Volume 2 Issue 24

REPUBLIC OF KENYA

KENYA WATER INSTITUTE KEWI Fountain Of Water Knowledge

WEEKLY Newsletter

June 22 – 28 2024

NACOSTI Inspects and Evaluates KEWI as a Research Institution

Prof. Ratemo Michieka (centre) & Prof. Mabel Imbuga (on his left) both from National Commission for Science, Technology and Innovation (NACOSTI) at KEWIs Non-Revenue Water laboratory during a monitoring and inspection tour of the institute as a research center. Looking on is Mr. Nelson Kwamini, Head of Research Division at KEWI and other officials.

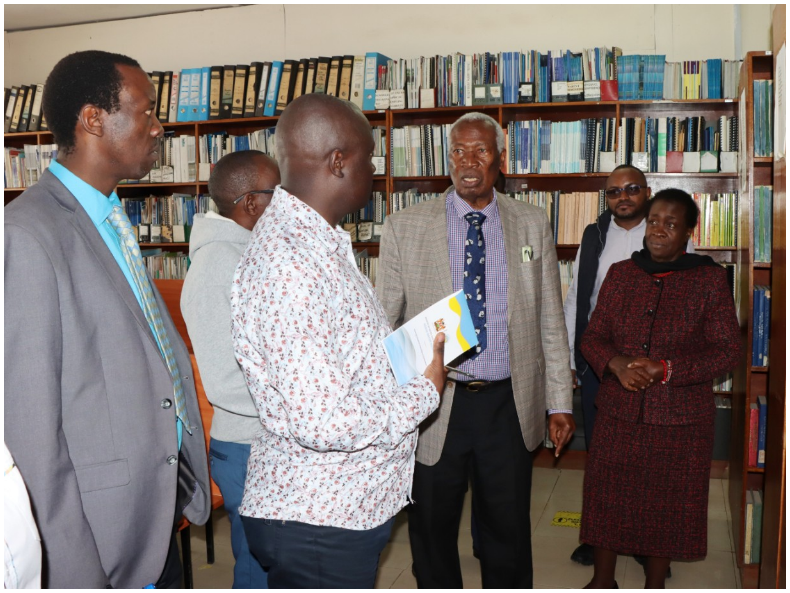
BY FAIZAH JEPKORIR

The National Commission for Science, Technology and Innovation (NACOSTI) has conducted a comprehensive inspection, monitoring, and evaluation of the Kenya Water Institute (KEWI) as a registered research institution and noted the strides the institution is making in its quest to enrich its research mandate. This evaluation, led by Professor Ratemo Michieka and other NACOSTI officials, aimed to assess KEWI's adherence to its research mandate and the progress of its licensed projects.

NACOSTI, under Section 6(n) of the Science, Technology and Innovation (STI) Act, is mandated to annually review and report on the progress of scientific research systems in Kenya. This review is then submitted to the Cabinet Secretary responsible for matters of science, technology, and innovation. KEWI, certified as a research institute in March 2017 and registered as the 9th

HIGHLIGHTS

NACOSTI Inspects and Evaluates KEWI as a Research Institution



research institution in Kenya, was among the institutions selected for this annual review.

During the visit, NACOSTI provided an overview of their mandate and expectations of KEWI as a research institution. They emphasized on the importance of continuous compliance with research standards and the need for KEWI to maintain its position as a leading research institution. The team also reviewed key activities and the performance of registered research institutions nationwide, highlighting KEWI's significant role in the sector.

The inspection and evaluation process involved a detailed overview of KEWI's ongoing projects, administrative processes, and the practical application of its research findings. NACOSTI's team filled out monitoring and evaluation (M&E) forms to document their observations and provided recommendations for further improvements.

"This evaluation comes at a pivotal time for KEWI, as the institution is preparing for a significant transition to the Kenya Water Institute Training and Research (KEWATRI). This move is aimed at expanding KEWI's mandate to include a stronger focus on training and research, thus enhancing its contribution to the water sector in Kenya," reiterated Mr. Nelson Kwamini, KEWI's Deputy Director of Research Consultancy and Technical Services.

The visit concluded with a thorough inspection of KEWI's facilities, during which the NACOSTI team interacted with various departments and gained insights into the institute's operational and research capabilities. The tour also included KEWI's Non -Revenue Water (NRW) center, where the NACOSTI team was introduced to advanced equipment such as leak detectors the listening sticks, and electronic floor meters.

NACOSTI's evaluation of KEWI underscores the crucial role of external monitoring and evaluation in fostering accountability and excellence in scientific research. The findings and recommendations from this review will be instrumental in guiding KEWI's future endeavors and ensuring its continued success as a premier research institution in Kenya.

