BOTSWANA INTERNATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

NEWSLETTER

NOVEMBER 2021 EDITION

BIUST, MCM COLLABORATION TOUR

By: Wandipa Gachala

BIUST & MCM personnel during the mine tour

The Botswana International University of Science & Technology (BIUST) entered a formal partnership with Morupule Coal Mine (MCM) in 2018 through a Memorandum of Understanding (MOU). On Tuesday 2nd November 2021 the Vice-Chancellor and his delegation visited MCM to provide for a basis of collaboration between the two organizations in the areas of skills development, research, and innovation.

Speaking at this meeting the Vice-Chancellor Professor Otlogetswe Totolo congratulated Mr. Edwin Elias on his recent appointment as the MCM General Manager. He assured him that BIUST will accord him all the necessary support he deserves to facilitate his success personally, and that of mine in general.

"BIUST and MCM entered into a formal relationship in 2018, and I am very proud to inform you that it has been easy in both directions to consolidate our partnership. We have signed a Memorandum of Understanding (MOU), which has set up a mode of engagement that allows us to work together in various fields of skills development; research and innovation", he said.

The aim of this collaboration includes but is not limited to;
Studies of coarse tailings and fine residue tailings deposits in terms of seepage and stability,

Geochemical studies; isotope analysis, water typing and sources differentiation for environmental considerations, Groundwater modeling, and predictive simulations,
Water and slurry/slimes testing, Mining Processes, Metallurgical processes, and Coal beneficiation technologies.

The discussions were extended to mapping possible ways of bearing more collaborations in the field of mining that will benefit students and the community. MCM supported BIUST's application to the membership of the International Association for the Exchange of Student for Technical Experience (IAESTE), based in Luxemburg which will help BIUST students to find practical internship opportunities at European companies in different industries.

"Our application succeeded, and as of yesterday, one BIUST student has already been offered a 6-months internship at Volvo in Sweden. Our partnership has witnessed several positive developments over a short period. I am happy to inform you that BIUST has seen a steady increase of its students coming to MCM for their practical attachments, a gesture which we truly and genuinely appreciate.

BIUST has had a total of 33 students between 2018 and now, particularly from Mining Engineering and Geological Engineering who have done their attachments at MCM. MCM has been a regular and valuable sponsor for the Best Student, the Department of Mining and Geological Engineering", said Totolo.

In his conclusion, he noted that it is pleasing to hear that significant progress has been made regarding the Motheo Project which is aimed at increasing the current mine's coal production to meet the increasing demand locally and other places afar. "The expansion of the mine is surely a sign of growth, and it is quite exciting for us because we are going to be a party to it. We will continue to offer our expertise whenever we are called upon throughout the project," he added.

BIUST ALUMNI SCOOPS BRONZE MEDAL WITH SASAqS

By: Rebecca Richard

On the 3rd of November 2021, the Southern African Society of Aquatic Scientists (SASAqS) awarded medals to deserving candidates of high standard and repute in aquatic sciences. Established in 1964, SASAqS is a learned society concerned with the research, management, and conservation of inland waters throughout Southern Africa.

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EDITOR'S NOTE

Mrs. Rebecca Richard

Welcome to our November edition. Collaboration plays a vital role in advancing and developing skills, research, and innovation. This is proven by the recent partnership of BIUST and Morupule Coal Mine that will enable the two to work together on issues of Geochemical studies; isotope analysis, water typing and sources differentiation for environmental considerations, Groundwater modeling, and predictive simulations just to mention a few.

The Japanese Embassy donated 100 Understanding Japan books to the BIUST library which enable the BIUST community to develop and understand Japanese culture, economy, international relations, politics, media, and many more This edition also covers the virtual workshop on "Nuclear Science and Technology Landscape in Botswana-An Overview".

This was the first of a series of workshops focusing on the theme "Peaceful Applications of Nuclear Science and Technology for Sustainable development in Botswana. BIUST hosted EFM2T aimed at addressing challenges on facilities management, maintenance in design, construction, and projects delivery in the African continent.

