2021 CEMEREM SUMMER SCHOOL REPORT

Taita Taveta University hosted the

5th CEMEREM Summer School

on

Innovative technologies, systems, and processes for resilient natural resources sector in the post-COVID-19 era

across

The coastal counties of Taita Taveta, Mombasa, and Kilifi in KENYA

October 31 – November 7, 2021

"Taking place at the watershed moments when a world recovering from a pandemic is holding climate change talks in Glasgow, the 5th CEMEREM Summer School was strategically positioned to draw on the growing advocacy for environmental responsibility and overall sustainability in mining and natural resource management. Resilience is critical to the natural resources sector, among the many sectors affected by the pandemic. Bouncing back depends on sustained regenerative capacities."

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Summer School Preparatory Phase

Taita Taveta University formed a committee to steer the process of organising the 5th CEMEREM Summer School. The committee consisted of academic staff and non-academic staff assisting with publicity and logistics. The following committee of seven (7) members was appointed to facilitate the organisation of this Summer School. The committee settled on October 31 – November 7, 2021, as the dates for the Summer School.

No.	Name	Designation	Remarks
1.	Dr Justin Maghanga	Dean SSI, TTU - Chairman	Representing SSI and the team's spokesman to the VC
2.	Prof. Maurice Ogada	Project Manager, CEMEREM	Overall coordination of CEMEREM activities
3.	Dr Nelima Ondiaka	COD, MMPE	Representing SME
4.	Veronica Nyatichi	Chair, BMS	Representing SBESS
5.	Nashon Adero	Lecturer, MMPE – Secretary	Experienced in all the previous Summer Schools, key to documentation
6.	George Kasamani	Publicity Officer	Handling all publicity matters
7.	Robert Ngeti	CEMEREM Finance Officer	Handling all budget/financial matters

Background Information

The **5th CEMEREM Summer School** is the second in the series that was held in Kenya, after the pioneering one held successfully in November 2020. Taking place amid COVID-19, the 5th CEMEREM 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. It also drew on the lessons of the 4th CEMEREM Summer School held in Kenya in 2020. 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.**

The Participants

A team of **38** TTU students and staff was nominated to participate in the 5th CEMEREM Summer School. The team consisted of 16 undergraduate students drawn from all the

TTU Schools, 5 CEMEREM postgraduate students, 1 TAITAGIS MSc student, 4 academic staff to make presentations, 7 Summer School Committee members, and 2 drivers. The German partners were scheduled to connect virtually from Germany.

Key Activities

The events of the first **four days** took place in Taita Taveta County, beginning with presentations by lecturers, students, and officers from the County Government of Taita Taveta. Postgraduate students made oral PPT presentations after being guided by assigned lecturers. Undergraduate students, under similar guidance from assigned lecturers, made poster presentations. The posters were each independently evaluated by three judges based on the following agreed evaluation criteria.

TTU CEMEREM Summer School Poster Evaluation Template			
CRITERIA	**Sub-criteria**	**Max. score**	**Actual score**
Design & Layout (15)	Visibility of fonts - easy on the eye?	3	
	Not congested?	2	
	Structured flow of contents	4	
	Colour scheme right?	2	
	Proper layout of logos, good figures and tables	4	
	Sub-total	**15**	
Quality of contents (18)	Concise, clear and cited literature	5	
	Scientific rigour of approach - materials & methods	7	
	Innovation/novelty of the idea	3	
	Standardised use of key terms, statistics and facts e.g., IUPAC names, right-alignment of numbers and matching of d.p.	3	
	Sub-total	**18**	
Mastery of contents (17)	Fluent presentation within allocated time?	5	
	Accurate explanation of contents	5	
	Engagement during Q&A demonstrates competence and thorough understanding?	7	
	Sub-total	**17**	
	TOTAL	**50**	**0**

Four (4) presentations came from external experts, drawn from Germany, Finland, and the County Government of Taita Taveta. Field visits to artisanal mining sites in Chawia and Lake Chala followed. Reports from the excursions were later collected using a reporting template.

After the visit to Lake Chala, the team travelled to Kilifi County and visited Malindi Salt Mining site on 5th November 2021. On 6th, the team visited Haller Park, 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.

The closing ceremony took place at the White Peacock Resort, Mtwapa, in the evening of 6th November 2021. Presenters of the top-three posters, ranked by the mean score assigned by the three judges, were each awarded commensurate cash prizes. The students shared their individual written observations and key lessons. Each group of students, by School, was required to write a consolidated Summer School Report.

Emmanuel Otieno, BSc Agricultural Education student at TTU, receiving a cash award from CEMEREM Project Manager for poster presentation, White Peacock Resort, Kilifi, Kenya (November 6, 2021).

Key Observations and Lessons

Some notable scenes were captured.

TTU students and staff witnessing tough and risky artisanal mining activities in Chawia, Taita Taveta. Photo taken on site on November 3, 2021.

TTU students being taken through a review of GNSS principles at Lake Chala to compare positional accuracy changes with environmental conditions and altitude. Photo taken on site on November 3, 2021.

Reports from the excursions were consolidated as shown in the following reporting template.

