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Editor's Note



Mr Daniel M. Nzonzo, HSC

Principal Corporate Communication Officer

Welcome to another issue of Irrigation News. This edition assesses the status of irrigation projects around the country. In our interview series, we also talked with our own Eng. Jairus Serede, whose inspirational journey covering the professional and personal lives epitomises the spirit of commitment, resilience and creativity in irrigation. We examine his extraordinary professional path and achievements at the National Irrigation Authority (NIA), where he has held important positions.

We have also surveyed the most recent developments in irrigation technology, such as the use of public-private

partnerships in increasing productivity and the application of remote sensing technologies to grow yield in the Galana Kulalu Food Security Project.

As you read through this edition, we believe the stories and insights will inspire, motivate, and push you to expand the boundaries in the irrigation sector.

Thank you for support and readership.

Chairman's Note



Eng. Gilbert Maluki
Chairman of the Board

During the financial year 2023-24, the Board ensured the National Irrigation Authority continued to develop requisite strategic documents and policies to guide the execution of its mandate. Among others, the Authority prepared and successfully launched its five-year strategic plan 2023-2027, which aligns programmes and activities with the Bottom Up Economic Transformation Agenda (BeTA). As the implementation of the Plan takes shape, the Board has ensured the first year targets are incorporated in the Authority's Performance Contract for Financial Year 2024/ 2025.

The Plan provides a strategic framework structured around five key result areas, namely:

- i. Improved productivity of irrigation schemes.
- ii. Enhanced productivity of irrigated agriculture.
- iii. Sustainable exploitation and development of irrigation potential.
- iv. Secure, reliable water for irrigation.
- v. A robust and dynamic institution.

To achieve these goals, optimising irrigation infrastructure is essential by enhancing farmers' capacity and engaging the private sector through public-private partnerships, as the country's crop production systems are predominantly managed by small-holder farmers. Most of these farmers lack adequate production and financial resources, which, in turn, affect optimal use of the installed irrigation infrastructure. The Authority will strive to be a one-stop shop where farmers are empowered to produce, add value and be linked to markets for their produce.

During the year, the Board approved several key policies, including the Finance Policy and Procedures Manual, the Risk Management Policy, the ICT Policy and the Corporate Social Responsibility Policy that guide the execution of daily duties.

I extend my gratitude to the Board members, staff and stakeholders for playing a pivotal role in the development of the new Strategic Plan and the policies. Your dedication and hard work has been instrumental in shaping our next steps as we strive to make Kenya food-secure.

CEO's Note

In the 2023/2024 Financial Year, the National Irrigation Authority (NIA) prepared its Strategic Plan 2023-2027, which was launched on July 1, 2024. The plan was the culmination of a vigorous process adopting a bottom-up approach and wide consultations with stakeholders. It is aligned with the Irrigation Act, 2019 and is well placed to deliver the aspirations of the Government espoused in the Bottom-Up Economic Transformation Agenda (BeTA), the fourth Medium Term Plan 2023-2027 and Kenya Vision 2030.

The Authority targets to increase the area under irrigation from 711,993 acres in the financial year 2022-23 to 1.2 million acres by 2027-28. Additionally, it eyes increasing the capacity of water harvested and stored for irrigation from the current 55.4 million cubic metres to 330 million cubic metres while rice and maize production should rise from 192,299 metric tonnes and 195,521 Kgs in 2023/24 FY to 700,000 metric tonnes of rice and 300 million bags of maize within the next 5 years.

The Plan intends to strengthen stakeholder engagement to optimise adoption of operational research and irrigation technologies and production. Among other goals, these will enhance governance and institutional capacity building to develop and adopt appropriate policy, legal and regulatory frameworks for better branding and corporate image for enhanced service delivery and stakeholder engagement.

As a result, the Authority has adopted a new vision statement, *'Irrigation for a Prosperous Nation'* and a mission statement, *'To Develop, Coordinate and Manage Sustainable Irrigation Services for Socio-Economic Development in Kenya'*. The core values guiding delivery of the Strategic Plan are Teamwork,



Eng. Charles Muasya, MBS

Chief Executive Officer

Innovation, Professionalism, Equity and Sustainable Development.

Additionally, the Authority is partnering with Rural Electrification and Renewable Energy Corporation (REREC) to provide an alternative source of power to the diesel-powered water abstraction intake in Tana, and expensive and erratic electricity connected to the West Kano and Usueni irrigation schemes.

The alternative sources being explored are connection of Tana Irrigation Scheme to the national grid in the short term while exploring the use of solar and gravity in the long-term in Tana, Usueni and West Kano schemes. This will reduce the cost of operation, ensure steady power supply, improve reliability, and reduce environmental effects of diesel generators. A consistent supply of irrigation water affordably will facilitate continuous food production and increase household income for the local farmers. The partnership with REREC has also been extended to Galana where the two entities are working to connect the project to national grid.

The Authority is also working with SunCulture to explore ways of supporting

farmers through implementation of climate-smart solar-powered pumps, irrigation kits and dam lining through pay-as-you-grow model.

Under the Public Private Partnerships (PPP) framework, three projects are progressing well and are at different stages. The Galana Production, Selu Limited Privately Initiated Proposal (PIP) was successfully evaluated, negotiated and is at the tail end of approval to pave the way for production of 20,000 acres in Galana.

Galana Kulalu dam construction PIP that China Road & Bridge Corporation submitted is being evaluated while High Grand Falls PIP by GBM Consortium is also under assessment. The implementation of these projects will significantly increase the area under irrigation and increase the production of Kenya’s staple crops such as maize and rice. As we work to make Kenya food-secure, we urge stakeholders to continue supporting us.

We call upon staff to internalise the Strategic Plan and live it.

Unlocking the potential of public-private partnerships



Maize at Galana Kulalu Food Security Project in Kilifi/ Tana River Counties under PPP Programme



By Eng. Jairus Serede

between the government and the private sector. These deals enable the private sector to build, operate, and maintain public infrastructure, thus providing services traditionally in the hands of the government.

In Kenya, such projects are supported by the Public Private Partnerships Act, 2021 as the anchor law.

Roads, airports, bridges, hospitals, schools, prisons, railways,

irrigation, water and sanitation projects are now under PPPs.

Unlike conventional asset-based approaches, PPPs focus on service delivery. The private partner invests in public infrastructure and provides related services while the government retains responsibility for delivering core processes. This collaboration aims to achieve high standards and improve efficiency in public service delivery.

