clajos2000@yahoo.com

Abstract

Many African communities have used indigenous knowledge (IK) as a critical knowledge base and survival tool for adapting to extreme climate events and other natural hazards. IK may be defined as an ancient, communal, holistic and spiritual knowledge that encompasses every aspect of human existence. Local communities through accumulated IK have gained from generation to generation, known patterns of weather; how and when local natural disasters occurred; how to plan to cope with their impacts on the natural environment, livelihoods, and lives. According to research, many African communities have developed techniques and strategies for forecasting, and managing climate variability including coping mechanisms to respond to both normal and harsh conditions of their local environments. They base their forecasting on observation of the natural environment including flora, fauna and stars. This paper discusses the close linkage between sustainability of community livelihoods and lives. Extreme climate variability such as floods and droughts often have far reaching environmental, health and socio-economic impacts in many developing countries. To counter this trend, there is need to have in place efficient and realistic climate risk reduction strategies, including availability of effective integrated early warning systems to enhance the planning efforts. This would reduce the negative impacts; take full advantage of positive impacts and adapt to climate change. Reducing this vulnerability calls for community-based adaptation through empowering local communities to take action on their vulnerability to climate variability and change. From a development point of view, wider access to knowledge and information will enhance local communities' resilience and reduce climate risks and inequalities within communities. It will open up opportunities for vulnerable members (women and youth) to benefit from integrated climate knowledge and strategies for sustainable use, management and conservation of biodiversity will enhance integrating scientific and IK resilience of the communities.

Key words: *Community, Capacity Building, Policy*

Ethics and Management of Street Families in County Towns in Kenya

Gilbert Nyakundi Okebiro✉

¹Asst. Lecturers & Ph.D student (Development studies), Schools of Arts and Social Sciences and Education, Kisii University-Kitale Campus

✉Email: okebiro@gmail.com/+254727309990

Abstract

Ethics is the study of right and wrong in the society and management is the relevant ways of doing effectively and efficiently. Street families are boys and girls who stay in town and loitering aimlessly and sleep anywhere in town. The problem is recently there is high rate of increase of street families in towns of the counties in Kenya leading to high rate of drug abuse and other social crimes openly in day times. The aim is to investigate the factors influencing high rate and why the county government is not managing the increase of street

families to minimal rate or alleviate it. The study would adopt in-depth interviews method and data would be collected from two focus groups; one county administrators and two, street families in seven towns of western counties in Kenya including Kitale, Kakamega, Kisumu, Kisii, Kapenguria, Kericho, Nandi and Eldoret, through stratified random sampling technique. The result is there is increase of street families in all towns in Kenya and county management is not taking any action to eliminate or suppress the problem. It is concluded, there is high rate of drug abuse and social crimes committed openly in county towns and no action taken by county governments. It is recommended county government administrators arrest the street families and investigate the causes and the origins and repatriate them to their village elders or chiefs and as consequence to encourage them to go to school because the government is giving free primary education to all children.

Key words:*Ethics, Management, Street families, Drug abuse*

Reconceiving Online Whistleblowing Tools In The Kenyan Public Sector

David Njoga[✉] and Samuel Liyala

*Regional Centre for ICT Governance Winstonia Business Centre, 3rd Floor North Airport Road, Off Mombasa Road
P.O. Box 27981 00100 Nairobi.*

[✉]Email: david.njoga@cictgov.co.ke

Abstract

The public service in its expedition to establish and maintain transparency and accountability for improved service delivery has resorted to various anonymous channels for providing reports and complaints. Such online reporting tools while initially believed to provide the much desired privacy and confidentiality to guarantee anonymity have since been compromised, consequently reducing their effectiveness. Using a random sample for a generalized online survey amongst local citizens, this paper explores the effectiveness of these online whistleblowing tools by determining the users' preference, volunteerism and confidence levels. It is established that majority of the citizens greatly appreciated the potential of online whistleblowing especially the instantaneity and convenience especially with mobile technology, with the public agencies also being able to quickly analyze these reports. With the computer security awareness gradually increasing, great uncertainty on anonymity and thus, the confidentiality and integrity of the online reporting significantly reduces the use of these tools. We examine these findings in the light of privacy legislation, witness protection and jurisprudence. Lastly, we demonstrate how our findings have implications on over-reliance on online whistleblowing tools to sanitise the conduct of public officers. It is recommended that a technical and process re-engineering of the platform be done in order to achieve the much desired anonymity.

