



MANAGEMENT OF ENVIRONMENT AND RESOURCES

Annual Report 2021

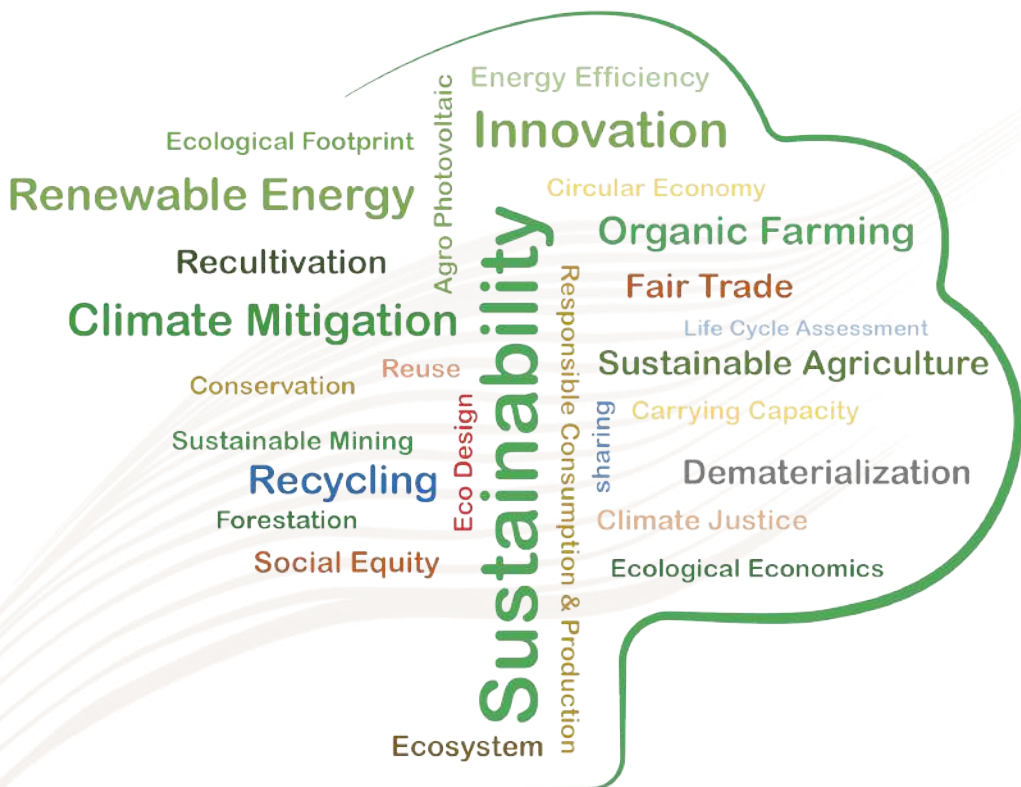


Table of Contents

Foreword	1
Projects	3
Teaching activities	17
Research	19
Alumni activities	23
Outlook into the future	28

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Foreword



This annual report is presented to you in the second year of the COVID 19 pandemic in Germany. Last year, there was a general impression that this pandemic would be a short and painful, but transitional, event, coming and disappearing quickly. Reality has shown that, instead, it will be long-lasting and it will have many consequences for human interactions locally, regionally and globally.

As a result, the URM activities which, traditionally, are carried out in Freiberg and internationally, were very much restricted in terms of locations. New wordings became developed, such as “in-person” and “online” events, “keeping social distance”, “virtual laboratories”, “cancellations”, “hybrid activities”, “online teaching”, “zoom meetings” and many more, evidencing the implementation of technical possibilities, theoretically already available

since long, but suddenly being put into practice within a very short time.

In essence, the COVID 19 pandemic has led to a globalization of a new world of virtual education and research with an incredible speed. Who imagined in 2017, 2018 and even 2019 that students and lecturers would log in into “virtual classrooms” and in “break-out rooms”, “share screens”, wear “headphones”, speak into “microphones” and message into “chatrooms” to attend lectures, defend their Master’s Thesis projects and join in “virtual” international conferences as jury members, contributors and participants? The world of learning and of research has gone and is going through fundamental changes, not so much in respect of the generation of science-based knowledge, but much more in the ways this knowledge is being communicated.

This URM annual report reflects this

development and shows how a continuation of activities can be maintained with appropriate technologies and skills to use them.

We wish you an informative and entertaining time with this Annual Re-

port for 2021 ... after downloading onto your “iphone”, “tablet” and “laptop”.

— JCB



*Freiberg Christmas Market, due to COVID 19, it was never opened
(Photo took by Jiangxue Liu)*

CEMEREM Project

The CEMEREM project, established as a consortium of Taita Taveta University (TTU) in Kenya, University of Applied Sciences Dresden (Hochschule für Technik und Wirtschaft Dresden (HTWD)) and TU Bergakademie Freiberg, was launched in May of 2016. The project seeks to establish a DAAD African Centre of Excellence for Education on Mining, Environmental and Resources Management in Partnership between Kenya and Germany. CEMEREM's overarching objective consists in a contribution to a sustainable development of the natural resources sector in Kenya and East Africa.

