



# BOOK OF ABSTRACTS

*- Open Collaboration and Innovation with Trust -*

South Africa – Japan University Forum

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### **JAPAN**

Ministry of Education, Culture, Sports, Science and Technology (MEXT)

Ministry of Foreign Affairs (MOFA)

Embassy of Japan in South Africa

University of Tsukuba

Tokyo University of Foreign Studies

Japan Agency for Medical Research and Development (AMED)

Japan International Cooperation Agency (JICA)

Japan Science and Technology Agency (JST)

Japan Society for the Promotion of Science (JSPS)

Japan External Trade Organization (JETRO)

Toyota Tsusho Corporation (TTC)

Japan-Africa Academic Network (JAAN)

Study in Japan Global Network Project in Sub-Saharan Africa

### **SOUTH AFRICA**

Embassy of South Africa in Japan

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National Research Foundation (NRF)

Universities South Africa (USAf)

Technology Innovation Agency (TIA)

Business Unity South Africa (BUSA)

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## PREFACE

We are very happy to organise the 5<sup>th</sup> South Africa-Japan University Forum (SAJU Forum) Conference online. The objective of the Forum is to establish a firm and sustainable platform for academic collaboration among the stakeholders from South Africa and Japan.

The Conference has been organised with the theme: **Open Collaboration and Innovation with Trust**. The recent explosion of the internet has drastically changed the way of communication. This has resulted in false information and extreme ideas with no scientific basis spreading around the world in the blink of an eye, creating division and distrust amongst people, distrust of science, distrust of democracy and so on. In addition, the isolation and frustration of people due to the COVID-19 pandemic may, in a sense, have accelerated this trend.

Under these circumstances, we in academia and related sectors must once again rebuild and continue open and innovative collaboration based on mutual trust, which is why we have set this theme.

In the two days, the following plenary lectures and panel discussions are planned, Perspectives and challenges towards open academic cooperation with trust, Lessons from experiences of bilateral research cooperation, Research Funding Mechanism, Cooperation Beyond Academia and Platforms for Academic Networking.

The parallel oral presentation and online poster session are made under three subthemes,

- Health and Wellness
- Security and Social Justice
- Growth, Exploration and Conservation

More than 40 abstracts from South Africa and Japan including the joint research between the two countries will be presented.

In order to contribute to the promotion of exchanges between the next generation of young people, the student's session is newly organized, where the students from South Africa and Japan discuss "Technologies of (dis)Trust and Transformation: South African and Japanese students' experiences of exchange and change through a pandemic in the era of misinformation."

We hope that the Conference will help to catapult South Africa – Japan collaboration to further levels.

## **LIST OF ACRONYMS**

AMED	Japan Agency for Medical Research and Development
BUSA	Business Unity South Africa
CSIR	Council for Scientific and Industrial Research (South Africa)
DHET	Department of Higher Education and Training (South Africa)
DIRCO	Department of International Relations and Cooperation (South Africa)
DSI	Department of Science and Innovation (South Africa)
IDE-JETRO	Institute for Developing Economics, Japan Trade External Organization
IEASA	International Education Association of South Africa
JAAN	Japan-Africa Academic Network
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JICA	Japan International Cooperation Agency
JSPS	Japan Society for the Promotion of Science
JST	Japan Science and Technology Agency
METI	Ministry of Economy, Trade and Industry (Japan)
MEXT	Ministry of Education, Culture, Sports, Science and Technology - Japan
MOFA	Ministry of Foreign Affairs of Japan
NRF	National Research Fund (South Africa)
SATREPS	Science and Technology Research Partnership for Sustainable Development
TIA	Technology Innovation Agency
TICAD	Tokyo International Conference on African Development
TTC	Toyota Tsusho Corporation (Japan)
TUFS	Tokyo University of Foreign Studies
USAf	Universities of South Africa

## **THEMATIC AREA 1: HEALTH AND WELLNESS**

# **Cultural Policies and Knowledge Circulation after Regime Change: A Cross-Border Case of Chopi's Timbila between Mozambique and South Africa**

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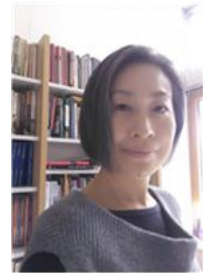
This study aims to inductively reveal how intangible traditional performing arts have confronted various policy interventions and maintained their characteristics. Cultural policy is a policy intervention of the state in society through culture, however, its impact does not confine to the geographical and temporal range envisaged by one country's policymakers, and the target culture continues to transform. Against the background of the growing interest in new cultural policy since the 1990s seeing culture as capital, as represented in David Throsby's work *The Economics of Cultural Policy*, this study aims to capture the new dynamics of cultural transformation that transcend the range of cultural policy. The conception of this study involves a cross-regional research interest in capturing the impact of the Cold War cultural policies in Southern Africa and East Asia in parallel. The study focuses on the case of performing art of timbila (xylophone), an intangible traditional culture of the Mozambican ethnic group, Chopi, who regularly migrated between the two countries as a part of contract migrant workers to the South African mining industry. It aims to examine; (1) The ethnic division policy in workplace under the apartheid regime. (2) The de-ethnicization and national integration policy under the socialist regime. (3) The transformation of traditional performing arts by combining the opposing elements of these policy interventions. (4) The practice of regional reflux of knowledge on traditional performing arts in contemporary Southern Africa. The methodologies employed to address these issues are (1), (2) archival research, oral history collection, and textual analysis of the archival material. For (3), an analysis of the musical works themselves, and for (4), interviews with those involved about practical initiatives incorporating elements of traditional performing arts at the South African College of

Music, University of Cape Town. The paper explores the case study as an emergent phenomenon of de-unilateral and complementary reconstruction of regional identity.

**Keywords:** Cultural policy, migration, South Africa, Mozambique, timbila

**Biography:**

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Akiyo Aminaka has been involved with studies related to migration and socioeconomic change in Mozambique and South Africa. Currently she has recently been taking part in research projects on social protection of migrants, African states, constitutional changes, and characteristics of "knowledge" among African youths.

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# **The impact of structural inequality in state responses to the Covid-19 pandemic – A South Africa case study**

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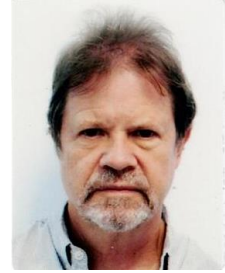
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As a legacy of its past and as a consequence of shortcomings in its social policies in the post-apartheid era, South Africa was ill-prepared for the onset of Covid. Large numbers of people live in densely populated informal settlements with inadequate access to basic services such as public health and water. In addition, high numbers of people live with compromised immune systems (from HIV/AIDS, Tuberculosis, diabetes, and cerebrovascular diseases) and this was a key factor in determining the government's strategy in combating the virus, namely that of "saving lives and preserving livelihoods" (Ramaphosa, 2020). Whilst the focus on saving lives met with initial popular support, little official attention was paid to resolving the paradox of preserving public health and sustaining growth in a highly dualistic economy. The lockdowns introduced at various stages of the pandemic were applied in equal measure to all citizens. However, in one of the most unequal countries in the world, it was inevitable that these measures would impact different strata of the population in different ways. Those more affluent, with access to public health, to the internet and other assets and resources weathered the Covid storm, albeit not always without difficulty. In contrast, the poor in great numbers lost their livelihoods and continue to suffer as a result. The impoverishment brought about by the pandemic is acknowledged to have been one of the triggers of an attempted insurrection and the outbreak of mass looting in 2021, prompting many commentators to question whether the preventative measures introduced were not worse than the disease itself.

**Keywords:** structural inequality, health-economy paradox, Covid-19, South Africa

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# **Possibilities of Social Enterprises for South Africa's Better Future? - Lessons from SPARK Schools**

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Since limitations of capitalism have become apparent, there has recently been initiatives to seek alternative economies. It is important to address how social and solidary economy (SSE) can contribute to realize more sustainable South Africa (SA) in the future. Although apartheid ended in 1994, SA still suffers from ill-legacies of the past. This situation presents both opportunities as well as challenges for SSE to be nurtured. Social enterprises (SEs) have recently been playing prominent roles, and the government of SA is now adopting the policy of social economy. This presentation uses SPARK School, established in 2012, in Johannesburg as a case study. The School adopts a customized hybrid model of computer-assisted online activities with face-to-face learning. This model is also enabled by sustainable financing. The SPARK Schools have become very popular among middle- and lower-middle income families, and the School is now the third largest private school network in SA. While the COVID-19 pandemic seriously hit the country, the Schools have succeeded in maintaining scholastic performances due largely to consolidated collaboration among teachers, pupils and parents. This impressive result presents a sharp contrast with national trends that unfortunately show significant pupil dropouts. The pandemic also highlighted the importance of policy dialogue among stakeholders. Even if public-private collaboration is far from easy, it has a potential to realize inclusive as well as sustainable community, which is much needed in the post-Apartheid SA. The SA experiences generate key lessons for us all who would like to see our life-world having a sense of purpose.

**Keywords:** social and solidary economy (SSE), social enterprises (SEs), SPARK School, COVID-19, stakeholder collaboration, policy dialogue.

**Biography:**

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Before joining the University, Fumihiko worked at UNDP in Bangladesh and Uganda for two and half-year each. At Ryukoku, he has been researching mainly on international development and sustainability studies. Special emphasis is placed on the complex trajectories of poverty, equity and social justice.

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# **Do Sports Clubs Contribute to Community Wellness? An Empirical Study of One Spot Club's Experience in Japan.**

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**Background:** Community wellness is an important factor in people's well-being, along with physical and mental health. This presentation will introduce the experiences of Smile Club, a non-profit organization sport club with a wide range of members, and discuss the potential of sports clubs to contribute to the wellness of the community.

**Results of Activities:** Smile Club, located in Chiba Prefecture, started exercise classes for children with developmental disabilities and volleyball classes as a voluntary organization in 1998 based on the philosophy of "encouraging people to enjoy sports, maintain good health, and lead better lives regardless of age, gender, or disability. The club has since been expanding its business while increasing the number of locations. The main projects and the number of participants in FY2019 are as follows: 1) Classes for children who are not good at exercise (exercise classes for children and adults with developmental disabilities) 200 participants (once a week at each facility); 2) Sports classes (volleyball 162 participants, badminton 84 participants, basketball 37 participants) (once a week per facility); 3) Infant gymnastics classes (37 participants) (once a week per facility); 4) After school day services (child development support: individual exercise classes, held daily) 192 participants; 5) Catering classes: total 34 times, 12~600 participants per class.

**Conclusion:** The experiences of the Smile Club show that local sports clubs have the potential to contribute to the individual wellbeing and community wellness for many residents, including those with disabilities.

