REFOOTURE

from sustainability towards regenerative thinking

West Nile Innovation Hub
Arua region in Uganda

Food System challenges and launch of the West Nile Innovation Hub

Sandra Langi, Molly Adokorach, Richard Malingumu, Robert Kajobe, Marlene Roefs

20/12/2022

Reviewer: Ingrid Coninx

WAGENINGEN
UNIVERSITY & RESEARCH

This report describes the challenges of the food system in the region of Arua and summarizes the key outcomes of the official launch of The West Nile Innovation Hub on November 8, 2022.

Sandra Langi[1], Molly Adokorach[1], Richard Malingumu[1], Robert Kajobe[1], Marlene Roefs[2], 2022, West Nile Innovation Hub – Arua region. Food System challenges and launch of the West Nile Innovation Hub. Wageningen, Wageningen Environmental Research, Report.

1. West Nile Innovation Hub
2. Wageningen University & Research

The REFOOTURE project (July 2020 – March 2023) has been commissioned by University Fund Wageningen and has been financially supported by IKEA Foundation.

Contents

1 Introduction

The West Nile region continues to experience rapid population growth, an influx of refugees, increasing cross-border trade and urbanization; all aspects point to the rising demands for food. Increasing food supply is expected to have potential environmental and social impacts. These impacts are associated with biodiversity loss, greenhouse gas emissions, land degradation, water for production; as well as the inequalities in access to diverse nutritious and safe food and livelihoods. Despite the existence of interventions to curb the adverse impacts in the West Nile region, challenges remain. Understanding the context specific pathways to increase and sustain food security and nutrition for all in West Nile region, while ensuring positive economic and environmental outcomes, is important to guide innovative policy designs and for sustainable development.

2 About West Nile Innovation Hub (WNIH)

Understanding the context specific pathways to increase and sustain food security and nutrition for all in West Nile region, while ensuring positive economic and environmental outcomes, is important to guide innovative policy designs and program implementation. Heterogenous groups of actors working in the region need to come together and local capacities strengthened to unleash the potential of West Nile as a hub for cross-border trade, inclusive community development and agrobiodiversity while limiting damage to the environment. This implies the urgency to engage with various actors in government, private sector, non-government organisations and the citizens to develop more context specific innovative solutions to realize the ambitious goals.

Muni University, a public university in West Nile, in partnership with Wageningen University & Research (WUR) are supporting the establishment of a West Nile Innovation Hub with the aim of stimulating participation in dialogues and scaling innovations to improve the West Nile food system. Supported through the REFOOTURE project with funding from IKEA foundation, the West Nile Innovation Hub (WNIH) will create a platform that brings together government, academic and research institutes, non-government organisations, financial institutions and food value chain actors (such as farmers, cooperatives, processors, traders and consumers). The objectives of WNIH are to:

- Foster dialogue and exchange concerning the development trending towards making the West Nile food system sustainable considering the needs and opportunities among the different local actors.

- Facilitate linkages among diverse actors to create networks for innovation and action research to identify concrete solutions to the challenges faced in West Nile region.
- Contribute towards the mission of positioning Muni University as the centre for knowledge and innovation supporting agricultural, environmental and socio-economic development for the region.

While the formal partnership has already been established in 2021, the official launch of the West Nile Innovation Hub took place in November 2022 (see chapter 5).

3 Process to identify food system challenges

As part of the exchange among actors in the food system, WNIH organized a series of food system dialogues between July and October 2021 to inspire different public and private actors to share insights about the challenges and opportunities to support innovations for sustainable and regenerative food systems. Although the food systems concept was fairly new, adopting the approach expanded the dialogues beyond the usual conclusions pointing to the dynamics of the refugee influx in the region. The seminars were attended by representatives of different local governments in particular the production officers, academia (Muni University, Kyambogo University, IABC, WUR), private sector, non-government organisations, donors (USAID) and farmer associations operating in the West Nile region. The intention of the was to create awareness and facilitate reflection on a regional food systems assessment conducted in 2020 by WUR and Muni University with support of a WUR-wide Knowledge Based project and internal resources of Muni. The study adopted a food systemsi perspective to identify the drivers and the transition pathways contributing to sustainable food security and nutrition in Arua district, West Nile. Collective reflection and awareness creation enabled stakeholders to identify propose the main entry points to improve the food systems in the region, including landscape approaches for soil sustainability and user rights, sustainable and inclusive agriculture production systems, food environment, digitalized agriculture and scientific and indigenous knowledge capture and gaps.

To align with the covid-19 regulations, a combination of online (three) and blended approaches were used in conducting the seminars. In addition the four seminars focused on different topics:

- Seminar I: Food systems, agriculture production (21 July).
- Seminar 2: Food system future scenarios (August 4).
- Seminar 3: Land use (August 18).
- Seminar 4: Postharvest losses and food system innovations (October 14).

The participants reflected on the effects of rapid population growth, slow agriculture development, declining forest and land resources and food waste challenges; as well as collectively proposed opportunities that could be leveraged to innovate towards more regenerative, inclusive and healthier food system(s) in the West Nile region.

Based on the dialogues, the stakeholders identified four entry points to make the food systems more regenerative, inclusive and healthy. First, landscape innovations involving long-term soil development (testing, fertilization, handling agro-chemicals, land rights). Second, enhance sustainable agriculture production and productivity (protect agriculture biodiversity, water for production technologies, integrated farming systems, pest and disease management, agri-finance and digitalisation). Third, improve the food environment, in particular postharvest losses and waste as well as nutrition education and awareness creation. Last, societal aspects linked to relationship building, managing conflict and other competing socio-economic development policy priorities that present key trade-offs in improving the food system. The insights informed the mapping of the innovation cases to consider in starting up the Living lab activity support.

4 Food system in West Nile region: Key issues, drivers, entry points and innovations

4.1 Characteristics of the food system in West Nile

4.1.1 Food system activities

The West Nile region has nine administrative local governments namely, Arua, Nebbi, Koboko, Yumbe, Zombo, Moyo, Adjumani, Pakwach and Maracha. The region is predominantly engaged in subsistence agriculture, focusing on staple crops including cassava, sweet potatoes, maize, beans, banana, sesame, groundnuts, peas, sorghum and rice. The major traditional cash crop is tobacco. The region generally has far lower crop yields compared to national average yields. The same applies for the livestock (goats, chicken, cattle, sheep, ducks) and fisheries production. Apiary is another common livelihood activity. The strategic location of the region supports considerable cross border with DRC and South Sudan involving various agro-products. Variations exist in the reduction capacities across the districts, Zombo is considered a fast-emerging food basket for the region (Stakeholder observation). Farmers in West Nile have inadequate access to quality farm inputs and production assets such as seeds, fertilizers, pesticides, irrigation and the capacities necessary to increase, diversify and sustain food production. The refugee population faces problems to secure access to land for production. Postharvest losses, declining agriculture biodiversity and low value addition to commodities are additional challenges which present opportunities for innovation.

4.1.2 Food system drivers

The main social economic drivers highlighted were the rapid population growth of 3 percent per year suggesting that the population may double by 2040. Refugees comprise about 20 percent of the total population and this is expected to increase as a result of the ongoing geopolitical dynamics. Refugee settlements have the potential to affect food markets in various ways, i.e. by selling surplus food aid at the local markets, marketing own produced food, and increasing the risk for land conflicts as well as competition for scarce agriculture resources, for example, extension services and inputs. Participants highlighted how the increasing urbanisation (.e., Arua was granted city status), growing urban population and infrastructure development is reshaping and causing tensions related to land rights and access to land outside the city for cultivation. Other drivers relate to the weak market linkages, competing profitable enterprises (e.g. sand mining), poor community mindset towards agriculture, complicated land tenure systems, inadequate access to agriculture finances and information and a decline in youth participation in agriculture production[ii]. Gender inequalities such as limited access to agriculture land (ownership is mainly by men) and limited decision making power over household assets have negative consequences on food production and nutrition (Seminar discussion).

The environmental drivers comprise of soils characterised by low organic matter and high sand content (infertile/marginal land) resulting in low marginal productivity (Seminar 3, August 18). Soil fertility and the practices associated with it are a leading driver of soil degradation in the region. Practices such as burning and cultivation, fragmented land, inadequate knowledge of utilisation of different types of soil, land wrangles and theft and unclear policies influence sustainable land use in the region. The land owned by farmers is often inherited and fragmented in small plots (e.g. 0.25 acres) that are distant from each other. Land division among families has occurred for several generations, and farms have become more fragmented over the years. Moreover, the difficulty in buying land is an obstacle for consolidation of larger plots of land. Land fragmentation promotes over cultivation without soil conservation measures. Possible effects of changing climatic conditions including drought (higher temperatures), more variable rainfall and insecure access to water for production, only one growing season, and more pests and diseases all may contribute to declining food yields in the future.

West Nile region hosts one of the largest refugee settlements in the world at a localized scale. Most of the population in in the region is dependent on natural resources to meet their cooking energy (fire wood), shelter and agriculture production needs. Trees are cut down due to increased fuel and construction needs, land for settlement and increased commoditization of forest resources as a quick-short term income generating activity (Barasa et al. 2020). Deforestation is a major contributing cause of biodiversity loss. Other factors are land degradation, loss of vegetation cover, water contamination, poor solid waste management, encroachment on wetlands and

infrastructure development in the region. Barasa et al (2020) stated that the current demand for natural resources and the heavy reliance on traditional biomass for energy is unsustainable – it exerts pressure on the woodlands, savannah grasslands and natural forests. The resulting competition for diminishing natural resources has increased tensions between the refugee and host communities (Bradford 2016). Urbanisation and expansion of Arua city, need to find land outside the city for cultivation. Infrastructure development is not always well planned, hence, threatens existing socio-ecological assets and increases conflict related to land rights (UNHABITAT 2019).