After 6 years development, these goals of CEMEREM have been achieved as follows:

- Three study programmes have been established with the assistance of the German partners.
- The infrastructure and research capacity at CEMEREM has significantly improved.
- Capacity building was in progress. Most courses of CEMEREM established study programmes were covered by TTU lecturers.
- Contacts with government and industry have been enhanced.
- A project and quality management has been established.
- A sustainable concept has been developed.



Main Campus of Taita Taveta University

CEMEREM III

DAAD gave its consent to continue its support for the CEMEREM Project for the next four years. Some future activities will include:

- integration of Taita Taveta University as a new partner University in the Triple Degree Study Programme for Mining Engineers already operating between TU

Bergakademie Freiberg and Montanuniversität Leoben

- Installation of a Doctoral Studies Academy at Taita Taveta University
- Another Summer School – hopefully this coming year in Germany
- More research activities
- Internationalization within Africa

Condolence Nicholas Muthama

Sunrise: 5 December 1977 - Sunset: 30 March 2021

With great sadness all of CEMEREM team have received the news about the sudden demise of Dr. Nicholas Muthama, the previous CEMEREM Coordinator at TTU, a senior lecturer in the School of Science & Informatics at Taita Taveta University. We are shocked by this unexpected event. We have come to appreciate and value Dr. Muthama as a competent, accurate, reliable and trustworthy colleague in our Kenyan-German CEMEREM project. He delivered an original, innovative and substantial contribution to our joint endeavour and to the education of many Kenyan



Dr. Nicholas Muthama

and East-African students at your university through his responsibilities in the CEMEREM project.

We have lost a diligent colleague with whom we collaborated. He was a person full of mutual respect, dignity, honesty and friendliness. We will miss him and keep him in our memories.

3rd Biennial CEMEREM Conference

16 – 17 September The 3rd Biennial International CEMEREM Conference on “Sustainable Mining and Natural Resource Management in Africa” took place at the Taita Hills Safari Resort in Taita Taveta, Kenya. Due to travel constraints caused by the COVID-19 pandemic, the conference was held in a hybrid mode with both physical and virtual participation. In total, more than 120 participants attended the conference. While some speakers from outside Kenya including from Ghana, Namibia, Zambia, and Finland attended physically, German partners and speakers from the UK joined virtually. The Vice-Chancellor of the University of Mines and Technology

(UMaT) in Ghana accepted the invitation to appear as a guest speaker in Kenya.

The conference was structured into the following six thematic sessions in which speakers provided profound insights into mining and natural resource management:

1. State of mining and natural resource management in Africa: past, present and future
2. Perspectives on natural capital and resource economics for sustainable development in Africa
3. Policy and technology implications for mining and natural resource management in the post-COVID-19 Africa

4. Revitalising agriculture for enhanced urban and rural livelihoods in the post-COVID-19 Africa
5. Decision support systems for sustainable mining and agricultural communities in the post-COVID-19 Africa
6. Education 4.0 and Mining 4.0: Post-pandemic frontiers for sustainable

mining and natural resource management

The presentations generated active discussions and engagement from the audience on both days, attesting to the high interest in the sub-themes.

Research Fair

28 – 30 September Members of the 12 DAAD Centres of African Excellence, further experts from related institutions as well as colleagues from the DAAD joined an Online Research Fair called ‘Past and Future Research for Inclusive and Sustainable Development’, organized by the Centre for Development Research ZEF, Bonn University, and the DAAD West African Centre for Sustainable Rural Transformation.

Overall, roughly 80 participants joined for the exchange and discussions of research and scientific projects taking place at the different Centres in order to explore potential synergies, particularly with a focus on opportunities

within the new „Round Table Africa“ initiative of the German Government. Participants enjoyed a rich and inspiring programme with lots of opportunities to get into discussion with colleagues about cross-cutting themes and developed bases for further joint projects.

CEMEREM participated with contributions about Life Cycle Analysis in mining, research on Agro-Photovoltaics, Carbon Credit Trade Management and community livelihood improvement in Taita Taveta County and Prediction and measurement of blast induced rock fragmentation in Kajiado County Quarries.