**Keywords:** Sport club, Community wellness, Disability inclusion, Physical activity

**Biography:**

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In 2015, he founded the Inst. GMSS, where he practices and conducts research on social wellness. Before starting it, he worked as a surgeon in Tokyo, US, and Ivory Coast. Publications: Sport for Peace and Development: Perspectives of the United Nations (UN): Volume 1: United Nations involvement, decisions and initiatives.

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## **Shearing the experience of Cattle-related injuries in Japan. - For Occupational health in livestock industry of Africa -**

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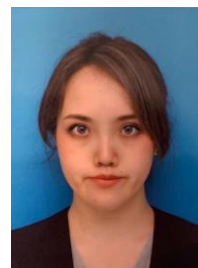
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Cattle are closed to our life and culture in Africa and Japan. And in some African region, cattle are important asset. We treasure cattle as asset, food, and labour for long time. However, occupational health in livestock industry is still poor. We need to deal with it more seriously for livestock industry's sustainability. Though cattle are looks genial, they are large herbivore. In Hokkaido Japan, cattle are significant factor in 84.3% of livestock-related accident. The specific countermeasures to respond to its characteristics are needed because cattle move as they like. This study aims to consider farmer's occupational health according to the cattle-related injuries in Japan. Authors examined the JA Kyosai mutual aid payment claim form data of the agricultural work-related accidents that occurred from 1st January 2013 to 31st December 2016. In these four years, there were 227 cattle-related accidents, and all were non-fatal cases. The most common age group of victims were in their 60s (37.9%). The Therapy duration was 1 to 243 days, with one day being the most common (10.1%); however, in 51.5% of the cases it required more than 30 days. The most common Operation at the moment of the accident was 'bringing' (22.5%), of which 'leading the cattle by rope' (56.9% of bringing) was most frequently mentioned. Even farmers with vast experience with cattle cannot control cattle proficiently. Since prevention of accidents has limits, harm reduction to farmers must be considered. Not only productivity but occupational health must be improved at the same time.

**Keywords:** Occupational health, Agriculture, Livestock, Cattle-related injuries, Japan

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## **Establishing a BSc (Hons) (Medical Physiology) module focusing on a humanities-rooted science context and approach**

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Many research scientists view their discipline as ‘neutral’ and devoid of any socio-political and historical contexts. This became evident during the Covid-19 pandemic where scientific facts mattered less in terms of shaping public opinion. Thus, there is a gap in the instruction of research scientists to be better trained to operate within the ‘post-truth’ world. A unique *Features of Science* module was therefore conceptualized and introduced as part of a BSc (Hons) one-year postgraduate degree program. The module curriculum was constructed, and the course content covered with BSc (Hons) students. Design principles rooted in authentic, self-reflective, and transformative learning theories were employed to enable a transformative teaching and learning experience. The module provided insights into the scientific process and knowledge production, its applications, and focused on the role of socio-politico-cultural and neoliberal economic factors in this instance. Student assessments included the completion of self-reflective journals, group presentations and an essay on a related, open-ended question. Student feedback was assessed by completion of an anonymous survey and a thematic-type analysis (anonymous) of their self-reflective journals. Feedback indicated that students found the subject content interesting and relevant, and that the safe and brave spaces allowed for different viewpoints to be freely expressed. The Socratic-type discussions in classes were well received and students indicated that it added considerable value to their learning experience. They also felt that the module enhanced their understanding of the complexity of the scientific process, while raising their awareness of humanity, empathy, and social justice. Our findings indicate that the *Features of Science* module can be successfully implemented within the Physiology higher education context and in other STEM environments, and that it may assist to produce science graduates that are well equipped and trained to handle (and lead) some of the contemporary, societal challenges facing humanity.

**Keywords:** Medical Physiology; Curriculum renewal; Postgraduate honors students; Post-truth world; Scientific process; Design-based research.

**Biography:**

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Prof. Faadiel Essop is the Director of the Centre for Cardio-metabolic Research Centre in Africa at Stellenbosch University. He is a Fulbright fellow, current President of the African Association of Physiological Sciences, a council member of the International Union of Physiological Sciences, and an elected Fellow of the American Physiological Society.

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## DEJIMA Infectious Disease Research Alliance (TOKKU)

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At Nagasaki University, five departments have vigorously promoted infectious disease research: the Institute of Tropical Medicine, the National Research Center for the Control and Prevention of Infectious Diseases, the School of Tropical Medicine and Global Health, the Graduate School of Biomedical Sciences, and the University Hospital. Along with the BSL-4 facility constructed in 2021 and overseas research centers in Asia and Africa, a research environment for all infectious diseases prevalent worldwide has been established. On the other hand, decentralization of functions due to independent operations had become an issue. In April 2022, the University launched the "DEJIMA Infectious Disease Research Alliance (TOKKU)" as a mechanism to enable the integrated operation of research resources dispersed throughout the University involving non-medical departments such as the Faculty of Information and Data Science. In the case of an emergency, the TOKKU will serve as a platform for pathogen analysis, clinical research, and the rapid development of therapeutic drugs and vaccines to provide a top-down emergency response. In addition, as an initiative to encourage the development of human resources for the infectious disease research not only at our University but also in Japan as a whole, we will also establish a "Researcher Mobility Program" that allows faculty members from domestic universities to conduct researches at the TOKKU (for about five years) while retaining their status at universities to which they were affiliated, and return to their original universities after the completion of the program. This system is expected to improve the research capability of our University and also to improve Japan's research capability in infectious diseases by creating a foundation to utilize our University's unique research resources in tropical medicine and emerging infectious diseases nationwide over a long period and to promote the development of the next generation of infectious disease researchers with a broad academic perspective.

**Keywords:** Infectious disease, BLS-4, Research organization, vaccine development

**Biography:**

Prof KANEKO Satoshi  
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He joined Nagasaki University from the National Cancer Center Research Institute in 2005 to establish a Kenya Research Station in Nairobi. Since then, he has continued his research on public health in Africa with a focus on Kenya. From 2022, he will also work as the Vice Dean of the Institute of Tropical Medicine, Nagasaki University.

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# INVESTIGATION OF HEPATITIS C VIRUS AND HEPATITIS E VIRUS IN CEREBOSPINAL FLUID OF PATIENTS TESTED POSITIVE FOR HUMAN IMMUNODEFICIENCY VIRUS AND SARS-COV-2 IN DR. GEORGE MUKHARI ACADEMIC HOSPITAL, PRETORIA IN 2020-2021.

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**Introduction:** Hepatitis C and Hepatitis E virus are a global health problem. Enterically transmitted Hepatitis E is believed to be associated with limited lack of good hygiene which might lead to fecal-oral transmission. While HCV is usually transmitted through infected blood. Both viruses, HCV and HEV can cause hepatocellular inflammation, liver cirrhosis, and hepatocellular carcinoma (HCC) in more severe cases. Neurotropism by both HCV and HEV viruses have been reported in the cerebrospinal fluid (CSF).

**Aim:** To investigate the prevalence of HCV and HEV in CSF of HIV and SARS-Cov-2 co-infected patients admitted at Dr. George Mukhari Academic Hospital (DGMAH) during 2020 and 2021.

**Methodology:** This was a descriptive study and consisted of 57 CSF samples collected from HIV and SARS-Cov-2 co-infected patients. Serum samples were subjected to extraction of RNA, cDNA synthesis for both viruses and PCR using specific primers targeting ORF2/ORF3 for HEV and those targeting the NS5B for HCV were used.

**Results:** HEV RNA was detected in 40% (23/57) of the HIV-positive CSF samples tested. While HCV RNA was not detected in any of the CSF samples tested 0% (0/57). There was no significant difference in CSF HEV RNA positivity and/or negativity when stratified by age, sex, ethnicity, CD4 count, as well as HIV viral load ( $P \geq 0.7$ ,  $P \geq 0.9$ ,  $P \geq 0.087$  and  $P \geq 0.2$  respectively).

**Conclusion:** HEV is more prevalent in the CSF of HIV-infected patients admitted at the DGMAH, while HCV was not found. Our finding necessitates studies to further

understand the diagnostic meaning of HEV RNA in CSF of HIV-infected patients in order to better manage neurological disorders in these patients.

**Keywords:** Hapatitis E Virus, SARS-Cov-2, HIV, cerebrospinal fluid, Neurological disorder

**Biography:**

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# **Establishing a rat model of chronic stress: an analysis of oxidative stress**

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Chronic psychosocial stress is implicated in the onset and progression of non-communicable diseases, and mechanisms underlying this relationship include alterations to the intracellular redox state. However, such changes are often investigated in isolation, with few studies adopting a systems level approach. Here, male Wistar rats were exposed to 9.5 weeks of chronic unpredictable mild stress and redox status assays were subsequently performed on cardiac, hepatic and brain tissues versus matched controls. The stressed rats displayed an anxious phenotype, with lowered plasma corticosterone levels ( $p = 0.04$  vs. controls) and higher plasma epinephrine concentrations ( $p = 0.03$  vs. controls). Our findings showed organ-specific redox profiles, with stressed rats displaying increased myocardial lipid peroxidation ( $p = 0.04$  vs. controls) in the presence of elevated non-enzymatic antioxidant capacity ( $p = 0.04$  vs. controls). Conversely, hepatic tissues of stressed rats exhibited lowered non-enzymatic antioxidant capacity ( $p < 0.001$  vs. controls) together with increased superoxide dismutase (SOD) activity ( $p = 0.05$  vs. controls). The brain displayed region-specific antioxidant perturbations, with increased SOD activity ( $p = 0.01$  vs. controls) in the prefrontal cortex of the stressed rats. These findings reveal distinct stress-related organ-specific vulnerability to redox perturbations and may provide novel insights into putative therapeutic targets.

**Keywords:** Chronic stress; Rat model; Oxidative stress.

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Prof. Faadiel Essop is the Director of the Centre for Cardio-metabolic Research Centre in Africa at Stellenbosch University. He is a Fulbright fellow, current President of the African Association of Physiological Sciences, a council member of the International Union of Physiological Sciences, and an elected Fellow of the American Physiological Society.

