



# **Sustainable food systems through diversification and indigenous vegetables**

**AN ANALYSIS OF THE SOUTHERN NAKURU COUNTY**

## **REPORT I**

**By Francesco Rampa and Hanne Knaepen**

July 2019



**Sustainable  
Agrifood  
Systems  
Strategies**



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## Executive Summary

This report is a major output of the “**Sustainable Agrifood Systems Strategies (SASS)**” programme, aimed at building knowledge, policy dialogue and partnerships to contribute to sustainable food systems at national, regional and international levels, based on three research locations in Kenya and Tanzania. An enabling policy and investment environment that makes sustainable food production and diversity of diets both affordable and attractive to producers and consumers is particularly **urgent in Africa**, given not only the persistent problems of food and nutrition insecurity, but also the already serious depletion of Africa’s natural resources, increasing social and economic inequalities as well as the worrying effects of climate change.

The report presents the results of SASS multi-disciplinary research and dialogue activities in Kenya, using a ‘**food systems approach**’: an assessment of the current performance of the southern Nakuru food system in terms of sustainability (social, environmental, economic) and outcomes (food quality, availability and access); a related governance analysis about the bottlenecks and drivers that make **diversification** of the food system difficult, with a **focus on indigenous vegetables** (given their great potential to improve nutrition, environmental and climate resilience, and smallholders’ profitability); the subsequent preliminary proposal of some ‘pathways to solutions’ to be followed for a more sustainable local food system, through increasing the production, distribution and consumption of indigenous vegetables.

Research results show that the **performance of the Nakuru County food system is poor in terms of economic, social and environmental sustainability**. In the short term, jobs and incomes are being created in the county thanks to economic growth, especially in the horticulture (vegetables and flowers), tourism and real estate sectors; however, there are however **significant medium-term economic risks**. These arise from the inability of this system to allow the vast majority of smallholders to adequately invest to improve production and productivity, thus remaining financially vulnerable, and from the deterioration of natural resources linked to such growth, which can lead to the future loss of jobs, incomes, and investments. In terms of social sustainability, the **exclusion of a significant part of the population** from economic growth, coupled with little diversity and quality in food production and consumption, constitute a serious threat to the health, social cohesion, well-being and traditional values of citizens. The **environmental status is also poor**, and worsening with climate change: water and land degradation, deforestation, biodiversity loss, and so forth are likely to reach a scale that exceeds the absorption capacity of the ecosystem. Finally, the performance of the Nakuru food system is currently **poor in terms of quantity and quality of food** for the large majority of the local population. The SASS research shows this is also clearly related to the weaknesses in terms of economic, social and environmental sustainability, which moreover clearly reinforce one another.

Drawing on this assessment of the local food system performance, the report presents a **governance analysis** of the related **bottlenecks that make diversification of the food system difficult**. The overall governance of the Nakuru food economy is characterised by incentives to produce, market and consume maize as well as horticultural and floriculture crops, mostly destined for export. With the economic power of these sub-sectors largely determining the decisions related to cropland allocation, water use, subsidies’ policies, and so forth, despite the government’s declared focus on supporting smallholders, diversification and sustainability. Indeed, the policy landscape is characterised by a multitude of well-conceived policies, but “the money is not put where the mouth is” and implementation tools and policy enforcement are often lacking, with **national subsidies and other policy execution largely dedicated to maize and few other export-crops only**. **Local institutions** that could stimulate a more diversified and sustainable food system are **very weak**, particularly farmer organisations, with the informality of smallholder business adding to this complexity and the difficulty to implement regulations and policies in their favour.