Date	Activity	Location	Key lessons	Key issues noted	Research opportunities	Remarks
02/11/2021	Field excursions to artisanal mines	Chawia, Taita	Need for tree planting, noise reduction (night), need for health centres for emergency, CSR a key area to address Gender inclusion Mechanisation in progress	EHS – air pollution, dust, no safety gear (heat stress), drunk workers, e-waste, littering, plastic waste, noise pollution, land clearance, women are under-represented, ventilation shafts missing, respiratory diseases due to aerosols from quartz, etc., rudimentary tools **– legacy systems**, poor support systems – hazardous, heat stress, insecurity in the mine sites, poor lighting, poor blasting procedures compromising health and safety, Family – social issues, children and labour rights Project financing bottlenecks/funding	Water use efficiency, water costs, addressing water pollution, gender issues in mining, mine water reuse, dewatering, integrating renewable energy, innovation to improve the practices, support systems for safety in mining (ASM), blasting techniques, happiness index through improved work environment, cultural capital, reclamation	Revenue sharing model by CBO is an example to emulate – the modern mine concept County Government to improve the mining environment
04/11/2021	Visit to L. Chala	Taveta	Cross-border harmony for shared resource management	Underutilised tourism potential of L. Chala Fishing activities – fishing gear not friendly to the ecosystem Insecurity Safety	Farming opportunities for L. Chala to be researched on Addressing resource-use conflicts for shared resources	
	Visit to stone quarry	Taveta	Labour-intensive process but machines for cutting make the work easier	Dry riverbeds are adversely affected by quarrying activities	Mechanisation of stone quarrying processes to enhance productivity Regulation to protect watercourses	
05/11/2021	Visit to salt mining site	Malindi	Automation to meet differentiated demands – human-to-machine matching managers	Labour-intensive involvement of women for long hours	Pollution monitoring	

			Natural process of salt mining	Safety of the workers e.g., using masks Asbestos – why they are left where they are without removal/safe disposal of the pollutants		
06/11/2021	Visit to Haller Park	Mombasa	Post-mining environmental responsibility is key to restorative efforts	Illegal activities	Benchmarking for mine reclamation and landscape restoration after mine closure	Ensuring ecological integrity of habitats is a key goal if such feats are to be achieved after mine closure

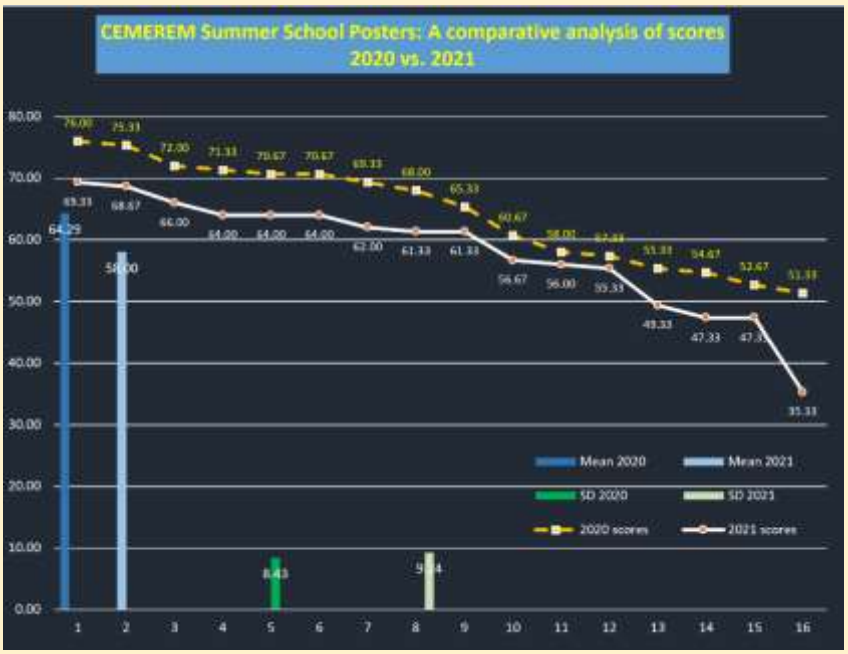
The following points also featured prominently from the testimonies shared by individual students and lecturers during the closing ceremony.

Testimonial Focal Points

i. Career path advancement – non-linear career trajectory in the new era of knowledge- and tech-led influence, hence career security as opposed to employment security
ii. Exposure is a key add-on to make education complete
iii. Practical problem solving – cultivating a solution-oriented mindset
iv. Research ideas for **social innovation** – society
v. Mining life cycle appreciation
vi. Presentation skills
vii. **Business sense** of mining
viii. **Climate change** adaptation
ix. Post-mining environmental responsibility
x. Health and safety in mining
xi. Automation vs. labour abundance
xii. Social and environmental concerns in the ASM sector
xiii. Understanding the physical environment – 3D positioning, navigation, appreciating space-time
xiv. Local content has allowed for a more organic and generative dialogue

Comparative Performance of Poster Sessions

Compared to 2020, the poster evaluation results of 2021 were lower. The students gave reasons related to the start of the Summer School just after a busy examination period. Preparation time was a challenge according to their report. The graph below shows the comparative analysis.



Comparison of poster evaluation results: 2020 vs. 2021

Summary and Recommendations

The 2021 summer school was better organised than the previous one in terms of logistics. It also covered more sites of interest to the students, Malindi Salt Mining plant being key. Experience and lessons will help improve the subsequent summer schools.

Compared to going to Germany, the local summer schools so far held in Kenya have proven to be lighter on logistics and costs and also more constructive in terms of local content.

Developing presentation skills, especially among postgraduate students, is a key area the exposure activities of summer schools are contributing substantially towards.

The following recommendations arose from the experience of holding the two summer schools in Kenya, in 2020 and 2021. They are key to reaping greater benefits since the students need to be well equipped to address local challenges in mining and natural resource management.

1. **Longer exposure period (10 – 14 days) for local summer schools** recommended for depth and breadth of coverage.

2. **Alternating the summer school venues between Kenya and Germany** to accommodate exchange by having students from HTW-Dresden and TU Freiberg coming to TTU could be an innovative model going forward.

3. Considering **awards for postgraduate students** with the best presentations in future would be a good motivation, or using their performance as one of the evaluation criteria for research stay in Germany.