Group photo of participants of the CEMEREM Conference

5th CEMEREM Summer School

31 October – 7 November The 5th CEMEREM summer school was held in Voi, Kenya. Taking place amid COVID-19, the Summer School looks back on the eventful and rich history of the previous Summer Schools that before COVID-19 have traditionally been held in Germany, from 2017 to 2019. The theme chosen resonated with the compelling moment of history that COVID-19 has introduced to a changing world: **Innovative technologies, systems, and processes for resilient natural resources sector in the post-COVID-19 era.**

38 TTU students and staff attended the Summer School. The events began with presentations by lecturers, students, and officers from the Coun-

ty Government of Taita Taveta. Four presentations came from external experts, drawn from Germany, Finland, and the County Government of Taita Taveta.

On 5th and 6th November, participants visited the Malindi Salt Mining site in Kilifi County and the Haller Park in Mombasa, a nature park reclaimed from a quarry wasteland where limestone was mined over the period 1959 – 1970. This was achieved using environmentally friendly processes and planting selected trees.



Left: Visit to the artisanal mining in Chawia, Taita Taveta

Right: Visit to the Lake Chala to compare positional accuracy changes with environmental conditions and altitude

1st CEMEREM Alumni Seminar

13 – 18 December The 1st CEMEREM Alumni Seminar was held in Voi, Kenya with financial support by DAAD. The event was attended by CEMEREM Alumni and other African Alumni from various countries. Because of the COVID 19 pandemic, the seminar took place in hybrid form. It was dedicated to the theme of An environmental management system for Taita Taveta County as a pilot project for East Africa.

The participants were welcomed by Prof. Fred Barasa, VC of Taita Taveta University, Prof. Dr. Jan C. Bongaerts and Prof. Dr. Ulrike Feistel as convenors. Participants attended introductory lectures about integrated regional planning in Germany, the state of the

Environment in Taita Taveta County, Life cycle analysis of Agro-Photovoltaics, Use of GIS for regional environmental management systems, water resources, soil and forest management in Taita Taveta County and more related subjects. Prof. Henning Zeidler of TU Bergakademie Freiberg introduced the use of renewable raw materials for 3D printing and surface smoothing of complex metallic components. Alumni presented their research work in several sessions. Participants also visited the laboratories which were installed within the CEMEREM project with support by DAAD. A large part of the seminar was dedicated to several excursions to mines and other natural resources projects.



Left: Group Photo of participants of CEMEREM Alumni Seminar

Right: Visit to CEMEREM laboratories

CEMEREM Pilot Projects

Smart Biogas project

The biogas project's aim is to foster scientific exchange between the project partners and transfer technology to the local communities. Kenyans must be enabled to reduce the impact of energy costs by using renewable energy technologies with own resources for a sustainable energy supply with protection of the environment as required under the laws of local and federal government. In 2018, four plants have been installed at the TTU main campus and at the campus of the School of Agricultural, Earth and Environmental Science



(SAEES) in nearby Ngerenyi. One of them is using in the chemistry laboratory for training students and research. Another one is used in the kitchen for the processing of kitchen waste and other biomass. The other two will become operational in 2021.

Macadamia Nut Cracker Project

As a result of initial request from SAEES, a project was started up at TU Bergakademie Freiberg with the intention to develop a nut cracking machine, especially for macadamia nuts which are characterized by a very hard shell which cannot be opened with existing devices. In Freiberg several tests with different principles were made before one promising principle was selected. This was again tested in a pilot scheme and, finally, a pilot machine has been built which meets all requirements: high availability, little damages to the nuts, easy



operation and robust engineering. Professor Kröger, who developed the machine, visited TTU and a Nut treatment factory in Kenya to identify potentials for manufacturing the machine on a commercial basis.

Agro-Photovoltaics

The Agro PV project was started up at SAEES (School of Agriculture, Earth and Environmental Sciences) for investigation of different climatic and soil conditions for plant cultivation under solar panels. Since February 2019, twelve solar panels are installed above arable land to generate electricity and to modify cultivation conditions for crops through soil improvements, better water management and less evaporation. In addition, a weather station has been built for the measurement of the air temperature and humidity,



the radiation intensity and the precipitation. Three Bachelor students and a Postdoc of the SAEES were trained to maintain the measurement system and set up a database of the measurement.

Gemstone project

This new project aims at the design and implementation of a web based platform for the trading of locally mined gemstones which enables artisanal miners to enter in direct contact with their ultimate clients, i.e., cutters and polishers anywhere in the world. The platform is embedded in a virtual sales platform. It operates with a cloud and a blockchain technology, as follows:

1. Every individual mined raw gemstone is documented in the cloud.
2. Interested buyers can place bids



3. Agreements on sales are equally individualized and uniquely documented and traceable with the blockchain technology. First analytical steps were taken to design the internet platform and select appropriate software.

EURECA-PRO - European University on Responsible Consumption and Production

Together with five partner universities in Austria, Greece, Poland, Romania and Spain, TU Bergakademie Freiberg and the University of Applied Sciences Mittweida have been selected to join the „European Universities Initiative“ launched by the European Commission. The Initiative supports Universities in Europe in their efforts to set up so-called European University Alliances for the joint delivery of Study Programmes and research activities.