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# **CHEMINFORMATICS IDENTIFICATION OF PHENOLICS AS MODULATORS OF PENICILLIN BINDING PROTEIN-3 OF *PSEUDOMONAS AERUGINOSA* TOWARDS INTERVENTIVE ANTIBACTERIAL THERAPY**

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Antibacterial resistance to  $\beta$ -lactams has been attributed to alterations in penicillin binding proteins (PBPs) coupled with  $\beta$ -lactams' inactivation by  $\beta$ -lactamase. Consequently, identification of a novel class of therapeutics with improved modulatory action on the PBPs is imperative and plant secondary metabolites, including the phenolics, have found relevance in this regard. In this study, phenolics were computationally evaluated against PBP3 of *Pseudomonas aeruginosa*, a superbug implicated in several nosocomial infections. In doing this, a library of phenolics with affinity for PBP3 of *P. aeruginosa* was screened using structure-activity relationship-based pharmacophore and molecular docking approaches. Subsequent screening of the top 5 phenolics (C1 – C5) with more drug-likeness attributes, feasible synthetic accessibility, and less toxicity characteristics was achieved through molecular dynamic (MD) simulation to understand their flexibility, compactness, and stability upon binding to PBP3 over a 120 ns evaluation period. Except for C1, all the hit phenolics had significantly higher negative free binding energy than cefotaxime (-18.72 kcal/mol), with C2 having the highest affinity (-28.99 kcal/mol) for PBP3. All the hits were stable at the active site of the protein with C2 being the most stable (2.14 Å) and established important interactions with Ser294, implicated in the catalytic activity of PBP3. Furthermore, following binding of the hit phenolics, PBP3 became more compact (bound: 29.90 Å Vs unbound: 30.39 Å) with less fluctuation (bound: 0.95 Å Vs unbound: 1.23 Å) of the active site amino acid residues. These observations are indicative of the potential of the test compounds as PBP3 inhibitors, with

C2 being the most prominent of the compounds that could be further improved for enhanced druggability against PBP3 *in vitro* and *in vivo*.

**Keywords:** Phenolics,  $\beta$ -lactam antibiotics, Structure-based pharmacophores, Molecular docking, Molecular dynamic simulation.

**Biography:**

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Since joining the Durban University of Technology (DUT) as a Senior Lecturer in 2019, Saheed has been involved with computational and systems biology studies related to drug discovery and development. Before joining DUT, he was a postdoctoral fellow at the University of the Free State NGS Unit.

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# **Cyanobacteria in Water Sources: Implications for Public Health: A review**

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Study 1: The Presence of Toxic and Non-Toxic Cyanobacteria in the Sediments of the Limpopo River Basin: Implications for Human Health. The study involved molecular techniques targeting the 16S rRNA gene and flowcam. The study showed the presence of genes expressing toxicity in the river sediments collected in the Limpopo River basin. The dominant cyanobacteria was *Microcystis* species, followed by *Raphidiopsis raciborskii*, *Phormidium* and *Planktothrix* species and were confirmed using molecular techniques. The presence of toxic cyanobacteria in the river sediments may be harmful to humans, livestock and wildlife.

Study 2: Occurrence of Cyanobacteria and Microcystin variants in Musina Raw Water Supply and Limpopo River Sediment, South Africa. Water & sediment samples were collected from Musina raw water supply and Limpopo river. The study showed the presence of *Oscillatoria*, *Microcystis* and *Planktothrix* as conformed by FlowCam and scanning electron microscope. The HPLC-PDA showed the dominant presence microcystin LR 47ppb and YR27ppb in levels in excess of WHO guidelines values. These high levels of microcystin LR are harmful to humans.

Study 3: The Quality of Water Sources of Two Towns in Arid Region During a Drought Year: A Study of Musina & Beitbridge Towns. Southern Africa experienced a severe drought in 2016. The samples were collected from Musina and Beitbridge towns' water taps and the raw water supplies. The molecular techniques showed the presence of *cyr* genes expressing toxicity for the cylindrospermopsin toxin in both the Limpopo weir and sediment samples. The Musina water tap showed the presence of genes expressing toxicity, while the Beitbridge water tap was free of these genes expressing toxicity. Thus, the presence of these genes is worrisome since they are a likelihood of contamination of the drinking water.

Study 4: Occurrence of cyanobacteria in water used for food production. The grinding of maize seeds to produce maize meals is an occurrence that happens in rural

communities all the time. However, the use of contaminated water with the presence of cyanobacteria is worrisome. Here the water is mixed with maize seeds to soften the seed and produce a fine mealie meal for human consumption. This study is ongoing and will report of the actual results.

**Keywords:** cyanobacteria, toxic and non-toxic species, cyanotoxins, human health, drinking water, sediments

**Biography:**

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He has supervised 4 PhD and 17 Masters students from Universities of Venda, Zimbabwe and Pan African University, Institute of Water and Energy Sciences including Climate Change, University Abou Bekr Belkaid. Published 45 peer reviewed journal articles, 46 peer-reviewed conference proceedings and 5 book chapters and has registered 4 patents.

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# **Oral health practices of community health workers in a primary health care setting in South Africa**

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*Research question:* Do community-health workers (CHWs) have adequate oral health practices and knowledge to maintain their oral health? *Background:* CHWs are core to the outreach component of the primary health care approach in South Africa. Their inclusion in the health care system is intended to promote health on a community level and increase access to health care, by forming the link between health facilities and the community. Oral health is not explicitly included in their role even though oral health is integral to health and wellbeing. *Purpose:* To enquire about the oral health related practices of CHWs in order to guide subsequent oral health interventions for CHWs. *Methodology:* A survey for a sample of CHWs in a district in a province in South Africa was done. One aspect of the survey enquired about oral health practices, attitudes and knowledge. *Results:* Most (98%) of respondents brushed their teeth at least once a day, 63% used a fluoridated toothpaste and 19% visited a dentist in the past two years-primarily for pain relief (43.9%). 50%-58% rated their teeth and gums respectively as good to excellent. Respondents who brushed their teeth less than twice a day had a significantly less positive attitude towards their gum ( $p<.001$ ) and tooth ( $p<.05$ ) health. 19.5% of respondents complied with minimum acceptable dental practices. Only 20% knew the causes of dental problems identified in the communities that they worked in. *Conclusion:* The oral health practices and knowledge of CHWs in this study are not adequate to maintain their oral health. If oral health is to be made a priority within the primary health care system, addressing the knowledge, attitude and skills regarding personal oral health of CHWs should be core to such an intervention.

**Keywords:** community-health workers, oral health, oral practices, attitudes, primary health care

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Natalie teaches in the oral hygiene and dentistry programs. She has an interest in curriculum development, clinical teaching and assessment and oral health promotion, also her research interest. She is doing a PhD on primary oral health care within the primary health care system in a district in South Africa.

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# **Chiropractic manipulation and mobilisation for postpartum low back pain: a systematic review**

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Low back pain is a common global problem and has been the leading cause of years lived with disability since 1990. Postpartum low back pain (PLBP) is very common, affecting between 33% to 75% of women in varying intensity, and can range from moderate to severely debilitating pain. Previous studies have investigated and reported evidence on the effectiveness of chiropractic treatment for postpartum low back pain. Chiropractic mobilisation and manipulation are reported as the most effective treatment modalities. To locate published work, the researcher will employ the following electronic databases: Google Scholar, Pubmed, Medline, Proquest Health and Medical Complete, EBSCO (CINAHL), Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL) and Index to Chiropractic Literature (ICL). A qualitative paradigm using the Cochrane systematic review approach will be used to ensure the impact of bias is reduced. The PICO framework (Patient/Problem, Intervention, Comparison and Outcome) will be employed to generate a focused research for this study, thereby identifying the key concepts for an effective search strategy. The objective of the present study is to ascertain whether manipulation and mobilisation can be considered as beneficial treatment modalities for PLBP. The aim of the study is to attain this information through a systematic review of studies, which will help the researcher identify, evaluate and consolidate existing evidence on the clinical efficacy of chiropractic manipulation and mobilisation as beneficial treatment for PLBP.

**Keywords:** Efficacy, Manipulation, Mobilisation, Postpartum low back pain, Pelvic Girdle pain

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## **THEMATIC AREA 2: SECURITY AND SOCIAL JUSTICE**

# **Attribute of Corporate volunteerism as an aspect of citizenship: A corporate social responsibility perspective**

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The focus of this paper is one of South Africa's higher education institutions, whose strategic plan is informed by nine institutional values, including social responsibility. Corporate volunteering can reinforce a positive workplace culture in the workforce, higher education sector. When students and employees work without expecting compensation but instead aim to promote others' well-being, the learning and working environment is improved. Given that everyone has a natural urge to give back, higher education institutions need to provide chances for students, support staff, lecturers, and managers to fulfil their civic duty. Therefore, we continue to investigate whether the institution offers these possibilities to encourage corporate volunteerism among its staff. To get information from students, staff members, lecturers, and management, focus groups are sought. Data will be analysed using themes. It is believed that the results would help to provide corporate volunteer opportunities.

**Keywords:** corporate volunteerism, corporate social responsibility, citizenship, higher education institution

**Biography:**

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Ndanganeni Florence Litshani, known as Kelly, is a Senior Lecturer in the department of Educational Studies, in the faculty of Humanities, Social Sciences and Education, at the University of Venda, Limpopo, South Africa. She holds a Doctor of Education degree from the Rand Afrikaans University (now UJ). Dr Litshani is a teacher by profession. She has taught in several education institutions for the past 39 years. Her passion is in leadership, management, and governance research projects. She has supervised extensively Honours, Master, and Doctoral students who specialised in Educational Management to completion.

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# **Literal poverty or poverty of the mind? An examination of how indigenous ways could be used to curb poverty in the 21<sup>st</sup> century**

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South Africa experiences serious challenges such as live catastrophe which leads to many families living in poverty. The downfall of the country's economy aggravates the situation by inflating commodities that are essential for human survival. Poverty is ongoing and affected many people and their families. This problem challenges social work as a profession that deals with the well-being of vulnerable groups including families that lives in poverty-stricken environments. The question to be asked is "is the poverty literal or is the poverty of the mind? The main research question guiding this paper is: what strategies did our forebears use to survive the impoverished conditions of their time. Qualitative research will be used to conduct purposive face-to-face interviews with the old generation to hear their views that can guide social work practice. The purpose of this paper is to explore possible ways to alleviate poverty in communities through the power of the mind. The results will assist in developing strategies to alleviate poverty guided by the indigenous knowledge shared.

**Keywords:** Poverty, Mind, Strategies, Indigenous knowledge, social

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Dr. Mamaleka is a social work lecturer at the University of Venda (UNIVEN). She worked as a supervisor with the Department of Social Development before joining UNIVEN in 2014. She teaches supervision and management in social work and fieldwork. Her areas of interest are parenting, indigenous knowledge, and supervising students' research.