Public-Private Partnerships (PPPs) are innovative contractual arrangements

PPPs in Kenya's development agenda

In Kenya, PPPs are integral to the country's development strategy, particularly under the Bottom-Up Transformation Agenda (BeTA) and the Fourth Medium Term Plan (MTP IV). These plans aim to finance development through sectoral budgets, domestic and foreign direct investments, PPPs, green financing, and support from development partners. The government is committed to aligning PPPs with development priorities while promoting a whole-of-government approach to service delivery.

Benefits of PPPs

1. **Economies of scale:** PPPs enable cost efficiency through scale.
2. **Focus on core functions:** The government can concentrate on areas where it has a comparative advantage, leaving other tasks to private entities.
3. **Increased access:** PPPs improve service access, especially for underserved groups.
4. **Transparency:** PPPs make government spending more visible and accountable.

Government role in promoting PPPs

The government plays a crucial role in facilitating PPPs by:

1. Ensuring strong political will and leadership.
2. Providing a clear and supportive legal framework.
3. Establishing a coordinating entity to support PPPs.
4. Prioritising projects of high economic efficiency.
5. Ensuring transparency and probity in the procurement.
6. Safeguarding the interests of customers and the public.

PPPs in agriculture

The agricultural sector offers many opportunities for PPPs, including the following:

- **Digital for Agriculture (D4ag):** This project targets 1.4 million farming households online and 2,300 agro-dealers to supply farm inputs.
- **Selu Ltd:** Engaged in the Galana Kulalu food security project.
- **Flower Industry:** Several PPPs are under way.

Challenges and success factors

Globally, studies on PPPs focus on themes such as risks, relationships, critical success factors, challenges, and financing/value for money. Achieving value for money in PPPs is a key concern due to the complex and lengthy procurement that requires expertise in identifying the best PPP candidate projects, selecting suitable private partners, allocating risks effectively, and managing stakeholders.

Among the challenges are complex negotiations, difficulty in valuing facility management, specifying service quality, potential conflict of interest, and the public sector's capacity to manage consultants. Despite these challenges, PPPs remain popular among governments due to their potential to reduce financial burdens, encourage private sector innovation, and provide value for money and timely project delivery.

PPPs in Kenya's irrigation sector

The government, through the National Irrigation Authority, is advancing PPPs as an alternative procurement method for large-scale projects. With limited fiscal space for borrowing, PPPs are a viable option. Significant milestones have been achieved, such as the completion of negotiations and project agreements for the Galana Kulalu project, which is Kenya's first-ever irrigation production project under PPP. Other ongoing projects include HGF Dam, Lowaat Dam, Thuci Dam, Radat Dam, and Gogo Dam.

Conclusion

Public-private partnerships hold a great promise for Kenya's development, particularly in the irrigation sector. By embracing PPPs, Kenya can unlock its irrigation potential, drive economic growth, and ensure sustainable and efficient service delivery. The government's commitment to a supportive legal framework and transparent procurement will be key to realising the full benefits of PPPs.

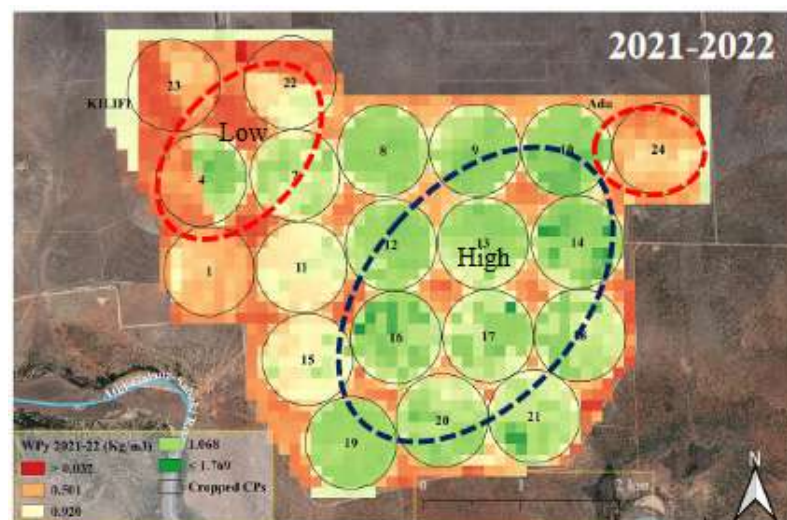
Galana Kulalu case: Using remote sensing to grow irrigation

By Eng. Jairus Serede and
Harun Mbugua

Background

With a rapidly growing world population, the pressure on limited freshwater resources is increasing and will continue. Globally, 820 million people face hunger (FAO, 2019). Indeed, about four billion people face water scarcity at least one month of the year (Unesco World Water Assessment Programme WWAP, 2019). Irrigated agriculture is the largest water-consuming sector but increasingly faces competing demands from other sectors, such as the industrial and domestic fronts. With an increasing population and less water available for agricultural production, the food security for future generations is under a big threat. Kenya's agricultural sector faces the challenge of producing more food with less water by increasing crop water productivity (CWP), which is the amount of marketable yield in kilogrammes produced per unit volume of actual evapotranspiration and interception (ET).

A higher CWP results in either the same production from less water resources or a higher production from the same water resources, delivering direct benefits to other water users. Globally measured average CWP values per



Spatial distribution of maize water productivity

unit of water depletion are 1.09, 1.09, and 1.80kg m⁻³ for wheat, rice, and maize, respectively.

The range of CWP is very large (wheat, 0.6–1.7 kg m⁻³; rice, 0.6–1.6 kg m⁻³ and maize, 1.1–2.7 kg m⁻³) and this offers tremendous opportunities for increasing agricultural production with 20–40 percent less water resources. Capturing and analysing spatial and temporal variability in CWP paves the way for identifying the potential for improving CWP.

Remote sensing is an excellent tool that allows comprehensive analysis and requires comparatively little ground information. It enables CWP estimation with acceptable accuracy, with errors ranging from seven percent to 22 percent for the

best-case scenario.

Finally, remote sensing is low cost technology compared to ground measurements and offers a rapid scan of the CWP in a rather large extent area. In combination with other spatial information, it can diagnose the causes of low performance and identify interventions for improving CWP.