The seven partner universities have are **Montanuniversität Leoben** (Austria), **Technische Universität Bergakademie Freiberg** (Germany), **Technical University of Crete** (Greece), **Universidad de León** (Spain), **Silesian University of Technology** (Poland), **University of Petrosani**

(Romania) and the **University of Applied Sciences Mittweida** (Germany). They have established a European University entitled EURECA-PRO with a focus on education and research on responsible consumption and production. The project has received funding until the end of 2023 but the objectives are set for the long term of 2040. Gradually, a joined virtual and integrated European campus is to be established.

In the first full year of the project was dedicated to many different introductory steps which are required for its organization. TU Bergakademie Freiberg has the task of the implementation of education with study programmes at all three levels (Bachelor's, Master's and Doctoral).



EURECA-PRO Week - TU Bergakademie Freiberg

12 – 16 July To introduce the EURECA-PRO project and its partnerships to students, researchers, teachers and staff of TU Bergakademie Freiberg, and to bring up the topic of Education for Responsible Consumption and Production in discussion, a virtual event "EURECA-PRO Week" took place. Beside of the introduction of EURECA-PRO and its partner universities, members of TU Bergakademie Freiberg and Peter Görlitz (IMRE 2009), Sustainability Manager Europe of Sonoco Consumer Products Europe, gave presentations on the supply of resources and the circular economy. Prof. Jan Bongaerts gave an

overview of the values of European citizens and the values of European Policy making in his lecture. The week closed with a panel discussion on European Education for Responsible Consumption and Production. Dr. Walter Kühme, Head of Unit for Universities and Art Colleges, Saxon State Ministry for Science, Culture and Tourism, Beate Körner, Head of Unit Erasmus+ Partnerships and Cooperation Projects, DAAD, attended the discussion and they expressed their positive expectation of the contribution of the European university on a sustainable education.

EURECA-PRO Review Week in Leoben

18 – 22 October After one year of EURECA-PRO, more than 70 participants from the seven EURECA-PRO partner universities came together in Leoben for the first time during the "Working and Review Week".

The purposes of the meeting were as follows:

- personal contacts after a long time of only online interaction
- review of the work activities of the year

- discussions about current issues
- drafting plans for the months to come
- setting up the next steps



Group Photo of members of the EURECA-PRO Alliance

EURECA-PRO Lecture Series



Free online lecture series presented by professors and researchers of the University Alliance. seven European universities from six countries. The summer lecture series consisted of 14 lectures on the topic "Responsible Consumption and Production". They were dedicated to the following thematic areas:

- Sustainable Development Goals
- European Union and Culture
- Responsible Mining Approach
- Circular Economy

- Sustainability and Energy Technologies
- Key role of materials in responsible production

The second lecture series in the Winter Term was focussed on the following three topics:

- Geoscience
- Technologies for a Circular Economy
- European values and identity

1st EURECA-PRO Summer School

1 September – 1 December The EURECA-PRO Team started the first international summer school on "Responsible Consumption and Production for Digitised Higher Education" at TU Bergakademie Freiberg.

The topics of the summer school relate to issues of digitised education. Key questions to be addressed can be expressed as follows. Which responsibilities are expected from education institutions when comparing online education with in-person education?

What is the ecological footprint of online education? Which new requirements does online teaching place on the infrastructure of universities? How do e-learning opportunities change the mobility of students in Europe?

A total of 20 participants from Austria, Germany, Greece, Poland, Spain and Romania of all seven EURECA-PRO partner universities were dealing with these questions during this first summer school.

In preparation during a pre-school, participants were required to familiarize themselves with UN Sustainable Development Goal (SDG) 12 on Sustainable Consumption and Production.

In the presence week from 5th to 11th September, the programme provided for lectures and presentations by experts from all seven EURECA-PRO partner universities on the Internet of Things, digitised education formats, technologies for online education, issues of sustainability related to

online education, the future of the online classroom and related topics. Participants engaged in international and interdisciplinary group work to study, analyse and discuss issues of online education and their implications for sustainability. The outcomes of their work constituted scenarios on various formats of future of learning and study and their impacts on sustainability. At the end of the week, the groups presented their scenarios in a plenary session.



Group Photo of the 1st EURECA-PRO Summer School

International DAAD Alumni Seminar

September 29 – October 8 Given the specific situation of the COVID-19 pandemic situation in South Africa in early 2021, the originally planned Alumni Seminar in a combination with IFAT Trade Fair in Johannesburg was cancelled. Instead, DAAD proposed the opportunity to participate in an alternative seminar in conjunction with another conference and trade fair entitled West African Clean Energy & Environment ([WACEE](#)) which was held online from September 29 to 30. This event was organized by the Delegation of German Industry in Ghana with various partners. In comparison with the seminar in Johannesburg with a focus on Water in Africa, the alternative seminar had a broader perspective as it included clean energy and the circular economy.