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# INVESTIGATION OF STUDENT WELL-BEING AND SUCCESS IN THE SOUTH AFRICAN RURAL-BASED UNIVERSITY

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This is a case study of one of the rural-based universities in South Africa. The university is in the category of Comprehensive Universities as universities in South Africa are categorized according to traditional, which are academic in focus, Science and Technology which are more vocational, and Comprehensive universities which offer a combination of both types of qualifications. In its Strategic Plan of 2021-2025, the first Thrust is student-centredness and engaged scholarship, out of the first thrust, there are four strategic objectives. The first strategic objective is student well-being and success. The study focuses on the first strategic objective of the first thrust of the selected university's strategic plan. We, therefore, investigate whether the university has adequate resources to accommodate student well-being and their success in the completion of programmes in the stipulated period. Student well-being and success are based on both undergraduate and postgraduate programmes. In this study, we are investigating factors that affect student well-being and success such as mental well-being, psychological distress, student accommodation, lecture halls, and e-learning. Data will be collected from students and academics (lecturers) through individual and focus group interviews. Data will then be analysed through themes and sub-themes. The assumed reality is that the university does not have adequate resources to fulfill the first strategic objective of the strategic plan.

**Keywords:** student well-being, student success, mental well-being, stress, accommodation, psychological distress

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Since joining the University of Venda as a lecturer in 2010, Prof Takalani Mashau has taught undergraduate and postgraduate students. His research interests are in Educational Leadership and Management, Comparative Education, Multicultural Education, and Law in Education. He has published extensively in peer-reviewed journals and supervised Master and Doctoral students to completion.

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# IMPERATIVES OF CULTURALLY RESPONSIVE STRATEGIES IN TEACHING TABOO SCIENCE SEXUAL CONCEPTS IN RURAL SOUTH AFRICAN SECONDARY SCHOOLS

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This paper investigates the effects of designing and implementing culturally responsive strategies to promote effective teaching of science content of a sexual nature during Biology classes in rural South African secondary schools. Literature highlighting the challenge of naming sexual concepts perceived as taboo in cultural groupings where teachers' and learners' use English as a second language is reviewed against the backdrop of prescribed, school science curriculum requiring mandatory naming of sexual concepts regardless of taboo perceptions. Research shows that the recognition and integration of indigenous knowledge is an important issue for developing culturally responsive strategies when teaching and learning science to, and by, indigenous people. However, little has been said about cultural taboos of a sexual nature and their effects on teaching and learning. A teacher professional intervention was designed to develop a culturally appropriate strategy using Contiguity Argumentation Theory. Research methods used were open-ended questionnaires, focus group interviews and drawings. Evidence promoting the use of culturally responsive strategies was drawn from qualitative data, using Critical Participatory Action Learning and Action Research design in a sample of teachers from Xhosa indigenous grouping. The claim is made that using culturally responsive strategies provides an effective teaching strategy for teaching taboo sexual concepts in Biology classes situated in a deeply, culturally determined Xhosa indigenous communities. While not generalisable, the effect of this strategy should be of value when considering teacher development in indigenous communities and disciplines.

**Keywords:** Sexual concepts, cultural taboos, culturally responsive strategy, Xhosa indigenous community, science

**Biography:**

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Ayanda has been involved with studies related to science teaching and language use on sexual concepts in rural schools. Ayanda worked previously as a teacher and a managing Subject Education Specialist for Biology. In 2018, Ayanda worked as a contract lecturer, got a PhD scholarship and lectured permanently from 2021.

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# **Public Diplomacy with Soft Power and its Role in Education: A Comparative Study on African Participants in Sino-Japanese International Education Programs**

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In this research, by employing *new public diplomacy* as a theoretical lens, which defines public diplomacy more expansively than as an activity unique to sovereign states, I will elucidate the characteristics of Sino-Japanese public diplomacy towards Africa and international education. Since the actual scope of modern diplomacy has broadened over time and context, I shall review literature on the evolution of diplomacy in international relations. There is a difference between ancient and modern diplomacy, however, studies of public diplomacy remain on the margins of mainstream IR understandable through a state-practice lens, therefore my research seeks to theoretically elucidate the plurality of public diplomacy. I seek to investigate the extent to which international exchange education programs play a role in building good public diplomacy. Knowledge is limited on whether the experiences of African participants in international education exchange programs such as the ABE Initiative, the JET Programme, the MEXT Scholarship or the China Scholarship Council Scholarship etc, match the objectives of whence these exchange programs originate. Many scholars assert that; soft power in relation to educational assistance assumes that through participation in international educational exchange programs, graduates will be sensitized to their host countries viewpoints and become knowledgeable in their respective languages, societies, cultures, history, and politics. Therefore, I seek to interrogate the perceptions of current and former African recipients of the mentioned scholarships about their host countries, either China or Japan.

**Keywords:** Public Diplomacy with Soft Power, Sino-Japanese Educational Cooperation with Africa

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Thami is a 3rd Batch ABE Initiative alumnus, from Hiroshima University with a master's degree in international Cooperation Studies. Since joining Stellenbosch University as a Coordinator of Internationalisation Support, he's been involved with the establishment of the Stellenbosch University Japan Centre (SUJC) to be officially launched on August 11, 2022.

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# **TOWARDS INTER-GENERATIONAL JUSTICE IN AN INTER-CONNECTED WORLD: CLIMATE CHANGE AND CHILDREN'S RIGHTS**

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The United Nations Framework Convention on Climate Change requires States to “protect the climate system for the benefit of present and future generations of humankind, on the basis of equity”. Obligations to future generations are found in international law and in many Constitutions and national laws. In a recent case about climate change brought to the UN Committee on the Rights of the Child under its Communications Procedure, the five respondent States argued that because all States are, to some extent, responsible for the effects of global warming, no one state can be held responsible. The Committee found, in accordance with the principle of common but differentiated responsibility, as reflected in the Paris Agreement, that the collective nature of the causation of climate change does not allow individual States to evade their individual responsibility that may derive from the harm that the carbon emissions originating within its territory may cause to children, whatever their location. The research for this presentation will be undertaken through an analysis of primary and secondary sources in international children's rights law children and allied fields such as environmental law. This presentation argues that social justice remedies for transboundary harms caused by carbon emissions requires an approach that promotes solidarity across States and across generations.

**Keywords:** Inter-generational, climate change, children's rights, transboundary, inter-connected, social justice

**Biography:**

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Professor Ann Skelton is a leading international children's rights expert, who has published widely in her field. She was Director of the Centre for Child Law at the University of Pretoria (2004-2018), and was counsel in more than 10 landmark cases that she argued in the Constitutional Court of South Africa. She is currently serving a second term of office as a member of the UN Committee on the Rights of the Child (2021-2025).

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Dr. Mikiko Otani is an international human rights lawyer based in Tokyo. In addition to over 30 years of practice in family law, she has extensive experience in the UN human rights mechanisms. She is Chair of the UN Committee on the Rights of the Child (2021-2023) and a Commissioner of the International Commission of Jurist.

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# **Exploring a case for a disability economic empowerment inequality index in the context of South Africa and Japan**

## **(Working paper)**

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The poverty-disability two-way link continues to causes a vicious cycle, where individuals with impairments continue to face barriers limiting their socio-economic participation on an equal basis with others; thereby perpetuating economic empowerment inequality, consequently hurting economic growth by depriving people's wellbeing. While there is a consensus that Indices are useful for social reality scientific analysis, as this absence limits adequate explanations to inform socio-economic policies and interventions. On the other hand, there is a growing interest towards sustainability arguing that leaving others behind may not achieve either economic, social and environmental sustainability, as supported by the Sustainable Development Goals, Agenda 2030, with a reflection on how inequality measures help reform policies and progress towards bridging these gaps thus ensuring No one is Left Behind. These efforts have however have not been seen across all population groups, as existing indices exclude disability disaggregated data. This dearth of knowledge on disability focused or inclusive indices, let alone pertinent economic empowerment indicators; form a basis of this working paper that explores a disability inequality framework of indicators, by comparison of the context of Japan and South Africa, to support the development of a disability inequality index.

**Keywords:** Social Justice, Inequality, Economic Empowerment, Disability, Japan, South Africa

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With a background in Development Studies, an injury which left her paralyzed birthed her interest in social Justice, whereafter, she worked as senior disability equality facilitator, research senior manager, advocacy deputy director for disability organization and government respectively. She has also served on various transformation structures, including voluntary advocacy.

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# **Rising Japanese Foreign Direct Investment in the Digital Economy of African Countries**

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Japanese foreign direct investment (FDI) into Africa has been under researched, particularly in comparison to China. The article explores the question of whether rising Japanese FDI into Africa is connecting to the continent's rapid emergence in ICT & Digital Technologies, and if so, how it is engaging with this emergence? To answer this question, the research assesses both quantitatively and qualitatively the rise of Japanese FDI into African countries, particularly in businesses and sectors that interact with ICT & Digital Technologies. This research is critical as it will contribute to the literature on Japan-Africa relations and the impact of Japanese investment on African economic development and innovation. It will also engage with rising scholarship on the digital economy which, from the perspective of compressed development, holds uncertainty for both African countries and Japan. Ultimately, the research finds that Japanese FDI is higher than Chinese FDI, and growing faster. It is unclear, however, to what extent this has been impacted by the Covid-19 pandemic. The research also finds that there is increased interest in African tech startups.

**Keywords:** Japan, Africa, FDI, Development, Digital, Economy

**Biography:**

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## **Agricultural producer responses to minimum wage changes**

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The South African agricultural sector experienced a 52% increase in the minimum wage in 2013. This study uses the difference-in-differences estimator on the administrative tax data to assess the channels through which farm-owners internalized the additional production cost associated with the minimum wage hike. Our study is significant on two primary levels. Firstly, we use administrative tax data to study minimum wage effects. It provides increased accuracy, larger sample sizes, and sensitive information that respondents are less likely to provide in a survey. Secondly, in addition to the employment channel which South African minimum wage literature extensively focuses on, it provides other firm-level margins that shift in response to minimum wage changes. Our empirical findings show that low-wage farms experienced a significant increase in labour costs. In response to increased labour costs, we show that low-wage farms gradually decreased their demand for labour overtime.

**Keywords:** Minimum wage, adjustment channels, employment, labour costs, capital, revenue

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PhD student in the Department of Economics at Stellenbosch University. Primary research interests concern the use of administrative tax data to study inequalities in the labour market. Experience in data collection, management, and quality assurance for academic research projects. Detail-oriented, with three years of experience in compiling raw company income tax records from the South African revenue service, providing documentation on the nature of the data. Also works as a research consultant at UNU-WIDER.