Governance related drivers: Various policies and programs are enacted at national and district level to structure and guide the governance of agriculture; and to create an enabling environment to facilitate improvements in the food systems in West Nile. Examples of the policies include the National Development Plans (NDP III), Sector Strategic Investment Plans (agriculture, environment, social development, health, water, infrastructure), the Uganda Multisectoral Nutrition Policy (2020), the District Development Plans (2020-2025) and the West Nile Investment Strategy 2020. Annex II show some of the policies and programs shaping the food system in West Nile region. The policies emphasize the modernization and commercialization of agriculture (economic outcome), and more recently, a focus on food and nutrition security (healthier diets outcomes) and social equity (inclusion outcomes). In particular, the policies elaborate plans to promote agro-industrialization, community mobilization and involvement, natural resources management, human capital development and urbanization all of which could potentially facilitate or stall food system transformations.

Examples of the government and donor funded programs through which policy ambitions are implemented: Operation Wealth Creation (OWC) which supplies agriculture inputs, National Agricultural Advisory Services (NAADS), the Uganda Multisector Food and Nutrition Security project (UMFNP), Development Initiative for Northern Uganda (DINU), the Development Response to Displacement Impacts Project (DRDIP), Social Assistance Grant for Empowerment (SAGE), Northern Uganda Social Action Fund (NUSAF 3) and West Nile Private Sector Promotion Centre (WENIPS). However, ensuring actual implementation and alignment of policy objectives is not always the case. Some of the policies present conflicting agendas which may have disproportionate effects on system transformation (reflection of participants). The extent to which these policies and programs are transformative and sustainable remains inadequately known.

In additional, many multilateral and bilateral international organisations and private sector organisations influence food system activities directly through supporting specific activities to address different challenges experienced in the regions. The low local revenue base, high dependence on government and donors, ever-changing

donor support conditions and staff restructuring are some of the factors threatening sustained outcomes. Annex I outlines the key food systems actors in West Nile region.

4.1.3 Food system outcomes

Nutrition: Almost 71 percent of the population in West Nile region experience moderate to severe food insecurity. Slightly over three out of ten children under five years or age are stunted (short for age), 10 percent have global acute malnutrition. Per capita calorie intake is less than 1750 Kcal per day compared the daily requirement of ≈ 2100 Kcal/day required. The current average intake of Vitamin A (138 mcg compared to 425 mcg required) (figure 2). Where the protein and iron requirements are met at 46g/day and 20mg / day respectively, there are disparities in the nutrient deficiencies in Arua. There is relatively low diversity in local diet which comprise of staples with little nutrient dense foods such as animal products, fruits and vegetables.

Environment: Low agriculture production implies limited to no surplus food to meet the growing demand, limited processing capacity and low labour productivity. Hence, despite the enabling policies, agriculture cannot be a driver of local socio-economic growth where there is no food surplus for trade and sufficient supply of nutritious food. The possible effects of the changing climatic conditions including drought (higher temperatures), more variable rainfall and insecure access to water for production, only one growing season, and more pests and diseases which may contribute to declining food yields in the future.

Food waste: It is a paradox that in the face of low agriculture production, the West Nile region experiences challenges related to post harvest losses especially on farm and in the market (Seminar 4, October 14). Discussions on food wastes and losses highlighted the challenges production (on farm), during transportation, processing, in the markets, as well in the restaurants. This was mainly attributed to underdevelopment markets, storage infrastructures and inadequate knowledge. Vital but perishable commodities like tomatoes are specific examples of crops that contain some of the required nutrients necessary in providing healthier diets for the region. However, stakeholders involved in producing and marketing tomatoes lost challenges significant quantities the commodity from the time of harvesting to consumption. The risk associated with post-harvest losses is a disincentive for sustained production.

4.2 Healthier diets: the possible food system futures in West Nile region

The second online seminar (August 4) discussed the scenarios of the possible futures of the food system in West Nile region. Food systems should ensure availability of, equitable access to and sustained delivery of safe nutritious and acceptable foods. The discussion aimed to validate the proposed scenarios, solicit additional ideas of how the food system could change and the innovations to consider to realise the required change. Scenario analysis was used to obtain alternative insights of the future developments of the food system in Arua highlighting the potential impacts of (lack of) different policies. The scenarios focused on the alternate futures in relation to the access to healthier diets. The current diet consumed is high in starch foods, low in vegetables and animal source protein, including the food acquired through local production and food aid (Figures 2 and 3). The main question addressed in the scenario analysis was: how should and could the food systems in Arua change to provide healthier diets? What amount of crop area will be required? Three scenarios were explored based on three drivers of the food system-population growth, reduced food aid and increasing demand for healthier diets and on the environment.

Scenario 1: Business as Usual => No change to the current situation up to 2040.

Scenario 2: No Food Aid =>Business as usual, but without food aid.

Scenario 3: Healthy Diets => All inhabitants consume a healthy diet.

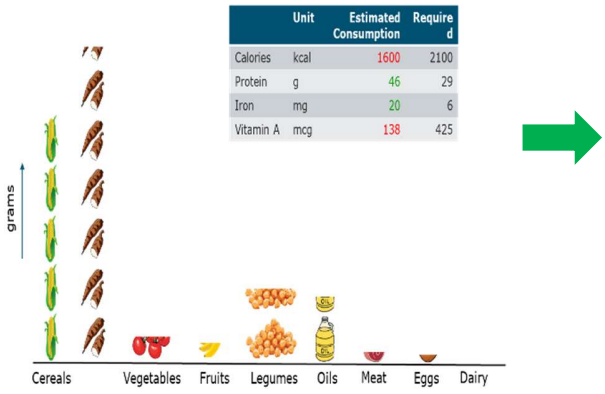


Figure 2. Current diets observed in West Nile region

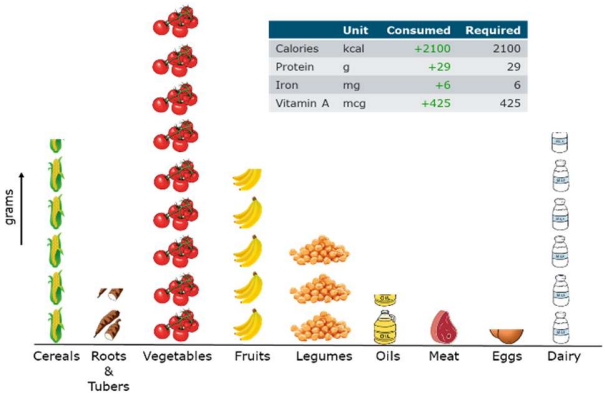


Figure 3. Example of a healthy diet

There were varied views on the future scenarios of the food systems in West Nile. On one hand, the participants were in agreement that the population was expected to increase as more investors and citizens with agriculture and non-agriculture linked livelihood relocate into the region as a result of the improved infrastructure; and due to the regional politics prompting migration and the continuous increase in refugees. Despite, other participants being optimistic that the level of refugees will reduce because of improved political stability in Sudan and DR Congo will improve. The increasing population demands food and calls for sustainable production of this food. On the contrary, other participants were doubtful that food system will change

drastically in the coming 20 years given that not much has changed in the food supply chain in the last 20 years. They believed the status quo would remain, with meagre increase in living incomes from agriculture production. Yet, there was consensus that food systems outcomes could be improved by strengthening local production and stimulating markets for food products. Transitions should accommodate the growing regional population without too much strain on natural resources. Without effective interventions to increase agricultural production and productivity, the food situation is expected to decrease in the future. The assumed theory of change is that the increasing population will result in increased local demand for healthy food and hence increased local market and business development in the region.

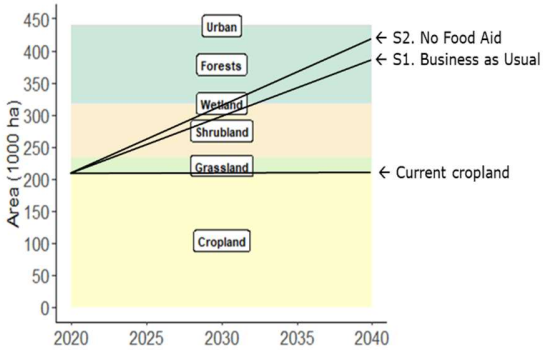


Figure 4. Scenarios of current diet and required crop area

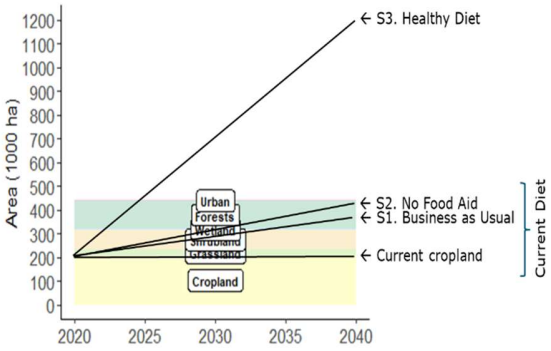


Figure 5. Scenarios of providing healthier diets and required crop area

The land area and land use in the required under all scenarios point towards increasing deforestation (Figures 4 and 5). Overall, increasing and diversifying agriculture production alone will not be adequate to support consumption of healthier diets in the district. To limit the trade-off and prevent adverse effects to the environment, interventions to improve crop productivity and diversification should be complemented with actions to reduce the postharvest losses, (bio)fortify food and conserve the environment.