The five-day seminar from 5 to 8 October had participants coming from Germany, Ghana, Kenya, Pakistan and Tanzania. Many IMRE Alumni attended the seminar. Topics discussed centred on clean water and clean energy, with a training workshop on business models and new digital business strategies. Life Cycle Assessment of renewable energy technologies was also widely discussed.

In line with the water theme, the majority of posters that were presented at the seminar in a virtual room for further reading and reference dealt with water in Africa and efforts to preserve and improve water access for peoples and industry.

A focus-group discussion on energy in Africa was one of the highlights of the seminar, with participants examining how the myriad challenges of access, infrastructure, connectivity and investments in renewable energy could be tackled through scenario planning of the determined drivers. Other discussion points were on affordability and inclusion, reliability, business plan, poverty alleviation and economic development.

A panel discussion on “Water in Africa: Status-quo, challenges and future” was led by Jonathan Gador, (Managing Director of TBL Resources Limited, Ghana) Dr. Asare Asante-Anor (University of Mines and Technology, UMaT, Ghana), and Dr. Justin Maghanga (Taita Taveta University, Kenya). The panelists talked about water pollution in Africa from mineral exploitation, industry and agriculture.

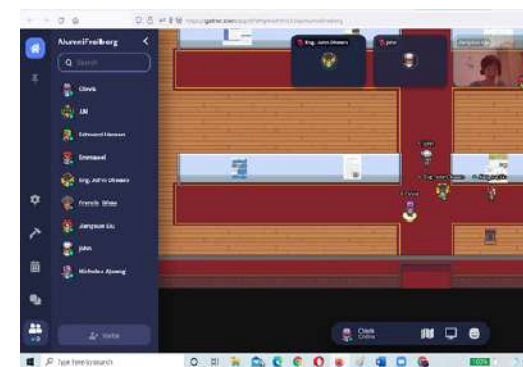


Other addressed increasing demographic pressure on water resources, the paucity of water resource information, and conflicts and disputes emanating from cross-boundary water resources.

The seminar was addressed by officials of DAAD, Prof. Dr. Jan C. Bongaerts (TU Bergakademie Freiberg), Prof. Dr. Ulrike Feistel (Hochschule für Technik und Wirtschaft, Dresden), Dr. Jiangxue Liu (TU Bergakademie Freiberg), Dr. Justin Maghanga (Taita Taveta University, Kenya), Dr. Asare Asante-Anor (University of Mines and Technology, UMaT, Ghana), Francis Gitau (Taita

Taveta University, Kenya), Audrey Mulama (Taita Taveta University, Kenya), Dr. Bernard Alunda (Taita Taveta University, Kenya), Franziska Böhler (Blackpoint Consulting), Marcus Braun (Blackpoint Consulting) and Peter Görlitz (Sonoco Plastics, Germany). The sessions were moderated by Dr Liu, Azuhchum Clovis and Edmund Hassan.

At the end of the seminar, an alumni meeting discussed upcoming events and future initiatives for further networking. DAAD presented participation certificates to all attendees of the seminar.



Left: Screen short of the alumni seminar
Right: Exhibition of alumni's poster in a virtual room

Teaching at TU Bergakademie Freiberg

As in earlier years, Prof. Bongaserts has taught three courses for international students in mining, groundwater management and a few other study programmes.

The titles of the three courses are as follows:

- Licensing, expectations and stake-

holder management (Summer Term)

- Management and Finance of Mining Operations along the Life Cycle (Winter Term)
- Project and Contract Management (Winter Term)

Teaching for CEMEREM and EURECA-PRO

JCB taught two courses CEMEREM students:

- Mineral Reserve Estimation and Financial Valuation (50%)
- Resource Economics

JCB gave lectures for each of the two EURECA-PRO lecture series, one lecture for the EURECA-PRO week and

another lecture for the summer school on the following topics:

- Responsible consumption and production: towards a new paradigm
- The values of Europe and of Europe's citizens
- European Values
- The economics of digital education

Lecture for International UNESCO Competence Centre for Mining Engineering (Austrian Branch)

On 4th April, upon invitation of this newly established Centre, JCB gave a lecture about "Life Cycle Assessment in Mining Engineering" in the frame-

work of its second online Lecture Series entitled "Sustainable Development Approaches in Engineering Research and Education"

Training Courses on Life Cycle Assessment

Since the beginning of 2021, Dr. Jiangxue Liu is offering training courses on Life Cycle Assessment using UMBERTO, a leading LCA software. Life Cycle Assessment is a methodology for assessing environmental impacts associated with all the stages of the life cy-

cle of a commercial product, process, or service. In her training courses, she gave an introduction to the LCA methodology and showed how to use the LCA software - "UMBERTO" to conduct an environmental impact analysis.