In 2017, the FAO Water Productivity Open-access Portal (WaPOR) was launched to monitor agricultural water productivity through open access to remotely sensed data in Africa and the Near East. WaPOR datasets are accessible at three different scales: continental (Level 1) 250m, country (Level 2) 100 m, and project (Level 3) at 30m. The methodology used for compiling the actual evapotranspiration

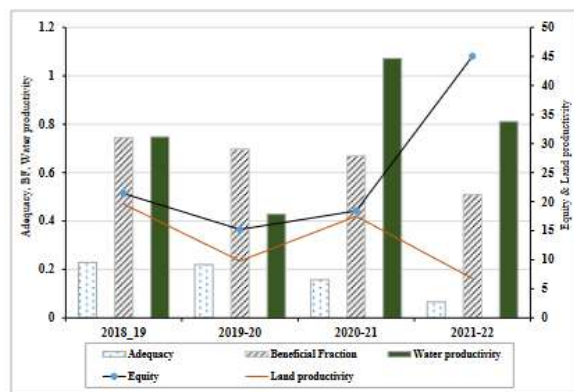
of WaPOR is based on the newly developed technique to calculate the evapotranspiration of vast areas using a range of remotely sensed data: moderate-resolution visible and near-infrared data from the MODIS sensor and low-resolution estimates of soil moisture from the AMSRE sensor. The Penman-Monteith equation is solved separately for vegetation and soil, facilitating the division of evapotranspiration into transpiration and evaporation.

First, bulk download of raster data (.tiff files) from the WaPOR portal is carried out. This is followed by downscaling the downloaded data to the desired spatial resolution, removal of data outside the study area, summing for seasonality based on the start (SOS) and end (EOS) of a cropping season, and calculating the aboveground dry biomass production (B). Biomass water productivity is calculated as the sum of biomass produced divided by actual (seasonal) evapotranspiration (ETa). The necessary raster corrections are applied on Quantum Geographic Information System (QGIS) so that pixel values in the raster shows the physical unit of the variable.

QGIS has various tools to perform series statistics, zonal statistics, and raster quantitative and qualitative analysis to analyse spatial patterns in the data to inform decisions. The irrigation performance indicators selected for the area of interest include uniformity, equity, adequacy, and productivity. These indicators are selected because they can be assessed using the WaPOR data.

Case study of Galana Kulalu Food Security Project

The Galana Kulalu Food Security Project was initiated with the main aim of mitigating the challenge of food shortage in Kenya brought about by recurrent drought. The main cropping started in 2015, growing basically hybrid maize. A study in 2022 using WaPOR data targeted to characterise the status of water use and water productivity in the Galana Kulalu irrigation scheme and to identify opportunities in the use of remote sensing to provide information for assessing performance of irrigated agriculture



Irrigation performance indicators and water productivity for irrigated maize at Galana Kulalu

at Galana Kulalu.

Results

Irrigation and performance analysis

The performance indicators varied markedly between the seasons and were lowest in the 2021-22 cropping season, for all indicators (Figure 1). Uniformity was particularly low and rated poor in the 2021-22 cropping seasons, showing a lack of evenness in water supply between the centre pivot sites. While this could be attributed to non-uniform irrigation practices, other underlying factors such as soil salinity and hardpans could also have been at play. Adequacy, the measure of relative evapotranspiration, and beneficial fraction were varied between the cropping seasons. Sites of concern were identifiable, which calls for more focused investigation and diagnosis of specific centre pivot sites.

Although land productivity was lowest in the 2021-22 cropping season, crop water productivity (WP_y) was second highest in relative terms (Figure 2). Spatially, high-performing CPs (such as nos. 9, 10, 14, 16, 18) were distinguished from the low-performing ones (1, 4, 22, 23, and 24). The mean WP_y was 0.81 kg/m³ with a 95th percentile target of 1.19 kg/m³. Reported yield gaps for maize in Kenya range at above 50 percent which could apply in this study. Unlocking yield potential

per unit land size of the affected low-performance CP sites requires more investigation into certain biophysical factors such as soil fertility, salinity, agronomic practices, and economic factors related to operations of the irrigation infrastructure.

Conclusion

Remote-sensing datasets are increasingly applied as an innovative tool for monitoring the performance of irrigation schemes to improve land and water productivity amid the growing competition for finite and even dwindling resources (land and water). WaPOR data can help answer the question: what is the implication of increasing the production of land and water resources? This can provide engineers, agronomists and management with important information regarding the implications of increasing production, either through agricultural land expansion or intensifying production in existing lands.

Secondly, the WaPOR-derived datasets can be applied to assess irrigation performance indicators, including uniformity, equity, adequacy, and land and water productivity at our irrigation schemes. Therefore, the systematic approach demonstrated in the Galana Kulalu Study can serve as a framework to operationalise the use of WaPOR-derived data and other increasingly available RS-derived products for irrigation performance monitoring and assessment in all our irrigation schemes and projects.

Leveraging public-private partnership for irrigation growth



By **Benedict P.O. Owilla**

Policy makers and implementers alike keep repeating that Kenya is a food-insecure country with a high population growth rate (2.2 percent against global average of 0.91 percent annually) but agriculture remains the anchor sector, contributing directly 25-30 percent to its Ksh15 trillion Gross Domestic Product.

The net effect of this scenario is that a unit change in agricultural productivity leads to a deeper spike in economic



Maize at Galana Food Security Project in Kilifi/Tana River Counties

performance by more than one unit. Further, agriculture is predominantly small-scale and rain-fed in Kenya. Fluctuations in agricultural productivity due to reliance on erratic rains as well as adverse impacts of climate change and volatile geopolitics have

led to serious shocks on the country's socioeconomic growth and development.

Consequently, Kenya seeks to stabilise and enhance its agricultural productivity and hence socioeconomic transformation through

accelerated irrigation expansion. The Constitution of Kenya, Vision 2030 economic blueprint and its attendant Medium-Term Plans, Irrigation Policy (2017) and Irrigation Act 2019 all anchor this strategy. The capacity of the developed infrastructure to achieve the food security goal depends on choice of irrigation enterprises, development and coordination of value chains of stakeholders, intensity of production, and effectiveness of crop production activities, operation and maintenance of irrigation infrastructure as well as on-farm water distribution and management. In most of Kenya's irrigation projects, small-scale farmers with inadequate production and thin financial resources that do not provide for optimal use of the installed irrigation capacity dominate the crop production systems. Therefore, large-scale commercial investments need integration into the production systems to enhance return on irrigation investment.

By virtue of their large operational capacity, the large-scale investors are able to mobilise financial and capital resources, thereby reducing their operational costs due to

economies of scale. It is against this background that the government is encouraging large-scale investment approach to support small-scale farmers in irrigation projects under the National Irrigation Authority (NIA).

To position the large-scale commercial irrigation at the centre of Kenya's agricultural transformation, the NIA is spearheading the development of Galana Food Security Project for large-scale crop production model. In addition, expansion of the Lower River Tana Belt is on course as a hybrid model where large-scale irrigators will operate alongside their small-scale counterparts. This is in addition to improving the performance of the other established public projects across the country.

Development of a framework for the management of large-scale private enterprises in the national irrigation projects is underway to facilitate injection of private capital. This will grow irrigated agricultural output, thus building the momentum for public irrigation expansion.