Special recognition goes to Prof Ravi Samikannu and his team members who share with us their research on transformer dielectrics. We congratulate Dr. Buxton, BIUST alumni who was recently awarded a bronze medal by the SASAqS

If you want to be part of this newsletter contributors, please send your work or enquiry to: barutir@biust.ac.bw or gachalaw@biust.ac.bw

Continue adhering to the COVID-19 health protocols and protecting the nation. Stay safe.

As a Society, SASAqS has for many years provided recognition of the research and contribution of people in the aquatic sciences. This recognition comes in the form of Gold, Silver, and Bronze Medals. The society had the opportunity of awarding a bronze medal to Dr. Mmabaledi Buxton who was a Ph.D. registered student from the Department of Biological Sciences and Biotechnology in the Botswana International University of Science and Technology (BIUST). The society awards the bronze medal irregularly in recognition of the exceptionally high standard of a specific piece of work by a junior scientist or manager. This work shall normally be in the form of a dissertation or thesis. The bronze medal should be for the best thesis in a year motivated by the supervisor, as judged by the medals committee (in the light of the examiners' reports and review by the medals committee). . Dr. Buxton's thesis was titled 'the bio-ecology of key mosquito vector species in Botswana: implications for shifting environments. It was the first study to assess mosquito ecology dynamics in the Central District, Botswana, and one of the few globally focusing specifically on mosquito ecology in temporary

Dr Mmabaledi Buxton

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BIUST HOSTS NUCLEAR SCIENCE AND TECHNOLOGY LANDSCAPE IN BOTSWANA VIRTUAL WORKSHOP

By: Wandipa Gachala

The Botswana International University of Science & Technology (BIUST) hosted a virtual Workshop on "Nuclear Science and Technology Landscape in Botswana-An Overview". This was the first of its kind among a series of workshops focusing on the theme "Peaceful Applications of Nuclear Science and Technology for Sustainable Development in Botswana".

The objectives of the workshop series were to demystify nuclear science and technology to the public, strengthen and diversify research programs in the local institutions, showcase local activities in nuclear science and technology, create synergies between local and international stakeholders, and address local problems through a multidisciplinary approach.

When delivering his welcome remarks, the BIUST Vice-Chancellor Prof Otlogetswe Totolo noted that the original idea to host such an event was conceived when he accompanied a delegation led by H.E. Dr.Athalia Molokomme, Ambassador at the Botswana Permanent Mission in Geneva, to the 63rd Annual Regular Session of the International Atomic Energy Agency (IAEA) General Conference in Vienna, Austria, in September 2019.

"BIUST was designated by the Ministry of Tertiary Education, Research, Science, and Technology to set up an organizing committee through the Office of Research Development and Innovation," Totolo stated.

He highlighted that the Organising Committee consists of representatives from BIUST, University of Botswana, Radiation Protection Inspectorate, Department of Research Science and Technology (from MoTE), Botswana Institute for Technology Research and Innovation, National Food Technology Research Centre, Botswana National Veterinary Laboratory, Botswana University of Agriculture and Natural

Resources, Chemical, Biological, Nuclear, and Radiological Weapons Management Authority.Furthermore, he said Nuclear Science and Technology have the potential to support socio-economic development in diverse sectors (such as health, food and agriculture, security, mining) through skills development for driving the 4th Industrial Revolution and to drive a knowledge-based economy in alignment with the objectives of the 11th National Development Plan (NDP11) and Vision 2036.

"Indeed, modern society cannot function without nuclear radiation technologies. The benefits of non-energy nuclear radiation technologies are enormous with global markets exceeding 500 billion US Dollars annually and growing rapidly. Botswana needs to capitalize on the deployment of high-tech accelerator technologies for basic, applied, and industrial research, with innovations leading to commercialization and income-generating prospects," said Totolo.

In conclusion, he alluded that the workshop would provide an overview of the Nuclear Science and Technology landscape in Botswana to identify relevant local stakeholders to promote collaborative synergies for undertaking world-class research in Applied Nuclear Science and Technology for the ultimate development of innovative products and services that will benefit the nation.

