HOTSPOT: KIAMUNYI

WATER AS LEVERAGE NAKURU FOR A RESILIENT SPONGE CITY

NATURE KAMA KUJIINUA [NATURE AS LEVERAGE]
A NATURE-BASED SPONGE SYSTEM

Water as Leverage
Nakuru
for a resilient sponge city

NOTE

The Water as Leverage (WaL) – Nakuru Programme is a design-driven climate adaptation initiative jointly developed by the Government of the Netherlands, the County Government of Nakuru, and a broad coalition of Kenyan, Dutch and international partners. It brings together technical, governance, and financial expertise to identify implementable, water-resilient projects that address flooding, water scarcity, environmental degradation, and the wider systemic pressures affecting the Lake Nakuru basin.

Over the past year, the WaL programme has worked closely with communities, institutions, and local experts to understand the city through a water lens and explore how Nature-Based Solutions, traditional knowledge, and integrated planning can restore the fundamental role of water as a driver of prosperity—today and in the long term.

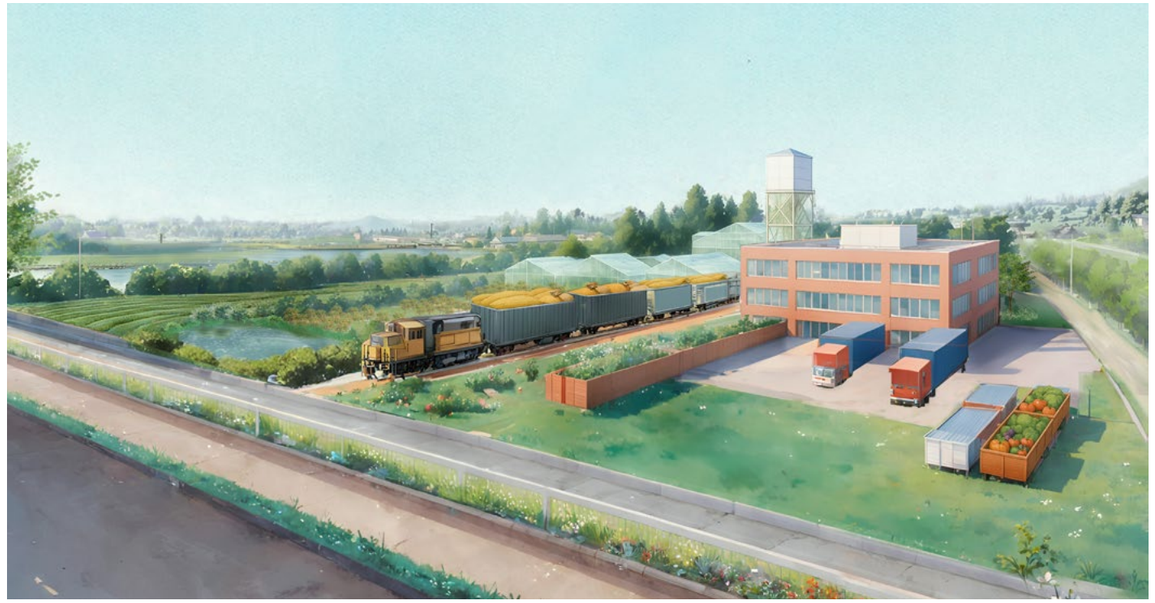
As part of this process, several hotspot areas across Nakuru were studied in depth. Each hotspot reflects a specific combination of challenges, opportunities, and local priorities within the broader water system. This booklet documents the work developed for Kiamunyi, Ngosur, or Lanet/Pipeline during the WaL conceptual and scoping phases.

While these hotspots are not continuing within the current phase of the WaL programme, the material produced is an important starting point for further development. The analyses, insights, and concept interventions presented here offer clear perspectives on pressing water issues and propose pathways that can guide future action. These ideas may evolve further through other municipal programmes, community initiatives, academic collaborations, or future investment opportunities.

This document is intended as a supporting knowledge foundation to inform future discussions and potential initiatives by different stakeholders. It reflects the collaborative spirit of the WaL programme and supports the ongoing ambition to contribute to a resilient, inclusive, and water-positive Nakuru, even beyond the scope of the current WaL phase.

KIAMUNYI AREA AND SURROUNDINGS

NAKURU AGROECOLOGICAL HUB



Project Description and Rationale

The Nakuru Agroecological Hub is a forward-looking impact project that integrates sustainable agriculture, community empowerment, and climate resilience in one of Nakuru's peri-urban zones. Located on public land within the Kiamunyi influence zone, near the Rift Valley Institute of Science and Technology, the hub will serve as a regional learning and innovation center, showcasing regenerative farming practices and acting as a catalyst for ecological and economic transformation.

Designed to empower women and youth, the hub offers training in cooperative farming, business incubation, and climate-smart land and water management. Demonstration areas align with local conditions: fruit trees and agroforestry on sandy soils, and vegetables and traditional crops on loamy and clay soils. Seasonal rivers crossing the site offer opportunities for riparian restoration, wetland creation, and floating agriculture to reduce erosion and support biodiversity.

Innovative water infrastructure—including water pans, bioswales, and greenhouses—will reduce runoff, enhance soil moisture, and boost yields. The hub blends modern techniques like hydroponics with traditional farming knowledge, creating a resilient, replicable model rooted in local heritage.

Crucially, as Nakuru grows and agricultural land in Kiamunyi is rapidly being converted to residential use, the project secures a strategic area for local food production, helping to ensure urban food security amidst ongoing land pressure. The Agro Hub mitigates fast runoff that contributes to urban flooding downstream in Njoro and the CBD, affecting up to 47,000 homes and local infrastructure. The project also addresses key risks: limited irrigation access for smallholders, groundwater depletion, soil erosion, and agrochemical pollution impacting both crops and water systems.

Project Objectives	• Reduce pluvial flooding in the urban settlements of CBD by retaining water • Reduce soil erosion • Improve water quality (ground and surface water) and water resources of groundwater
Project Size	**1,065 ha**
Capex (€)	**53 million (€) // 7,500,000 (Ksh*1000)** ***[The Solar Farming accounts for €28 million of the total cost]***
Opex (€)	**1.6 million annual (€) // 230,000 annual (Ksh*1000)**
Impact flood reduction	**1,200,000 (m^3)**
Water Resources	**2,500,000 (m^3/year)**

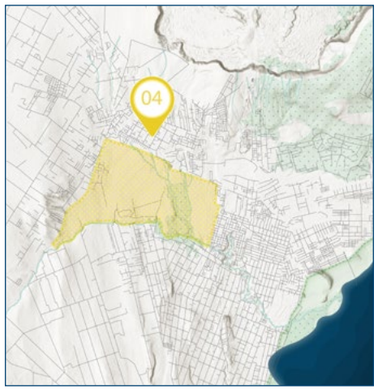
	Current situation with Climate change (2090)		**After measures with Climate change (2090)**	
	Flooded area (ha)	Affected buildings	Flooded area (ha)	Affected buildings
T5	394	15750	0	0
T10	491	19633	0	0
T50	696	27826	105	4213

Benefits	Economic viability indicated by a benefit-cost ratio greater than 1. • Flood risk reduction for middle-income residential areas and the CBD. • Water security benefits via infiltration and enhanced water quality. • Potential to boost agricultural productivity and generate rural employment, providing food security to the city. • Energy production
Components	• 7 ha Retention ponds and 42 ha Wetlands • 70 ha Solar farming • 160 ha Agroforestry (timber and fruit) • 52 ha River improvement • 670 ha Agriculture
Project owner / Implementing Agency	• Ministry of Agriculture • Other relevant institutions: WRUAs , Farmer Coop., County Agricult.Dept, NAWASSCO, KWS
Potential financing instruments & sources	• The project is not suited for private project-based finance due to limited direct revenue generation. • Public funding is relevant given its public goods nature and co-benefits. Sovereign loans, for larger possibly pooled projects, and especially grant programs could be explored. • It requires engaged project owners and endorsement from line ministries (Water, Urban Development), and eventually the Ministry of Finance. • Some private sector engagement - management and funding - may be viable only in operation and maintenance roles. • Positive features for the WaL Nakuru program are the champions at Nakuru City, EKN and Ministry of Water level. • Revenue models greatly depending on strategic choices and options: Options for private involvement for agri / processing industry, Options for Invest International to finance (with Dutch content), Options for micro-finance repayment. • Potential for revenue generation through Agri yields/crop value improvements, Avoided cost of water filtering or water supply expansion and Smallholder aggregation.
Points of attention	• Contracting and implementation may be complex. • Land tenure and ownership issues could delay development. • Presence of faultlines. • Large risk of unsustainable land use due to encroachment by middle-income residents, making the investment less sustainable.