4.3 Entry points and innovations to transform the food system in West Nile region

Changes are necessary in different parts of the West Nile food system (policy, service sector, markets, consumers) to realise the desired economic, societal and environmental outcomes. Some of the areas identified as opportunities to improve the system include the following elements:

Land use innovations (Environment)

- Innovations should focus on land use rights issues, tailor make the user rights depending on the systems (customary laws) in place. High fragmentation of land because of inheritance and non-fragmentation, serious farmers cannot rent the land or grow permanent crops on the lands because of fear of losing ownership. Poor policies have aggravate land use challenges. 'The host communities in West Nile have previously lost land because of poor agreements made with Office of the Prime Minister and UNHCR, they are hesitant to share the available land. The fear is inhibiting land availability for increased production' (Seminar 4 participant). Slash and burn approach is a logical strategy where there is no ownership, land tenure rights are important to facilitate innovations focused on more long-term soil development because of assured security of ownership. Knowledge on sustaining the land use becomes key.
- Soil fertility. Soil needs to be recharged, the norm is to cultivate without investing in soil health. Farmer education on recharging the soil (similar to how a pone works) is necessary. Practices used by farmers are degrading the land. The region has a long history of tobacco and cassava production on the same plots of land, slash and burn practices with minimal investment. Innovations should sensitize on soil sustainability. For instance, Omia Agribusiness teaches farmers how to recharge the soil using both organic and inorganic means. Organic means such as manure, composite and cultivation approaches improve the physical properties of soil to hold water and retain nutrients. Inorganic gives quick returns that a plant requires in a short time. A combination of the organic and inorganic ensure that farmers are able to keep their soil productive for long while providing required nutrients at that time. Innovations should focus on affordable means for soil testing (what is in the soil) is necessary to guide decision making about choice of crops, required soil management strategy, quantities of fertiliser necessary. A combination of organic and inorganic to maintain long-term soil fertility while meeting the short term needs for fast growing crops like tomatoes.
- Refugees have a small piece of land where large scale cultivation is difficult. Some organisation constitute farmer groups and opt members from the host communities to increase access to land. Invest in relations building between refugees and host communities to expand production beyond allocated land.
- Mishandling of agro-chemicals. Farmers use agro-chemicals to increase tobacco production with minimal guidance. The practice has increased the wealth of households, but has also caused damaged other ecosystems such as the fisheries, micro and macro organisms are affected. Innovations should promote high value crops that require limited land for production and quality agro-inputs. It is crucial that farmers realise that it is not about how much one plants, but how much quality can provide.

Agriculture production

- Expand the current cropping area. Innovations to increase the production frequency, i.e. increase the number of growing seasons per year, invest in irrigation technologies, access to water for production. General low soil fertilities call for integrated farming systems; crop and livestock enterprises. Innovations should promote high value crops that require limited land for production and quality agro-inputs. Too much reliance on annual crops which are very susceptible to weather and climate change. Shift to perennial crops.
- Increase agricultural productivity, i.e. increase the production per unit of land through increased use of organic and inorganic fertilizers. Focus on initiatives that look at climate change and resilience building, major and minor crops of West Nile and their nutritional content, at programme design. Farmer specialization in few specific crops is an important approach towards improving productivity. Facilitate livestock and fisheries initiatives.
- Protect and increase the use and management of the rich agricultural biodiversity. Document the local foods in the area, understand their seasonal availability, nutritional value and use these to improve production. Indigenous and traditional foods provide the population with diverse, healthier, fresher, and nutritious foods that are culturally appropriate. There is need for information to guide the production and to conserve these foods along with the associated indigenous knowledge.
- Changing the population mindset towards agricultural activities is critical for all the actors in the food systems. Agricultural initiatives should be designed that provide the youth opportunities to generate a fair income. Sustainable interaction between the different sub-systems within the food system of West Nile is (and should be) one of the key focuses of this initiative. Besides bringing different stakeholders together, WNIH could explore joint resource mobilization to enable detailed studies and implementing/testing of the options to improve the food system.
- Improve access to agri-finance by the youth and small-scale farmers.
- Digitalization of agriculture to enhance easy access of market and information.

Food environment

- Reduce post-harvest losses. Market linkages to ensure market availability to match increased production-and tap into the emerging market opportunities across the border.
- Nutrition education and promotion. Campaigns on healthier diets and use of indigenous foods.

Societal aspects

- Knowledge on sustaining the land use is vital. Innovations should focus on land use rights issues- tailor make the user rights depending on the systems (customary laws) in place. Slash and burn approach is a logical strategy where there is no ownership, land tenure rights are important. This will facilitate innovations focussed on more long-term soil development because of assured security of ownership.
- Invest in relations building between refugees and host communities to facilitate access to land for production and restore trust. Refugees have a small piece of land where large scale cultivation is difficult.
- Shift the population mindset towards agricultural activities is critical for all the actors in the food systems. Agricultural initiatives should be designed that provide the youth opportunities to generate a fair income. Sustainable interaction between the different sub-systems within the food system of West Nile is (and should be) one of the key focuses of this initiative. Besides bringing different stakeholders together, WNIH could explore joint resource mobilization to enable detailed studies and implementing/testing of the options to improve the food system. Invest in skills based training and research should be made more accessible to the farmers.
- Be cautious of the competing claims for the resources and the consequences of the options. Each option requires careful consideration, identification of feedback loops and possible trade-offs for effective food systems interventions.
- Be cautious of the competing claims for the resources and the consequences of the options. Each option requires careful consideration, identification of feedback loops and possible trade-offs for effective food systems interventions.

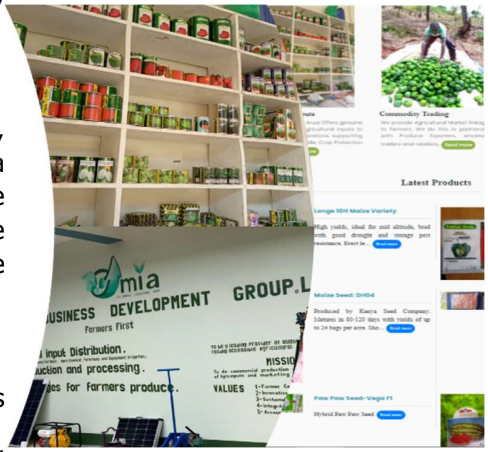
4.4 Food systems innovations in West Nile

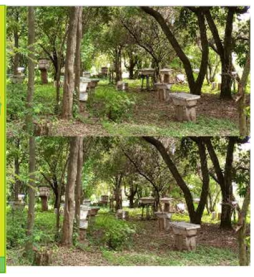
There urgency to invest in innovations that ensure regenerative and inclusive food systems in the region was nurtured; with viewpoint to simultaneously prioritise interventions in technology, social, economic, organizational and policy processes. According to FAO (2021), innovations may comprise of attracting consumers and keeping them engaged, knowing your market, finding the right price, sharing and co-creating knowledge for sustainable production, managing and accessing sustainable inputs, staying connected through logistics, packaging for sustainability, guarantees for sustainability, innovative finance, formalising collective work, to brining in partners and advocates. Systemic changes are essential to transform the West Nile food systems with various actors having different roles to play, hence the urgency for collective action. Examples of innovations in West Nile region.

Table 1. Existing food systems innovations

Name of initiative	Description	Pictorial
Agency for Community Sanitation and Sustainability (ACOSS) **Location**: Yumbe **Started**: 2018	**Objective** Promote good sanitation and hygiene, environmental health and resilient livelihood through waste recycling. **Activities:** ° De-sludge latrines and solid waste management, using black soldier flies. ° Produce organic manure ° Agro-forestry (tick tree that is drought resistant and has quality timber) ° Water for production (potential enterprise). **Partners:** Care International, International Organisation for Migration, Yumbe district **Issues for consideration** ° Potential to increase market demand, address mindset about safety of product. ° Scale up to other districts. ° Access to adequate raw material. Solid waste management using BSF requires huge quantities of wastes.	
Nutrition and Income Generation Intervention (NIGI) **Location**: Terego	**Objective:** Contribute to healthier lives and more resilient livelihoods of refugees and hosts communities in WN by ensuring improved access to and consumption of nutritious crops. **Activities** ° Household nutrition: refugees and host communities supported in vegetable and fruit production, awareness raising on good nutrition. ° Commercial vegetable production: farmers with large plots supported to produce and market horticulture commodities. ° Quality seeds: Local seed businesses supported to produce and market quality seed. **Partners:** WUU, EWS-KT, WUR, Arua district, Terego district, communities, NGOs **Issue for consideration** ° Strategies to support nutrition in fragile situations. ° Learn effective collaboration and co-existence of refugees and host	https://www.youtube.com/watch?v=ZTIQ7n66QOk 

Name of initiative	Description	Pictorial
	communities. Poverty higher in host communities compared to refugees. ◦ Develop business models for horti input business & nutrition-agric training ◦ Soil fertility and nutrient management in disadvantaged contexts ◦ Develop local seed businesses and promotion of QDS ◦ Strong focus on women and refugees in production, nutrition and business development ◦ Opportunity to develop regenerative technologies (renewable energy, ICT, waste management, processing and residual flows)	
Long Bottom Mixed Farm- Inaku Patrick Wole **Location:** Maracha **Started**: 2006	**Objective:** Economic, social, environmental, and healthier diets. Every challenge is an opportunity to innovate. Use of locally produce materials as raw materials for production (circular production). **Activities** ◦ Circular agriculture including piggery, poultry, maggot production for animal feed, bio-gas production, horticulture and fish farming. ◦ Learning sites for communities and students to receive practical lessons on circular production, agribusiness and tourism. ◦ Agribusiness **Partners**: Kilimo Kisasa, UNHCR, MUNI, Maracha DLG. **Issues for consideration** ◦ Sandy soils can be improved to produce high yields. ◦ Community outreach and education to adopt the technologies.	https://www.youtube.com/watch?v=bAtezW-kRUA
Omia Agribusiness Development Group Limited **Location**: Arua (head office), Paidha, Koboko, Adjumani and agents in districts of WN. **Start**: 2018	**Objective**: Offer quality, affordable and readily accessible agriculture inputs and grains market to our clients. **Services** ◦ Agricultural inputs and extension services to farmers in remote areas (fertilisers, seeds, equipment and tools, crop protection chemicals).	https://www.omiaagribusinessdg.com/