These governance features of the food system also contribute to a particular **‘system bias’ against the production, distribution and consumption of indigenous vegetables**, which is investigated by SASS through mapping of relevant stakeholders and analysis of their agendas, arenas and alliances. The market power of the big parastatal **seed** company, as well as the bias of both laws and formal markets in favour of hybrid seeds and conventional crops, do not provide incentives to legally supply seeds of indigenous vegetables to small producers, nor protect their informal seed systems. Smallholder **farmers** (the most prominent producers of indigenous vegetables) are rather scattered and unorganised, hence poorly supported by weak alliances among themselves and ultimately driven by the agendas of the rest of the actors in the VC, especially input providers and middlemen. This also explains their reluctance to diversify their produce and grow more indigenous vegetables, which would in principle allow them to connect more effectively to processors and consumers in urban areas. Diverging agendas between few existing **processors** in Nakuru County and the many potential producers of these vegetables, together with current disconnect between supply and demand of processed indigenous vegetables, also add to the ‘system bias’. Given the currently unstable nature of the market demand also for the fresh vegetables (compared to other crops like maize or export vegetables), **middlemen** don’t find it worth investing in changing such bias; but they have an unexploited potential to connect smallholders to consumers, thus making the access of indigenous vegetables to markets more stable and profitable for the benefit of the whole food system. Finally, the **consumers’** arena of influence towards more sustainability can be large as they are in a position to set, increase or lower demand and therefore drive producers’ and distributors’ choices; but this would require much stronger alliances between consumers and the other actors in the food system, which in turn would entail much stronger consumers organisations.

The report puts forward a package of preliminary **‘pathways to solutions’ to address such governance bottlenecks** and this system bias against indigenous vegetables, and ultimately improve the sustainability of the southern Nakuru food system. The seeds system for instance should be improved through: **subsidies** for the distribution of indigenous vegetables seeds; **technical assistance for smallholders** and community-based seed banks; specific regulations to gradually shift towards an **open source seed system** that allows the multiplication, processing, marketing, and distributing of a wide variety of seeds by smallholders. The production system should be strengthened through: **better extension services** promoting safe, environmentally friendly and nutrition-effective production techniques for indigenous vegetables; public **investment in storage** and aggregation centres specifically for indigenous vegetables; **business brokerage** support for smallholders to effectively manage fair contractual arrangements with market actors. A number of pathways are also suggested to **improve the processing system for indigenous vegetables**, grouped in solutions that promote better research, regulatory framework, technologies and governance arrangements. The distribution and consumption systems should be improved through: **market research** to investigate demand for these vegetables in particularly interesting market segments (the bottom of the consumer pyramid; the Nairobi markets; the tourism sector in Nakuru); building upon the **maize distribution networks**; launch smart **communication campaigns** about the health benefits of indigenous vegetables via TV, radio, social media and the wide dissemination of indigenous vegetables recipes; **public procurement** for bulk purchase; establishing a **multi-dimensional sustainability label** for indigenous vegetables indicating production practices, origin, food safety, nutritional value, and environmental impacts, to overcome consumers’ trust issues and the cultural inertia against certain indigenous vegetables and some of the producing regions like Naivasha. Finally, an example of crosscutting solutions is a **multi-stakeholder platform** to regularly bring together all relevant actors to share information, discuss improvements, build trust, facilitate compromises, coordinate action and monitor development impact.

Effective implementation of these pathways and proposed interventions would require **working with local drivers of change and targeting the right ongoing policy processes**. The report also gives some

examples of such actors and processes. For instance, a particularly promising partnership opportunity that could involve the SASS programme would be the establishment of such multi-dimensional label for indigenous vegetables, in collaboration with the Kenyan Ministry of Agriculture, the FAO Mountain Partnership Secretariat, and other local stakeholders (who explicitly expressed their interest for this).

Moving forward to its final phase, the **SASS programme will explore in more depth such pathways** and the different intervention options, analysing the respective implications and possible **synergies** in terms of economic, social, and environmental benefits, as well as the involved **trade-offs** (possible negative consequences to be balanced). All in all, one and a half year of work in Kenya seems to indicate that indeed SASS can contribute to local ongoing efforts to promote a transition: from an economic growth model mainly based on export-oriented (relatively undiversified) agriculture, tourism and real estate to a more sustainable development approach, based on an innovative food economy with smallholder agriculture, differentiated production and diets, and Kenyan markets (starting with Nairobi) at its core. The feasibility of this diversification and transition will depend largely on the ability to minimize the costs from trade-offs and maximize the development benefits from synergies; which in turn will depend on the behaviour of food system stakeholders and the **incentives** they face. For each proposed 'pathway to solution', therefore, SASS will also study and discuss with relevant actors how to foster **inclusive and effective partnerships as well as the needed innovative policies and investments**, both public and private (with focus on stronger engagement of smallholder farmers, food SMEs and financial intermediaries in relevant coordinated interventions).