KIAMUNYI

©Eduardo Marín

CURRENT SITUATION



Located on the northwestern periphery of Nakuru, Kiamunyi is experiencing a rapid socio-environmental transformation. Once known for its productive farmland and ties to the Agricultural Development Corporation, the area now faces overlapping challenges: climate variability, land fragmentation, urban encroachment, and deepening water insecurity. These pressures are straining both agricultural productivity and residential resilience.

Seasonal Extremes and Water Insecurity

Kiamunyi's water crisis is shaped by extreme seasonal fluctuations. Intense rains in April and September trigger flash floods that erode fertile soils, destroy crops, and inundate riparian plots. These events—alongside floods from CBD and Mengenai—generate volumes between 1.5 and 2.4 million m^3, threatening up to 47,000 homes and affecting nearby industries. In contrast, prolonged dry spells bring drought and crop failure, increasing dependence on groundwater that is increasingly saline and harder to reach.

Rainwater harvesting exists but remains insufficient. With no piped water infrastructure, households must often rely on costly trucked water—up to 2,500 KES per 6,000 liters. Sandy soils further reduce the effectiveness of water pans, limiting the area's capacity to retain water locally.

Groundwater Pressure and Unregulated Development

The strain on groundwater continues to mount. Boreholes that once struck water at 80 meters now require drilling as deep as 150 meters. While commercial farms may absorb these costs, smallholders cannot, often turning to informal or inadequate water sources. Unregulated urban development, especially in areas like Ogilgei, compounds the problem. Poorly planned housing lacks drainage and is vulnerable to erosion and flooding—particularly when built in riparian zones.

Agricultural Stress and Land Fragmentation

Kiamunyi's agricultural backbone is weakening. Once productive farms are increasingly subdivided, leaving plots too small for viable agriculture. Rising input costs, unreliable rainfall, and poor market access have pushed many young landholders to sell off inherited land. In one case, a 15-acre inheritance was reduced to 0.25 acres through successive sales.

Of 29 original landholders owning 27 acres, only a few plots remain actively farmed, many repurposed for housing. The area's farming culture is fading, replaced by informal trade and outmigration. The resulting deforestation—driven by land clearing and charcoal use—has stripped the landscape of vegetation, increasing runoff and soil erosion.

Unsustainable Agricultural Practices

Farming practices are compounding environmental stress. Monoculture and limited crop rotation heighten

vulnerability to pests and climate shocks. Chemical fertilizer use, though subsidized, disrupts soil health and contaminates downstream waters. During dry periods, exposed fields reduce infiltration and worsen erosion when rains return.

Efforts to promote sustainable practices—such as drip irrigation or soil conservation—are hampered by lack of funding, training, and infrastructure. Many smallholders, discouraged by low yields and poor returns, are exiting agriculture entirely.

The COVID-19 pandemic underscored Kiamunyi's fragility. Market closures and mobility restrictions left households without income or food access, exposing the dangers of overreliance on rain-fed farming and informal economies.

A Turning Point for Land and Livelihoods

Unless reversed, current trends risk accelerating the collapse of rural livelihoods, the erosion of farming knowledge, and the degradation of Kiamunyi's land economy. Yet this crisis also presents a critical opportunity. By embracing nature-based, community-led strategies, Kiamunyi can link water security with economic revitalization—charting a new future for farming, resilience, and sustainable growth.

DETAILED HOTSPOT VISION:
A RESILIENT AGRO-ECOLOGICAL FUTURE

The future of Kiamunyi lies in becoming a resilient, multifunctional agro-ecological landscape—where sustainable rural livelihoods, structured urban growth, and ecological restoration reinforce one another. Instead of being consumed by sprawl and degradation, Kiamunyi can be a blueprint for land stewardship, youth engagement, and nature-based innovation.

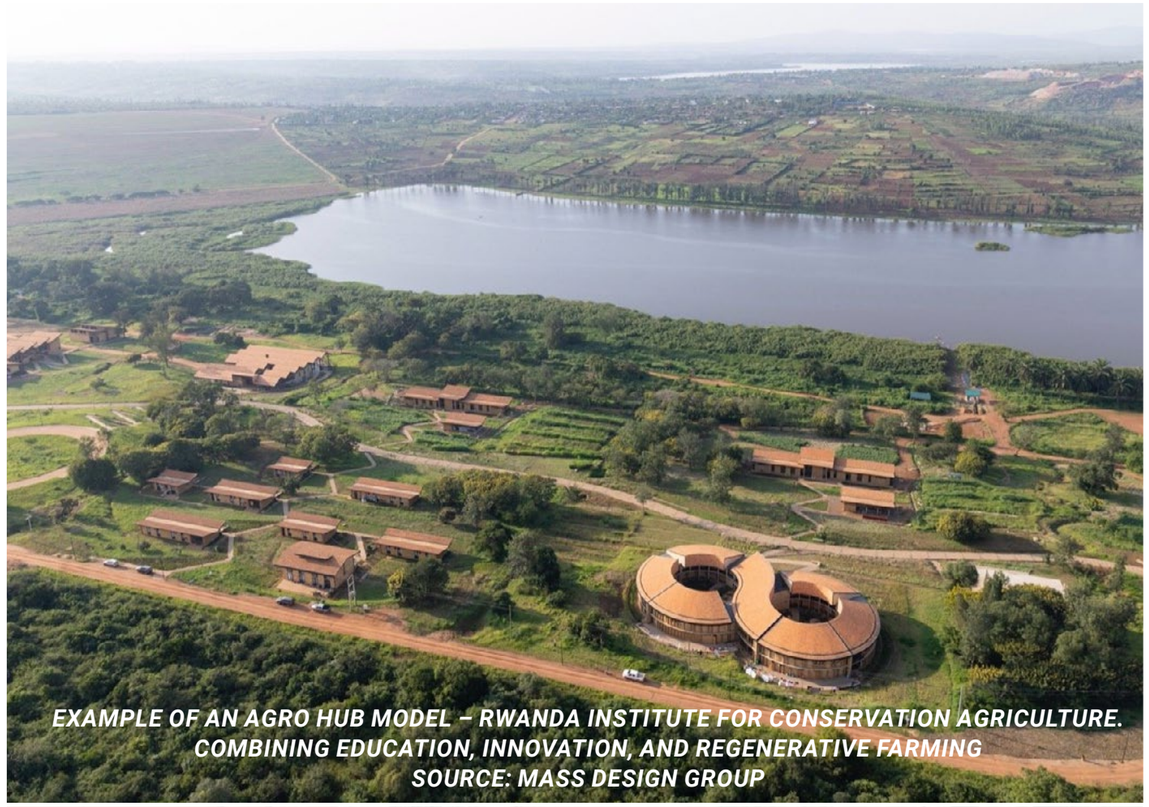
Central to this transformation is a renewed relationship with land—one that values soil health, water security, and food sovereignty. To offset the loss of productive farmland, space must be deliberately reserved for food production. This includes identifying new farming zones and integrating agriculture into residential and communal landscapes. Reviving agriculture means combining deeply rooted traditional growing methods with modern techniques that increase yields, reuse water, and reduce external inputs. This fusion gives new momentum to Kiamunyi's agricultural heritage and presents farming as a promising future for the next generation.