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Dr. Buxton's thesis was titled 'the bio-ecology of key mosquito vector species in Botswana: implications for shifting environments. It was the first study to assess mosquito ecology dynamics in the Central District, Botswana, and one of the few globally focusing specifically on mosquito ecology in temporary wetlands.

The body of work in his thesis has added significant insights into our understanding of the role of temporary wetlands and regional disturbances leading to mosquito proliferation dynamics. The study further discovered potential mosquito bio control alternatives and ecosystem services provided by pristine environments.

Dr. Buxton not only completed his Ph.D. within the required minimum of three years but published seven articles in reputable peer-review international journals from his thesis while other articles were still under review. Moreover, the examination panel for his Ph.D. defense unanimously rated his work as excellent and of great practical and fundamental value recommending the award of a Ph.D. degree with distinction.

In addition to the fundamental contribution to science, findings from his Ph.D. work have informed the national mosquito vector program in Botswana that has implications for various local and regional community education awareness on mosquitoes and outreach programs.

Beyond this award, Dr. Buxton wishes to advance his academic and research career development in keeping with promoting a knowledge-based economy. Although Dr. Buxton is currently unemployed, he is eagerly searching for opportunities and hopes to unleash his potential in solving local and regional problems with science. Overall, Dr. Buxton reckons this award was not only prestigious & motivating for his career advancement, but was also a huge achievement to his former university (BIUST) and the nation at large.

"THE READ JAPAN PROJECTS" BESTOWS BIUST LIBRARY WITH BOOKS.

By: Tshegofatso Teseletso

Library Director Dr. Ayanda Lebele (l) receiving books from the Deputy Head of Mission Japan Embassy in Botswana Ms. Fujino Yuka (r)

In a bid to offer readers around the world a more accurate, diverse, clear picture and understanding of Japan as a country and her offerings, the Japanese Embassy recently donated 100 Understanding Japan books to the Botswana International University of Science and Technology (BIUST).

The Deputy Head of Mission of the Japanese embassy in Botswana Ms. Fujino Yuka handed the books to the Director of BIUST Library Services Dr. Ayanda Lebele during the handing over ceremony held here in BIUST.

The 100 books were donated through the "Read Japan Project" which is one of the Nippon Foundation's overseas projects. Since its establishment in 2008, the Foundation has donated books to over 1,000 institutions in 138 countries. In Botswana, the Botswana National Library, the Institute of Development Management, and the University of Botswana have benefited from this projectThe well-versed hardback books cover interesting and crucial subjects such as Economics, Business, Politics, International Relations, Culture, Arts, Media, and History. The Read Japan Foundation intends to reach out to young researchers who are interested in Japan, opinion leaders, and intellectuals specializing in areas other than Japanese studies.

Upon receipt of the books, Dr. Lebele expressed profound gratitude for BIUST being found as a worthy recipient of the donation even under the transformed Read Japan to Japan Science Society".

Books are in their nature works of creativity and intellectual output and through these works' readers will have a better understanding of Japan, Dr. Lebele further stated. She highlighted that the books will add value to BIUST's learning and teaching experience, "Hence as the BIUST library we will create a very wide visibility of the collection to all their direct and indirect users," she said.

Furthermore,

Dr. Lebele noted that there was a need for learners to gain more knowledge from different disciplines for solving problems in their career and be aware of activities and appropriate steps to take after schooling and the usefulness of the donation.

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For his part, the Assistant Minister, in the Ministry of Tertiary Education, Research, Science & Technology Hon. Machana Ronald Shamukuni said since this is the first installment in the workshop series, there is a need to appreciate that the bulk of our population only knows of nuclear science about nuclear power and weaponry.

"It is our combined task to educate our fellow citizens of the benefits that can be accrued from nuclear technology. Other than nuclear power and weaponry, nuclear technology is used for beneficial purposes in different sectors of the economy such as in medical applications related to the use of X-Rays for diagnosis of disease and Radiotherapy for the treatment of cancer. In Food and Agriculture, nuclear techniques can be used to eradicate pests, such as the Tsetse fly and fruit flies.