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# **FOOD SECURITY STATUS AMONGST STUDENTS REGISTERED AT THE UNIVERSITY OF VENDA**

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South Africa is food secure at the national level with pockets of insecurity at various levels of care. Food insecurity in institutions of higher learning has been reported to be high. The purpose of this study was to describe the food security status among students registered at the University of Venda and the coping mechanism adopted to tackle food insecurity challenges. A cross-sectional study was conducted on 515 university students. Three variables were measured namely, socio-economic status, food security status and coping strategies. A researcher-administered questionnaire was used to collect information from students. Data were analysed using the Statistical Package of Social Sciences, version 26. The study findings reveal that more than half (53.6%) of male and 62.8% of female students experienced hunger, while 36.5% of males and 30.1% of females were at risk of hunger. Only 9.9% of males and 7.1% of females were food secure. Coping strategies among Univen students included asking for money or food from parents and friends, having part-time jobs, cutting down money for clothes, consuming alcohol and skipping breakfast. It is concluded that the majority of University of Venda students were food insecure. Food insecure students are at risk of poor spending habits and resort to different coping strategies.

**Keywords:** Food secure, Strategies, Hunger, Challenges, and Students

**Biography:**

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Since joining the University of Venda, Ms Mbhatsani has been involved in food and nutrition security-related studies in Limpopo province. She started as a research assistant and then became a lecturer in the department of nutrition attached to the faculty of Health whereby she supervised honours and masters students in few research niche areas including food and nutrition security.

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# **Climate Smart Water and Soil Management Strategies for Achieving Food Security in Africa**

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The global population is estimated at 9 billion by 2050, with much of this population increase will occur in developing countries. This will push the demand for agricultural crop production to counter food insecurity, especially in sub-Saharan Africa, where one in three people is chronically hungry. In this way, ensuring food security and agricultural water management is crucial since water scarcity is already a problem in many parts of the world. Additionally, the future of agriculture crop production has the challenge of enhancing crop production under uncertain climatic extremes, with limited (or degraded in some areas) land area, and rapid degradation and erosion of natural biodiversity such as soils. Climate variability and extreme weather events are projected to increase in nearly all regions. Although irrigation agriculture is being practiced, only 300million hectares of 1.5 billion cultivated are irrigated with over 70% in Asia. Irrigation agriculture has not developed much in most parts of Africa. The current irrigation water uses, and management practices include watering cans, border, furrow in paddy and pressurized ones such as drip and sprinkler. However, the continent faces several challenges such as declining soil fertility, limited innovative technologies in irrigation networks, limited in-situ data, poor irrigation practices, etc It's upon this background that this research paper highlights the current research findings and reviews from literature on technologies aimed at improving soil water management in Africa. Therefore, promotion of interventions such as alternate wetting and drying (AWD) in paddy, drip irrigation for upland rice and other crops, on-farm organic fertilizer, biomass mulching boards, part root drying, Internet of things (IoT) in agriculture will contribute to building climate resilience soil and water management in agriculture.

**Keywords:** Soil and water management, food security

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Denis Bwire is a Ugandan whose research focuses on optimizing alternate wetting and drying (AWD) irrigation for climate-smart water management in paddy fields. Bwire has worked at the current university as a research assistant and a lecturer at Busitema University, Uganda. He is the founder of Saerd Centre Ltd company.

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# **NEGLECTED AND UNDERUTILIZED PLANT SPECIES FOR SUSTAINABLE NUTRITION, LIVELIHOODS AND RESILIENCE TO CLIMATE CHANGE IN WESTERN AFRICA**

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Agriculture is essential for food security in Sub-Saharan Africa (SSA), and an important source of livelihoods in the region. However, agricultural systems in SSA tend to rely on a few food crops (e.g. maize, rice, millet, sorghum, cassava) and cash crops (e.g. cotton, sugarcane). Furthermore, many agricultural systems are not resilient to climate change throughout the region. They tend to have low productivity, adopt environmentally unsustainable production practices, and be vulnerable to the accelerated climate change and other socioeconomic shocks. Arguably there is a need to develop highly productive and diversified agricultural production systems, that are locally appropriate, provide sufficient nutritious food, and are environmentally sustainable, climate-resilient and able to adapt to the rapidly changing environmental conditions. There is evidence to suggest that the increased promotion, adoption and utilisation of Neglected and Underutilised Plant Species (NUS) is one of the possible solutions in this challenging interface of food security, rural livelihoods, environmental degradation, and climate change. NUS are domesticated and locally-important crops that can cater for multiple uses (e.g. food, medicine), but are nevertheless less prevalent in the wider food system in SSA. This presentation will outline the FORENS project, a partnership between research institutions in South Africa, Japan, Senegal and Burkina Faso, which seeks to understand and assess the potential of NUS to enhance the resilience of agro-ecosystems and local communities

in Western Africa to environmental change. The FORENS project seeks to bridge knowledge gaps on the (a) conceptual links between NUS and resilience, (b) current and future distribution of NUS, (c) mechanisms and factors affecting the adoption and socioeconomic impacts of NUS, and (d) appropriate approaches to upscale the promotion and adoption of NUS. This presentation will provide a background about the relevance of NUS for sustainability, as well as share preliminary findings of the FORENS project.

**Keywords:** Food systems, Food security, Resilience, Agro-diversity, Senegal, Burkina Faso

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Prof Emmambux is currently a Full Professor in the Department of Consumer and Food Sciences, University of Pretoria. His research is broadly on African food biopolymers for food and nutrition security. He works on reducing glycaemic index of foods, improving nutrient density of foods and on biodegradable packaging system.

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# ENTOMOPHAGY TOURISM: THE PANACEA FOR FOOD INSECURITY AND POVERTY

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There are two facts that cannot be disputed; firstly, the human population is constantly growing, and this has led to an increased demand for food; the second fact is that agricultural productivity is expected to decline due to climate change and this will affect food security. In African, Asian, and Latin American countries, entomophagy (the practice of eating insects) is proving to be an alternative source of food (protein), yet not everyone seems to be embracing this “alternative source of food.” The aim of this study is to obtain insight into what motivates people when choosing what they eat and the willingness to eat edible insects among the ecotourism population in the Limpopo Province in South Africa. The research approach was both qualitative and quantitative and local people and ecotourists were included in the data collection. The study findings highlight that factor such as affordability, religion, nutrition value and looks/texture influence ecotourist choice of food. The availability of edible insects influences both urban and rural respondents’ consumption of insects. The lower consumption of insect species in urban areas could hamper the potential contribution of insects to food security in these areas. Therefore, the promotion of entomophagy by marketing and maintaining traditional knowledge on insect processing should target urban people through the provision of tasty products and communicating nutritional value.

**Keywords:** ecotourism, entomophagy, Limpopo Province Consumption motives

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## **Current and Past Research Interests on Southern Africa at the Institute of Developing Economies (IDE-JETRO), Japan**

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This poster-presentation seeks to showcase the current and some of the past research projects on southern Africa at the Institute of Developing Economies (IDE-JETRO). IDE-JETRO is a publicly funded Japanese research institute specializing in social science research on the contemporary political, economic and societal issues in African, Asian, Latin American, and Middle Eastern countries. Each researcher focuses on one or a few countries and themes and participates in individual and/or collaborative research projects which normally last for 2 years. At the moment there are 3 area studies researchers working on southern African countries and together we are doing a research project which examines the challenges of social protection for transnational migrants in southern Africa with South Africa as the principal destination country. While the current project is conducted by a small team of researchers within IDE-JETRO, individually and collectively we are interested in opportunities to develop collaborative research projects with researchers based in southern Africa. In the past there was such a collaborative project between IDE-JETRO's and South African researchers on development experiences of Japan and South Africa. However, we understand that research collaboration is usually driven by personal relationships between individual researchers. As a first step to explore and facilitate the possibility of future research collaboration, we explain our research interests in the forms of past and present research projects and some of IDE-JETRO's institutional framework to support research collaboration.

**Keywords:** research collaboration, IDE-JETRO, transnational migrants, social protection, social science

**Biography:**

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Chizuko has researched a wide range of topics related to South African politics and society, including land reform, small-scale farming and livelihoods of urban refugees. Currently she is involved in research projects on social protection of transnational migrants, African states, and risk management under Covid-19.

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## **Emerging Powers' Cooperation for Energy Transition: Boosting the South Africa-Brazil Strategic Partnerships**

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This paper analyzes how emerging powers have cooperated in renewable energy and climate change policies that promote energy transition. Emerging Powers are countries that could be considered “pivotal states,” which aim to maneuver a more significant role and influence in their region and the outside world and in a relationship to work together on the global agenda as members of BRICS, BASIC, G20, IBSA. In the 2000s, emerging powers began implementing economic development with technical and financial strategic partnerships. A strategic partnership defines a cooperative relationship between countries or groups based on national security and economic interests. However, previous studies on strategic partnerships have not thoroughly explained the dimension of “sustainability.” Instead, they focused on economic and trade policies. To fill the gap, I combine insights from the literature on Earth System Governance and development assistance and identify the conditions under which strategic partnerships between economic powers on energy transition have been formed and developed in three main factors: geopolitics, economic interdependence, and international norms. The paper focuses on the historical evolution of the South-South climate cooperative relationship between South Africa and Brazil into three distinct periods: The Mbeki-Lula period, the Zuma-Rousseff period, and the Zuma-Temer period. By analyzing these dimensions of the relations, I can make two propositions. Firstly, identifying the conditions, objectives, and effects of the strategic partnership between South Africa and Brazil can help elucidate the dynamics and consequences of engagement through strategic partnerships between other emerging powers, such as South Africa-China relations. Secondly, including the 2030 agenda for Sustainable Development in strategic cooperation could promote comprehensive collaboration. As the confrontation between the Western and Non-Western countries in the “Multiplex world” becomes more acute, enabling the

SDGs could mitigate conflicts between countries if strategic partnerships in addressing global issues go beyond the mere pursuit of economic interests.

**Keywords:** Strategic partnership, energy transition, South-South Cooperation, emerging powers, economic security, Brazil

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Since joining the Tokyo University of Foreign Studies, Masukata has been involved with Global Environmental Governance, South-South Cooperation, and Latin American politics. Before joining the university, Masukata was a Visiting Researcher at the University of São Paulo, Brazil. Currently, Masukata is a Boarding member of the Japan Association for Latin America Studies (AJEL) and the Japan Society of Social Science on Latin America (JSLA).