Crash Course on Economics of Climate Change Policy

On 8th June, Dr. Jiangxue Liu gave a lecture on Climate Change Economics to Environmental Engineering Master Students of Dresden University Applied Science (HTWD). Her lecture

dealt with specific market-oriented approaches to reduce greenhouse gas emissions, provided an overview of international climate policies and their economic assessment.



New lecture hall in Prüferstrasse

Life Cycle Analysis for the Natural Resources Sector

With the request of a mining company about the environmental impacts of alternative processes for mine recultivation in 2020, a new research activity was started up for the investigation of the environmental impacts of processes within the natural resources sector along the life cycle. For this purpose, the license for the use of a dedicated software called UMBERTO was renewed. Students with an interest in this subject were given training in the use of this software for their research activities. In the course of 2021, studies on LCA were com-

pleted about the following subjects:

- drilling and blasting in mining
- mining recultivation and rehabilitation
- manufacturing of lithium batteries
- recycling of photovoltaic panels

More studies are in preparation. One student started her career with a company providing the GaBi software for Life Cycle Analysis, another student will soon join a small company providing LCA services to the mining sector.

YEMAYA Project

In October 2019, the German Ministry of Education and Research (BMBF) launched a call for expressions of interest for a Programme entitled African Women in STEM. The motivation was obvious: to promote and qualify African women at PhD level in Science, Technology, Engineering and Mathematics. In cooperation with the Institute for Electronics and Sensor Materials, the Chair for Hydrogeology and Hydrochemistry and GraFa (PhD

Research Academy), JCB put together a team including Taita Taveta University and Machakos University, both in Kenya, Ho Technical University and the University of Mines and Technology, both in Ghana, and the University of Nigeria in Nsukka. As requested by the call, a first preliminary proposal was drafted. The theme of the proposed research was focused on water resources within a trade-off between mining and agriculture.

In August of 2021, BMBF signalled the acceptance of the proposal followed by an invitation to draft a more detailed research agenda for further evaluation. For that purpose, several online meetings were held with all partners to identify and clarify the overall research theme and to select

the women scientists and specify their individual research projects. The proposal will also contain capacity building activities. It must be submitted by the end of January 2022 for the second evaluation round.

Environmental Innovation at Local Government Level

The PhD project of Florian Unger analyses the influences and impacts of the implementation of environmental innovations towards climate protection at a local government level. The consideration of the environmental innovations as one of the options to reduce the environmental damage through the impacts of behaviour change, modified products as well as production processes, usually focuses on the economical interactions taking place in the market sector. The local government level, or generally speaking the public sector, however, as an actor and initiator of environmental innovations is rarely investigated.

The main objective of the PhD project is to generate a closer insight into the evolution of innovations by the example of municipal administra-

tions in Germany. To tackle this research complex, the project primarily deals with the question of what factors drive the innovation behaviour of the employees of the local government.

The methodical design for the PhD project is based on the Grounded Theory approach. The aim of the Grounded Theory is to generate theoretical statements in the course of the research through a gradual data collection process and the repeated test of their theoretical relevance of the “grounded” theory model. This approach is finally used to provide a model of the impact of environmental innovation in the municipal administrations in the field of local climate protection.



<p>XVII International Forum - Contest of Saint Petersburg Mining University: "Topical Issues of Rational Use of Natural Resources", break-out session 11: "Economics of sustainability and global investment trends" 2 – 4 June</p> <p>Participant: Prof. Bongaerts as Jury Member</p>
<p>International Autumn school – “Climate Policy and Energy System Transformation: New Opportunities and Challenges of the Consideration of Co-Benefits” 13 – 17 September 2021</p> <p>Participant: Dr. Jiangxue Liu</p> <p>Poster topic presented: Life Cycle Assessment in Mining</p>
<p>Online Research Fair called ‘Past and Future Research for Inclusive and Sustainable Development 28 – 30 September 2021</p> <p>Participant: Prof. Bongaerts and Dr. Jiangxue Liu</p> <p>Topic presented by Prof. Bongaerts: LCA Life cycle assessment for mining and minerals processing, LCA software and students capacity building (Jan Bongaerts)</p>
<p>DAAD International Alumni Seminar WACEE 4 – 8 October 2021</p> <p>Participants: Prof. Bongaerts and Dr. Jiangxue Liu</p> <p>Topic presented by</p> <p>Prof. Bongaerts: Renewable energy in Africa: Top down – bottom up, grid connected – off-grid?</p> <p>Dr. Jiangxue Liu: Life Cycle Assessment of solar technologies</p>
<p>CEMEREM Alumni Seminar 13 18 December 2021</p> <p>Participant: Prof. Bongaerts</p> <p>Topic presented: Environmental Management Systems for Regional Development: Lessons Learnt</p>