Name of initiative	Description	Pictorial
	◦ Agribusiness consultancy services. Advisory services on good agronomic practices. ◦ Commodity trading **Partners**: NARO, MAAIF, Solar Now, EWS-KT, SNV, CEFORD, CARE, Caritas Uganda, Arua District Farmers' Association, Nowegian Refugee Council, Palm Corps Uganda, Danish Refugee Council-Uganda, African Evangelistic Enterprise (AEE0) Uganda, CRS, World Vision. **Issues for consideration** ◦ Access to good agricultural inputs remains very low. ◦ Integrated socially responsible model delivering holistic and demand driven products and services to sustain framer incomes, meet buyer demands and create multiplier effects towards rural community development.	
Northern Uganda Resilience Initiative (NURI) **Location**: Arua, Madi-Okollo, Terego, Nebbi, Zombo, Pakwach, Koboko, Moyo, Obongi, Adjumani, Kitgum, Lamwo and Agago	**Objective**: Enhanced resilience and equitable economic development in supported areas. **Activities** ◦ Improving farmers knowledge on climate-smart production methods. ◦ Rural infrastructural support and water resource management. ◦ Collective marketing. ◦ Visible crop production during dry season. Market price stabilization for certain crops. **Partners**: Operation Wealth Creation, PLENOR, Caritas, District Local governments, NARO., AFARD, ARUDIFA, CARE, PICOT. **Issues to consider** ◦ Irregular rain patterns mostly in season one negatively affects crop yields thus low production. ◦ Project support ends 2022.	https://nuri.ag/ 
Wadelai Cooperative Society **Location**: Pakwach **Started**: 2012. Over	**Objective**: Alleviate poverty in WN through improved access to quality seeds and market opportunities. **Activities**	

Name of initiative	Description	Pictorial
150 farmers are members. Supplied rice and rice seeds in big quantities to markets across the entire country	° Produce and supply quality seeds to communities. ° Bulk produce purchases and sell to cooperatives and private businesses. ° Value addition. ° Empowerment learning centre (agriculture practices, agribusiness, climate change, gender action learning) **Partners**: WUU, NURI, Packwach DLG, CEFORD, OXFAM, ISSD **Issues to consider** ° Access to quality seeds by rural communities is one of the reliable ways of improving production, crop yields and market opportunities.	
Alfred's Farm- Terego District	° The Innovator has over 150 bee hives. The processing machines are being assembled and installed in the farm's office in Arua town. ° Has a carpenter shop that makes the hives ° Produces honey ° Harvest and packages the honey ° Sells hones The farmer is in the process of installing big processing machines to allow him upscale to a larger production	
Abi ZARDI Apiary **Location:** Provide services to West Nile region	**Objective**: Develop and promote a system to produce and promote high quality bee products (honey, bees wax, propolis and bee venom) **Activities** ° Improve skills of local beekeepers and ability to develop acceptable bee products ° Capacity development in entrepreneurship, gender action learning systems (GALS), leadership, by-laws etc. • **Partners:** local governments, apiculture farmers, NGOs	 

5 Formal launch of the West Nile Innovation Hub – 8 and 9 November 2022, Muni University Conference Hall, Arua city.

Muni University in North Western Uganda in collaboration with Wageningen University and Research (WUR) in the Netherlands organized a stakeholder workshop on regenerative and inclusive food systems (RIFS) at Muni University and under the umbrella of the West Nile Innovation Hub (WNIH). The workshop took place from 8th to 9th November 2022 at the University Conference Hall in Arua City.

During the workshop, The West Nile Innovations Hub (WNIH) was launched as well. WNIH is a Multi-Stakeholder Innovation Platform (MSIP) that brings together various actors in the food systems in the West Nile region in order to mobilise their innovation capacity to find solutions to the challenges affecting food production in the region.

The mission of WNIH is to become an inclusive platform in engaging diverse stakeholders in innovation processes to transform the food system in the region towards becoming more regenerative, inclusive and healthy.

The team of the West Nile Innovation Hub

5.1 Programme of the launch and workshop

WNIH Launch Programme

Programme for stakeholder workshop on regenerative and inclusive food systems and the launch of the West Nile Innovation Hub (WNIH)		
Workshop Day 1 - Tuesday 8th November 2022		
Time	Activity	Responsible Person
8:00-9:00	Arrival and registration of attendants	Hellen Androa
9:00 – 9:20	Introduction	MCs
9:20-9:30	Objectives of the workshop	Molly Adokorach
9:30-9:45	Welcome remarks by the Vice Chancellor	Assoc. Prof. Simon Anguma
9:45-10:00	Opening of the workshop	Executive Director WENDA
10:00-10:30	Break tea and group photo	Desert Breeze Team
10:30-10:50	Presentation on food system scenario in West Nile	Prof. Robert Kajobe
10:50-11:10	Presentation of the RIFS concept	Dr. Marlene Roefs and Richard Malingumu
11:10-11:40	Discussions	MCs
11:40-11:55	Presentation on the West Nile Innovation Hub (WNIH)	Sandra Langi
11:55-12:30	Highlights from some Innovation Cases 1. Zero waste 2. Fishery & Aquaculture 3. Vegetable Production	Molly Adokorach, Richard Malingumu

12:30-13:00	Discussions	MCs
13:00-14:00	Lunch	Desert Breeze Team
14:00-15:00	Group discussion	Richard Malingumu
15:00-16:00	Presentation by group representatives	Gobo Denis
16:00-16:30	General discussion	Gobo Denis
16:30-17:00	Evening Coffee	Desert Breeze Team

Workshop Day 2- Wednesday 9th November 2022		
Time	Activity	Responsible Person
8:00-9:00	Arrival and registration of attendants	Hellen Androa
9:00-9:15	Recap	MCs, Sandra Langi
9:15-9:25	Remarks from the University Secretary/ Accounting Officer	Mr. Emmanuel Natal Banya
9:25-9:45	Transforming food systems in West Nile to achieve healthy diets for all: Experiences from the MAAIF multi-sectoral collaborations to address food and nutrition security	Mr. Twinamasiko Julius, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
9:45-10:00	Discussion	MCs
10:00-10:30	Tea/Coffee break	Desert Breeze Hotel
10:30-10:50	Presentation of other identified potential innovation case areas	Prof. Robert Kajobe
10:50-11:10	Agroforestry and landscape restoration efforts towards RIFS in West Nile	Assoc. Prof. Clement Okia
11:10-11:40	Discussions	MCs
11:40-12:00	Access to quality inputs and markets as driver to regenerative and inclusive food systems	Mr. Omia Razaki
12:00-12:20	Affordable Finance options for agriculture and forestry businesses	Centenary Bank
12:20-12:45	Discussion	MCs
12:45-14:00	Lunch	Desert Breeze Hotel
14:00-14:20	Summary of major issues captured during the workshop	Rappateur
14:20-14:35	Interlude	MCs
14:35-14:45	Remarks from Wageningen University & Research	Dr. Jochen Froebrich
14:45-14:55	Remarks from Vice Chancellor	Assoc. Prof. Simon Anguma
14:55-15:15	General remarks, Launch of WNIH & Closure by the Chief Guest	LCV chairperson Arua District

15:15-15:25	Group Photo	Mr. Kefa Atibuni
15:25-15:40	Interlude	MCs
15:40-16:00	Tea/Coffee break and Departure	Desert Breeze Hotel

Day 1: OPENING CEREMONY

The participants were welcomed by the masters of ceremony. Ms. Molly Adokorach took participants over the objectives of the workshop. The objectives of the workshop were to:

- Identify key stakeholders: Identify and engage with the key actors in the food system in West Nile
- Identify major challenges affecting the West Nile food system: Discussion with stakeholders about the major challenges affecting the food system in the West Nile region
- Understand stakeholders' views on what they consider to be the most important entry points to transform the food system in the West Nile region

Remarks by the Vice Chancellor, Muni University: The workshop was officially opened by the Acting Vice Chancellor Muni University. In his communications, he welcomed all the participants and thanked the various partners for working with Muni University to address the challenges in the food systems in the region. He stated that the University's role, was well articulated in its motto; "Transforming lives" of communities. He re-emphasized that agriculture which is the backbone of the country was faced with a number of threats in the region and the entire country. Some of the threats he highlighted included declining soil fertility in the region which he said could be attributed to the region's history of growing tobacco, although he said the claim needed to be investigated. He explained that grasses had grown short and all big trees in the region were no more, which was evidence of biodiversity loss. Because of land degradation, biodiversity loss, especially deforestation was inevitable thus affecting the watershed and catchment areas. This has farfetched negative implications such as silting of local rivers among others.

He added that a negative attitude towards agriculture especially by the youth was a big challenge. Many youths were loitering in trading centres and most of them engaged in the Boda-boda transport business and had abandoned agriculture. He also mentioned that there were many non-seasonal freshwater rivers in some districts such as Terego which were great opportunities for the youth in the areas as sources of water for off-season farming. He concluded by urging the workshop to focus on how to properly address the issue of mindset change so that more and more youth can be drawn to agriculture.

Remarks by the Executive Director (West Nile Development Association (WENDA): The Executive Director WENDA presented that food systems often takes into account mainly five items that include, production, distribution, marketing, preservation and pricing. He explained that the days when soil used to feed the

people in the region without being fed back were long gone, hence there was a need to start feeding the soil before it feeds us. According to him, as a region diverse with different food production capacities and potentials, it was time for the politics of the region to work together towards changing to promote agricultural production.

He explained that about 71.3% of the tomatoes consumed in the West Nile region were from outside the region, which is a huge concern, as it comes with health implications due to poor preservation methods, yet this could be produced locally. The tomato business in West Nile is worth 15 billion, implying that 71.3% of the business, worth 10.9 billion is lost to other regions. There is therefore an important question for West Nile, can't West Nile feed its population?