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## **Japanese Anti-apartheid movements at the intersection between Western and Afro-Asian contexts**

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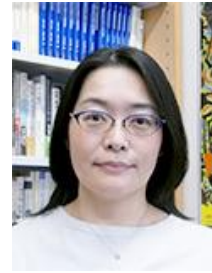
This poster presentation summarizes some of the research findings of the JSPS KAKENHI project “International Solidarity against Apartheid: The Case of Japanese Citizens’ Movement” (KAKENHI grant number 26380227) of which the author was the principal investigator. It also provides an overview of ongoing research projects that build on the outcomes of the above project. The struggle against racial segregation and apartheid in South Africa was one of the most significant global political campaigns in the twentieth century. There is a growing research interest in the international aspects of anti-apartheid movement. However, the literature was until recently confined primarily to the Western anti-apartheid movements, and to a lesser extent African solidarity support for liberation movements. Instead, this study focuses on the anti-apartheid movements in Japan, which have been overlooked in the literature. The Japanese activism serves as an interesting case study for a global history of anti-apartheid movements in the sense that it was located at the intersection between Western and Afro-Asian contexts. Japan’s overall relations with South Africa, both in terms of Cold-War geopolitics as well as economic relations, were similar to those of Western countries, therefore the Japanese anti-apartheid movements drew on experiences of Western anti-apartheid movements and adopted their strategies such as consumer boycotts into their own activism. On the other hand, however, unlike Western movements, the inception and early development of the Japanese anti-apartheid activism was significantly contextualized by the Afro-Asian solidarity.

**Keywords:** Anti-apartheid, Afro-Asian solidarity, Japan, citizen’s movements

**Biography:**

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Since joining the IDE in 1996, Kumiko have frequently visited South Africa for research, including two extended stays at UCT (2001-03) and at Wits School of Governance (2018-19). Her research interests include democracy and distributional politics in post-apartheid South Africa, history of global anti-apartheid movements, and Africa-Japan relations.

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### **THEMATIC AREA3: Growth, exploration and conservation**

## Showcasing remote collaboration in linguistic research

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This paper presents research collaboration between Japan and South Africa during the pandemic when such a collaboration became challenging due to restrictions on cross-border movement. The remote collaboration resulted in three types of outcome: (i) translations of COVID-19 mythbusters from the World Health Organization, (ii) creation of digital archives of various eastern and southern African languages, as well as (iii) a publication based on archival data. First, the translations of COVID-19 mythbusters were prepared at the onset of the pandemic and disseminated through a website (<https://covid-no-mb-org>), which now contains versions 125 languages spoken in African and other parts of the world. These translations were also made into a language resource for natural language processing research (<http://db.covid-no-mb.org>). Second, two types of digital archives were created so that researchers can further utilize resources in their research. One archive (<https://renelda.aa-ken.jp>) includes morphosyntactic recordings from six South African languages (Xitsonga, Tshivenda, Northern Sotho, Sesotho, Southern Ndebele and Siswati). The other archive, called Bantu Language Digital Archive (BantuDArc, <https://bantuDArc.aa-ken.jp>), includes paradigmatic data from 5 eastern and southern African languages. Third, Xitsonga data in BantuDArc was analyzed 6653 data points and summarized them into a manuscript by three authors, two of whom are native speakers of the Tsonga language. The book titled “Aspects of Xitsonga Grammar” is unique because it marks all the examples with tone, which was not done in previous publications. In sum, the three types of activities conducted during the pandemic showcase that remote collaboration is possible, even if challenges remain.

**Keywords:** COVID-19 Mythbusters, Digital Archives, Documentation, Remote Collaboration

**Biography:**

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Since joining the International Christian University, Seunghun has focused on linguistics of the southern African languages. Since 2010, Seunghun has been working on Xitsonga and other languages with researchers in Limpopo, South Africa. He is currently an adjunct professor at the University of Venda.

**Biography:**

Dr Crous M. Hlungwani

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Since joining the University of Venda, Crous's research has focused on various morphosyntactic aspects of the grammar of Xitsonga. During his more than 24 years of tenure in higher education, he has supervised numerous honours, masters and PhD students. He has published extensively in peer reviewed and accredited journals.

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# Using Wearables to Investigate Stress and Language Learning

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\*Corresponding author. Study completed and successfully examined for Rhodes University PhD award, 2022

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Language Learning Anxiety (LLA) is a popular concept in the literature, where confusion over terms such as anxiety and stress is evident. This study investigated the link between stress and language learning, using wearable devices measuring heart rate variance, to establish the feasibility of using this new technology in stress research. The study was conducted in a Japanese university, with second year students as participants wearing the devices over a two-week period. The nature of the contextualised data generated in this study allowed for comparisons between participants' stress readings in academic contexts, such as language and non-language classes, and their free time. The findings suggest that certain long-held assumptions about heightened stress in academic contexts may not hold true. The findings constitute proof of concept that the contextualised data delivered by wearable devices may allow for new types of stress research, incorporating longitudinal perspectives on participants' stress levels. The inclusion of contextualising data led to fundamentally different conclusions about the relationship between stress and language learning. The generated data challenges the current dominant paradigm in LLA, which proposes a straight-line negative correlation between stress and learning. Instead, the inverted U stress relationship seems to be a better fit for the data. The same may be true of other areas of stress research. In addition, the type of data delivered by wearable devices was qualitatively different from that normally associated with quantitative studies, opening intriguing methodological possibilities for further research. The use of wearable devices prompts certain challenges ranging from practical considerations to ethical conundrums: these are tackled in this study and may make beneficial future contributions.

**Keywords:** LLA, Stress, Wearables, HRV

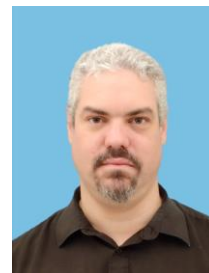
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William comes from South Africa, where he worked and taught at the Production Management Institute (a PHEI). In 2006 he moved to Japan to teach on the JET Program. After 5 years on the JET Program he lectured at the Fukui Prefectural University and in the University of Fukui Medical Department, before moving to Nagasaki in 2016 to work at the University of Nagasaki.

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Before my university lecturing career, I taught in primary and secondary schools in KwaZulu Natal; and following professional psychology training, I worked as a School Psychologist. I lectured at the University of Natal, 1992 – 2003 (and have been an Honorary Professor at its successor, the University of KwaZulu Natal, 2014-2019). After moving to the UK in 2004, I worked for two years in the Higher Education Academy Subject Centre for Psychology at the University of York, then moving to York St John University (YSJU) as a Senior Lecturer. I achieved a Principal Lectureship in Psychology at YSJU through personal promotion in 2008; and became Professor of Community Psychology in March 2014. I re-located to Rhodes University in 2015. My research focusses on community-based interventions, often utilizing Action Research and Activity Theory. I am a Chartered Psychologist with the British Psychological Society (BPS), a Senior Fellow of the Higher Education Academy, and registered with the Health Professions Council of South Africa (HPCSA) in both Counselling and Educational Psychology.

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# POSITIONING THE STUDY OF FORENSIC LINGUISTICS IN SOUTH AFRICA AND ON THE AFRICAN CONTINENT

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In this paper we provide a holistic background to the study of forensic linguistics in South Africa and on the continent. We define the discipline in relation to seminal international scholars in the field such as Olson, Gibson, Eades and others. We ask the question as to why it has taken so long for the discipline to emerge in South Africa and in Africa, given that we are probably the most multilingual and multicultural continent. This in turn impacts on how courts of law conduct themselves in South Africa and elsewhere. This year the University of the Western Cape now offers formal courses in this discipline at the postgraduate level and it hosts a research Chair in Forensic Linguistics and Multilingualism. This is however a well-established discipline in countries such as Australia, New Zealand, Canada, Poland, America, Britain, and Japan. The purpose of this paper is then to explore comparative models for the teaching and researching of forensic linguistics from different countries, particularly those residing in the Global South, and to see how these can influence and benefit from the scholarship of the discipline in South Africa and on the continent. We will also review what has been done in Africa and in South Africa in particular, including the setting up of a research Chair as well as the impact of a series of publications in the field of forensic linguistics by African SUN Press. This has greatly positioned the visibility of the discipline in South Africa and abroad. The paper will explore what we can learn from one another in different parts of the world in constructing courses that are contextually relevant and how Africa can contribute to the discipline of forensic linguistics.

**Keywords:** Forensic Linguistics, Comparative models, Teaching, Research

**Biography:**

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Russell Kaschula is Professor in the Department of African Language Studies at the University of the Western Cape where he is the Postgraduate Coordinator. He holds the Chair in Forensic Linguistics and Multilingualism.

**Biography:**

Prof Monwabisi Ralarala  
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Ralarala is Professor (Forensic Linguistics) and Dean: Arts and Humanities. They recently co-edited volume 3 of the book series: Ralarala, M. K.; Kaschula H R. & G. Heydon (Eds.). 2022. *Language and the Law: Global Perspectives in Forensic Linguistics from Africa and Beyond*. Stellenbosch: Sun Press.

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# IMAGINE AND CREATE THE FUTURE THROUGH MAKING MANGA STORIES

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My project is to apply Science and Fiction (Sci-Fi) thinking and Manga creation method to the project-based learning in order to nurture imagination to take unexpected challenges into account and to be prepared in the recent VUCA (standing for volatility, uncertainty, complexity and ambiguity) society. Sci-Fi thinking and prototyping is a way to predict future according to the Sci-Fi story making methods where one focuses on a certain social issue or science and technology and set up a future society and worldview based on scientific knowledge and then creates a story of the future from an individual perspective. Like creating Sci-Fi stories, the future is allowed to deviate from reality without constraints or assumptions, considering not only possible futures but also improbable futures, desired and undesired futures in equal measure. Manga creation considers living characters with an inner self and a personality and concrete setting and story with introduction, development, turn, and conclusion, which gives the characters of the future story created by science fiction prototyping a clear personality and inner life, giving the story a realistic and concrete image. In this presentation, I introduce the prototype of the online workshop for creating future stories. Through the workshop, the students are expected to acquire free imagination and the perspective that recognises future and global issues as problems that concern the individual.

**Keywords:** Sci-Fi thinking, Manga creation, Project-based learn

**Biography:**

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As a professor of the Bureau of Global Initiatives, Dr. Takahiro Morio is involved in planning the international cooperation strategy of University of Tsukuba and coordination of academic exchange with universities of African countries. His current research topics are comparative study of contents business and application of manga to education.