Name	Title of Master's Thesis
Ahmed Waqar	Decentralized Organic Waste Management System - A Study of Smart Biogas Plants - Challenges and Opportunities of Implementing Biogas Plants in Pakistan
Worurarethai Lakantha	Life Cycle Assessment of Drilling and Blasting Technologies: Case Study of an Opencast Mine in Thailand
Suren Dhanasekaran	Integrated Reporting in the Forest Sector - The quality of Environmental Disclosure Evaluation
Erdenebileg Ulziikhutag	Gold Mining Risk Assessment and Management in Mongolia
Samineh Moghaddas	Bottom-Up Life cycle Assessment for Lithium-ion battery cell production
Nima Pouya	Pricing Methods as an Electric Mobility Service Provider
Ali Ashan	Effects of Entrepreneurial Marketing on the Overall Performance of Small and Medium-Sized Enterprises (SMEs)
Clovis Azuhchum Khan	A Cost-Benefit Analysis of the Switch to Renewable Energy in the Mining Industry
Kayeh Noris Kawas	Energy Efficiency of the Carbon Footprint of Open Pit Mine Operations
Christopher Enabulala	Identifying suitable financing options for each stage of the mine cycle of ASM companies

Support India's Transition to a Green Economy

In the current climate scenario, India has a huge responsibility on its shoulders to cut down on emissions and move towards a greener economy. While India's rapid Renewable Energy (RE) expansion and green initiatives are helping in cutting the emissions, state and central governments are still looking forward to constructing huge coal fired thermal power plants (TPPs) and opening new coal mines. While the increase in demand for electricity is growing in India, these new coal projects are neither economically nor ecologically viable in the long run. Climate Risk Horizons (CRH), an Indian start-up works towards identifying and analysing the long term impact of such projects on the climate. **Vishnu (IMRE 2018)** works as a Researcher on Energy & Finance at Climate Risk Horizons. His role involves collecting data about new projects related to electricity, policies related to RE and other new developments in the field. He is working on analysing the current energy scenario in Andhra Pradesh (southern state in India) and for a report about essential actions the state needs to

take to support India's transition to a green economy.

CRH works in tandem with multiple environmental groups in India to assure that reports reach those people with power and responsibility to make decisions. One recent report about Tamil Nadu's (southern state in India) TPPs is now on the state's deputy chief minister's table and will have a huge impact on the government's decision regarding development of TPPs. CRH is now covering many energy related projects across several states in India.

Most Recent Report:
<https://climateriskhorizons.com/>



Innovation Management– A new Module for the MBA Programme

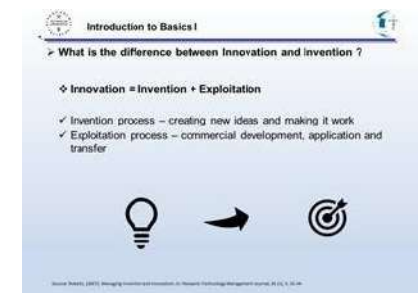
A free elective has been added to the MBA program IBRE (a follow up program to IMRE) on the topic of “Innovation management - From creativity to transformation” with a specific focus on innovative practices for sustainable design.

Jeanette Haenseroth offers this lecture as part of a block-seminar spread across two weekends. She graduated the MBA IMRE program in 2013 and is following a career around environmental management and the energy transition. Today, she works in Siemens Gamesa Renewable Energy, an Original Equipment Manufacturer of wind turbines that engages in innovation across the renewable energy portfolio. She works as an Innovation Manager covering activities throughout the value chain as well as projects in the area of other renewable technologies and brings experience from corporate activities and publicly funded research projects.

Within the teaching concept, theory is complemented by case studies from industry, mostly, but not exclusively,

emanate from renewable energy production.

Moreover, various group projects emphasize the practical implementation of the learning. Students acquire competences to devise and manage entrepreneurial innovation policies. It is further key for Jeanette as a lecturer to strengthen an entrepreneurial mindset of students and discuss current practices as she believes that „Innovation in technology combined with resource adjustments are key for the future of our society”. By now, two courses have successfully been completed in a hybrid and online set-up and resulted in high interest and much positive feedback.



The First Pilot Learning Energy Efficiency Network in Industry in Sao Paulo, Brazil

Felipe Toro (IMRE 2001) is now working on the first Pilot Learning Energy Efficiency Network in Industry in Sao Paulo. This project is financed by GIZ and the Federal Economics and Energy Ministry in Germany with the support of the Ministry of Mines and Energy in Brazil and the German-Brazilian Chamber of Commerce (AHK Sao Paulo).

The industrial sector in Sao Paulo in the South-East of Brazil is the largest in South America and it exhibits the highest potential for energy efficiency and renewable energy investments.