Construction of Irrigation infrastructure in Galana Food Security Project in Kilifi/Tana River Counties

Launch of Strategic Plan



Pictorial



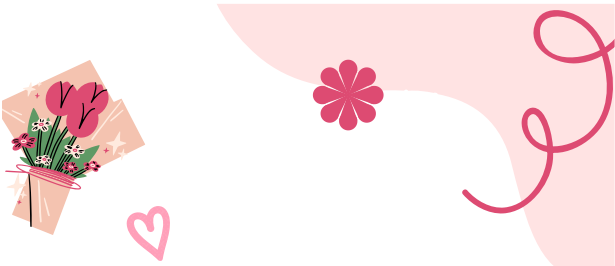
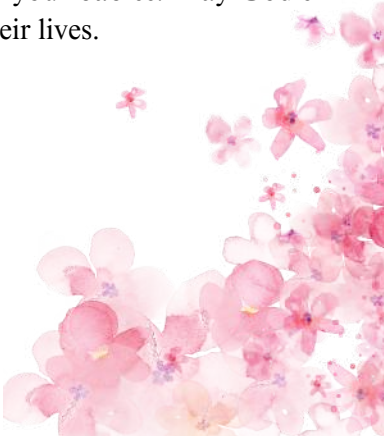
1. A stakeholder validation workshop for the Authority's Strategic Plan 2023-2027 held at Kenya Utalii College in Nairobi on June 21, 2024.
2. Principal Secretary, State Department for irrigation, CPA Ephantus Kimotho, CBS (4th Left), Irrigation Secretary Eng. Vincent Kabuti (2nd Left), National Irrigation Authority (NIA) Chief Executive Officer Eng. Charles Muasya, MBS(3rd Left),Thika town, MP Hon. Alice Nga'ng'a(Center) and other leaders presiding over a stakeholder engagement meeting in Ndula Magogoni Irrigation Project located in Thika town constituency, Kiambu County on May 3, 2023.
3. NIA Chief Executive Officer Eng. Charles Muasya, MBS (infront)leading staff in the National Tree Growing exercise in Namanga Hills, Kajiado County on May 10, 2024.
4. Principal Secretary, State Department for irrigation, CPA Ephantus Kimotho, CBS (in a blue reflector), NIA Chief Executive Officer Eng. Charles Muasya, MBS (Right) accompanied by Mwea Irrigation Development Project (MIDP) package 2- Lot 1 and 2contractors to assess the effects of floods on the project on May 31, 2024.
5. Principal Secretary, State Department for irrigation, CPA Ephantus Kimotho, CBS (4th Left) Kajiado County Governor H.E Joseph Olelenku, EGH, (center) the Authority's Chairman Eng. Gilbert Maluki (2nd Right) CEO Eng. Charles Muasya, MBS, (Right) at Masai Technical Training Institute in Kajiado County for dissemination of the Kenya Vision 2030 MTP IV 2023-2027 on June 3, 2024

Staff News

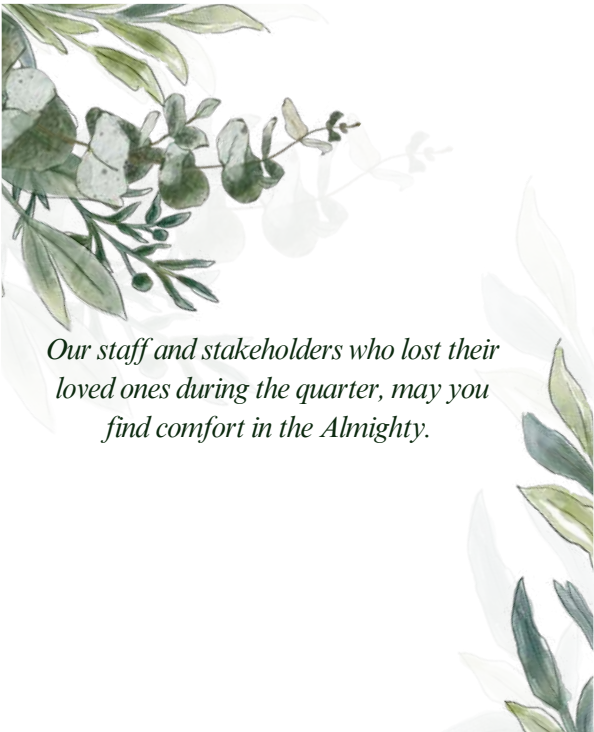


Congratulations Dennis Okinyi, Dennis Nyabuto, Scheryll Ouma, Maureen Gatwiri, Halima Adhan, Daniel Atei, Gordon Bundah, Maurice Okengo, Lawrence Otiende and Rachael Mwangi on the arrival of your babies. May God’s favour carry them all the days of their lives.

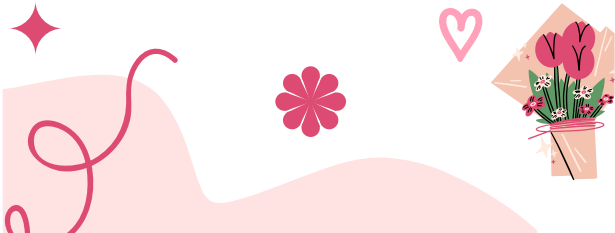
WELCOME TO THE WORLD



We wish a quick recovery to all our staff who are ailing. Among others, Moses Nyandusi, Swa Koech, Peter Birir, Tairus Okuku, and Collins Omondi, you will soon get over this. Once more, Quick Recovery!



Our staff and stakeholders who lost their loved ones during the quarter, may you find comfort in the Almighty.



Feeding the nation through large-scale irrigation



By George Maina

The National Irrigation Authority develops and manages large-scale irrigation schemes, small-scale community-managed irrigation projects through construction and rehabilitation of infrastructure with the aim of achieving food security.

According to the Irrigation Act, 2019 large-scale irrigation schemes cover bigger than 3,000 acres. Over the years, the Authority has seen the successful operation of the seven gazetted public irrigation schemes, namely Mwea, Ahero, West Kano, Bunyala, Bura, Tana, and Perkerra. It also manages Katilu, Lokubae clusters, and Lower Kuja Irrigation Development Project.

Mwea Irrigation Settlement Scheme, the largest public irrigation scheme in Kenya, is in Kirinyaga County and falls within two sub-counties of Mwea East and West. Its development started in 1954 from the Tebere section with about 65 acres in irrigation farming and has grown to 30,350 acres. The area under irrigation in the scheme is 30,600 acres with rice being the main crop. Others include tomatoes and French beans. The scheme has an expanded



Rice in Mwea Irrigation Scheme in Kirinyaga County

area of 5,000 acres, benefits 14,850 households, and produces an average annual production of 131,800 metric tonnes with an average gross income of more than Ksh25 billion.