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# **Reflections on the effectiveness of virtual engagements in facilitating collective learning, empowerment, and co-innovation amongst South African and Japanese agribusiness entrepreneurs**

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The COVID-19 pandemic has provided significant challenges to collective learning and co-innovation often facilitated by collaborative partnerships. High education institutions have responded to this challenge by initiating and scaling up virtual learning and engagements between students, researchers, and other beneficiaries. Despite the continued utilization of online approaches, their effectiveness, particularly in collective learning and facilitating innovative collaboration is still unclear. Therefore, this paper utilises the responses and reflections of a cohort of South African and Japanese entrepreneurs who are targeted beneficiaries for a collective learning and co-innovation Africa-Asia Business Partnership Forum. The Forum is intended to provide a regular opportunity and platform for 18 young African and Asian entrepreneurs in the agribusiness sector to interact with and learn from experts and leaders in Africa-Asia partnerships exchanges. Through the utilisation of a “trans-local” network of “living labs”, the forum focuses on promoting collective learning, empowerment, and co-innovation of collaborative practicable venture schemes. The first phase of virtual workshops will be followed by a second phase consisting of an exchange of field visits by the two teams (i.e., the Japanese team to South Africa and the South African team to Japan) for on-site learning and joint project development exercises, which will be followed by a synthesis phase to conclude both co-creation of projects and joint research covering the whole project process. This experimental action research project will be concluded in April/May 2023. The project first phase of engagements was originally intended to be in-person,

however, due to the COVID-pandemic these interactions were changed to virtual engagements. A series of 5 virtual workshops – each lasting 4 hours were held between November 2021 and April 2022 to support the project objectives. An experienced facilitator was appointed to facilitate the beneficiary interactions, as well as engagements with experts broad agreed agribusiness themes (e.g., financing Asia-Africa collaborative agribusiness initiatives). At the end of the 5 workshops in April 2022, an online survey was conducted together with interviews of the beneficiaries to assess the effectiveness of the online engagements in facilitating collective learning, empowerment, and co-innovation for the agribusiness entrepreneurs. The results reveal that the content and structure of the virtual engagements was considered to be adequate. However, the cultural differences between the entrepreneurs proved to be a challenge to overcome through virtual engagements, particularly for the Japanese entrepreneurs who are culturally not used to these forms of interactive engagements. As a result, the South African entrepreneurs learnt more than the Japanese entrepreneurs. There is evidence of formative collaboration but its development and scaling up was limited in an online environment.

**Keywords:** virtual, entrepreneurs, collective learning, empowerment, co-innovation, agribusiness

**Biography:**

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Dr Farai Kapfudzaruwa is a Grants and Strategic Partnerships Specialist in the Department of Research and Innovation at the University of Pretoria (UP). His main responsibility is facilitating global partnerships through the University's transformative global engagement strategy – the African Global University Project (AGUP). Prior to joining UP he was a programme coordinator for the Education for Sustainable Development in Africa (ESDA) initiative which was initiated by the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) in Tokyo, Japan. From 2016-2017, Farai was a JSPS UNU Postdoctoral fellow at UNU-IAS. His postdoctoral research focused on the 2030 Agenda (SDGs), with particular emphasis on governance and linking the global vision with national implementation strategies in the Asia-Pacific and Africa. Before joining the United Nations University, Farai was an Old Mutual Emerging Markets lecturer for three years at the Graduate School of Business, University of Cape Town. In addition to this, he also worked as a consultant on projects related to inclusive business models, energy efficiency, environmental management and climate change in Sub-Saharan Africa for organizations such as UNDP and GIZ.

Dr Farai Kapfudzaruwa holds a PhD in Business and Political Science from the University of Cape Town, South Africa. His thesis explored the business contributions to climate change governance in areas of limited statehood in the case of South Africa and Kenya.

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# **SOLVING PRACTICAL NEEDS OF COMMUNITIES THROUGH UNIVERSITY-COMMUNITY ENGAGEMENT: THE CASE OF WETLAND REHABILITATION AND RESTORATION AT AMANDawe COMMUNITY, KWAZULU-NATAL (KZN) PROVINCE**

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Historical evidence shows that anthropogenic activities have affected wetland ecosystems globally, with dire consequences for nature, humans, and economies of nations. The purpose of this paper is to study how university-community engagement can be a useful instrument to provide for rehabilitation and restoration of wetlands, using the case of Mangosuthu University of Technology (MUT) community engagement (CE) initiative. The study was conducted at the wetland area in Amandawe, in the south of Durban, which was registered with the Community Engagement and Development Directorate (CEAD), MUT in 2017. It focused on rehabilitating and restoring of degraded ecosystem, for improved quality and ecosystem services, with a service-learning unit. Over the years, the wetland has become invaded with alien species and turned into dumping sites, which impacted the ecology of the area. Soil and water samples were collected to understand the biochemical composition. A mapping exercise was conducted to identify areas needing attention for invasive alien plant clearing, tree planting and riverbank stabilization. Using an integrated control measure, alien plants were removed, and dumps cleared. Thereafter, a restoration process was initiated by planting indigenous plants. A total of three interventions were made between 2018 and 2019. After the second intervention, there was a progressive restoration of water in the area, but about 97% restoration of water was observed in the wetlands after the third intervention. Similarly, various faunal species were also observed. New native grass species sprouted, while some invasive alien plants were successfully cleared. The community also accessed the available water for irrigation purposes in their community gardens. Evidence of

reflections from students and community members suggests that service learning could be a vital instrument in restoration of degraded ecosystems to improve wetland functioning in areas with minimal funding.

**Keywords:** University-community engagement; community engagement; service-learning; wetland rehabilitation and restoration; Amandawe community

**Biography:**

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Sithembile is a lecturer and a passionate teacher who has been involved in improving student experience and graduate outputs within her Department. She has initiated various projects that are student, and industry centered. Before joining MUT, Sithembile worked at South African National Parks as an Invasive Species Researcher.

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# **Epic Collaboration: Mazisi Kunene and Japanese Anti-apartheid Activists**

Tomohiro Kambayashi

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This presentation will reveal the mechanism behind the formation, circulation, and legacy of the image of the pre-colonial African past in the age of decolonization through the examination of the political activities and literary work of Mazisi Kunene (1930–2006), one of the most prominent South African poets in the twentieth century. I will examine Mazisi Kunene's travel worldwide as an exiled leader of the African National Congress and the significant impact Kunene had on the Japanese anti-apartheid movement and Japanese writers and literary scholars interested in African literature. With his two visits to Japan in 1970 and 1983, Kunene radicalized the Japanese activist as the proponent of armed resistance; as a Zulu poet, he showed Japanese novelists and poets the wealth of Zulu and the African past as poetic themes. This presentation will focus on the idea of “epic” in Kunene’s work and examine how his “epic” of the Zulu past influenced Japanese reception of the African image through the translation of his works. More specifically, I will analyse the translation of Kunene's work. Kunene translated his Zulu epics into English himself. The self-translated work *Emperor Shaka the Great* established his reputation as the Zulu poet. English version became the base of Japanese translation. By examining the process of translations, I will argue that even though the Japanese translators read Kunene's works in English, it was partly his emphasis on the importance of original isiZulu writings that facilitated the reception of his poetry as an authentic African voice. By examining Kunene’s visits to Japan and the Japanese reception of his work, this presentation will reveal how his epics enabled epic encounters between the Zulu intellectual and Japanese anti-apartheid activists.

**Keywords:** History, Mazisi Kunene, Anti-apartheid movements in Japan, Epic, Translation

**Biography:**

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My current project focuses on uncovering the African experience of racial segregation and apartheid in South Africa by using vernacular (isiZulu) and English text written by African people as the main source. I am a research associate at Archive and Public Culture, University of Cape Town and will be a visiting scholar at WiSER (Wits Institute for Social and Economic Research) from September 2022.

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# **Alternative Development Model for Sustainability: Communal Development Perspective from Ubuntuism**

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This presentation is to shed light on an African sustainable development model from ubuntuism and to insist transitional pathway for an alternative model of development. Ubuntuism is one of the alternative discourses in development rediscovered in Africa. It is a Sub-Saharan Bantu philosophy on humanity, which represents the African dignity, communality to support each other, and interconnectedness with other humans, nature and the spiritual world. The presentation aims to integrate communalism into development discourse from the perspective of ubuntuism. The study will not be limited to Africa but on a global scale to suggest including communal capacity building by bonding and retaining individuals' social ties. Many scholars have researched sustainable development pathways from the livelihood, the state, and the planet's prosperity. Although the Sustainable Development Goal was introduced with a multilateral negotiation and agreement between United Nations member states, it remains a question—by looking at the reality—whether it has decolonised the development of the global south. Especially the post-development researchers, have long been warning about the westernisation of the development discourse/trends. For example, while Japan used to be a communal society that respects *wa* (harmony in Japanese), recent studies insist that economic affluence in Japan led to people's isolation. Additionally, there are concerns that this is due to excessive individualism in the pursuit of self-responsibility and independence, hardly able to rely on others, even their family. With its controversial debate on western development discourse, developing nations have introduced alternative terminology for their sustainable development and wellbeing.

**Keywords:** ubuntuism, alternative development, communalism, social ties, sustainability

**Biogprahy:**

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Since joining the graduate programme of University of Tsukuba, Daichi has been involved with studies related to anthropology and social transfer in Sub-Saharan Africa. He participated in United Nations Youth Volunteer programme during his undergraduate studies and worked for United Nations Resident Coordinator's Office as a communication officer.

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# **STUDIES OF EARTHQUAKES AND DEEP LIFE IN DEEP SOUTH AFRICAN GOLD MINES**

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Gold and platinum mining makes a significant contribution to South Africa's prosperity, providing direct employment to more than 265,000 people (2021) and contributing to the fiscus through tax and royalties. SA's gold mines are amongst the deepest mines in the world. This poses significant technical challenges. For example, mining-induced stresses may exceed the strength of the rock, causing it to rupture and release energy in earthquakes that pose a risk to miners and the public. Japanese researchers have enhanced safety and the sustainability of deep mines through various technical collaborations. The bilateral SATREPS project (2010-2015) "Observational studies to mitigate seismic risks in mines", led by Professors Ogasawara and Durrheim (Ritsumeikan and Witwatersrand universities, respectively), produced new insights into earthquake nucleation and rupture processes, expanded the SA National Seismograph Network, implemented a Japanese technology to measure stress in highly-stressed rock masses, and fostered several outstanding early-career researchers. Building on the outcomes of the SATREPS project, in 2016 the project "Drilling into Seismogenic Zones in South African gold mines" (DSeis) was initiated under the auspices of the International Continental scientific Drilling Program (ICDP). In addition to the earthquake studies, DSeis geomicrobiologists are investigating organisms that live in 'solid hot rock' in conditions resembling those on extraterrestrial bodies such as Mars. Cooperation between Ritsumeikan, Tohoku and other universities and institutes (Japan) and Wits University, CSIR and the Council for Geoscience (South Africa) is governed by collaboration agreements. The DSeis project has introduced new partners from Free State University (South Africa), Australia, Canada, China, Europe, India and the USA. At the SAJU Forum we will review the contribution that we have made to knowledge and technology in the fields of mining engineering, rock mechanics, seismology, geology and geomicrobiology. We are keen to resume our

research activities that were disrupted by the COVID pandemic, and will introduce our prospects.