Based on successful experiences in Germany of 30 Pilot Learning Energy Efficiency Networks and the Federal Initiative on Energy efficiency Networks (IEEN) from DENA and the Ministry of Economics and Energy, a transfer of German experiences to Brazil was conceived by GIZ as a promising instrument to demonstrate energy efficiency in industry. The project was successfully conducted from June 2020 until Dec 2021 with 11 middle and large size companies in Sao Paulo, Brazil, including Bosch, Novartis and GM among other ones.

The main objective of the project is to provide support and advise the anchor organization in Brazil and the participating companies in developing a pilot concept and successfully implement an industrial energy efficiency and energy management network in the Sao Paulo region in Brazil.

Information on the project:

<https://irees.de/en/2020/09/30/pilot-energy-efficiency-network-in-sao-paulo-brazil/>



Calling the EU to Protect Threatened Habitats

Prior the crucial COP26 climate negotiations in Glasgow, Annisa Rahmawati with other Mighty Earth activists from producer countries of high risks commodities, were meeting with officials of the European Commission, calling them to strengthen upcoming legislation aimed at preventing consumer goods linked to deforestation and climate destruction from entering the European Union.

Since 2014, she and environmental activists in Indonesia, have been calling upon the industry to protect forests and other valuable ecosystems of the world and human rights via the implementation of NDPE (No Deforestation, No Peat, No Exploitation) commitments. The activists are concerned about significant weaknesses of EU legislation, namely: the exclusion of forest-risk commodities, such as natural rubber and leather and the delisting of agricultural commodities grown in other threatened habitats with massive carbon sinks. They also showed their concerns about Brazil's Cerrado, Indonesia's peatlands, and the El Pantanal wetland ecosystems shared by Bolivia, Brazil and Paraguay that have high biodiversity and important to protect our climate stabil-



Meeting with officials from the European Commission

ity, as well as ignore human rights abuses associated with the production of commodities.

They required EU Commission to include vital ecosystems like peatlands, wetlands, savannah and not only forests in upcoming EU legislation to prevent a perverse incentive to shift palm oil production from rainforest to peatlands.



Annisa took part in the Friday for Future demonstration on the Obermarkt in Freiburg after her Brussels trip

Establishment of Saxonesia Consulting in Indonesia

In 2021, IMRE alumni from Indonesia, Nazaruddin (IMRE 2010), Annisa Rahmawati (IMRE 2010), and Athariq Pribadi (IMRE 2012) founded an environmental consulting company named “Saxonesia Consulting” for searching sustainable solutions for environmental related issues in Indonesia and in Southeast Asian region. Saxonesia Consulting provides services with a focus on waste management, forest protection campaign, stakeholder engagement, and eco-



tourism. The company is open for the cooperation and collaboration with partners around the world in terms of strategy and finances to establish solutions for climate change challenges.



Founders of Saxonesia Consulting (from left: Athariq Pribadi, Annisa Ramawathi, Nazaruddin)

Alumni Meeting 2022: Sustainable Mining, Natural Resources Awareness and Social Acceptance of Mining

For mining companies, sustainable practices are essential for their “licenses to operate” and their managers need to be environmentally and socially responsible and ensure that costs are covered by revenues. Sustainable mining offers new opportunities for “the capacity for the biosphere (environment) and human civilization to coexist”.

In many resource dependent countries, people resist – sometimes vigorously – mining projects because they see no benefits for their communities and fear the environmental impacts. Gold mining in Latin America meets with protests featuring “Agua si, oro no!” (yes to water, no to Gold). In

many countries, coal mining is challenged. Often, protests are raised against foreign mining companies and resistance may lead to interruptions of mining operations.

All this shows the importance of the subject of the Seminars for Alumni who work as professionals in the mining and minerals sector, the mining equipment sector, investors in these sectors, trade unions, consultancy, government agencies, NGOs and research institutions.

The host of the alumni seminar in 2022 is the Faculty of Mineral Resources Technology at University of Mines and Technology (UMaT) in Tarkwa, Ghana.



University of Mines and Technology in Tarkwa, Ghana

Honorary Colloquium of JCB: 20 Years Education on Environmental and Resources Management

On the occasion of JCB's 70th birthday in September 2021, a decision was made to organize a honorary colloquium. It could not take place because of

the COVID 19 restrictions decided by National and State Governments.

If possible, it will take place in 2022.

Fact Finding Mission to Senegal

DAAD gave its consent to support a Fact Finding Mission to the University of Dakar with the purpose of a co-operation in the area of mining. The country has a school of geology, but it lacks higher education in mining. Due

to the COVID pandemic, the travel was not possible. DAAD has signalled that the funds for this Mission will be transferred to 2022 without the requirement to submit a new proposal.



*Yi Lin (IMRE 2005) taking photo of glacier
in South East Tibet*



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