This evaluation is not only a testament to KEWI's ongoing efforts to uphold high research standards but also a step towards achieving its vision of becoming a leading center for water research and training in Africa. The collaborative efforts highlighted during this inspection will pave the way for enhanced water management practices and innovations, benefiting the broader community and contributing to sustainable development goals.

RESEARCH

Effects of Fluoride in Your Drinking Water

BY ROSE WAMBUI & PETER MWENDWA

Fluoride, a naturally occurring mineral, helps prevent tooth decay, strengthen teeth, and stimulate bone formation. About 80% of orally ingested fluoride according to an article in the health information section of the National Institutes of Health is absorbed in the gastrointestinal tract, with half retained in the body and the other half in urine. Children retain about 80% of ingested fluoride.

Fluoride, added to water in small amounts, is commonly consumed in fluoridated water, toothpaste, dental materials, dietary supplements, and some medications like voriconazole.

The Kenya Bureau of Standards recommends a maximum permissible fluoride level of 1.5mg/l in portable water, both treated and natural, for the country.

High fluoride intake in water can lead to dental fluorosis, brittleness of teeth, skeletal fluorosis, impaired neurological development, kidney damage, thyroid issues, hormonal issues, and gastrointestinal symptoms. It also increases the risk of bone fractures, skeletal deformities, and joint pain. The mineral's long-term consumption can also cause kidney damage, thyroid issues, hormonal issues, and gastrointestinal symptoms.

Millions of Kenyans are at risk of fluoride-related problems due to excessive fluoride intake from rural sources like wells, rivers, springs, streams, and boreholes. Due to inaccessibility and underdevelopment, water quality is undermonitored, and 56% of Kenyans rely on these sources, according to a survey by the Kenya Bureau of Statistics.

Davis and Shirtliff published an article that reported excessive levels of fluoride in borehole water samples around the Nairobi region, up to ten times the amount recommended by WHO. Excessive fluoride levels in water in Kenya have led to increased bone mineralization and dental fluorosis, particularly in central and Rift Valley regions, affecting children. Urban areas, particularly Machakos and Nairobi, have also seen enamel changes due to fluoride exposure. Around 20 million Kenyans consume water with toxic levels.

In 2015, the Kenya National Oral Health survey revealed a 41.4% prevalence of dental fluorosis in children, affecting two in five. Studies show high fluoride water levels negatively impact intellectual efficiency and working memory. A 2017 study in Nakuru County reported 86% fluorosis prevalence, with severe cases.

To address the fluoride issue, testing portable water for fluoride is crucial to help will reveal the severity of the problem and act as a baseline from where to start. Installing water filtration systems, mixing low-fluoride water with high-fluoride water, rainwater harvesting, and using domestic defluoridation units can help reduce fluoride levels. Adsorbent materials like bone char, activated alumina, and clay soils can also be used. Community education is also essential to raise awareness about fluoride levels and the ways to mitigate risks.

In conclusion excessive fluoride in portable water can cause tooth discoloration, bone weakness, neurological impairment, and gastrointestinal issues in fluoride-prone areas, necessitating community education for prevention.

RESEARCH

Research on Rural Livelihoods, Health, and Wellbeing in Vhembe District, South Africa, And Narok County, Kenya

BY ERIC K. WAMITI

In innovative research collaboration, the Kenya Water Institute (KEWI), South Africa Weather Services, the Water Research Commission of South Africa, and the Centre for Transformative Agricultural and Food Systems at the University of KwaZulu-Natal have undertaken a comprehensive study titled "Assessment of Rural Livelihoods, Health, and Wellbeing in Vhembe District Municipality, South Africa, and Narok County, Kenya." This study, now published in the renowned ELSEVIER journal on Environmental Science and Policy, focuses on the Water-Energy-Food (WEF) nexus perspective to evaluate the multifaceted impacts of climate change on rural communities.

Objectives and Scope

The primary aim of the research was to assess the interlinked aspects of rural livelihoods, health, and wellbeing at a local level, recognizing that climate change exacerbates vulnerabilities within these communities. By understanding the critical linkages between water, energy, and food resources, the study provides empirical evidence essential for sustainable development. This research is crucial for informing the development of policy instruments designed to balance societal needs with environmental sustainability, especially in the context of a changing climate.

KEWI's Contribution

KEWI's specific role in this collaborative effort focused on Narok County, Kenya. The institute examined various dimensions of rural livelihoods in Narok, including: ***Water Access and Management:*** Investigating the availability, quality, and management practices of water resources, ***Energy Sources and Usage:*** Analyzing the types of energy sources available to the communities and their utilization and ***Food Security and Agricultural Practices:*** Evaluating the local agricultural practices, food production levels, and food security status.