Empowering youth is critical. As traditional farming becomes less attractive, Kiamunyi must introduce modern, climate-smart practices—agroecology, aquaponics, vertical farming, and digital tools—that offer viable income and purpose. Training hubs, demo plots, and mentorship programs can provide skills, confidence, and access to green jobs, redefining agriculture as a modern and desirable path.

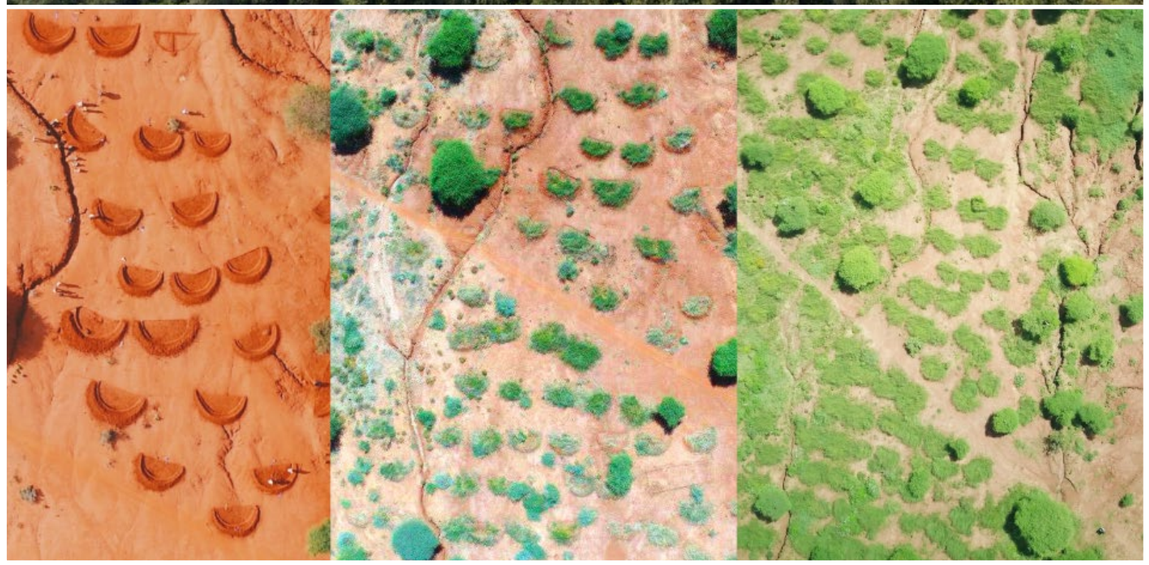
As shared in a workshop, "We once moved with nature. Now, to farm, we need technology." This vision does not discard tradition—it evolves it. Nature-based solutions such as terracing, mulching, agroforestry, and water retention marry ancestral wisdom with climate resilience.

Kiamunyi can also strengthen local food systems—through farmer cooperatives, market access, storage, and drought-resilient crops. Schools and community centers can become food gardens and knowledge hubs, embedding sustainability in daily life.

In this future, Kiamunyi is more than a productive area—it is a regenerative one. Land is protected, water is conserved, and communities are empowered. Nature-based solutions anchor development, while inclusive planning ensures change is just and locally rooted. By embracing its agro-ecological identity and investing in its people—especially youth—Kiamunyi can secure its future and become a model for resilient peri-urban landscapes across the Rift Valley



EXAMPLE OF AN AGRO HUB MODEL – RWANDA INSTITUTE FOR CONSERVATION AGRICULTURE. COMBINING EDUCATION, INNOVATION, AND REGENERATIVE FARMING SOURCE: MASS DESIGN GROUP



Project references

NATURE-BASED SPONGE SYSTEM (NBSS) APPROACH

Within the Nature-Based Sponge System (NBSS), tailored interventions can be deployed to regulate runoff, enhance infiltration, and buffer climate extremes.

Tailoring NBS to Soil and Plot-Level Conditions

Addressing Kiamunyi's complex water issues requires site-specific NBS that respond to distinct soil types, hydrology, and land uses.

- Despite a network of roads, forest edges, and railways, the plot scale—in both residential and agricultural parcels—is where water-related stress is most acute.
- In residential zones, measures like contour bunds, swales, grass strips, and water pans help delay runoff and improve groundwater recharge.
- In sandy soil zones, where infiltration is high but retention is low, soil enrichment, biochar, or mulch-based solutions improve water-holding capacity.
- In loamy-clay areas, clay-lined water pans provide critical seasonal storage.
- Rainwater harvesting systems, water towers, roof tanks, and small weirs can buffer water availability in both zones.
- Riparian buffers along ephemeral rivers are essential to reduce erosion, improve microclimates, and create ecological corridors that support biodiversity and long-term resilience.

These decentralized, replicable measures allow households, institutions, and cooperatives to take action, making water resilience a distributed responsibility across the landscape. Within the NBSS framework, Kiamunyi's interventions align with the five core water functions:

Recharge: Soil enhancement and infiltration infrastructure increase groundwater recharge, particularly through multi-zone water pans adapted to local soil capacity.

Delay: Use of weirs, check dams, and contour farming to slow surface runoff, reduce erosion, and protect lower-lying plots.

Collect: Rainwater harvesting in schools, homes, and farms offers drought-time relief and reduces dependence on over-extracted groundwater.

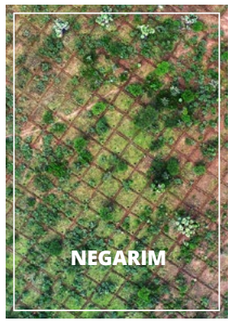
Transport: Vegetated buffer zones along seasonal watercourses provide safe routing of floodwater and protect infrastructure and farmland.

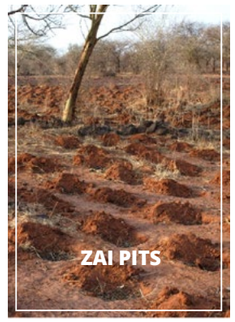
Clean: Agroforestry, grassed waterways, and vegetative strips filter sediments and pollutants before they can degrade the wider watershed.

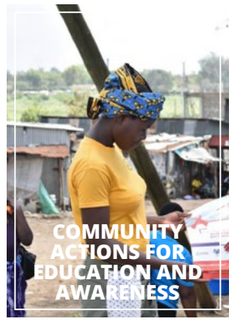
Contribution to Lake Nakuru's Health and Systemic Resilience

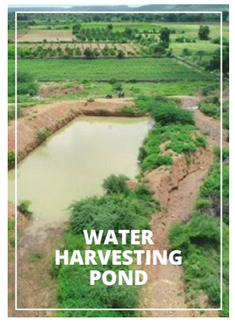
Kiamunyi's seasonal rivers, gullies, and runoff systems feed directly into the lowland floodplains and Lake Nakuru. The health of this upstream zone directly shapes the lake's sediment load, water quality, and hydrological stability. By deploying the NBSS, Kiamunyi plays a crucial systemic role in:

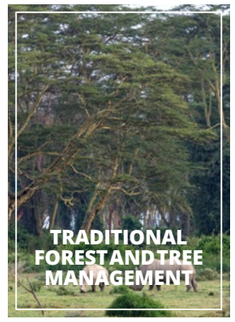
- Reducing sedimentation through erosion control.
- Enhancing aquifer recharge to support baseflow.
- Filtering non-point source pollution, especially agricultural residues.
- Lowering pressure on shared groundwater reserves.