**Keywords:** South African gold mines, safety and sustainability, internationally ideal science lab at depth

**Biography:**

Dr Hiroshi Ogasawara  
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Japan



Since 1992, Hiroshi has been involved with studies in seismology in South African gold mines. As he has chaired several international projects, his research scope has broadened. He is retiring from Ritsumeikan University within two years, before which he is very keen to resume his activity in South Africa.

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Yasuo joined studies in seismology in South African gold mines. He is a co-PI of the Japanese-South African projects “Observational studies in South African mines to mitigate seismic risks” (2010-2015) and “Drilling into seismogenic zones of M2.0–M5.5 earthquakes from deep South African gold mines” (2016-present).

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Durrheim held the SARChI in Exploration, Earthquake and Mining Seismology from 2007-2021. He co-led the Japanese-South African project “Observational studies in South African mines to mitigate seismic risks” (2010-2015) and is a PI of the project “Drilling into seismogenic zones of M2.0–M5.5 earthquakes from deep South African gold mines” (2016-present).

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Manzi is an associate professor and the founding director of the Reflection Seismics Research Centre at Wits University. He leads a European Union – South African collaborative project that seeks to advance high-resolution imaging and modelling of the host rock and any mineralisation between tunnels and the surface and in the down-dip direction (EraMin Future, 2022-2024).

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# **LIFE IN A HYPERSALINE SUBSURFACE ECOSYSTEM ANALOGOUS TO SUBSURFACE MARTIAN ENVIRONMENTS**

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South Africa hosts some of the deepest mines in the world (near 4 km depth). Since 1996, the exploration of deep hypersaline water found in those mines by geomicrobiologist researchers from South Africa (Prof. E. van Heerden), Japan (Dr. K. Takai and Prof. Y. Suzuki), USA (Prof. T. Kieft and Prof. T. C. Onstott) and Europe (Dr. G. Borgonie), and supported by the UN space Treaty, COSPAR, NASA, or ICDP programme, has expanded our understanding about the limits of life. Since 2016, the ICDP DSeis project, led by the Ritsumeikan University-Japan (Prof. H. Ogasawara) and hosted by the University of the Free State-South Africa, has recruited more researchers of different fields from Japan (Dr. A Urai), South Africa (Dr. J Castillo) and Europe (Dr. M Zimmer), among others. The joint effort of this multidisciplinary consortium (microbiologists, geologists, and chemists) has helped to elucidate the formation and habitability of a 3.2 km deep subsurface hypersaline brine found in the South African gold mine Moab Khotsong. The discovery of living microorganisms in this hypersaline deep fracture water dated 1.5 billion years old infers the capability of extremophiles microorganisms to colonize the subsurface of Mars, where analogous conditions are present. At the SAJU Forum, we will attempt to summarize and convey the experiences, lessons, and knowledge gained during the last three years within the ICDP DSeis project. Thanks to this project, we could

increase our mutual support and collaboration to overcome the challenges caused by the COVID pandemic.

**Keywords:** South African gold mines, geomicrobiologist, ICDP DSeis project, deep subsurface hypersaline brine, extremophiles microorganisms, Mars.

**Biography:**

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Castillo is the leader of the Applied and Environmental Microbiology Group at the University of the Free State. He is the head representative in South Africa for the HORIZON Europe project “Mine tailings reprocessing and revalorization” and is a member on National Committee of the International Continental Scientific Drilling Programme (ICDP).

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Alba has a doctorate in geohydrology awarded by the University of the Free State, and a doctorate Cum Laude in earth science awarded by the University of Huelva. She has participated in numerous national and international projects and co-leads an ERAMIN project of the Horizon 2020 platform.

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**Biography:**

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Jameel Alom is a master's student in the Applied and Environmental Microbiology Group at the University of the Free State under supervision of Dr. Castillo. Since 2020, He is collaborating in the project "Collaborative Research: US-South Africa: Biogeochemical Processes in a Subsurface Hypersaline Environment near the Abiotic Fringe".

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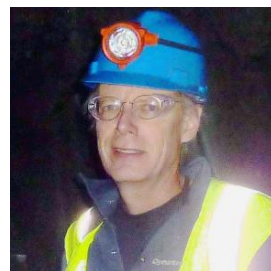
Devan is a fourth year PhD student and National Science Foundation Graduate Fellow in the Geosciences Department at Princeton University. She has worked in the Onstott Lab on the project "Collaborative Research: US-South Africa: Biogeochemical Processes in a Subsurface Hypersaline Environment near the Abiotic Fringe" over the last three years.

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**Biography:**

Dr. Thomas L. Kieft  
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Kieft is a microbiologist with >30 research experience in subsurface microbiology. He has been studying the geomicrobiology of deep fracture water in South Africa since 1998. He is currently co-PI on an NSF-funded project investigating ancient brine at Moab Khotsong mine in South Africa.

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He won the 2021 JpGU Nishida prize for his contributions to understanding biological and inorganic interactions in the dark biosphere (deep sea and underground). [https://www.u-tokyo.ac.jp/focus/en/press/z0508\\_00099.html](https://www.u-tokyo.ac.jp/focus/en/press/z0508_00099.html) introduces one of his outstanding outcomes. Furthermore, a TV program of NHK World has introduced how keen he wants to join the DSeis project.

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Since 1992, Hiroshi has been involved with studies in seismology in South African gold mines. As he has chaired several international projects, his research scope has broadened. He is retiring from Ritsumeikan University within two years, before which he is very keen to resume his activity in South Africa.

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# **PETROGRAPHY AND GEOCHEMISTRY OF SANDSTONES OF THE PERMIAN VRYHEID FORMATION, HIGHVELD COALFIELD OF SOUTH AFRICA: IMPLICATIONS FOR PROVENANCE, PALAEO- WEATHERING AND PALAEO-REDOX CONDITIONS**

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Provenance, palaeo-weathering and palaeo-redox conditions of sandstones of the Vryheid Formation of the Ecca Group in the Highveld Coalfield, Mpumalanga, South Africa, were studied with the intention of identifying possible source rocks. The investigation approach involved collecting sandstone samples from borehole cores, followed by laboratory studies of mineralogy and petrography, major and trace element analysis by X-Ray Fluorescence (XRF). Mineralogy and petrographic analyses suggest that these sandstones are arkosic to sub-arkosic arenites. The generalized mineralogical compositions, in order of abundance, consist of monocrystalline and polycrystalline quartz, plagioclase, igneous and volcanic rock fragments and minor to trace amounts of mudstone clasts. Quartz grains are predominantly monocrystalline, implying they came from granitic and volcanic rocks and as well as hydrothermal quartz veins. The presence of higher amounts of feldspars favours either a fast/high depositional rate and relative dry or a cold climate at the source area, and is also indicative of dominance of felsic igneous or metamorphic rocks in the source area. The bulk rock geochemistry supports the petrographic results. The ratio of  $K_2O/Na_2O$ , plots of  $Na_2O-CaO-K_2O$  and Th-Sc-Zr/10 attest to a passive margin tectonic setting. Observed patterns of REE values, ratios of  $K_2O/Al_2O_3$ ,  $Al_2O_3/TiO_2$ , La/Sc, Th/Sc, Th/Co, and Th/Cr, plots of Th/Co vs La/Sc, Hf vs La/Th, Th vs Sc, V-Ni-Th and discriminant function further suggest felsic rock sources. The sediments were deposited by glacial material, underwent mechanical weathering and grinding, and therefore the sediments deviate from normal chemical weathering trends. The chemical index of alteration (CIA) suggests minimal chemical

weathered source rocks typically deposited under a cool to temperate climate. U content, authigenic U, V/Cr, Ni/Cu and Cu/Zn ratios attest to an oxidic depositional environment.

**Keywords:** Sandstone provenance, palaeo-weathering, palaeo-redox conditions, Vryheid Formation, Eccra Group, Karoo Basin.

**Biography:**

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Since joining the University of South Africa, Lindani Ncube has been involved with studies related to the provenance of sediments and the development of both drainage and sedimentary basins in Southern Africa. Lindani joined UNISA as a Post-Doctoral Fellow as part of Unisa's Post-Doctoral Fellow's programme in 2015. Dr Ncube has initiated the formation of a research community of practice "GATE- Geology and the Environment" in the Department of Environmental Sciences. The research group consists of Professors, senior academics, junior academics, post graduate students, research associates and collaborators from South Africa, Zambia, China, Italy, German, United Kingdom, Sweden, CSIR, Japan and the USA. At present, the research group has six funded projects, and is developing a website to showcase the groups' work. In addition, she has initiated a community engagement project (in the process of being registered at UNISA) with successful US academics, Professors Geraldine Richmond (Under Secretary of Energy for Science, Department of Energy, USA; University of Oregon's Presidential Chair in Science, and Co-founder of COACH, USA), Margaret Gitau (Purdue University, USA and President of Mentoring Network for African Women in Academia -MTAWA) and Clare Muhoro (Towson University, USA). The CE project targets young female researchers from historically disadvantaged backgrounds, and seeks to address "*The issue of a leaky pipeline*" in South African academia.

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# **Study on Wi-Fi Direct for Implementing Smart Mining into Underground Mines in South Africa**

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South Africa is home to several mineral resources such as gold, coal, platinum, and diamonds, but global population growth and increasing demand for supply also require mining at greater depths, which in turn increases the risks faced by miners. In recent years, there has been an increasing need to develop more efficient and safer technologies that maximize production and reduce negative environmental impacts.

Japan has made progress in information and communication technology (ICT), with a focus on soft computing, artificial intelligence, big data, and data mining. ICT is versatile and has a high affinity with other technologies, making it applicable to a wide range of fields, and it has been the subject of recent research. ICT has been the subject of much attention in recent years. The use of ICT in resource development is referred to as smart mining, Digimine or Mining 4.0. This study proposes smart mining practices in South Africa in collaboration with the Wits Mining Institute, which aims to utilize digital technologies such as Digimine for sustainable development.

The objective of this research is to develop a robust monitoring system to help monitor miner safety in increasingly complex underground mines. The study will develop a simple and cost-efficient communication system that will allow underground environmental data, to be verified at ground level. The communication assessment of the system will be evaluated by comparing demonstration tests and simulations in the mine. The communication standard to be used is Wi-Fi Direct for ad hoc communication. This communication system will be used for implementing other smart mining technologies. The results of this research will lead to practical applications in operational mines in South Africa.

**Keywords:** Smart Mining, Monitoring System, Wi-Fi Direct, Underground Mining, ICT

**Biography:**

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