Indeed, this was achieved in the Chobe area as we have been able to impact tourism positively without the worry about Tsetse fly," Shamukuni said.

When delivering the keynote address, he also noted that in the quest to attract more women and young girls to pursue careers in the nuclear field, the IAEA Marie Curie Fellowship Programme (MSCFP) offers grants to help increase the number of women in the Nuclear Science and Technology.

"I, therefore, encourage young women to take advantage of this initiative. In addition, the IAEA Ph.D. The sandwich program also offers opportunities for further studies in nuclear technology and is open to everyone. Botswana has benefited from this with one (1) graduate and another individual currently enrolled in the program," he said.

He urged all the relevant stakeholders to take advantage of the IAEA support to move our county forward where nuclear technology has an advantage over other technologies.

"Ladies and gentlemen, my sincere hope is that we will see a lot of synergies in our research to maximize the potential benefits of adopting nuclear and related techniques that will contribute to the economy at large.

I encourage you not just to collaborate with traditional partners such as the IAEA, but also to seek new partnerships with other donors and institutions locally, regionally, and internationally," he concluded.

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BIUST HOSTS A SUCCESSFUL ENGINEERING FACILITIES MAINTENANCE OF MANAGEMENT TECHNOLOGIES (EFM2T '21) CONFERENCE

By: Wandipa Gachala

The Botswana International University of Science & Technology (BIUST) hosted the International Conference on Engineering Facilities & Management Technologies (EFM2T). The 2-day virtual conference was aimed at addressing challenges on facilities management, maintenance in design, construction, and projects delivery in the African Continent.

In delivering the welcome remarks, the Deputy Vice-Chancellor, Research, Development, and Innovation, Prof Abraham Atta Ogwu said, "This conference now provides practitioners, academics, and policymakers with fresh opportunities for collaboration to improve the practice in our continent. The EFM2T'21 conference will foster discussions and inspire participants from a wide array of themes to initiate collaborations within and across the disciplines for the advancement of facilities maintenance & management."

Furthermore, EFM2T'21 will showcase various thematic sessions which highlight significant scientific advances and the impact of modern and African traditional technologies employed in the maintenance and management of engineering facilities.

For his part, the Vice-Chancellor, Prof. Otlogetswe Totolo expressed his sincere gratitude to be officiating the event. He noted that Engineering Facilities Management had evolved significantly over the last few years, hence the need to give it careful and considered attention.

"It is my firm belief that the outcome of this conference will be enhanced knowledge in the discipline of Facilities Maintenance and Management Technologies," Prof Totolo.

He added that naturally maintenance was routine and recurring and was meant to keep machinery and facilities at the normal operating condition for efficient performance and delivery to minimize loss of time due to avoidable breakdowns.

"It is worth noting that Facilities breakdown has become a bit of a challenge in most developing countries, especially within the continent of Africa. The problem faced by Botswana and other nations is that of lack of facilities maintenance and management. In the olden days, it was a norm that a machine was used if it worked. When it stopped working, it would either get repaired, serviced or discarded. However, in the modern world, several advanced types of equipment purchased are sensitive to damage hence require timely preventative maintenance," he said.

In conclusion, Totolo highlighted that maintenance was an important function in any operation as it elongates the life span of equipment and ultimately reduces costs while ensuring that the mandate of the operation is met by enabling strategic planning, managing day-to-day operations, implementing, and enforcing health and safety procedures, and organizing maintenance and repairs of the equipment

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She also highlighted that the gesture shall benefit both direct and indirect users of the University library. "BIUST library serves as a support system to some of its partners like the Botswana Defense Force, libraries consortium, Palapye Librarians Forum an outreach and support system that reaches out to different schools found around Palapye and public libraries. "These are our indirect beneficiaries," she said.

The Deputy Head of Mission for the Japan Embassy in Botswana Ms. Fujino Yuka expressed honor and privilege to hand over the donation of 100 books of understanding Japan. "Today I am delighted that BIUST will be among the beneficiaries of this great initiative,"
Ms.Yuka said.

Through the books donated today, she continued, we sincerely hope that more interest will be evoked among students, researchers, faculty members, and the indirect beneficiaries all over Botswana as mentioned by Dr. Lebele.