He explained that the food system was not only a concern for science, but also for life, politics, and development. West Nile food systems need diverse stakeholders to get involved, which was why WENDA had a big interest and was glad the academia and CSOs in the region were in it. In his concluding remarks, he thanked WUR and Muni University for creating the West Nile Innovation Hub and pledged WENDA's support for the Innovations Hub in all ways possible.

Presentation on food system scenario in West Nile, by Prof. Robert Kajobe

Prof Kajobe is the director of Graduate training, Research and Innovations, in the University and also the team leader for the West Nile Innovations Hub. He explained that food system involved the sum of actors and interactions along the food value chain from input supply and production of crops, livestock, fish, and other agricultural commodities to transportation, processing, retailing, wholesaling, and preparation of foods to consumption and disposal. The major components of a food system include; production, processing distribution and consumption and the main focus of scientists had been the push side (production) but not the pull side (consumption), a trend that needed to change.

According to him, a study had been conducted in the greater Arua before Terego district was curved out, and the findings showed that the district had a land area of 440,000 ha (1,1 million acre) with a population size of 1.1 million (including ≈ 20% refugees). About 70% of the population was employed in subsistence agriculture and generally in the country, 71% of the population in host communities face moderate to severe food insecurity, against 89% of the refugee population. Acute malnutrition was greater than 10% for children under 5 years in host communities, with a per capita calory intake < 1750 Kcal/day (≈ 2100 Kcal/day required). This had resulted into consequences such as low labor productivity, increased disease incidences, stunted physical growth, and impaired cognitive development of children.

He said there was a need to establish perennial crops because the annual crops alone could no longer sustain the population alone. His conclusion was that the Refugee policy had shifted from food aid to cash-for-food programs. This meant increased demand for food from local markets and, more own food production by

refugees resulting in more demand for agricultural inputs and food supply, and increased land conflicts.

Presentation of the RIFS concept by Richard Malingumu

In this presentation, it was appreciated that there was need to look at the whole food system rather than individual components to solve the food system problems. It introduced participants to the systems concept in relation to regenerative and inclusive food system. It explained the major food system outcomes that included nutritious food, good livelihood, healthy ecosystem and making sure everyone is on board (inclusivity). It was explained that food outcomes could be achieved through regenerative and inclusive practices, and some of the regenerative and inclusive practices integrated into addressing food security, poverty and environmental concerns identified included; creating women and youth opportunities, reducing cost of access to inputs and services, addressing challenges of food, nutrition and malnutrition, and closing the gap between formal and informal seed systems.

Questions and comments

- The Chairman Board of Directors Okoro Coffee Union noted that many times people attended workshops with minimal impact. What is presented in workshops is often academic, which is good but there was need to see reality. He added that In the 1970s they used to see so many extension workers but in the 1990s when Structural Adjustment program came in, all was lost because the program came in with "a lot of unrealistic changes". According to him, so many research documents had been shelved with little implementation of the recommendations. There were also other mostly related comments to Robert's presentation.
- In response, the comments and concerns raised were appreciated and the audience was informed that Muni University had been established in the region to solve such problems. The University would achieve it through her four key mandates which included teaching and learning, research and innovations and community outreach. He explained that as a young university, Muni University was making efforts to ensure that all research findings were disseminated so as to empower communities.
- A Professor from Jimma University in Ethiopia who joined online, mentioned that, much as the presentation was good pointing out pertinent issues such as inclusivity, it did not strongly emphasize issues of mindset change, especially among the youth such as the baoda-boda riders that the Vice Chancellor had strongly alluded on.
- One of the responses was that, there was a need for the government to get involved when it comes to the issues of the youth and that needed not to be politicized and change would arise.
- The Dean Faculty of Management Science, Muni University, noted that financial inclusion needed to be part and parcel of the food production system

because finances push some of the other factors needed. As a rejoinder to this, Mr. Titia Kamure, a farmer from the Terego district added that he was touched by the fact that financial institutions had no respect for farmers yet they eat what farmers produce. According to him, financial institutions demand for collateral security which is beyond the means of farmers who need credit to finance their farming activities.

- Another commentator mentioned that there used to be cash crops and food crops but, there were not clear anymore. That there were no coordinated agricultural plans, and that there was a need to rethink how the whole food system can work well again through the West Nile Innovations Hub (WNIH).
- The regional Police Community Liaison Officer in charge of the West Nile region called for an urgent need to change the way we look at our food systems. He added that he was surprised that Vurra which used to be the food basket of the region was now leading in opium (Cannabis) production, second to the Terego district.
- Another participant noted that aspects of value addition needed to be inculcated in the people of the region. This could include basic things like washing farm produce before selling, keeping the abattoirs clean and so on.
- In addition, a participant stressed the issue of inclusivity, mainly emphasizing the issue of gender inclusion in agricultural value chains. He urged participants never to look at women as vulnerable and explained that what men can do, women could also do.
- The last comment urged the people especially the farmers of West Nile to work on the local Indigenous Knowledge and innovations and the University and other Research based bodies in the region should contribute towards validating and improving the knowledge through research.

Presentation on the West Nile Innovation Hub (WNIH) by Ms. Sandra Langi

In this presentation, it was clearly explained that the West Nile Innovation Hub was a multi-Stakeholder approach towards a regenerative and inclusive food system in the West Nile Region of Uganda. With challenges in the food system, it was important to re-design and rethink about the future of food systems in the region as the food system was complex with many different actors. It was emphasized that these actors needed to come together through the hub because their disconnection affects the development and delivery of agricultural knowledge and innovation and creates weak linkages and gaps.

However, because these short comings had already been recognized, attempts to establish linkage mechanisms had been put in place, though face considerable problems. However, development of new ideas was a non-linear process and could emerge from any actor at any time.

Questions, comments and response

There were no comments or comments for the presenter.

Highlights from some Innovation Cases

The ICs briefly gave highlights on what their innovations.

GROUP DISCUSSION

Six groups were formed and each group was a question to answer.

Group 1: What future do you see for the West Nile food system?

The future of the West Nile food system can be very bright with improved standards of living and increased economic empowerment, only if the current bottlenecks and barriers to food production, processing, distribution and consumption are addressed.

- Production: West Nile food production was still on the lower end of production compared to other regions, therefore there was a need for increased access to fertilizers and a changed farmer's attitudes towards farming.
- Processing: There was need to increase access to increase access to Energy/electricity to promote processing.
- Distribution: There is a need to improve the main/trunk roads and increase the number of collection centres for farmer's produces.
- Consumption: There is a need to improve on consumption habits and gender mainstreaming.

Group 2: What are the most important areas to intervene (entry points) to improve the West Nile food system; and why?

The answers to this question included; improving the production and productivity through mechanization, improved seeds, GAP/SALM, water for irrigation and access to land; encouraging and facilitating attitude and mindset change; encouraging value addition to promote competitiveness and better price; bulking and collective marketing among and to promote Nuclear farming groups and; improving on policies for financial inclusion-advocacies for agricultural financing

Group 3: What changes (attitude and behavior) are needed to co-exist?

To co-exist in the West Nile food system, Innovators should innovate in inclusive food systems, share information, have a collaborative spirit among actors and be accountable. In addition, there is a need to develop policies to protect farmers from being exploited by middlemen. More so, adopting new innovations requires learning and unlearning the old practices, for example, irrigation and the use of inorganic

microorganisms (IMO). Financial institutions should also be dynamic to adopt a new approach for farmers such as agricultural insurance.

Group 4: What changes do you need/what needs to go right to ensure a healthy environment and diet?

This group gave the responses in two distinct areas;

Soil Health: They said there was a need to improve soil health through appropriate and sustainable agricultural practices such as zero waste techniques, incorporating agroforestry land use methods and wetland conservation and management. Use of renewable energy, apply intensive farming techniques, advocating for policy reforms/Changes, like reforms in land tenure system and mindset change towards methods that improve the environment and diet were other major solutions suggested.

Diets: The team here recommended that families in the region should be encouraged to consume organic foods and diversify the varieties of food consumed. This can be achieved through enterprise mixing and use of appropriate food preparation/processing guides.

Group 5: Who are the key stakeholders in the food systems in West Nile?

The participants identified their key stakeholders as famers, government (Local Governments, Central Government i.e.,. Ministries, Departments and Agencies), the private sector (input/service providers, processors, transporters, marketers/ trade aggregators), training institutions, the media, research organizations and universities, consumers, financial institutions. Others included the NGOs, religious Institutions and the cultural institutions

Group 6: What are the major challenges affecting the food system in West Nile region?