Tana Irrigation Scheme is the oldest started in 1953 with a gazetted area of 12,630 acres. Rice, watermelon, sunflower, onions, green grams and tomatoes are some of the crops grown within scheme. Its area under irrigation is 5,000 acres that benefit 1,450 at 9,000 metric tonnes average annual production valued at Ksh300 million averagely.

The National Irrigation Authority was in charge of the Bura Irrigation Scheme from inception in 1978 to 1985 when its management was transferred to various ministries, starting with Agriculture, then Regional Development, later Land Reclamation, Regional and Water Development and back to Agriculture up to 2002. In 2003, the scheme management changed to the Ministry of Water and Irrigation. In December 2005, the management was taken over by National Irrigation Authority.

Sitting along the Tana River in Tana River County, it



A farmer harvesting Onions in Tana Irrigation Scheme, Tana River County

covers 176,297 acres with 12,000 installed with irrigation infrastructure. Today, 3,000 farmers settled in the scheme crop maize, green grams, cowpeas, cotton, watermelon, tomatoes, butter nuts and onions, giving them an annual average gross income of more than Ksh1 billion. The Authority is working on its expansion to 25,000 acres with the construction of the gravity canal from Korakora.

Perkerra is situated 100km, north of Nakuru near Marigat Township in Baringo South Sub-County. It derives its name from River Perkerra, which is the source of its irrigation water and the only permanent river in the region.

It has a gazetted area of 5,800 acres where 2,750 are under irrigation with the main crop being seed maize. Other crops are green grams, beans, horticultural crops, okra and butternuts. It benefits 1,625 farmers with an annual production of 5,000 metric tonnes of seed maize and 790 metric tonnes of legumes and pulses. This comes with an average annual gross income of more than Ksh 410 million.

Ahero Irrigation Scheme is in the Kano plains between the Nandi Escarpment and Nyabondo Plateau. Its construction started in 1966 and started operating three years later with a gazette area of 4,176 acres. The scheme gets its irrigation waters from River Nyando while the main crop is rice (Sindano, IR-2793 & ITA 310 varieties taking 90 percent), Basmat-370 at five percent while another five percent is hybrid (Arize Tej Gold & Arize 6444 Gold). Other crops are soybeans, vegetables and maize.

In the past five years, the Authority has expanded Ahero from 2,168 acres to 13,000

with a gazetted area of 4,176 acres. The area under irrigation infrastructure in Ahero covering Okana, Mbega, Kore, Nokiso and Masune is 10,810 acres from where about 29,000 metric tonnes of rice are produced annually with an average annual gross income of more than Ksh1 billion.

Bunyala Irrigation Scheme was started in 1959 with an initial 534 acres under paddy rice production. The irrigation water is pumped from River Nzoia and flows by gravity through open earth channel to the farms. Due to increased demand for rice, two new pump sets were installed in 2005 and two more in 2007, bringing the combined discharge to 1.2m³/s along with the widening of the main canal. The acreage was expanded to more than 1,600 acres on the left bank of the river. It has a gazetted area of 10,000 acres while the area under irrigation is 3,126 acres with an expansion area of 2,592 acres benefiting 3,489 households.

The main crop is rice that produces 10,000 metric tonnes annually with an annual gross income of Ksh500 million. The Lower Nzoia Irrigation Development Project, once completed will bring under production 10,000 acres on the left bank under the first lot. The second will bring similar acreage under irrigation on the right bank.

West Kano Irrigation Scheme is located in the Kano plains between Nandi escarpment and Nyabondo plateau on the shores of Lake Victoria in Kisumu County. It was constructed in the year 1974 and became operational two years later. Its main crop is rice, while maize, vegetables and soya beans are the others. It has 2,230 acres under irrigation that benefit 901 households. The scheme produces 7,024.5 metric tonnes annually with an average annual gross income of more than Ksh316 million.

Turkana County, the largest county in Kenya, has two major irrigation schemes, namely Katilu Irrigation Scheme and Lokubae Clusters (Lokubae, Elelea and Morulem irrigation schemes).

Katilu sits in Turkana South Sub-County, approximately 130km South of Lodwar town. It is situated along Turkwel River, which is perennial and irrigation water is abstracted by gravity via earth canals to the scheme. It has a total of 1,968 acres benefiting 2,546 farmers, each owning 0.5 acres within the scheme while



Farmers transplanting rice in Ahero Irrigation Scheme, Kisumu County

the outgrowers have varied land sizes.

Lokubae Irrigation Scheme is in Turkana East Sub-County in Lokori Division. It has 2,560 acres under irrigation benefiting 4,678 farmers that crop maize, sorghum, cow peas, green grams and groundnuts. Vegetables such as sukuma wiki, tomatoes, watermelons and spinach also cover the schemes.

Elelea Irrigation Scheme, which was developed in 1983 under the Turkana Rehabilitation Project, has an acreage of 1,300 and 2,600 farmers growing maize, sorghum, cow peas, green grams and groundnuts. The rest are sukuma wiki, tomatoes, watermelons and



Farmers weeding in their Sorghum and millet farm in Elelea Irrigation Scheme, Turkana County

spinach.

Morulem Irrigation Scheme that came to be in 1983 has 1,680 acres (780, 600 and 300 acres in phases 1, 2 and 3) in the hands of 3,240 farmers. Maize is the main crop here while the rest are sorghum, cow peas, green grams and groundnuts.

Lower Kuja is in Nyatike Sub County in Migori County, close to the shores of Lake Victoria within the Lower Kuja River basin. It is situated about 400 km to the West of Nairobi County, 110 km to the south of Kisumu County, 45km to the north-west of Migori town and 15km to the West of Macalder Township. It covers six locations and 13 sub-locations in Nyatike and Karungu divisions at 14 blocks for crop production. Currently, Block M, Block 1.1, Block 2.1 and Block 3 are cropped under irrigation of which, rice is the major one. Others include sugarcane, horticultural crops and tubers.

It has a gazetted area of 19,000 acres with 3,250 acres now under irrigation in the hands of 2,797 farmers. The average annual production is 37,903.5 metric tonnes, earning about Ksh162 million annually; 4,600 acres have irrigation infrastructure. Construction of Gogo Dam is expected to increase the area under irrigation to about 75,000 acres.