Ms. Yuka said that even before the COVID-19 pandemic, reading hard-copy books had become a little obsolete as more people transitioned to reading e-Books and researching on the internet. "We recognize the merit that it is fast and more convenient, less heavy and in COVID-19 times it is safer," she highlighted.
When closing the ceremony Mr. Michael Moleleke, Director of International Linkages and Partnerships appreciated the Japan Science Society for their kind gesture. He recognized that some of the books donated are in the field of social sciences even though BIUST was a production facility of hard-core scientists and engineers.

"We try as much as possible to infuse the element of softness in the way we approach and appreciate the subject matter, and we do that through the BIUST Centre for Business Management and Entrepreneurship.

The Centre aims to bring the social sciences into the core element of BIUST's teaching and learning as a way to ensure that our students can relate what they are taught to both the economy and society within which they live,"
said Moleleke.

TRANSFORMER DI-ELECTRICS

By: Prof. Ravi Samikannu, Prof. Abid Yahya, Dr.Modisa Mosalaosi, Mr. Raymon Antony Raj, Mr. Bokang Agripa Tlhabologo.
(Department of Electrical Computer and Telecommunications Engineering)

Power transformers are an important unit in power transmission and distribution. The transformer enablers are crucial in ensuring efficient power transmission with minimal losses. When in operation, the static device uses the mutual induction principle. In the process, heat is generated at the core. This heat ought to be conducted to the external radiators for dissipation hence cooling the transformer. Transformer oil commonly known as transformer liquid dielectrics is used to distribute this heat from the core to the radiators. The dielectric is also used as an insulator between the coils of the transformer and other parts hence it should have both high cooling and dielectric properties. Commonly used liquid dielectrics are produced from crude/mineral oil.

Our High Voltage Insulation research team investigates alternative transformer dielectrics to minimize dependence on non-renewable resources yet satisfy the market demands. The potential of natural esters in replacing the dominant use of mineral oil is being explored using various techniques. Natural esters currently under study are Morula, Moretologa, Baobab, Mongongo, and Kalahari Melon Seed oils, which have been used mainly in the cosmetics industry for more than two decades. These esters are readily available in the sub-Saharan region and can be grown for large-scale production. The seeds and residues from these plants are cold-pressed to extract the ester oil. As a non-renewable resource, mineral oil is proven to be unsustainable in terms of being readily available in the future hence natural esters from plant and vegetable products are considered a better alternative for further exploration.

The main dielectric properties for a transformer liquid dielectric that qualify it for standard use are bio-degradability, breakdown voltage, kinematic viscosity, corrosive sulphur, fire point, and flashpoint. These parameters are tested on high voltage analysis equipment following ASTM and IEC standards. Mineral oil-based insulators are highly non-biodegradable.

This poses risks of contamination to areas surrounding the transformers also causing a threat to marine life in water bodies that are close to these devices in cases of possible leakages and/or explosion. Since natural esters are highly bio-degradable, they are termed as "environmentally friendly", hence worth investigating for potential use over mineral oil. Furthermore, though mineral oil is satisfying minimal standards of breakdown voltage, corrosive sulphur, fire, and flash point, their levels are relatively low, close to the set minimums.

Research on the ground has proven that many natural esters have much higher breakdown voltage, fire, and flash point hence potentially able to mitigate limitations of mineral oil-based dielectrics. The limitations of natural esters are that it is too viscous, causing them to be too slow in cooling the transformer. Also, the natural esters have very high moisture content with could increase the chances of corrosion in the copper components of transformers and also reduce the breakdown voltage strength if the water content could separate from the oil molecules. Furthermore, Natural esters are quite expensive to use in large-scale production.

To mitigate the limitations of natural ester dielectrics, the research team focuses on two methods being the use of nanoparticles as additives to the oil and blending mineral oil with natural ester oil. Before applying either method, the water content in the dielectric is reduced to the standard requirement. When nanoparticles are added to natural esters, the intention is to reduce viscosity and improve the dielectric strength.