A very long list of challenges were presented by the participants, these included poor land tenure system, poor market access, poor mindset and negative attitude towards agriculture by the youth, limited access to rural finance, weak government support to agriculture. The state ought to control an important enterprise like agriculture, weak farmer institutions, limited technology options and low fertility of soils. They also identified inadequate support for local innovations, handout syndrome among people, high post-harvest losses, weak linkages along the value chain, poor infrastructure, social-cultural barrier, poor agricultural inputs, high price elasticity of agricultural products and pests and disease burden. Others included insecurity for high value crops, high cost of production and lack of policy on land tenure system to stop the unnecessary land fragmentation

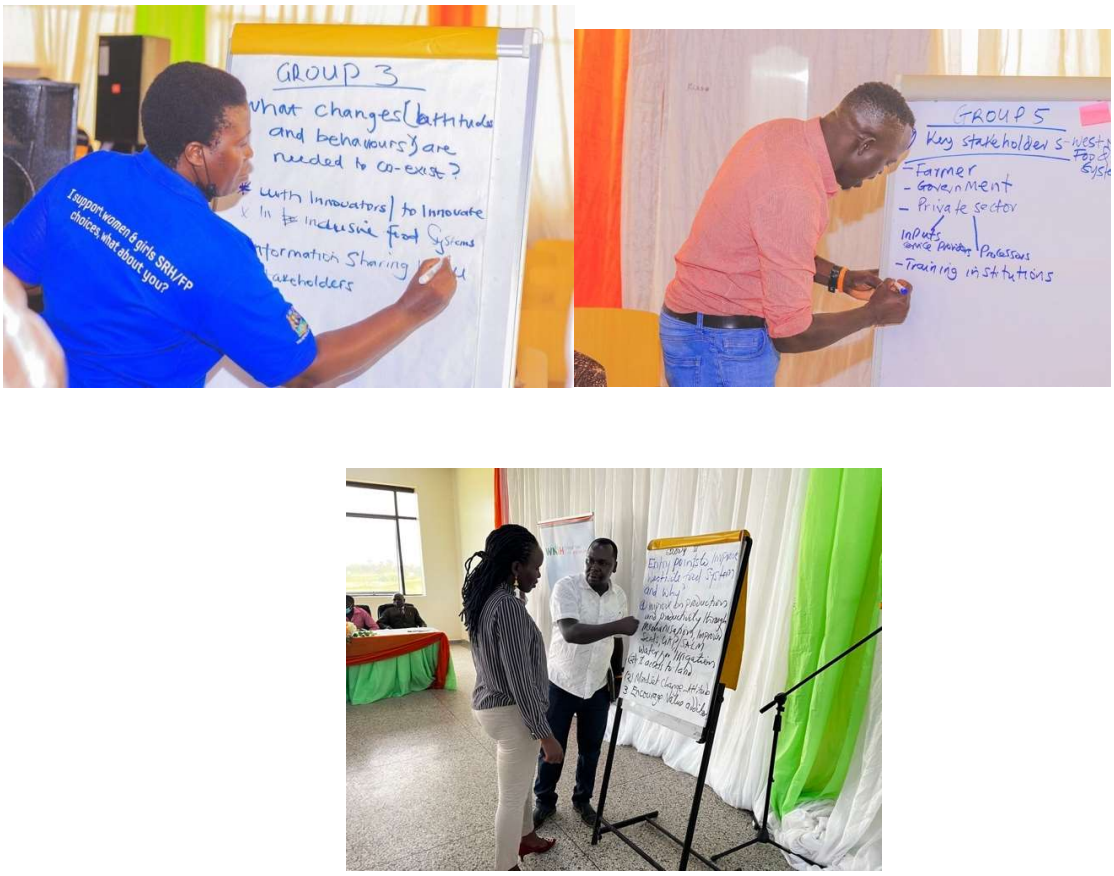


Figure 1: Participants doing group work

Day 2: Recap of previous day discussions.

Remarks from the University Secretary/ Accounting Officer

Day two started with exiting remarks from the University Secretary, Muni University.

The University Secretary who also doubles as the government of Uganda's appointed Accounting Officer to the University welcomed every body for the workshop. In his remarks, he explained that the workshop was very important as it concerned food which is a core for survival. He re-emphasised that food production in the region was under threat due to poor soil conditions, low soil productivity and the refugee crisis. So there was need for collective efforts on ways to recover land cover. In his view, the persistent use of wood fuel was the main issue killing the region (environmentally), and that coming together under WNIH to address the challenges was commendable and exciting. To deal with the challenges, there was need for a partnership, collective effort, and joint vision that the WNIH was working towards. He recognised the earlier visit by the REFOOTURE partners, who earlier made a learning visit to the university and thanked all partners, especially IKEA for supporting innovations to transform the society.

Presentation from a representative of the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) on Transforming food systems in the region to achieve healthy diets

The representative from MAIF started by explaining that the country was moving towards the "Food systems" thinking approach and the region was on the right track. He explained that food security meant all should have access to food, hence it couldn't be achieved in the region through short term interventions. He therefore encouraged growing own food in the region to ensure there was sufficient access to food for all. He further stated that such could only be achieved through a nutrition sensitive regenerative and inclusive agriculture. This he said was very important because 33% of children in West Nile were stunted due to poor nutrition. He added that there was a need to increase production and consumption of micronutrient-rich foods and utilization of community-based nutrition services in small holder households in project areas and suggested that the primary schools would be great entry points to nutritious food in the communities. According to him, demonstration plots with vegetables, orange flesh sweet potatoes, meetings to give agricultural information and nutrition information, energy saving stoves were some of the identified entry points for increasing youth interest in agriculture. He said MAIF had already started through embedment of the activities within the government, local government structures to know how a project was contributing to the impacts reported. – An end line survey was done. Reports will be shared.

Questions/ Comments

- Concern that some interventions are under threat e.g., Climate change is affecting innovations on yellow flesh s. What can we do about that? We are training and need to continue training on innovative water harvesting techniques so that we have water for agriculture. Other innovative training is in vine conservation so that vines survive from one season to the next. "Let us harvest the water during rainy season and harvest it during dry season"
- Let us not wait for government to do everything for us e.g., if government provides equipment. Let us help our communities to be responsible.
- How can Tractors services be made more available? There is a government program to mechanise agriculture by the MAAIF.
- Agriculture Insurance Scheme through ACDP program, UGift that we can take advantage of through the hub.
- Other government sectors which need to be brough on board e.g., Ministry
- What is the sustainability plan
- We need the MAAIF to establish Animal Breed Improvement Artificial Insemination and training for farmers

- There is information gap
- The youth do not have access to capital to buy land to access agriculture.
- Important to link farmers (producers) to processors

Presentation from Assoc. Prof. Clement Okia on Agroforestry and Landscape restoration efforts towards RIFS

In his presentation, Prof. Okia begun by elaborating on regenerative agriculture. It is about re thinking food production to be in harmony with nature, nourishing both people and planet. Currently, the West Nile region has mainly sandy soils with low water retention, low organic soil matter, sparce vegetation and variability in rainfall. He stated that the current farming practice is characterised by labour intensive agriculture, limited use of inputs, unsustainable tree cutting for charcoal, which result to poor outcomes (Low crop yields, food and nutrition insecurity, malnutrition, low income (poverty), youth disinterest in farming, land and environmental degeneration). He highlighted the key drivers of land degradation such as bush burning, deforestation and use of wood fuel.

Agroforestry is growing integrating trees within the farming system, to benefit farming households and environment. It is a form of regenerative agriculture that is in line with National policies (vision 2010, NDP 2, NDP 3 and ruling party Manifesto). He stated that agroforestry can benefit the people in the region when done right e.g., integrating carefully selecting trees, in addition to growing and managing trees on farms. In doing so, we can harness the value of trees on farms to sequester carbon from the atmosphere, bringing up water and nutrients from lower soil layers, building up soil organic matter and carbon, making landscapes more resilient, regenerate land (e.g., design systems to integrate trees pigeon pea agro-forestry system)

He emphasized that there is need to care for the land so that it can care for us. Most of the land in WN is sick and needs to be regenerated. There is need for land health surveillance to identify land constraints and targeting land management options in smallholder farming systems in region. A mobile soil laboratory can be beneficial to give farmer on-the-spot information (parameters) on soil. He recommended, that 1) there is need to build the capacity of farmers to enable them take care of land, 2) there is need to develop nature-based value chains e.g., honey, shea butter tree, desert date, 3) there is need to design and promote suitable agroforestry options for West Nile starting from local knowledge.

Questions/Comments

- The demand for wood fuel will increase with increasing population, how can we grow fast growing trees? - There are interventions for short term and long term, mixed.

- Where do we obtain advise from in order to promote agroforestry and RIFS? - District Forestry/ Environment Officer, NARO. We need to give more knowledge to existing extension officers, to enhance knowledge of agroforestry.
- Comment 1: Performance of soil depends on trees and therefore we need to promote agroforestry. We need to identify crops people can appreciate.
- Comment 2: Can MU help in identifying innovations of trees to promote biodiversity in the soil?

Presentation by Imran Ejotre on Adding Value to Shea Nut to improve livelihoods and as a conservation approach towards RIFS

Imran Ejotre shared private sector experiences in the shea value chain. In his presentation, Mr. Ejotre highlighted the conservation and business approach that the Shea Nut Natural Conservation Company is using to promote the conservation of the endangered Shea Nut tree. The tree is endangered because it is cut to produce charcoal. The company is working with a community of women to add value to shea nut. In their model, the company buys shea nuts from the community at a higher price compared to the market value, this was to show that the value of nuts collected from one season could provide the same amount of money as cutting down the entire tree. This has caused mindset change in the community to stop cutting down the shea tree. The women also benefit from profits from the sale of shea butter.

Questions/ Comments from Shea presentation

- How many kg do you get from one tree? 40 kg (1 Kg is bought at 1,500 ugx vs 800 ugx on the market)
- One way to enhance conservation is by adding value. Commends the work being done.
- It is seasonal. What other viable economic activities during off season.
- How fast can trees e.g., shea treaa be propagated and provided to the farmers? Using indigenous knowledge, trials on propagation of shea have been conducted. We need to collaborate

Presentation from the Omia Agribusiness Development Group on quality inputs and market access

In his presentation, Mr. Omia stated that quality inputs directly correlate to the quality of the final yield, and consequently income generation (improved livelihood) and Food / nutrition security. Income is a strong motivation for farmers to take up

good practices for the farming and the environment. He elaborated on the challenges regarding access to inputs such as remote farmer location, low critical mass of buying farmers, limited knowledge, misconceptions about improved inputs, misconceptions about improved inputs, counterfeit agro inputs in the market. There are also challenges regarding market access. However, Omia Agribusiness group is utilizing multiple approaches to enhance access to extension services (pre-season farmer training, weekly radio talk show). He concluded by acknowledging that although the challenges are many there are several opportunities that can be capitalized on. He encouraged the audience to look at agricultural interventions from a business perspective for sustainability.