Key Findings

The research highlighted several critical insights:

1. Climate Change Impacts: Both Vhembe District and Narok County are experiencing significant impacts from climate change, affecting water availability, energy accessibility, and food production.
2. Vulnerability and Adaptation: Rural communities are increasingly vulnerable to these changes, necessitating adaptive strategies to enhance resilience.
3. WEF Nexus Interdependencies: The interdependencies within the WEF nexus are crucial for sustainable resource management. Integrated approaches are needed to address the interconnected challenges faced by these communities.
4. Community Engagement: Active community participation is vital in developing and implementing effective policies and practices that address local needs and conditions.

Policy Implications

The research underscores the need for comprehensive policy frameworks that integrate WEF nexus considerations. Policies should: promote sustainable water management and conservation practices, support the development and adoption of renewable and efficient energy sources and enhance food security through improved agricultural techniques and infrastructure.

This collaborative research provides a valuable contribution to the WEF nexus-livelihood research domain, offering insights that are critical for policymakers and stakeholders .

https://www.sciencedirect.com/science/article/pii/S1462901124001515)

RESEARCH

Redefining Water Utility Efficiency Indicators: Moving Past Numbers

BY ERIC OMONDI

Performance metrics serve a pivotal role in guiding decisions on the recognition of the performance of water utilities in Kenya and ultimately determine the resources allocated to different water utilities. WASREB and other water sector institutions use % NRW as a metric to compare the performance of water utilities in Kenya.

This metric paints an incomplete picture of water utility performance, often resulting in misleading comparisons. To adequately compare the performance of water utilities, a paradigm shift from percentages to a more comprehensive expression of water loss is essential.

Consider two hypothetical water utilities, Utility A and Utility B, serving different populations and geographical regions in Kenya. Comparing the two utilities using % NRW might imply a significant difference in terms of their performance. It shows that Utility A records a high unacceptable % NRW of 42% according to WASREB standards while Utility B records a more acceptable % NRW of 15%. However, diving deeper into the figures tells a different story.

Utility A serves a population of 120,000 people has a water supply of 14,400 m^3/day and 30,000 connections. On the other hand, Utility B serves 200,000 people, has a supply of 40,000 m^3/day and 40,000 connections. The NRW per day for both utilities is 6000m3/day but the %NRW shows a significant variation between the two utilities.

The glaring discrepancy in % NRW is a result of the limitation of using % NRW as a metric for comparing the performance of water utilities. NRW does not account for contextual factors such as the total population served, the total number of connections, the length of the connections, the water demand, and other infrastructural utility differences.

Therefore, it is unfair to compare water utilities using % NRW without considering these contextual differences.

To adequately address this discrepancy, regulators such as WASREB need a paradigm shift from comparing water utilities using conventional NRW percentages to more comprehensive performance metrics such as m3/day/km or m3/day/connection. This way, a true reflection of each utility's performance is achieved.

For instance, in Utility A with 30,000 connections, the NRW in m3/day/connection is 0.20 while Utility B with 40,000 connections have an NRW of 0.15 m^3/day/connection indicating a slight difference in the performance of the two utilities compared to the significant variation observed using % NRW.

Expressing NRW in m3/day/km also shows that Utility A loses slightly more water (6.7m3/day/km) compared to Utility B (3.8m3/day/km). This analysis shows that the use of % NRW to compare water utilities can be misleading, and therefore regulators should consider other performance metrics such as NRW in m3/day/km, NRW in m 3/day/connection, Infrastructure Loss Index (ILI) and Apparent Loss Index (ALI) that consider the contextual differences between water utilities to determine performance.

RESEARCH

The Significance of Microbiological Water Quality Assessment

BY DRYDEN KAZIRA

Water touches every aspect of development and it links nearly every Sustainable Development Goal (SDG). It drives economic growth, supports healthy ecosystems and it is essential and fundamental for life.

According to the World Bank approximately 2 billion people around the globe do not have access to safely managed drinking water services; 3.6 billion people do not have safely managed sanitation services and 2.3 billion lack basic hand washing facilities.

Currently the country is experiencing flooding due to the prolonged rains. This poses a threat to the quality of our drinking water due to possible contamination. It is therefore critical to ensure that drinking water is subjected to water quality testing; physical, chemical and microbiological analysis. Microbiological water quality testing is the process of analyzing water samples to detect and quantify the presence of bacteria and other microorganisms that can indicate contamination or pose a risk to the human health. The test is crucial in water quality monitoring and ensures that water is safe for consumption and other uses.