The other technique of blending mineral and natural ester oils at optimized ratios is used mainly to reduce the viscosity of the natural ester while improving the dielectric strength of the mineral oil and ultimately producing a more efficient and effective solution. Due to the high cost of natural ester production, it is considered that using the blending method reduces the costs. This does not imply that fresh mineral oil must be sourced again. Only old mineral oil that has already been used is to be utilized in the process.

The old mineral oil is reclaimed using activated bentonite and enhancing reclaimed and fresh transformer oils with antioxidants. The research on these alternative transformer dielectrics will improve the performance of power transformers and minimize the risk of explosions during the faulty condition.

Due to the extreme weather conditions that our region experiences, it is vital that the insulation of transformers is improved to the best of engineering capabilities for safety of both the environment and power grid. It is worth noting that these dielectrics are also applicable for use as insulators for other electrical devices too such as capacitors and circuit breakers.

Several articles and reviews have been published in highly reputable journals such as Energies and IEEE Access on this subject matter with our Ph.D. and Masters' students who are part of this research team. The outcomes of exploring this topic will influence informed decisions on how to conduct mass production of the best transformer liquid dielectrics, which is an opportunity to create jobs and income hence contributing to the economic GDP of the region.

PROFILE

Dr. Adams Duniya

In our April 2021 edition, we published an inaccurate article about Dr. Adams Duniya which was not approved by Dr. Duniya prior to application. This Publication bears an approved version of the article

Dr. Adams Duniya is an Astrophysics Lecturer at the Botswana International University of Science and Technology (BIUST). His duties at BIUST include the teaching of science that employs the methods and principles of physics in the study of astronomical objects and phenomena. Before devoting his work fulltime to BIUST, Dr. Duniya undertook two Postdoctoral Research Fellowships at the University of Cape Town (UCT), from September 2015 until October 2019: first at the Cosmology and Gravity Group, Department of Mathematics and Applied Mathematics, and later at the Division of Biomedical Engineering, Department of Human Biology, UCT Medical School.

As a dedicated and meticulous researcher, he also acted as a Peer Reviewer to the prestigious International Journal, the Monthly Notices of the Royal Astronomical Society, United Kingdom, between July 2016 and May 2017. For his doctoral education, Adams enrolled at the University of the Western Cape (UWC), South Africa and graduated with a Ph.D. in Physics, specializing in Cosmology.

His Ph.D. study was centered centred on investigating how Einstein's theory of general relativity affects what astronomers measure from observing the distribution of billions of galaxies in the Universe. Academic success wasn't difficult for Adams, he produced a pioneering research work, a first detailed attempt at incorporating both relativistic effects and a general form of Dark Energy – producing several publications. His thesis earned him an automatic membership of the prestigious Golden Key International Honour Society.

During his Ph.D. studies, he was selected in a global competition as the first scholar ever from UWC – among only a selected few from Africa – for the 65th edition of the prestigious Lindau Nobel Laureate Meetings, which was attended by researchers across various fields of study.

Moreover, at graduate level, Adams excelled as one of the top three graduates from his class, with a Bachelor of Science Honours degree in Physics, from Ahmadu Bello University in 2009. As an adept scholar, he won full scholarship to the African Institute for Mathematical Sciences,, South Africa, to study for a Postgraduate Diploma in Mathematical Science – from which he graduated in 2011.

He further showed dedication and determination by winning full scholarship from the (South African) Square Kilometre Array Project in 2011, to study for an M.Sc. in Cosmology at UWC, Cape Town: a work which was later upgraded to a Ph.D. project by the UWC Senate Committee for Higher Education.

Dr. Duniya is a calm and pragmatic explorer capable of adapting to new environments, and who excels in leading projects from an initial concept to completion

“Beke le Beke”

Ga lo ja dinama
netefatsang gore
Melawana ya Covid 19
e a obamelwa

– Melawana –

Netefatsa gore o apere sebipa molomo sentle nako tsotlhe fa oleng teng

Thapa matsogo ka molora le metsi a a phepa kgapetsakgapetsa

Dirisa metswako e e bolayang megare nako tsotlhe (sanitizer)

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