Integrating Language And Sacred Knowledge In Conservation Of Indigenous Trees In Siaya County

Francis Owino Rew[✉]

*School of Humanities and Social Sciences, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box
210, Bondo, Kenya*

[✉]Email: lardnet2005@yahoo.com Tel: 0722953634

Abstract

This is a descriptive survey of sacred places and trees considered the sources of powerful forces, energy and wisdom within the lake region of Kenya. Sacred landscapes are maintained through the practice of religious rituals, ceremonies, and sanctions within a specific cultural group. The sacred ecology refers to the interactions between humans and nature in a particular landscape in this life and next. Sacred places may hold significance for one household, a community or multiple communities. Indigenous knowledge systems, rooted in a particular geography, are mostly culturally transmitted via collective memory that is encoded in stories, myths, legends, songs, dances, rituals and practices. It may also be sacred or specialized knowledge known only to a few, such as religious leaders and herbal practitioners. Among the Luo community of Kenya all living

creatures as well as non-living material objects contain some form of 'power' making them sacred to the user communities. The power might be dormant until they are provoked. In this presentation the paper aims at to show how developments in recent history have devalued and in some cases eliminated indigenous fauna and flora together with knowledge and practices through destruction of the sacred places, objects and unique plants and vegetation. Conflicts have emerged between the need to conserve language, enhance local livelihoods and protection of the environment. Increasing public awareness of deforestation and its links to soil erosion, loss of biodiversity, floods, and other forms of environmental degradation have not been made central to community's economic activities. While stressing on economic well-being and tourism, the society has ironically destroyed cultural identity and has adulterated sacred places with abandon.

Educating the Kenyan Voter for the Ballot Box

Robert M. Mambo✉

Department of Social Science Education, Faculty of Education and Social Sciences, Masinde Muliro University of Science and Technology, P.O. Box 190-50100, Kakamega

✉Email: bobmambo@yahoo.com Tel: 0711759480

Abstract

This study seeks to suggest ways to educate the Kenyan voter and enable him to approach the ballot box in an intelligent manner. The Kenyan voter must be a citizen, is generally an adult who is at least eighteen years of age, of a sound mind and not a criminal. One does not have to pass an "examination" to become a citizen; he merely acquires the national identity card and is then entitled to vote. The Kenyan politician is glib and easily sways the potential voter. Politicians will use religious affiliations or offer some financial rewards. In the USA, there are two major political parties: the Republican also known as the Grand Old Party, GOP, and the Democratic Party. The GOP is a party of big business and their mission is to promote individual wealth. The Democratic Party is the party of the middle class. They support issues such as unemployment benefits, medicare and medicaid. Because of this, their opponents, especially the Republicans, see the Democrats as a party of big spenders of the citizen's tax money. But at least both these parties have a policy or an ideology. Similarly in the UK, there are two major political organizations: the Conservative and the Labour parties respectively. The former is the party of the wealthy and their policy is to "conserve" or maintain the status quo. The Labour Party is primarily an organization of the commoners. It favours the workers and its earlier policies included the nationalization of the means of production: factories, mines and some industries. Here in Kenya, parties do not seem to have any ideology. The potential voter is not given an opportunity to study the party's policy because there is probably none. Even their party manifestos tend to gloss over issues. What remains is the personality of the contestant. He is a smooth-speaking gentleman, somewhat wealthy and is not averse to giving out handouts while on the campaign trail. He tells the voters that if his party forms the next government, they would reduce the prices of consumer goods or they would even build a large factory in the neighbourhood. Sadly the voters do not ask where the money for all that would come from. This study relies heavily on library and archival sources. However, a questionnaire will also be administered. Hopefully, the findings of this study will help to modify voter attitudes. And the future voter will hopefully be equipped with the know-how to be able to detect a fraud from a well-meaning, issue-based and ideologically principled party.