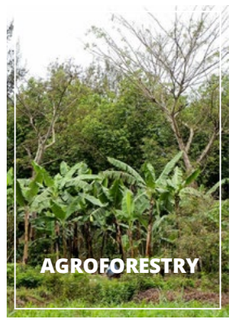


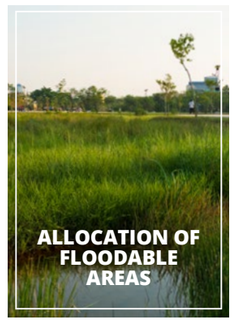


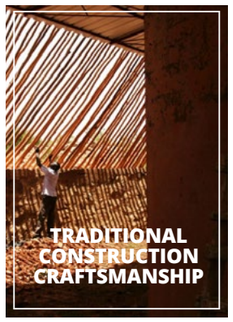




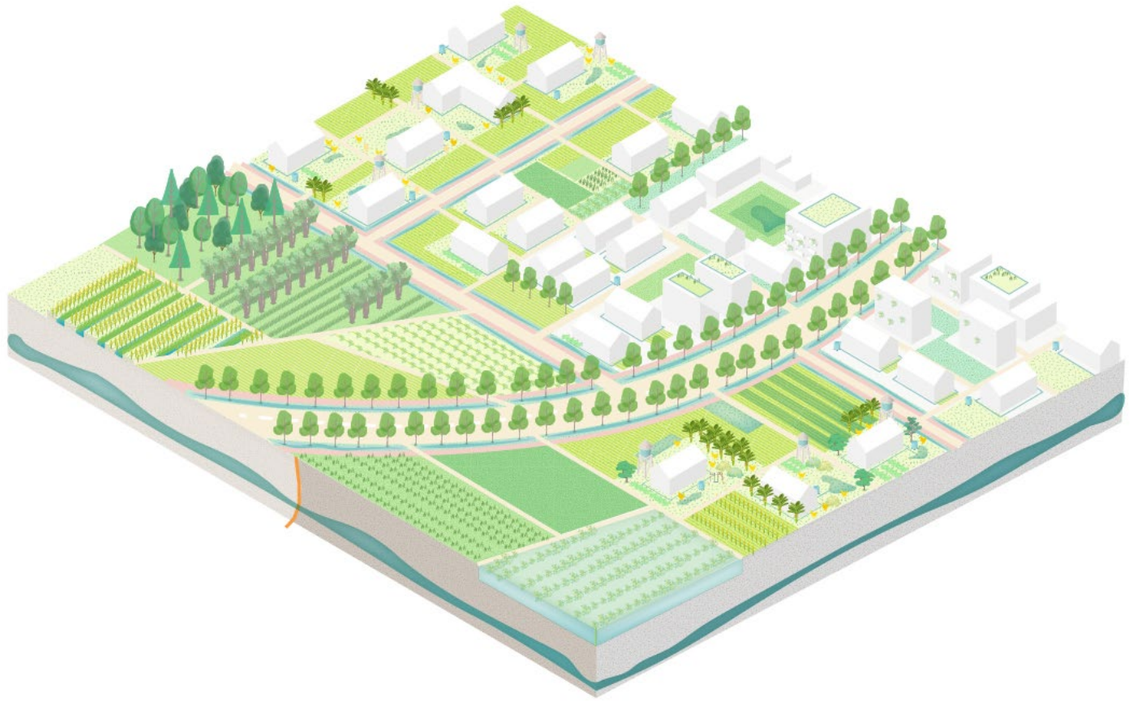




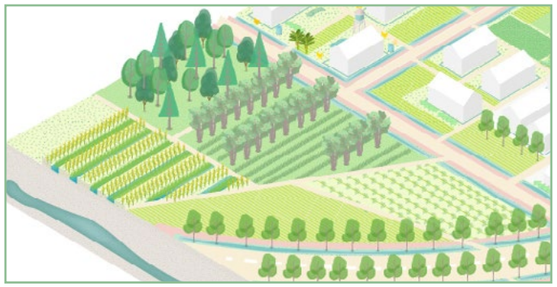




1 OPERATIONAL TOOLS
VISION PRINCIPLES AND GUIDELINES



Design Principles for the Kiamunyi Area – Integrating local food production and residential development, emphasizing the role of private landowners and community capacity in preserving agriculture and managing water resources, tailored to the area's diverse soil conditions.



LAND USE AND SPATIAL CONFIGURATION

- ***Minimum Plot Division and Regulation:*** Land fragmentation has severely undermined productive agriculture in the area. To counter this trend, a regulatory framework should establish minimum plot sizes that maintain the viability of agricultural production. For example, agricultural parcels should be no smaller than 2 acres to ensure space for both farming and water management infrastructure. These rules should be integrated into local planning by-laws and enforced through strengthened governance institutions.

- ***Clustered Residential Zones:*** New residential development should be strategically clustered in areas with sandy soils, where water retention is more challenging and agriculture is less feasible. This clustering allows for cost-effective infrastructure provision (such as roads, schools, and water services), while also minimizing encroachment into more productive loamy-clay areas.

- ***Scalability of solutions on plot level:*** Each household or farm plot should integrate tailored NBS interventions depending on local soil type and land use:

1. In sandy soils (high infiltration): Encourage biochar application, shallow retention basins, and mulching to increase water retention. Plant drought-tolerant species and deep-rooting agroforestry trees to minimize water loss and improve soil structure.
2. In loamy-clay soils (good water retention): Promote clay-lined water pans, terraces, and vegetated swales to slow water movement and improve infiltration. Integrate mixed agroforestry belts along plot edges to reduce erosion and support diversified livelihoods.
3. In flood-prone zones: Promote adaptive cropping patterns, such as short-cycle crops, floating gardens, and elevated planting beds, paired with flood-tolerant tree species and bioengineered riverbanks.
4. Linking these NBS interventions across plots builds landscape-wide functionality. For example, runoff from clustered settlements can be channeled through bioswales into water pans located in agricultural zones, creating a cascade system that maximizes water retention and minimizes erosion.

- ***Agricultural and Agroforestry Zones:*** Areas with fertile, moisture-retaining soils should be safeguarded and enhanced for productive agro-ecological farming. These zones should be equipped with soil and water conservation measures such as swales, terraces, and bio-swales, and linked with reforested patches to provide shade, wind protection, and nutrient cycling.

- ***Agro-Ecological Corridors:*** Between these zones, multifunctional green corridors (e.g. Mosop Water Retention and Agroecology Corridor) combine reforestation, water retention infrastructure, and ecological restoration. These corridors act as both buffers and connectors—helping to control runoff, recharge aquifers, and sustain biodiversity.

- ***Riparian and Buffer Zones:*** All seasonal rivers and wetlands must be buffered by a protected riparian strip of at least 30 meters, planted with native trees and shrubs. These areas must be permanently protected from settlement and serve as stormwater buffers and ecological connectors.

INSTITUTIONAL SUPPORT AND GOVERNANCE

- ***Local Leadership and Customary Authorities:*** Ward-level administrations and local elders must be formally engaged in land use planning. Their legitimacy can help enforce rules around minimum plot sizes and protect riparian zones.