Figure 2: Omia Agribusiness group ED making a presentation on inputs and access to markets

Questions/ Comments

- QN: Concern about use of inorganic pesticides which are detrimental e.g., bees.
- We need more innovators who can make organic fertilizers/ pesticides that we can commercialize and make available to farmers. E.g., Rabbit urine, how can we standardize the concoction? Prof. Kajobe further added that there is need to validate the products (what is the active ingredient?)
- Comment: Please discuss entry point for lending money to farmers on basis of trust (e.g., using Omia agribusiness)

Presentation from Centenary Bank on affordable financing options

- Inquiry about the youth funds/loans for agriculture
- 100,000/= to 5 million needs no collateral. Interest rates are quite high.

Online Questions/Comments to the presentations

- Froebrich, Jochen: This is a very relevant presentation and underlines well the need to see RIFS development broader than advancing individual agri/business practices. But it also shows that the Forest restoration cannot be achieved/ financed without transforming and innovating income opportunities for communities. So your WNIH discussion is right at the heart of the essential themes
- Keeffe, Sinead: From the millions of trees that they are intending to plant, are they also intending to use the trees (or carbon sequestered by the trees) to generate carbon credits to be used in the developing carbon markets (e.g. carbon credits for offsetting or in setting). If they are indenting to do this- who will benefit from the money generated?
- Bebe Bockline (Guest): with million trees, explore carbon offsetting opportunities to rewards land owners. Who will be paying for mobile soil testing services?
- Keeffe, Sinead: What about starting to develop soil testing kits that farmers could use themselves? And track their own soil health? and through the development of the kit you are also indirectly training them...and yourselves

Recap of the discussions – Sandra Langi

Remarks from Jochen Froebrich:

In his remarks, Jochen congratulated the team for the milestone achieved. He gave a brief background of the REFOOTURE project and what the team would like to achieve. He thanked all the participants for demonstrating their commitment towards addressing the challenges in the West Nile Food System towards RIFS.

Figure 3: Jochen Froebrich making remarks

Remarks from the Chief Guest – Arua District Local Government Chairperson

In his remarks the chief guest congratulated and thanked Muni University and the WNIH for their commitment to community transformation. He stated that RIFS in line with the Government of Uganda plans and the Standard Development Goals, and as such by promoting RIFS, the WNIH is contributing to government goals. He stressed that there is need multi-sectoral stakeholder collaboration to address the challenges in the West Nile food system such as declining soil fertility and malnutrition. He commended the WNIH, for using a multi-stakeholder approach bringing people from different back grounds. He stated that there is need for enhanced communication between researchers and policy makers (why are we having problems in our food system), and need for evidence (Data) from research can help government make policy and improve interventions. As the representative in charge of civil organisations in the West Nile Development Agency, he pledged to support the WNIH. Furthermore, he urged the university to develop courses in line with RIFS. At the end of his remarks, the chief guest officially launched the WNIH.

Figure 4: The Arua District Local Government Chairperson launching the WNIH

Thereafter, participants had a musical interlude, Group photo and departed at will.

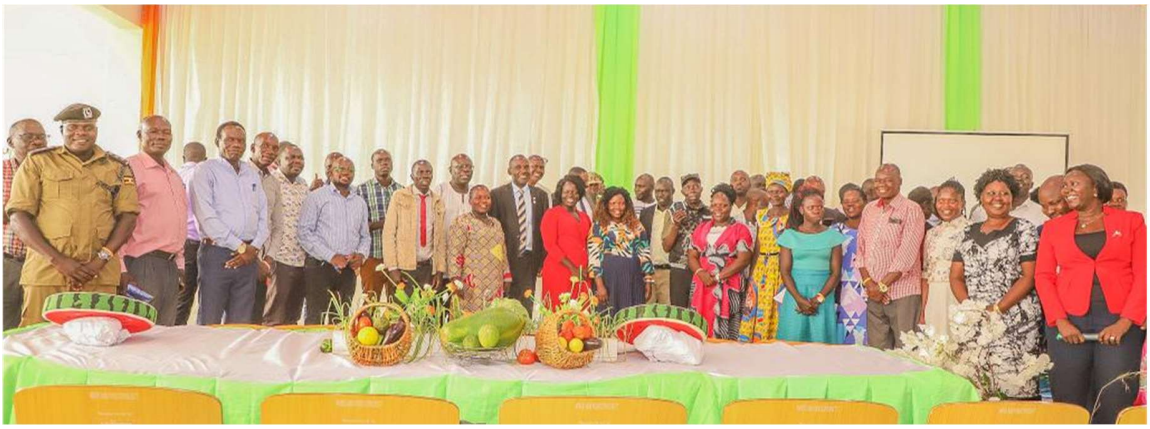


Figure 5: Participants pose for a group photo

Resolutions from the launch

At the end of the two-day conference, members resolved that;

- Participants welcomed the WNIH and are committed to fully participate in the FSIP activities in their various capacities.
- Participants noted with concern issues of land/environmental degradation in West Nile. To that effect, the participants resolved that there is urgent need to undertake interventions that will lead to addressing issues of land/environmental degradation
- There is need for environmental / forest / woodland restoration that can be done with high value trees e.g., coffee and shea trees that have many products of economic value. Tree species integrated must be of value to the community.
- Climate change issues should be crosscutting in all innervations
- There is need to address issues of soil health (biodiversity, and nutrient status)
- There is need to map/document all food systems related innovation cases in West Nile. It was noted that whereas local innovations exist and they are working, there is a limitation to their commercialisation because the active ingredients, ratios are not known and quantified. Therefore, they are difficult to be certified by Uganda National Bureau of Standards. As such, there is need to describe and scientifically validate all innovations that have been identified
- There is need for mindset change, especially among the youth on issues of agriculture/food production

- All interventions should have positive impact on the livelihoods of the community

5.2 Innovation agenda and innovation cases

Among the topmost priorities of the hub is the Innovation Agenda. The Innovation Agenda present the topics for innovation in the scope of the living lab:

INNOVATION TOPIC	RELATED PRACTICES
Improving soil fertility	• Mixed farming • Crop Rotation practice • Circular farming practices where waste from one project are raw materials/inputs for the other • Taking advantage of Nitrogen fixers like legumes • Organic fertilizer processed from agricultural wastes
Nutrition	• Capacity building on best agronomic practices; land preparation, seedling production, water and soil conservation, post-harvest handling, storage • Capacity building on food preparation and consumption • Household income enhancement through short term crops like vegetables and fruits
Food Wastes/Losses	• Right choice of inputs to avoid losses due to short shelf life • Promotion of circular farming • Right Storage facilities for the different agricultural products
Processing & Value addition	• Identification of more innovators involved in food processing along the value chain • Sensitisations on the benefits of value addition and processed products
Practices and initiatives that encourage inclusivity	• Creating opportunities that target Women and Youth involvement • The multi-stakeholder approach to improving the food system • Aligning activities to government related projects that also target the food system • Closing gaps between formal and informal markets: • Encouraging/promoting proper postharvest handling • Processing for value addition to tap export opportunities

The Innovation Cases

Innovation Case	IC Details	Innovation Goal	Innovation Agenda	RIFS Orientation

Zero-Waste	This innovation case (IC) works towards circularity in resource management at the household level by optimizing resource use, minimizing resource loss and wastage in a mixed farming system. Wastes such as residuals of agricultural biomass, food wastes etc. generated from one subsystem of the farm become inputs in another subsystem of the same farm. For example, animal manure from the cow and piggery unit is used to generate biogas, a source of clean energy.	To empower lives through innovative, regenerative, and sustainable agriculture	Soil health and fertility enhancement, biomass (waste) recycling	• Use of organic waste • Use of BSF as animal feeds • Production of biogas for home use • High and superior seeds/inputs • Apiary for pollination
Fisheries & Aquaculture	The aquaculture innovation cases focus on the use of both sustainable and regenerative practices in aquaculture. Most notably, the use of alternative protein ingredients in fish feeds, practices polyculture and uses nutrient rich pond water to fertilize crops.	To produce quality, nutritious, and affordable food for the West Nile region	Dietary diversification, Works with groups of Youth (men and women)	Pond fertilization and use of pond water for vegetable irrigation. Additionally, waste from piggery/goat rearing is used to fertilise the pond Alternative fish feed protein ingredients Polyculture: There is farming of Nile tilapia and African catfish, with completely different feeding behaviour and habits together to increase fish production in the same pond. This presents a form of integrated aquaculture that promotes efficient use of water, pond area and nutrient recycling

The vegetable IC	This Innovation case is based on the adoption, spill over and re-innovation of vegetable production technologies that were introduced through the Nutrition and Income Generation Intervention (NIGI) project. Wageningen University and Research (WUR) and the East-West seed Knowledge Transfer (EWS-KT) implemented the NIGI project between 2018-2020 between both refugees and host communities in the Omugo refugee settlement, in North-Western Uganda. Demonstration gardens were established on vegetable production, promotion of nutrition-sensitive home gardens, carrying out nutrition sensitization sessions, training extension staff and trainers, promotion of best-fit agricultural practices, strengthening the capacity of local seed businesses in quality seed production, and increasing awareness on quality seeds among seed users. This has caused a mind-set change towards the use of modern farming practices and technologies in the localities	To increase household income and consumption of vegetables and fruits among communities in the West Nile region	Improve the nutrition status of the communities in WN There is inclusion through a strong focus on women and refugees in production, nutrition and business development through vegetable production	Use of basic irrigations practices Mulching Use of raised gardens Use of high quality seeds and superior varieties crops Intercropping Use of organic fertilisers and pesticides

5.3 Location of office

Abi-Zonal Agricultural Research and Development Institute-Arua City

5.4 Communication channels

Website: West Nile Innovation Hub https://www.westnileinnovationhub.org/

Facebook: https://www.facebook.com/profile.php?id=100087200996950

Twitter: @WNInnovationHub

Media appearance/Free Publicity

UBC Television TV: https://www.youtube.com/watch?v=L4vSuCSDOVY

Muni University Newsletter: https://muni.ac.ug/images/newsletters/issue62.pdf

Social Networks	Facebook	Twitter
Followers/Subscribers	22	31
Posts	20	21
Clicks (Likes/Share)	17	81