Language and The Making of Kenya: A Case for Dialogue as a Tool for Better Governance

J. N. Ogutu✉

Department of Linguistics & Foreign Languages, School of Arts & Social Sciences, Moi University, Eldoret, Kenya

✉Email: drogutujn@yahoo.fr

Abstract

Eastern Africa is a conflict-prone region today. Internal (mostly ethnic) conflicts are common in most of the countries. These internal conflicts are a major setback to peaceful coexistence and to development. This

paper looks at conflict resolution through better governance in Kenya and in the region at large. When, in 1962, African countries were just waking up to political independence from colonialism, French agronomist René Dumont wrote a landmark book called *L'Afrique noire est mal partie* (translated as: Sub-Saharan Africa has had a false start). He had foreseen a troubled future for the sub-continent. And true to his prediction, coups d'état, bloody ethnic conflicts, poverty, ignorance and disease still plague this region fifty years later. This paper sets out to prove, with sample data from Kenya, that there is a lot of social inequality (i.e. conflict and discontent) in Kenya (first objective). The paper also contends (second objective) that the biggest obstacle to peace, social and economic progress in Kenya, and in Eastern Africa, is this social inequality. The third objective of this paper is that poor governance (leadership) is the main cause of social inequality in Kenya. The data is analyzed statistically and linguistically (using discourse analysis) to support the assertion that political leaders, by their self-seeking, egocentric behaviour, have brought the Kenyan nation to its knees. After considering three major causes of social instability in Kenyan society, the paper proposes (in conclusion) that only meaningful national dialogue can sort out the country's predicament.

Key words: *Language, Communication, Dialogue, Change, Kenya.*

Knowledge, Attitude and Practices on Endod (*Phytolaccado decandra*) in Three Counties in Western Kenya

Ooko S.¹✉, J.B.Okeyo-Owuor², Odipo Osano² and Beru. F²

¹*Department of Pure and Applied Chemistry, Masinde Muliro University of Science and Technology, P. O. BOX 190-50100, Kakamega, Kenya.*

²*Department of Environmental Health, University of Eldoret, P. O. Box 1125-30100, Eldoret, Kenya.*

✉Email: selline.ooko@mmust.ac.ke

Abstract

A Knowledge, Attitude and Practices (KAP) survey was conducted in three districts in Western Kenya between December 2008 and April 2009 to determine knowledge, attitude and community practices on endod (*Phytolaccado decandra*) also called African Soap Berry. A structured questionnaire was administered to randomly chosen participants who had some knowledge on endod and who at least knew one of its ethno medical uses. Each County in the study represented one ethnic community in Western Kenya (i.e. Siaya – Luo, Busia - Luhya and Nandi – the Nandi). The study revealed wide use of endod as a medicinal plant with each community having its preferred leading use. Some of these uses such as procuring abortion, treatment of fungal skin diseases and deworming of domestic animals compare favorably with those in Ethiopia and Zambia. In as much as the Nandi consider it a poison not to be taken orally (they use it topically) the Luhya use it as a vegetable in addition to some of its medicinal uses. New uses so far not mentioned in the literature also emerged. These included its use in convulsive disorders, treatment of sprains and joint pains, poultry diseases and insect bites amongst others. The three communities were quite knowledgeable on endod and had good attitude towards its use most saying it is efficacious as a herb. More scientific studies need to be conducted to identify the active ingredients in endod and also to scientifically confirm its efficacy in some of the applications assigned to it by the communities.

Key words: *Topical, Convulsive disorders, Efficacy*

Language as Repository in the Preservation of Biodiversity: An Ecolinguistic Perspective

Ogone John Obiero

Senior Lecturer and Chair, Department of Linguistics, Languages and Literature, Jaramogi Oginga Odinga University of Science and Technology, P. O. Box 210, Bondo, Kenya

Email: obby3@yahoo.com

Abstract

The current rapid global climatic change has caused a drastic reduction in the biodiversity. Habitats previously occupied by plants and animals are fast being encroached by human populations. But even more worrying are the dynamics within that human population: The older generations who were custodians of indigenous knowledge are being replaced by new generations without this knowledge. This unfortunate trend is especially critical in cases where intergenerational transmission of indigenous knowledge has been disrupted to a great extent, causing an urgent need for intervention. Previous studies have found language to be an elaborate repository of knowledge about a people and their environment (both physical and social) (c.f. Sapir, 1912). It has been noted, for instance, that characteristics of a given social or physical environment is stored in the vocabulary of a given language. This paper is of the view that conservation efforts aimed at restoring biodiversity may not amount to much without records of traditional systems of knowledge. One way to document such knowledge is through language documentation, especially the vocabulary related to the physical environment comprising plants, animals, and social environment - particularly folklore related directly to the social environment, personal accounts, narratives and experiences and knowledge about the climate.