- ***Capacity Building and Farmer Field Schools***: To sustain the transition, establish Agroecology Training Hubs in partnership with local institutions like the Rift Valley Institute of Science and Technology. These hubs should provide hands-on training in NBS design, organic agriculture, and water management, targeting youth, women, and local farmer groups.

- ***Community Water User Associations (WUAs)***: Empower communities to manage shared water infrastructure—like pans, weirs, and swales—through WUAs. These associations should be supported by county-level water authorities and trained in financial management, maintenance, and equitable distribution.

- ***GIS-Based Land Use Monitoring:*** Develop and maintain a community-accessible land use map that outlines designated zones for housing, agriculture, water infrastructure, and conservation. This map should be used to guide development decisions, ensure compliance with zoning rules, and inform future investments.

- ***Financial Incentives and Microcredit:*** Collaborate with financial institutions to offer low-interest loans or microgrants for the construction of water pans, fencing of riparian zones, and purchase of agroecological inputs. Conditional cash transfers or tax exemptions can incentivize sustainable land management.

©Xuejing He

LOCAL POLICY ALIGNMENT:

The Nakuru County Integrated Development Plan (CIDP) 2023–2027 sets strategic directions that directly benefit Kiamunyi. It promotes integrated water resource management, climate-smart agriculture, protection of catchment areas, and targeted investments in infrastructure such as boreholes and water harvesting systems. It also supports youth and women's empowerment in agribusiness, value chain development, and cooperative structures to connect peri-urban producers with urban markets.

The Urban Resilience Strategy (2023–2033) frames Kiamunyi as a pilot area for climate adaptation and risk-informed planning. It emphasizes access to clean water, green infrastructure for flood and erosion control, and inclusive economic development. The strategy reinforces the need to integrate resilience considerations into land use planning, with a focus on managing urban expansion and supporting sustainable rural–urban transitions.

The Lands, Physical Planning, Housing and Urban Development Sub-Sector Report (2023) underlines the urgency of addressing tenure insecurity, informal land subdivision, and service gaps in areas like Kiamunyi. It prioritizes zoning enforcement, digitization of land records, and improved infrastructure provision to reduce land fragmentation and unplanned development. It also encourages the use of alternative building materials and affordable housing strategies that alleviate pressure on agricultural land.

The Nakuru Integrated Strategic Urban Development Plan (ISUDP) reinforces the designation of Kiamunyi as a protected peri-urban agricultural zone. It promotes compact urban growth, buffers against speculative land conversion, and supports phased infrastructure delivery to avoid leapfrog development. The ISUDP also integrates climate resilience and environmental protection into spatial planning, encouraging participatory processes that strengthen smallholder livelihoods and ecosystem stewardship.

2 OPERATIONAL TOOLS
IMPACT PROJECT

THE NAKURU AGROECOLOGICAL HUB

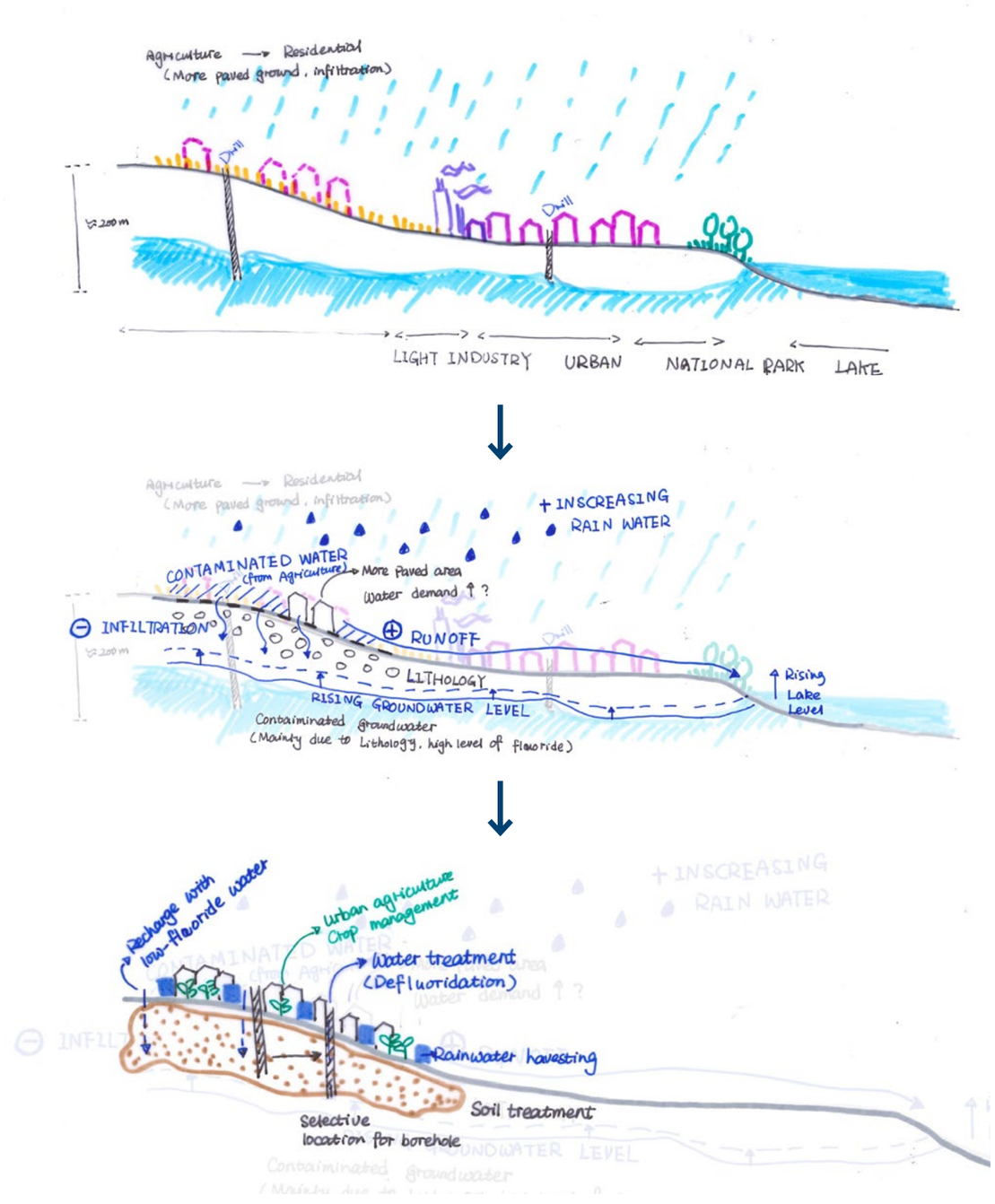
PROJECT DESCRIPTION AND KEY INFORMATION

The Nakuru Agro-Hub is envisioned as a transformative impact project that unites sustainable food production, community empowerment, and climate resilience. Strategically located on public land between Njoro and Nakuru City—partly within the Kiamunyi area and designated for educational and agro-industrial use under Nakuru's Structure Plan—the hub aligns with the nearby Rift Valley Institute of Science and Technology. This provides a unique opportunity to demonstrate regenerative agriculture while supporting enterprise development and preserving the region's productive landscape heritage.

The hub will serve as a regional center for agroecological learning and innovation, with a strong focus on empowering women and youth through farming cooperatives. It will combine traditional farming knowledge with modern water and land management techniques, offering a scalable model for resilient peri-urban development. By integrating demonstration plots, training programs, and business incubation facilities, the hub will catalyze both economic opportunity and environmental regeneration.