## Acronyms

AFA	Agriculture and Food Authority
ASDS	Agricultural Sector Development Strategy
AU	African Union
CAADP	Comprehensive African Agricultural Development Programme
CIAT	International Centre for Tropical Agriculture
CIDP	County Integrated Development Plan
COMESA	Common Market for Eastern and Southern Africa
CSA	Climate-Smart Agriculture
EAC	East African Community
ECDPM	European Centre for Development Policy Management
GDP	Gross Domestic Product
INGO	International Non-Governmental Organisation
IPES-Food	International Panel of Experts on Sustainable Food Systems
KCSAS	Kenya Climate Smart Agriculture Strategy
KEPHIS	Kenya Plant and Health Inspectorate Service
KOFC	Kenyan Ordnance Factories Corporation
KSh	Kenyan Shilling (1 euro = approx.114 KSh)
NAAIAP	National Accelerated Agricultural Inputs Access Programme
NBSI	Naivasha Basin Sustainability Initiative
NGO	Non-Governmental Organisation
RRI	Responsible Research and Innovation
SASS	Sustainable Agrifood Systems Strategies
SDG	Sustainable Development Goal
SHG	Self Help Group
SNV	Foundation of Netherlands Volunteers
SSN	Seed Savers Network
SWOT	Strengths, weaknesses, opportunities and threats
UNICATT	Catholic University of Milan
UNIMIB	University of Milano-Bicocca
UNIPV	University of Pavia
UNISG	University of Gastronomic Sciences
UPOV	International Union for the Protection of New Varieties of Plants
US	United States of America
VC	Value Chain

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# 1. Introduction

The “**Sustainable Agrifood Systems Strategies (SASS)**” programme is a consortium initiative by ECDPM, the University of Milano-Bicocca (UNIMIB), the University of Cattolica del Sacro Cuore (UNICATT), the University of Pavia (UNIPV) and the University of Gastronomic Sciences (UNISG). Between 2017 and 2019, the SASS multidisciplinary programme, funded by the Italian Ministry of Research, aims to build knowledge, policy dialogue and partnerships contributing to sustainable food systems at national, regional and international levels, based on three research locations: the Arumeru region in northern Tanzania, the Southern Agricultural Growth Corridor of Tanzania in southern Tanzania, and southern Nakuru County in Kenya.

This **multidisciplinary approach** is crucial when studying food systems: the nature and operation of food systems is determined by many factors and therefore the food systems should be studied from the perspective of a range of disciplines, including anthropology, sociology, economics, agronomy, biology, political science, and so forth.

The specific **objective of SASS**, implemented in partnership with many local stakeholders (such as universities, public and private sector representatives, civil society, etc.), is to contribute to improving the sustainability of the three food systems analysed, with a focus on identifying the opportunities and challenges of better integrating indigenous vegetables, also called ‘orphan crops’, ‘high-value traditional crops’ or ‘Neglected and Underutilised Species’, within these food systems.<sup>1</sup> **Beyond understanding the overall performance of the local food system in terms of sustainability, SASS is testing the following hypothesis: a stronger integration of indigenous vegetables in the food system contributes significantly to making such a system more nutritious, more sustainable and more inclusive.** SASS will address the social, environmental, economic and institutional/political sustainability aspects in three regions, with a special focus on contributing to better policies and investments to improve the outcomes of the three food systems, through specific recommendations in the three different locations.