An Analysis of the Phenomenon Ime Y'omwana Movement in Kenyena Sub-County, Kisii County, Kenya

Makori Alice Nyangara, Napoo Naila and Hezekiah Obwoye

Department of Religion, Jaramogi Oginga Odinga University of Science and Technology

P. O. Box 210, Bondo, Kenya

Email: alycnyangara@gmail.com

Abstract

The bewildering explosion of new religious movements in Africa forms a tremendous increase in number of splinter groups in Christianity. In this paper, we give an analysis of a phenomenon ImeY'omwana movement in Kenyena Sub-County in Kisii County. ImeY'omwana is separatist novel religious movement and it is a splinter group from Seventh Day Adventist church in Kenyena Sub-county, Kisii County. The paper traces its origin from the reasons for the division from the main church, its beliefs and practices. It is curious to note that ImeY'omwana movement puts more emphasis on the son of God. They speak more on the son of God and they rarely speak of God. The ImeY'omwana (IYM) in Kisii language means literally *in the Son of God*. This a splinter group was started as protest against some tenets of the main church like tithing, righteousness by faith, baptism of the Holy Spirit, choice of leaders according to the level of education and offerings. The IYM began in Kenyena Sub-County in Kisii County in 1979. Latter it moved to Gucha Sub-County then to Gucha South Sub-County, Masaba south sub-county all the way to Nyamira County. Experience of 31st December 1999 from Kenyena sub-county showed that the IYM followers sold all their properties and made artificial wings in readiness to fly to heaven with Jesus upon the dawn of millennium. Those who tried to fly from the trees fell down broke their limbs and some even died. It is also alleged that the IYM followers do not take their children to school nor do they go to hospital for treatment.

CONFERENCE ORGANISING COMMITTEE

Prof. Benson BA Estambale	Convener
Prof. Omolo Ongati	Chairman, Organizing Committee
Dr. Calleb Gudo	Vice Chairman
Mr. Fredrick O Oluoch	Secretary

Conference Secretariat

Prof. Omolo Ongati	Convener
Dr. Henry JO Ogola	Member
Mr. Fredrick O Oluoch	Member
Mr. John Agili	Member
Mr. Oscar Osika Naphtaly	Member

Abstracts and Programme Committee

Dr. Darius O Andika	Convener
Dr. Henry JO Ogola	Member
Dr. Bernad N Okello	Member
Dr. Amolo Asito	Member
Mr. Samuel Oyieke	Member
Mr. Jasper Ondulo	Member

Budget Committee

Prof. Benson BA Estambale	Convener
Prof. Omolo Ongati	Member
Dr. Patrick Akhaukwa	Member

Logistics and Invitations

Mr. Kenneth O Aduda	Convener
Dr. Lorna G Okotto	Member
Dr. Pamela Were-Kogogo	Member
Dr. Michael Oloko	Member

Publicity Committee

Mr. Osir Otteng'	Convener
Dr. Calleb Gudo	Member
Ms. Damaris Ochanda	Member
Dr. Obiero Ogone	Member
Mr. Fredrick O Oluoch	Member



OUR CONTACTS

Jaramogi Oginga Odinga University of Science and Technology (JOOUST)

Bondo (Main) Campus

P.O. Box 210 - 40601 Bondo – Kenya.

Telephones: 057 – 2058000, 057-2501804, 0707 - 058000

Fax: 057 2523851

Email: vc@jooust.ac.ke

Kisumu Learning Centre

P.O. Box 210 - 40601 Bondo – Kenya.

Telephone: 057 - 2022575

Email: ksmlc@jooust.ac.ke

Kisii Learning Centre

Telephone: 0714038433

Email: kislc@jooust.ac.ke

Busia Learning Centre

Telephone: 0724463306

Email: buslc@jooust.ac.ke