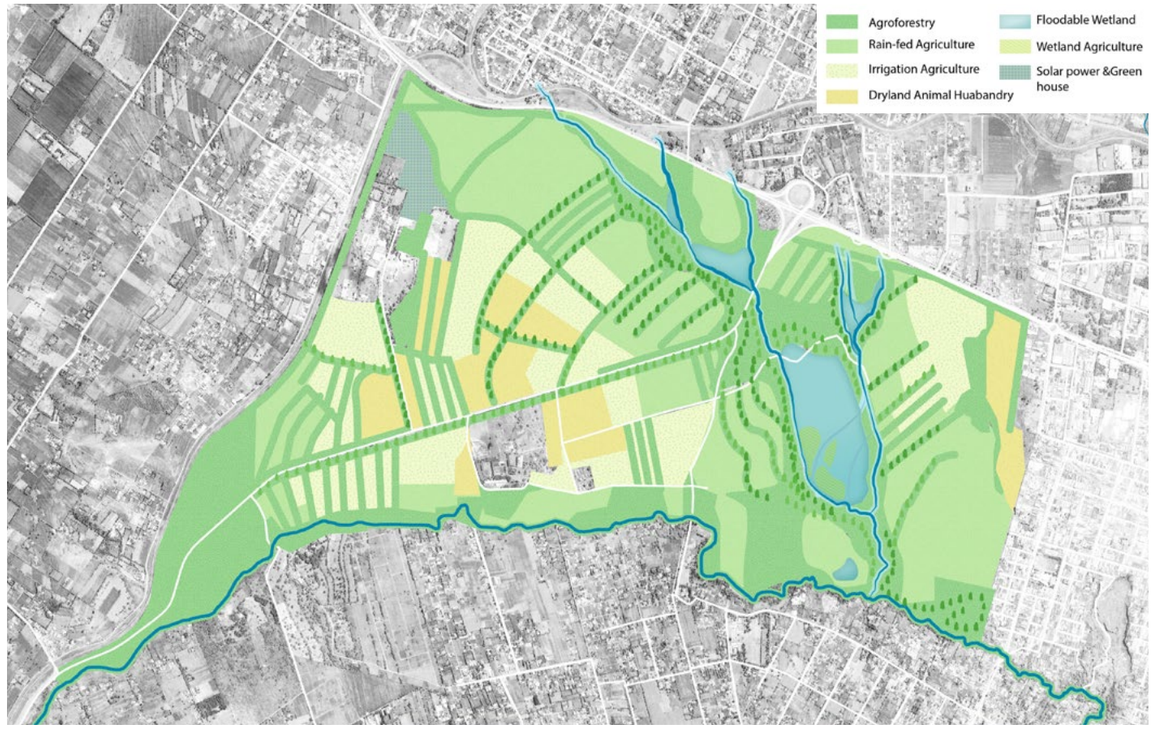
Key features include:

- **Agroecological Demonstration Zones:** Cultivation areas aligned with existing terracing and soil types—sandy zones for fruit trees and agroforestry; loamy/clay zones for vegetables and traditional crops—showcasing climate-resilient methods.
- **Riparian Restoration and Wetlands Development:** Two seasonal rivers cross the site. Riparian zones will be restored to reduce erosion and flooding, while wetlands support biodiversity, flood buffering, and experimentation with amphibious or semi-floating agriculture.
- **Water Management Infrastructure:** Positioned on elevated terrain, the hub will intercept runoff before it reaches urban zones below. Water pans, bioswales, and soil-moisture retention techniques will improve infiltration and dry-season resilience.
- **Innovative and Traditional Farming Techniques:** Greenhouses, hydroponics, and vertical farming will be piloted alongside interpretive areas celebrating indigenous practices—bridging innovation with heritage.
- **Education, Training, and Capacity Building:** Targeted training in agroecology, soil health, and water harvesting will support youth and women, with business incubation and access to microfinance. Farming cooperatives will be encouraged to strengthen market access.
- **Regional Interpretation and Exchange Center:** A dedicated center will showcase agricultural heritage and facilitate knowledge exchange across the Rift Valley.
- **Material Support and Extension Services:** Distribution of seedlings, compost, and tools, combined with mobile extension services, will enable households to adopt sponge-based practices effectively and inclusively.



Sketches of the transformation of the area into an Agro-Hub

IMPACT PROJECT FLOORPLAN AND KEY INFORMATION



Project area	**1,065 ha**
Capex	**53 million (€) // 7,500,000 (Ksh*1000)**
Opex	**1.6 million annual (€) // 230,000 annual (Ksh*1000)**
Impact flood reduction	**1,200,000 (m^3)**
Water Resources	**2,500,000 (m^3/year)**
Benefit-Cost ratio	**Economic viability indicated by a benefit-cost ratio greater than 1.**
Public land and large property owners in the project areas	• Menengai Forest reserve -Kenya Forest Service • Roret-Kiamunyi water project land • Public Schools

Retention ponds

Wetlands

Solar farming

Agroforestry (timber and fruit)

Agriculture

River improvement

Components	Quantities	Design Costs	Impact flood (m^3)	infiltration and water supply (m3/year)	Cost effectiveness per component	
					Flood (Euro/m^3)	Infiltration (Euro/m^3)
Retention ponds	7 ha	200,000	130,000	20,000	1.5	10.0
Wetlands	42 ha	12,380,000	740,000	740,000	16.7	16.7
Solar farming	70 ha	27,840,000	0	110,000	0.0	253.1
Agroforestry (timber and fruit)	160 ha	2,400,000	110,000	480,000	21.8	5.0
River improvement	52 ha	990,000	160,000	160,000	6.2	6.2
Agriculture	670 ha	2,230,000	30,000	1,000,000	74.3	2.2
Accompanying measures (floating agriculture)	13 ha	6,660,000	0	0	0.0	0.0

BENEFITS ON WATER MANAGEMENT AND ADDITIONAL BENEFITS

WATER MANAGEMENT BENEFITS

• **Flood risk reduction for middle-income residential zones** in Kiamunyi and the downstream CBD through improved infiltration, run-off delay, and natural retention measures.

- **Enhanced groundwater** recharge via site-specific sponge infrastructure such as water pans, swales, and soil improvement techniques.
- **Improved water quality,** as reduced fertilizer use and vegetative buffers filter pollutants before reaching water bodies.

ENVIRONMENTAL

• **Increased infiltration** supports aquifer health and stabilizes seasonal water flows toward Lake Nakuru.

- **Agroforestry and ecological buffers** improve landscape resilience, reduce erosion, and support biodiversity.
- **Reduction of non-point source pollution**, contributing to cleaner surface and groundwater, especially in farming zones.

ECONOMIC

• **Boosts agricultural productivity** by promoting sustainable, climate-smart farming techniques adapted to local soil and climate conditions.

- **Supports rural employment** and enterprise development through farming cooperatives and access to agro-processing, training, and microfinance services.
- **Enables local food production**, reducing reliance on external supply chains and enhancing economic resilience.

SOCIAL & CULTURAL

• **Enhances food security** for both peri-urban communities and the broader city

• **Promotes youth and women's empowerment** via targeted training, access to land, and cooperative business models.

- **Fosters knowledge exchange** through the Nakuru Agro-Hub, celebrating agricultural heritage.

POLITICAL & INSTITUTIONAL

• **Demonstrates a replicable model** of nature-based urban agriculture aligned with Nakuru's Structure Plan.

- **Supports cross-sectoral collaboration**, with roles for county institutions, agricultural agencies, and community organizations.
- **Strengthens city-wide resilience planning,** linking upland water management to downstream urban health and sustainability.