Microbiological water quality testing is crucial as it: helps prevent outbreak of water related infections; proactive testing ensures identification of microbes and treatment is done before it is dispatched to the consumers to prevent water related infections outbreak for example: cholera, typhoid, salmonella, guides public health intervention; testing provides critical data to health authorities to make informed decisions on necessary intervention or deploy emergency measures response in case of detected contamination, maintains public confidence; testing builds trust in the drinking water supplied to consumers, ensures safe drinking water; regular testing ensures that water remains safe for drinking, cooking and hygiene uses.

In conclusion, microbiological water quality testing is essential in preventing water borne infections, maintaining public confidence in water supply, ensuring safe drinking water and protecting the public health.

Round up of The Week's Events

A familiarization meeting between KEWI leadership and a delegation from Chinese Embassy in Kenya at KEWI , Nairobi

Quote of the Week

"The task of leadership is not to put greatness into humanity, but to elicit it, for the greatness is already there." By. John Buchan

EDITORIAL TEAM

Editor

Dorine Eva Irungu

Eric Wamiti

Pius Kimani

Faizah Jepkorir

Rose Wambui

Peter Mwendwa

Dryden Kazira

Eric Omondi

Photographer

Pius Kimani

Designer

Pius Kimani

Round up of The Week's Events

Nairobi Campus tour by NACOSTI officials during their monitoring, evaluation and inspection exercise.

Long - Term Programmes

Diploma in Water Engineering Technology (DWET) Diploma in Wastewater
Diploma in Water, Sanitation Engineering Technology (DWSET)
Diploma in Water Resources Management Technology (DWRTM)
Diploma in Irrigation and Drainage Engineering Technology (DIDET)
Diploma in Information Communication Technology (DICT)-KNEC
Diploma in Water Laboratory Technology (DWLT)
Certificate in Wastewater and Sanitation Engineering Technology (CWSET)
Certificate in Water Resources Management Technology (CWRMT)
Certificate in Information Communication Technology (CICT)- KNEC
Certificate in Water Laboratory Technology (CWLT)
Certificate in Water Engineering Technology (CWET)
Drilling Operations and Management (DOM)
Plumbing and Pipe Fitting (PPF)
Water Operators Course (WOC) in:

- Water Supply
- Meter Reading
- Sewerage Operations

Short - Term Programmes

Use of Earth Observation Tools and GIS for Water Resources Management
Entrepreneurship and Financial Management for Water Managers
Operation and Maintenance of Water Supply Networks
Metering and Installation of Water Supply Networks
Leak Detection & Repair techniques
Drilling Operations and Management (DOM)
Operation & Maintenance of Pumping Stations
Pump Selection, Installation and Maintenance
Plumbing, Pipe Fitting and Solar Water Heating
Instrumentation for Water and Wastewater Systems
Water Governance, Management and Technology
Application of GIS for Water Utilities Mapping
Drilling Operations and Management
Water Quality Sampling and Testing
Microbiological Water Quality Assessment
Integrated Water Resources Management
Non-Revenue water
Water Management
Customer Care

Vision

A Technical Centre of Excellence in Training, Research, Innovation and Consultancy in the water, Sanitation and Irrigation Sector.

Mission

T o offer Competency-Based Training, Research, Innovation, Consultancy and Outreach Services in the Water, Sanitation and Irrigation Sector for sustainable development.

Core Values

Good Corporate Governance
Professionalism
Customer Focus
Innovativeness
Inclusivity
Patriotism
Integrity

GET IN TOUCH WITH US

The Director,
Kenya Water Institute,
P.O. Box 60013-00200 Nairobi
TEL: +254 722-207757
Email: info@kewi.or.ke
Website: www.kewi.go.ke

For enquiries about our TVET programs
Contact the Registrar, Admissions Office.
Phone: 0735339206
Email: admissions@kewi.or.ke

KEWI Nairobi Campus
P.O. BOX 60013 – 00200
Tel: 0722207757
Email: info@kewi.or.ke

KEWI Chiakariga Campus
P.O. BOX 12 – 60215
Tel: 0729009104
Email: chiakariga@kewi.or.ke

KEWI Kitui Campus
P.O. BOX 1514 – 90200
Tel: 0707566395
Email: kitui@kewi.or.ke

KEWI Kisumu Campus
P.O. BOX 7825 – 40100
Tel: 0746212708
Email: kisumu@kewi.or.ke

OTHER SERVICES OFFERED

Water Quality Laboratory Services
Drilling and Test Pumping Services
Ground water Assessment Services
Conferencing Services
Troubleshooting of pumps boreholes and distribution systems
Repair of pumps boreholes and distribution systems

Your feedback is crucial for our improvement

communications@kewi.or.ke **@kewi_kenya** **Kenya Water Institute** **www.kewi.go.ke**