6 Annex I: Food system stakeholders

- Citizens dwelling in West Nile region, comprised of nationals and refugees from South Sudan and DR Congo (farmers, traders, consumers)
- Government ministries and their respective departments, including Office of the Prime Minister (OPM), Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Health (MOH), Ministry of Gender Labour and Social Development (MGLSD), Ministry of Water and Environment (MWE), Ministry of Works and Transport (Uganda Roads Authority), Ministry of Local Government (MoLG), Ministry of Finance, Planning and Economic Development (MFoPED), Ministry of Education and Sport (MoES).
- Government parastatals such as National Agricultural Research Organisation (NARO), Operation Wealth Creation (OWC), West Nile Development Agency (WENDA)?, National Forestry Resources Research Institute,

- Research institution academic, e.g. Muni University, Adraa College, Uganda Christian University, Islamic University, Nile University,
- International and national non-governmental organisations and community based organisations. Majority focus on the needs of refugees. Organisations include UNICEF, WFP, UNHCR, USAID funded projects (Mercy Corps, ACHAP AFYA, etc), World Bank funded projects, World Vision Uganda, GIZ, ZOA International, Refugee Youth Volunteering Uganda (RYVU), CEFORD, Enabel - the Belgian Development Agency, DanChruchAid, HarvestPlus, Food for the Hungry, Catholic Relief Services (CRS), Lutheran World Federation, CARITAS West Nile, SNV, .
- Private Sector companies, including British American Tobacco (BAT), Nile Breweries Limited (NBL), East West Seed Company, Omia Agribusiness Development Group, Mukwano Industries, Nile Pro Trust, Honey Pride Uganda, Bee Natural Uganda Limited, Yumbe Fruit Processing Factory, King of Tilapia. Various small scale agriculture enterprises.
- Farmers' Associations such as, Amatura Farmers' SACCO, West Nile Foresters, Arua district Farmers' Association, ACAV Koboko, West Nile Cooperative Union, The Uganda National Apiculture Development Organisation (TUNADO)

7 Annex 2: Policy environment, key programs and key actors shaping the food system in West Nile

Policy	Issues addressed and goals *Strategic goals related to regenerative agriculture and inclusive systems Explicit mention of principles and practices considered as regenerative agriculture (including minimise tillage, avoid pesticides, encourage water percolation, foster plant diversity, rely on biological nutrient retention etc). (criteria based on Giller et al. 2021)*	Interventions *The plans have clear actions that promote regenerative agriculture*	Actors *Stakeholders engaged at political, sectoral, departments, community level*
NATIONAL POLICY FRAMEWORKS			
Uganda Vision 2040	A transformed Ugandan society from a peasant to a modern and prosperous country within 30 years	Opportunities to realise the the Vision include; oil and gas, tourism, minerals, ICT business, abundant labour force, geographical location and trade, water resources, industrialisation, and agriculture. The fundamental investments in include: infrastructure for (energy, transport, water, oil and gas, and ICT); Science, Technology, Engineering and Innovation (STEI); land use and management; urbanisation; human resource; and peace, security and defence	
National Development Plan 2020/2021 – 2024/2025	Increase average household incomes and improve the quality of life of Ugandans. Under the theme of sustainable industrialization for inclusive growth, employment and sustainable wealth creation.	Increased agricultural production/productivity and agro-processing, mineral beneficiation and mineral-led industrialization, oil refining, tourism expansion, and labour-intensive light manufacturing (including cottage industries). Agro-industrialisation: Agro-processing occupies a very important place in the agricultural value chain, creating backward and forward linkages between the farm and the market. The backward and forward linkages between the	

		agricultural, industrial and service sectors through agro-industrialization will stabilize and increase demand for raw agricultural commodities, increase prices, and stimulate increased production/ productivity through increased use of improved inputs, increased agricultural research and reduced postharvest losses.	
National Agriculture Policy 2013	Objective 5: Ensure sustainable use and management of agriculture resources (environment and natural resources) Objective 2: Ensure national and household food and nutrition security	Periodic mapping state of agricultural resources and utilisation patterns. Regulate the exploitation of agricultural resources, information on good and conservation practices Develop capacity to harvest water for agricultural production, land use and farm planning services Plan to address climate change Professionalise agriculture, strengthen linkage between formal and non-formal agriculture education Technologies and practices to minimise post-harvest losses across commodity value chains. Promote production and consumption of diversified nutritious foods including indigenous foods Strengthen farmers and farmer groups capacity to scale up production and productivity	MAAIF
Agriculture Sector Strategic Plan (ASSP 2020/2021 – 2024/2025)	Priorities and strategies contributing to wealth creation through research, extension, pest, vector and disease control, provision of critical farm inputs, sustainable land use and soil management; post-harvest handling and improve markets access and value addition. Water for agriculture production to address over-reliance on rainfed agriculture. Strengthen research and extension services, Build key human resource capacity; Technology adaptation at farm level (modern irrigation technologies, upscale utilization of food-production and labour-saving technologies for women farmers) Increase access to and use of critical farm inputs and agriculture finances Nutrition	12 priority commodities: bananas, beans, maize, rice, cassava, tea, coffee, fruit and vegetables, dairy, fish, livestock. Boost production and marketing of fruits and vegetables [provide quality seedlings; improve grading standards, packaging and quality assurance; registration of exporters; plant quarantine restrictions; pests and disease control; and support processing through PPP (e.g. Nwoya fruit company]. Relevant Projects: Agriculture Cluster Development Project (ACDP); Agriculture Value Chain Development Project (AVCDP); Uganda Multisectoral Food Security and Nutrition Project (UMFSNP - West Nile); Regional Pastoral	MAAIF, Operation Wealth Creation, National Agriculture Research Organisation, World Food Programme, World Bank, Local governments, Office of the Prime Minister, USAID, Private sector

		Livelihoods Resilience Project (RPLRP - North East)	
Rural Development Strategy			
National Urbanisation Policy			
National Environmental Management Policy (2009)			
National Land Use Policy 2014			
National Fertiliser Policy	Provide both organic and inorganic fertilisers to increase soil fertility to increase agriculture production and sustain the domestic and international market demands.		
National Fisheries and Aquaculture Policy 2018	Improve livelihood of fishing communities; accelerate and sustain the fisheries sector growth; promote sustainable management of water resources		
National Seed Policy 2018	Access and utilisation of quality seed, value addition, multiplication and commercialisation to increase agriculture productivity.		
National Organic Agriculture Policy 2019	Increased food security and income for smallholder households, environmental protection, reduce agricultural chemincal runoff into water bodies, increase soci-economic benefits of smallholder farmers' groups, increase health benefits and life expectancy of communities.	Capacity development to increase farmer groups engagement in organic agriculture to meet local and global demand. Tax incentives Investment in value addition, agro-processing and storage for organic products Research Group certification	National Organic Agriculture Movement of Uganda (NOGAMU) (private sector companies), Uganda National Bureau of Standards, Uganda Export Promotions Board, MAAIF, Export companies District level: NOGAMU- Biofresh Uganda Ltd, Uganda Crop Industries Ltd (UCIL Spices, Bee Natural Products (BNP),
DISTRICT LEVEL POLICIES AND PROGRAMS			
West Nile Agriculture Investment Plan (draft 2021)	A modern sustainable regional agriculture sectors for enhanced income and food security for all. Strategic drivers of agriculture transformation: manage climate change (adopt rural irrigation techniques, adjust production to prevailing weather, water and soil conservation);	Agriculture growth initiatives. Crop productivity intensification (fertilisation, high value crops and quality seed, pest and diseases control, agronomic practices) Livestock intensification (animal waste management, small livestock management, milk processing and distribution, aquaculture)	OWC, MoFPED, MAAIF, MTIC, MWE, MLHUD, DPs, MUNI, NARO, BTVETIs, UNCCIS, WENDA, WISED, UNADA, YUDIFO, NULSBA, Financial Institutes, Unions, NGOs, private sector, local

	Cheap available labour force (re-train and retool active and productive labour force for agribusiness development); Fertile abundant land (mechanisation and commercial farming system); Ready domestic and global markets; Agro-industrialisation (agro industrial parks)	Value addition practices (post-harvest handling, processing and marketing) Water for production Mechanisation and innovation Research and technology	governments West Nile
Arua district Development Plan *All local government have district development plans*		Government Projects: Agriculture Technology and Agribusiness Advisory Services (ATAAS) Project; Northern Uganda Social Action Fund (NUSAF); Uganda Women Entrepreneurship Program (UWEP); Vegetable Oil Development Project; Youth Livelihood Programme (YLP); Project for Restoration of Livelihood in Northern Region (PRELNOR); Uganda Multi-Sectoral Food Security & Nurition Project (UMFSNP) Development Initiative for Northern Uganda (DINU) Other initiatives NOGAMU (private sector organic agriculture initiatives)	MAAIF, World Bank, UNICEF, Local government, MGLSD, MoES, MOH, OPM, European Union, JICA
PROJECTS AND INITIATIVES			
West Nile Private Sector Development Promotion Centre Ltd (WENIPs)	Promote private sector led growth and sustainable development through	Business development services Microfinance development Agriculture and agribusiness skills (fruit processing, apiary, biogas and energy saving stoves, livestock, agro enterprises and vegetable oil)	ISSD, CRS, NUTEC (Palladium group), IITA, Kinyara Sugar Works, Makerere University, SNV, Area producer Cooperative, UNDP Youth Entrepreneurship Scheme (YES), local government, AVSI/SCORE, MAAIF, SACCOs in West Nile, Care International, Stromme Foundation East Africa

[i] Van Berkum S, Dengerink J, Ruben R. 2018. The food systems approach: sustainable solutions for a sufficient supply of healthy food. Wageningen Economic Research.

[ii] Muni University 2021. Draft West Nile agriculture investment plan.