Alongside the proposed interventions, there is an opportunity to integrate a research and knowledge exchange center within the Nakuru Agro-Hub. This space would provide education, training, and community support while serving as a platform for international collaboration. Partnerships with countries like the Netherlands could bring in expertise in greenhouse management, water reuse, and climate-smart agriculture—enhancing traditional practices with innovative techniques. The center would strengthen local capacity, foster innovation, and position the hub as both a local anchor and regional reference for sustainable, climate-resilient agricultural development.

SDG ASSESMENT

SDG6 (High)

Ecosystem restoration (6.6) with NbS and riparian buffers rehabilitation, leading to water quality enhancement (6.3) and improved access to drinking water (6.1), through integrated water resource management (6.5) and the involvement of local communities (6b). Promotion of water-use efficiency (6.3) in agriculture. WaL Nakuru project expands international cooperation and capacity building to developing countries in water and sanitation(6a).

SDG8 (Low)

Reduction of flood- and drought-related economic losses (8.1) and job creation (8.5), particularly for women and youth (8.6), in agriculture. Demonstration projects that may lead to policy development in inclusive economic development (8.3).

SDG11 (Medium)

Safeguarding seasonal rivers (11.4) per capita environmental impact (11.6) through flood mitigation (11.5). Creation of inclusive accessible green public spaces (11.7). Demonstration project that may lead to policy development in integrated disaster risk management (11.b).

SDG 13 (High)

Strengthening resilience and adaptive capacity to climate-related hazards and natural disasters (13.1) through flood mitigation and enhanced drought resistance, education and awareness-raising (13.3) and capacity building (13b). WaL Nakuru project as a whole supports the GCF initiatives (13a) and may mainstream integrated disaster risk management (11.b) and climate-change (13.2) in local and national policies.

STAKEHOLDERS

- ***National government:*** *Ministry of Water, Sanitation & Irrigation; State Department of Environment and Climate Change*
- ***Nakuru county government:*** *County Dep. for Lands, Physical Planning, Housing & Urban Development; County Dep. for Infrastructure; County Dep. for Agriculture, Livestock, Fisheries and Cooperatives*
- ***Local government****: City Manager for Nakuru City; Nakuru City Board*
- ***Water utilities:*** *Nakuru Water and Sanitation Services Company Ltd (NAWASSCO); Nakuru Rural Water and Sanitation Company Ltd (NARUWASCO)*
- ***Regional authorities:*** *Water Resources Authority (WRA) Nakuru; The National Environmental Management Authority (NEMA)*
- ***Academia/research:*** *Kabarak University; KARLO (Kenya Agricultural and Livestock Research Organization); KARI (Kenya Agricultural Research Institute)*
- ***Multilateral and international Organizations:*** *WWF; UN-Habitat; Triangle Environment; MetaMeta; GIZ; Unicef; Finish Mondial; WSUP*
- ***National Organizations:*** *WASPA; Women in Water and Sanitation (WIWAS); KEWASNET*
- ***Local organizations:*** *Nakuru Residents Association*
- ***Community leaders:*** *Assistant County Commissioner/ Ward representatives; Member(s) of the County Assembly; Chief(s)*
- ***Other community actors:*** *Local Forest Association; Landowners; Residents formal areas; Local Farmers Association; Ward Climate Planning Committees; Local Water Resource Users Association (WRUA)*

FINANCIAL AND POLICY CHECKLIST

RATIONALE FOR THE PROPOSED DESIGN	Kiamunyi is traditionally an agricultural area where irrigation relies primarily on boreholes and local water storage. While medium and large agricultural enterprises often have access to such infrastructure, small-scale farmers face significant limitations. As the population grows, water demand increases, infiltration rates decline, and groundwater levels drop—resulting in water shortages and crop losses during dry periods. Erosion of topsoil further reduces soil fertility and agricultural productivity, while the displaced sediment contributes to siltation in downstream areas. Additionally, the widespread use of chemical fertilizers and pesticides—especially on small to medium-sized farms—contaminates both groundwater and surface water, including Lake Nakuru. Current agricultural practices also accelerate surface runoff, increasing flood risks in downstream zones such as the CBD and Njoro. Combined flood volumes from these areas are estimated between 1.5 and 2.4 million m³ per event, affecting an area of approximately 700 to 1,200 hectares. These floods can severely damage up to 29,000 dwellings during a 1-in-5-year event and as many as 47,000 in a 1-in-50-year scenario. Industrial areas downstream are also affected, with floodwaters disrupting production and logistics. The area also sits near an active fault line, which poses a growing risk to housing and infrastructure. As development encroaches further into high-risk zones, exposure to seismic hazards increases.
SPECIFIC COST (CAPEX/OPEX)	**53 million (€) // 7,500,000 (Ksh*1000)** **1.6 million annual (€) // 230,000 annual (Ksh*1000)**
SPECIFIC COST BREAKDOWN PER PROJECT	• 7 ha Retention ponds **— 200,000 (€)** • 42 ha Wetlands **— 12,380,000 (€)** • 70 ha Solar farming **— 27,840,000 (€)** • 160 ha Agroforestry (timber and fruit) **— 2,400,000 (€)** • 52 ha River improvement **— 990,000 (€)** • 670 ha Agriculture **— 2,230,000 (€)** • Accompanying measures **— 6,660,000 (€)**
IMPACTS	• Reduce pluvial flooding in the urban settlements of CBD by retaining water **1,200,000 (m³)** • Improve water resources of groundwater **2,500,000 (m³/year)** • Reduce soil erosion • Improve water quality (ground and surface water)
POTENTIAL PROJECT OWNER	• Ministry of agriculture
OTHER RELEVANT INSTITUTIONS	• WRUAs • Farmer Cooperatives • County Agriculture Department • NAWASSCO • KWS

ALIGNMENT WITH LOCAL, REGIONAL, NATIONAL PRIORITIES	**NATIONAL**	**Constitution of Kenya, 2010:** Contribution to equitable and sustainable livelihoods by providing economic opportunities for youth and women through farming cooperatives, supporting inclusive growth in agriculture and empowering marginalized communities. **Kenya Vision 2030 and Medium Term Plan IV:** Contribution to sustainable agricultural development and economic transformation by promoting agroecology, climate-smart agriculture, and innovation. **Water Act, 2016:** Contribution to integrated water management by implementing water harvesting techniques and sustainability for farming. **Climate Change Act, 2016:** Contribution to climate resilience by promoting water-efficient agricultural practices and ecosystem restoration. **Environmental Management & Coordination Act (EMCA):** Contribution to environmental protection through the implementation of sustainable farming practices that conserve soil health and promote biodiversity **Forest Conservation and Management Act, 2016:** Contribution to forest restoration and agroforestry, including tree planting. **National Water Policy, 2024:** Contribution to sustainable water use and management, enhancing water storage and distribution for agricultural purposes. **National Wetlands Conservation and Management Policy:** Contribution to the restoration and management of wetlands by integrating riparian zone restoration **National Environment Policy 2013:** Contribution to ecosystem restoration and the promotion of sustainable agricultural practices. **National Climate Change Action Plan (NCCAP) 2023-2027:** Contribution to building climate resilience in agriculture.
	COUNTY	**Nakuru County Integrated Development Plan (CIDP) 2023–2027:** Contribution to sustainable agricultural practices and integrated water resource management. **The Nakuru County Water and Sanitation Services Act No. 6 of 2021:** Contribution to sustainable management for agricultural and community use. **Nakuru County Climate Action Plan (NCCAP):** Contribution to promotion of irrigation techniques and agroforestry activities.
	LOCAL	**Nakuru's Urban Resilience Strategy:** Contribution to improving environmental health through flood mitigation and ecosystem restoration**.** **Nakuru Integrated Strategic Urban Development Plan (ISUDP):** Contribution to urban sprawl mitigation and agriculture promotion in emerging zones.
BREAKDOWN OF NECESSARY AND OPTIONAL INTERVENTIONS	**SHORT TERM**	Initial actions focus on setting up Agroecological Demonstration Zones to showcase sustainable land use practices and initiate productive use of available land. Parallel efforts include launching Education, Training, and Capacity Building programs and providing Material Support and Extension Services to build farmer capacity and ensure early engagement.
	MID TERM	Development expands through the implementation of Water Management Infrastructure and the application of Innovative and Traditional Farming Techniques to improve productivity and resilience. These interventions will strengthen food security and support climate-smart agriculture practices.
	LONG TERM	The project culminates with the Riparian Restoration and Wetlands Development, and the establishment of a Regional Interpretation and Exchange Center to facilitate regional knowledge sharing and position Nakuru as a leader in agro-ecological innovation.