How Thiba Dam is transforming lives in Mwea Irrigation Scheme



By Beatrice Njeri

Since the completion of Thiba Dam, farmers in Mwea Irrigation Scheme have reported huge positive changes, among

them the availability of adequate water for irrigation. This monumental project, spearheaded by the National Irrigation Authority, is revolutionising rice farming, ensuring a stable water supply, boosting productivity, and promising better incomes. One of the primary benefits of Thiba Dam is stabilising irrigation water with a storage capacity of 11 million cubic metres that allows farmers to plan and work with limited interruptions and hiccups, if any.

Before the construction of the dam, the main sources of water for the scheme have been Nyamindi and Thiba rivers whose supply irrigates approximately 25,000 acres of rice crop fields. However, the water from these two primary sources has been inconsistent, especially during dry seasons, hurting expansion goals, especially double cropping.

The dam's completion has expanded the irrigated area within the scheme from



Thiba dam in Kirinyaga County
 Insert: Farmers (Beneficiaries of Thiba dam) transplanting rice in Mwea Irrigation Scheme

25,000 acres to 30,600 acres, a game-changer for farmers. The increased acreage will double rice production and significantly boost the region's agricultural output.

The reservoir has increased the annual national rice production from 192,299 metric tonnes in 2022 to 234,000 in 2023 and is expected to climb by the end of 2024. The step-up has attracted large private rice millers in Kirinyaga with more than 13 that are expanding.

The value of rice produced at the scheme since the completion of the dam has grown from KSh10 billion to KSh14 billion a year, creating additional 28,000 jobs that have improved the living standards and enhanced skills development.

A stable water supply allows farmers to adopt better farming practices, including double and ratoon cropping. This practice involves planting two and a half cropping seasons in a year, with the main starting in July and ending in December, giving way to ratoon crop that starts in December and is harvested in February.

The second season whose acreage is between

5,000 and 10,000 acres, depending on weather starts in March and is harvested in July, boosting rice production while giving farmers more financial muscle and ability to invest in better practices and technologies, for example drones to apply fertiliser. Double and ratoon cropping maximise the use of land, making it more productive. Additionally, the dam's water management system ensures that water is released on demand, optimising irrigation efficiency and reducing wastage.

Baling of rice straw as fodder has also increased, providing a cost-effective and sustainable livestock feed. This practice also reduces wastage, enhances livestock productivity, lowers feed cost, protects the environment by repurposing agricultural by-products, and creates job opportunities in the processing and distribution of fodder.

Thiba Dam stands as a beacon of hope on stabilising water supply, increasing irrigated acreage, and boosting economic output. The National Irrigation Authority's commitment to enhancing irrigation infrastructure continues to pave the way for a prosperous and sustainable future for Kenya's farmers.

Assessing climate-smart irrigation



By Gloria Sang

Climate-smart irrigation involves the use of advanced technologies and practices designed to enhance productivity while minimising environmental impact. This approach typically integrates precision techniques, such as drip irrigation or sensor-based irrigation systems, with climate data and forecasting to optimise water use.

Climate-smart irrigation holds immense potential as a model for the future of agriculture in Kenya. With the country facing increasing challenges from climate change seen through events including drought and unpredictable rainfall patterns, climate-smart irrigation technologies can revolutionise water management.

Key components of smart irrigation

- i. Soil Moisture Sensors that measure the soil moisture levels and send data to the controller to determine when and how much to water is required.
- ii. Weather Sensors for



Climate-smart Irrigation System at the National Irrigation Authority's Nairobi International Trade Fair Stand 2023

- collecting data such as temperature, humidity, and rainfall, helping to adjust irrigation schedules, according to current and predicted weather conditions.
- iii. Controllers for central units that process data from sensors and automate irrigation. These controllers are programmed to communicate with the entire system.
- iv. Flow Meters that measure the amount of water used and detect leaks or inefficiencies.

Importance of climate-smart irrigation

Water conservation is achieved through the use of sensors and data analytics to deliver water directly to plants at the right time and in right quantities. Climate-smart irrigation optimises water use, hence reducing cost of operations.

In addition, it lowers the environmental impact of irrigation, including groundwater depletion and energy use by integrating renewable energy sources such as solar power, further enhancing their sustainability and reducing dependency on fossil fuels.

Climate-smart irrigation aims to achieve several key goals. Firstly, it focuses on water efficiency through precise application based on real-time data and environmental conditions. Sustainability is promoted through the adoption of practices that reduce the ecological impact of agriculture, ensuring long-term viability. Resilience is enhanced by making agricultural systems more adaptable to climate-related risks, such as adjusting practices in line with the shifting precipitation patterns and temperature changes tied to climate change.

These goals collectively aim to foster a more sustainable and resilient agriculture capable of meeting global food demands while mitigating environmental impact.

The National Irrigation Authority has implemented several projects that promote climate-smart irrigation. In Mandera and Wajir counties, there are 42 projects, including Lehele and Mansa projects that cover 1,700 acres, with more than 2,000 farmers directly benefiting from the food security programmes. Lehele in Wajir County uses drip irrigation that directly delivers water to the root zone, thus reducing water wastage. They also use solar-powered pumps that are environment-friendly and cost-effective. Mansa in Mandera County uses sprinkler irrigation, which distributes water evenly

across the field and promotes efficient water use while reducing evaporation losses.

The Mwea Irrigation Scheme has adopted Water Rice Saving Culture and System of Rice Intensification (SRI) to maximise efficient water use. The future of climate-smart irrigation is promising with advancements such as AI enabling precise water management. This approach integrates sophisticated sensors for real-time monitoring of soil moisture, weather conditions, and plant health, facilitating data-driven decision-making. Predictive models will help to anticipate climate patterns, optimising irrigation schedules amid changing environmental conditions.

Word Search

Under the Strategic Plan 2023-2027, National Irrigation Authority is now guided by the vision, ‘**Irrigation for a Food Secure and Prosperous Nation**’ and the mission ‘**To Develop, Coordinate and manage sustainable irrigation services for Socio-Economic Development in Kenya.**’ Locate the five core values that guide the Plan: Teamwork, Innovation, Professionalism, Equity and Sustainable Development within the grid:

E	M	T	N	E	M	P	O	L	E	V	E	D	H	J
R	E	S	U	S	T	A	I	N	A	B	L	E	S	T
P	A	T	I	E	N	C	E	V	S	O	X	G	Y	Y
P	R	O	F	E	S	S	I	O	N	A	L	I	S	M
M	B	G	H	Q	O	Y	R	F	Z	N	I	J	U	T
R	E	L	I	U	I	N	N	O	V	A	T	I	O	N
Y	C	N	E	I	N	P	S	N	A	R	T	P	A	S
P	G	N	I	T	E	A	M	W	O	R	K	O	R	P
P	E	R	S	Y	N	A	L	I	Z	A	T	I	O	N