INDICATIVE PROJECT STRUCTURING

Ownership and Governance
Project ownership is expected to fall under the Ministry of Agriculture, given the alignment with Nakuru's Structure Plan and the strategic location between the city, Njoro, and the Kiamunyi area—coinciding with agro-industrial and educational zoning. Supporting institutions include WRUAs (for equitable water use and source protection), NAWASSCO (for aquifer recharge and improved water quality), and farmer cooperatives (for implementation, maintenance, and knowledge dissemination). The County Department of Agriculture plays a key role in delivering extension services and coordinating implementation on the ground. Despite risks, strategic partnerships and targeted planning can make this a replicable model for agroecological transition in peri-urban Kenya.

Revenue Potential and Cost Optimization
Smallholder farmers may benefit through higher yields, reduced irrigation costs, and improved food security. NAWASSCO could see avoided costs from reduced water treatment and less dependency on groundwater. The development of the Nakuru Agro-Hub, including education, demonstration, and light processing functions, also presents modest but stable revenue opportunities.

Points of Attention
- Complex contracting and multi-actor coordination
- Land tenure and ownership uncertainties
- Encroachment risks from middle-income urban expansion
- Presence of geological fault lines
- Low short-term return potential, limiting commercial investor interest (except Invest International)

FUNDING AND FINANCING CONSIDERATIONS & IDENTIFIED INVESTOR INTEREST

The Nakuru Agroecological Hub is not suited for traditional private project-based finance due to its limited direct revenue generation. Given its strong public goods character and long-term co-benefits—including food security, water resilience, and sustainable livelihoods—it is best supported through public and donor funding, complemented by concessional finance and grant mechanisms.

- Public grants from rural and climate resilience programs—such as FLLoCA, KCSAP, DFCD, and SNV—should form the financial backbone. National government co-financing will also be critical, requiring the formal endorsement of line ministries such as Water, Agriculture, and ultimately the Ministry of Finance.
- Invest International may support specific components where Dutch content or expertise is present—particularly in agro-processing, water management, or circular farming systems. Additional opportunities for private investment exist in agro-processing, input supply chains, and aggregated smallholder services, although these would likely materialize in later phases.
- Microfinance institutions and SACCOs can play a key role in facilitating access for smallholders through tailored repayment models. Revenue potential is largely indirect and depends on strategic implementation—through improved crop yields, avoided water treatment costs, and value-added agri-products.
- While private sector engagement is not expected for capital investment, it may become viable in operation and maintenance roles, especially in training, input delivery, and market access.The alignment with Kenya's rural development agenda positions the project well for multi-source funding, including blended finance models, particularly if tied to broader food security and climate resilience objectives.

3 OPERATIONAL TOOLS
CAPACITY BUILDING AND PILOT PROJECTS

REVIVING FUTURES THROUGH PLOT-LEVEL INNOVATION AND AGROECOLOGY

Capacity building in Kiamunyi plays a foundational role in fostering a new generation of land stewards equipped to manage water, soil, and food systems under changing climatic conditions. Beyond institutional outreach, the focus lies in enabling individual landowners—particularly small-scale farmers and peri-urban residents—to implement nature-based solutions directly on their own plots.

Early Action: Building Capacity Before the Agro Hub
While the Agroecological Hub represents a cornerstone for long-term transformation in Kiamunyi, capacity building and pilot implementation must begin now—well before the hub is constructed. These first steps are essential for preparing the ground: socially, institutionally, and ecologically. Pilot interventions offer a way to test methods, train communities, and build local trust and skills that will feed into the larger vision of the hub. Initial pilots can be deployed on public land, institutional grounds (e.g., schools or churches), or through volunteer plots from engaged farmers and residents. These early testbeds demonstrate how nature-based solutions (NBS) work at the plot scale, and how they improve food production, manage water more effectively, and support local livelihoods.

Learning by Doing: Pilots as Decentralized Training Grounds. Each pilot initiative will act as a decentralized node of learning—providing hands-on examples of contour bunding, swales, clay-lined pans, rainwater tanks, agroforestry, and composting. These can be supported by technical partners, youth groups, and Ward Climate Change Committees to ensure proper installation, monitoring, and visibility.

They will also serve to gather evidence: what works in sandy soils? What harvesting techniques are most effective in limited space? These learnings will directly shape the programs and physical design of the future hub.

Empowering Plot Owners With Targeted Support
Crucially, these pilots will help train private landowners on how to improve their own land. Many of Kiamunyi's plots are small and fragmented, but they hold great potential for localized sponge interventions. Through field visits, mobile demonstrations, and practical trainings, households can learn to build their own small-scale water systems and food gardens. Starter kits (e.g., rain barrels, seedlings, compost, tools) can be distributed to enable immediate action, especially among vulnerable or first-time farmers. These early activities create a feedback loop: landowners improve their plots, gain interest, and ultimately become key users or partners of the future Agro Hub—where they can access materials, receive technical support, and join cooperatives.

Linking Pilots to Systemic Impact
Even at a small scale, these pilots can begin to regenerate degraded landscapes, improve seasonal water retention, and demonstrate the economic value of climate-smart farming. Their visibility within the community builds momentum and legitimacy, especially when aligned with local leadership and governance structures. Moreover, by focusing on social groups that are currently disengaged—such as youth who see farming as unviable—these initiatives can redefine what agriculture means in Kiamunyi. Not as subsistence or hardship, but as innovation, stewardship, and opportunity.


©MASS DESIGN GROUP

INITIAL ASSESSMENT ON PHASING

OPERATIONAL TOOL		ACTION	ST	MT	LT
VISION PRINCIPLES AND GUIDELINES	Land use and spatial configuration	Minimum Plot Division and Regulation			
		Clustered Residential Zones			
		Scalability of solutions on plot level			
		Agricultural and Agroforestry Zones	?		
		Agro-Ecological Corridors			
		Riparian and Buffer Zones			
	Institutional support and governance	Local Leadership and Customary Authorities	x		
		Capacity Building and Farmer Field Schools			
		Community Water User Associations (WUAs)	x		
		GIS-Based Land Use Monitoring			
		Financial Incentives and Microcredit	x		
IMPACT PROJECT	The Nakuru agroecological hub	Agroecological Demonstration Zones			
		Riparian Restoration and Wetlands Development			
		Water Management Infrastructure			
		Innovative and Traditional Farming Techniques			
		Education, Training, and Capacity Building	x		
		Regional Interpretation and Exchange Center			
		Material Support and Extension Services	x		
CAPACITY BUILDING AND PILOT PROJECTS	Reviving futures through plot-level innovation agroecology	Building Capacity Before the Agro Hub			
		Pilots as Decentralized Training Grounds			
		Empowering Plot Owners With Targeted Support			
		Linking Pilots to Systemic Impact