Solution to the word search (Irrigation Term) in the 20th issue

I	Z	C	D	U	I	T	R	F	O	L	O	P	N	C
V	X	A	R	S	D	E	T	U	W	V	W	R	H	L
S	P	R	I	N	K	L	E	R	V	X	Z	M	O	N
E	R	W	P	C	H	I	A	R	V	O	U	A	E	B
V	H	G	E	B	F	L	O	O	D	B	A	N	I	A
U	J	H	S	E	T	A	R	W	O	L	F	U	X	S
C	E	N	T	E	R	P	I	V	O	T	E	A	E	I
O	W	T	A	G	R	X	Z	B	V	M	S	L	K	N
N	O	I	T	A	G	I	R	R	I	B	U	S	A	D



Eng. Jairus Serede

Ag. Deputy General Manager,
Planning and Strategy

Jairus Serede: Early riser who became top engineer



By John Bosco Obonyo

Eng. Jairus Imbezi Serede, the Acting Deputy General Manager for Planning and Strategy at the National Irrigation Authority, is a testament to the power of

perseverance and adaptability. From humble beginnings in Kapsabet, Nandi County, to holding a strategic leadership role. His journey underscores the importance of hard work, continuous learning and strategic vision. His experiences highlight how a solid educational foundation can shape one's professional trajectory and drive significant impact in the irrigation sector.

May you tell us briefly about your background?

Thank you for having me. I was born in March 1983 in Kapsabet, Nandi County,

in a family of seven of two brothers. I am the fifth born in the family, and the last of the boys. We are known as the Js family because our names start with the letter J.

That's interesting! Where did you go to school?

I proceeded to Vihiga High School after attending Kiptuiya Primary School. My high school years were crucial since that is when I discovered my interest in either engineering, commerce, or the biomedical sciences. My resolve to become an engineer was solidified when

I attained an A- (minus) in physics. In addition, I was the top student in physics and mathematics and excelled in sports, especially in the 10km marathon race. In my KCSE, I was ranked second in agriculture as well as second best in Vihiga High School.

Were you in school leadership?

Yes, I did. In high school, I served as the Form 4 West prefect and chairman of Mathematics club. It was quite an experience, especially since I was a small guy (laughs).

More about your family and how they influenced your career.

As an art, craft and music teacher, my late dad instilled in us practical knowledge of wood work, carpentry and basic agriculture. We were an extremely hardworking family. We used to get up really early to find pasture for the livestock, collect water and trek a great distance to school. We also assisted with tea picking on the two-acre family tea farm. These experiences helped to shape my career path and gave me a strong work ethic.

What was your experience at university?

University was life-changing. I had to manage life and finances on my own, focusing primarily on my education. Our school, Egerton University, had vast lands and agricultural systems, which provided us with practical knowledge on farm management and irrigation systems. Of course Egerton was known to be the best university in agriculture then

and today. In my fifth year I met my wife, who was a first-year student then. We referred to it as “the gold rush”. We are blessed with two children.

Could you tell us about your professional journey?

I worked as the deputy principal for three months and as a teacher at Shiners Girls High School for six months after graduation. Between 2009 and 2010, I was posted to Naivasha to oversee the building of greenhouses for flower firms after joining African Hydroponics Limited as a technician.

Motivated by my uncle’s success in landing a job in the UK after completing his master’s, my father volunteered to support my master’s degree to maintain my competitiveness in the field. I resigned from work to pursue my master’s degree. On the last day of my course work examinations in April 2011, I spotted an advert for a position at the National Irrigation Authority (the National Irrigation Board then), which I applied for.

I went back to work at African Hydroponics Ltd as I worked on my master’s thesis. I was invited for interviews during this period from Budhia Associates, the National Irrigation Authority (NIA), and Bukura Technical College. They all got me offers, but chose NIA that I joined in September 2011 as an irrigation engineer II. I had to pick up new abilities, such as perfecting designs and consultancy supervision under the supervision of a number of senior engineers, Eng. George Odedeh (now at Lake Victoria North), Eng. Raphael Ogendo

(retired) and Eng. Vincent Kabuti, OGW (currently the Irrigation Secretary, State Department for Irrigation.)

How did you manage to adapt to these new responsibilities?

The entire process was intriguing. It was essential that I develop my leadership abilities and maintain focus on my goals. I learned how to navigate by watching people who came before me and had to think creatively. I had the privilege to study for a Diploma in hydraulics in Egypt, from where I learnt a lot. We were exposed to large-scale water projects while studying in Lake Nasser, West Bank, and Aswan High Dam. Their advanced technology in hydrological monitoring allowed them to record real-time data in the Nile River basin. From these experiences, NIA is collaborating with the Water Resources Authority (WRA) to share data on key rivers in Kenya. Through FAO programmes, we get real-time data from models like Water Productivity (WaPOR), which helps us to understand water availability, irrigation scheduling and water productivity across our schemes.

That was an incredible learning experience. Can you tell us about your roles within NIA?

I started working as an irrigation engineer in 2011 at the head office. In 2016, I was posted to Ahero Irrigation Scheme as the Acting scheme manager until 2018. I was then posted back to the head office and assigned to the Planning and Strategy Department as a senior irrigation engineer.

At this time, I also supported Operations Department on rehabilitation and expansion of schemes to ensure continued production. I worked in Planning Department until 2022, when I was promoted to Acting Principal Planning Officer. Currently, I am the Acting Deputy General Manager in the Planning and Strategy Department. I lead the creation, execution and assessment of NIA corporate strategy, making sure that it complies with the goals of national development and our organisational vision and mission. As a department, we manage the creation of irrigation investment plans, annual work plans and budget projections and carry out resource mobilisation to finance irrigation infrastructure and organisational expansion. As a department, we implement and manage the institutional quality management systems, monitor progress, ensure and oversee performance contracting and carry out impact assessment of programmes for sustainability of the Authority.

How has humility and teamwork played a role in your success?

Being humble and working as a team player has helped me significantly. Remaining focused on my goals with each assignment has also helped me since I get the opportunity to understand NIA comprehensively.

Your laughter is quite infectious. Is that by nature?

(Laughs) Yes, it's inborn, but do not let it fool you. I have learned to remain cheerful in all circumstances. Being cheerful helps me achieve more and makes me approachable and accommodating. It also keeps people from predicting my next move. I enjoy creating a positive impact in all situations.

What motivates you to keep striving for excellence?

My drive stems from my desire to never disappoint anyone, particularly considering my modest upbringing. My father was a great role model who had high expectations from us. Being the last-born son and his favourite, I felt the need to make him proud. I was the first in my family to get to university, and others followed. This keeps me exploring and seizing more opportunities as I mentor people along the way.

What do you think is crucial in resolving issues?

Openness is key. You cannot hide character. I believe in resolving issues openly and honestly. At a time, when you are on the wrong side, being remorseful and apologetic will cost you nothing. Reconciliation is key while working and maintain teams.

How do you maintain a work-life balance?

Somehow, I manage. Most of my time is spent at work, so I dedicate my weekends to my spiritual and social development. My weekends are for family and personal quiet time. I participate in church activities at Harvest Family Church, where I serve as an usher. I run at least five kilometres two times a week. Additionally, as a passionate environmentalist, I enjoy working in my garden.

You have held several senior management roles in the irrigation sector. What is your experience in setting and executing organisational strategy?

Creating and carrying out strategic plans that promote organisational growth and help us accomplish our goals are part of my job. This entails establishing both short- and long-term strategies, managing teams to guarantee these plans are carried out effectively, and allocating capital efficiently. I have worked under the Public-Private Partnership (PPP) framework for some time now, and this expertise has been helpful in creating and carrying out project ideas that are in line with the government's agenda and our strategic goals.

What do you think are the key factors for successful project implementation in the irrigation sector?

The irrigation sector's ability to undertake projects successfully depends on a number of important criteria. The involvement of stakeholders comes first. It is essential to establish and preserve solid connections with funding agencies, business leaders, government agencies and industry specialists not forgetting political influence in resource allocation and project conceptualisation. To represent the organisation's interests and promote partnerships that result in shared objectives, effective communication and negotiating skills are essential. Furthermore, it is critical to have a thorough awareness

of the newest techniques, technologies and best practice for designing, building, and managing irrigation systems. This guarantees that initiatives are not just creative but are also efficient and long-lasting.

Lastly, sustainable funding and effective supervision of projects are key to successful project implementation in the sector.

You have mentioned sustainability several times. How do you incorporate environmental sustainability into your projects?

A fundamental tenet of planning is environmental sustainability of all our programmes and initiatives. Water conservation is our top priority and we take steps to reduce our negative environmental effects from irrigation activities. This entails using cutting-edge irrigation technology, such as sprinkler and drip systems, which minimise water wastage and maximise water productivity. We also interact with communities to encourage environmentally conscious behaviour and sustainable water usage. Our objective is to increase agricultural output while making sure the long-term ecological balance is supported by our programmes. We spearhead environmental impact assessments and audits with the help of our environmentalists.

Can you share your key achievements?

One project that stands out is the successful delivery and signing of the recent project agreement of the Galana Kulalu Food Security Project under the PPP framework with Selu Ltd and the construction plans for Galana reservoir, which is crucial for enhancing irrigation efficiency and ensuring water availability throughout the year at the Project. It will not only improve agricultural productivity but also demonstrate the successful implementation of a large-scale irrigation initiative under a PPP framework.

Additionally, delivery of our strategic plans for 2019-2023 and 2023-2027, the latter will guide the Authority's strategic direction in the coming years.

Other notable projects are the successful delivery of the rehabilitation of Ahero pumping station and Perkerra Scheme Intake works. These projects have had a significant positive impact on the local community and agricultural productivity.

How do you approach team leadership and management?

Motivating and encouraging teams to reach their goals is the essence of leadership. Through mentoring, I try to foster a cooperative, encouraging work atmosphere where members feel empowered and appreciated. I think that setting a good example and keeping lines of communication open are important. My goal is to assemble a diverse team with a range of ideas to promote success as a whole.

What are some of the challenges that you face in the irrigation industry, and how do we overcome them?

The irrigation industry faces several significant challenges that must be addressed to ensure sustainable water management and agricultural productivity. Key among them are water scarcity, climate change, sustainable funding, policy reforms, technological adoption, infrastructure maintenance, and stakeholder collaboration.

Water scarcity is a critical issue in many regions, exacerbated by population growth and climate change. To address this challenge, the industry can adopt efficient irrigation technologies. Implementing systems such as drip irrigation, sprinklers, and smart irrigation can significantly reduce water wastage. Capturing and storing runoff to provide an additional water source for agricultural use is key.

Climate change alters weather patterns, leading to unpredictable water availability and extreme weather events. To mitigate these impacts, the industry should develop climate-resilient crops by investing in research to create crops that are more tolerant to drought and extreme conditions. There is also a need to leverage weather forecasting and climate models to plan irrigation schedules effectively. Securing long-term funding for large-scale irrigation projects is a major challenge. Possible solutions include leveraging private sector investment through PPP frameworks can provide necessary funding. Exploring mechanisms like green bonds, microfinance, and blended finance to fund projects and advocating for and utilizing government funding programs can support irrigation initiatives.

Outdated or inefficient policies hinder the development and implementation of modern

irrigation practices. Working with policymakers to promote reforms that support sustainable irrigation practices, establishing regulations that encourage efficient water use and protect water resources and training stakeholders on best practices and compliance with new policies to ensure smooth implementation.

How do you ensure effective monitoring and evaluation of your strategies and projects?

The effectiveness of our plans and initiatives depends on efficient monitoring and assessment. We have created a strong structure for performance that encompasses reporting, assessment and outcome tracking. With the use of this framework, we can monitor our performance in relation to predetermined goals and targets, spot discrepancies, and take appropriate action. Empirical data and regular performance reviews help us make well-informed judgments and validate our assessments. To guarantee accountability and transparency, we also handle performance contract discussions, implementation, monitoring, and reporting jointly through a committee selected from all departments.

How do you engage with partners to secure funding for your projects?

One of the most important parts of our work is mobilising resources. Our approach is involving

various strategic partners such as corporations, foundations, national governments, multilateral and bilateral organisations. This entails creating and revising our irrigation investment plans regularly as well as making strong pitches for funding to possible partners. Internally, we look at improving generation and collection of O&M and attracting all support including technical collaborations on short term trainings and capacity building.

What excites you about the future of the irrigation industry?

The irrigation business has a bright future because sustainable practices and new technologies can completely change how we manage water resources. I am excited about the potential for creative irrigation solutions to boost food security and increase agricultural output. In the next three years, the BeTA plan of the government has food security at its centre stage.

Through dedication, innovation, collaboration and funding, we have the opportunity to transform the way we manage water resources, enhance agricultural productivity, and promote environmental sustainability. I am excited to be part of this journey of contributing to a more sustainable and prosperous future for all.



Eng. Jairus Imbezi Serede explaining the progress of Galana Kulalu Food Security during an inspection visit.



VISION

“Irrigation for a Food Secure and Prosperous Nation”

MISSION

“ To Develop, Coordinate and Manage Sustainable Irrigation Services for Social-Economic Development in Kenya”

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