This first SASS report summarises the research conducted so far in one of the three research locations, in southern Nakuru County in Kenya, with focus mainly - but not exclusively - around the Lake Naivasha Basin. This location was selected not only for the existing local partnerships and networks of the SASS consortium members, but also because the Lake Naivasha area, located in the Rift Valley, is home to both an internationally renowned environmental treasure as well as an agricultural industry that successfully exports high value fresh vegetables and cut-flowers to international markets (especially Europe). From now onwards, this report will refer to the SASS research area as ‘southern Nakuru County’ or ‘Nakuru’ in short (or ‘Lake Naivasha Basin’ when addressing issues of ecological or hydrological nature related to this basin).

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<sup>1</sup> The term ‘Neglected and Underutilised Species’ was coined by Bioversity International that has been doing extensive work on indigenous vegetables in many parts of the developing world (See: <http://www.nuscommunity.org/>). We will use the more general term ‘indigenous vegetables’ in this SASS report, as defined by the World Vegetable Center, i.e. “*plant species consumed in specific locations as part of traditional diets*” (See: <https://avrdc.org/category/main-iv/>), while taking also into account the ‘neglected and underutilised species’ definition that Bioversity uses: “*Neglected and underutilised species are those to which little attention is paid or which are entirely ignored by agricultural researchers, plant breeders and policymakers. They are wild or semi-domesticated varieties and non-timber forest species that are not typically traded as commodities*” (Padulosi et al. 2013: 1). Importantly, the aim of this report is not to express a preference for one or the other term; rather, given the objectives of SASS, we adopt the one that is immediately understandable by both local actors and international stakeholders, while keeping a neutral connotation to the term (while ‘Neglected and Underutilised Species’ and ‘orphan crops’ are perceived to be too negative by most local actors; and ‘high value traditional crops’ implicitly express a judgement on their value).

This **first SASS report provides a comprehensive, but non-exhaustive, ‘food system analysis’**, around the current production, distribution and consumption of food in the southern Nakuru area. It also provides a sustainability scoping exercise, based on economic, social and environmental dynamics within the local food system; and it puts forward initial ideas and ‘pathways to solutions’ for improving sustainability of the food system. The evidence provided is not conclusive, given both the complexities involved in a food system analysis and the fact that some of the SASS research teams are still processing their data and finalizing their quantitative studies.<sup>2</sup> However, the **information and analysis presented here is sound and very useful**: it draws on extensive and multi-disciplinary literature reviews; it was collected and triangulated through dozens of fact-finding missions to Kenya over one and a half year; it benefits from key informant interviews, thematic focus groups and various multi-stakeholder workshops, in addition to the local knowledge of the key SASS locally based partner, the Naivasha Basin Sustainability Initiative (NBSI)<sup>3</sup>; thematic expert inputs were synthesised, studied and compiled into an overall ‘system analysis’ during several multi-disciplinary internal SASS consortium workshops; it is an important attempt to test the ‘food system approach’ (as explained in the next section), under the assumption that local stakeholders’ perceptions on their food system may not per se constitute conclusive evidence, but are certainly very important, especially when different actors’ information and opinions converge towards a clear set of ‘bottom lines’ about food system drivers and sustainability bottlenecks.

A **final SASS report** will refine all this work, and also present the research results of a ‘viability exercise’ about the suggested ‘pathways to solutions’, in terms of policies, investments and other types of interventions: it will put forward, in consultation with local stakeholders, a set of recommendations for improving the sustainability of the local food system.

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<sup>2</sup> For instance, the assessment of environmental sustainability of different agronomical practices (with focus on soils, maize and indigenous vegetables) requires soil sample collections and field trials of vegetables in farms around Lake Naivasha during different seasons. Data from different times of the year, and from different years, need then to be compared before reaching robust conclusions.

<sup>3</sup> NBSI is a Kenyan community-based organization that has been working for 10 years on the ecological status of the Naivasha Basin and the health of its population, through capacity building and ‘citizen science’ initiatives. Its contribution to SASS is invaluable, both for the experience and local knowledge of the NBSI staff and since the NBSI premises host the SASS multi-stakeholder workshops and are the logistical base for the SASS researchers’ missions.

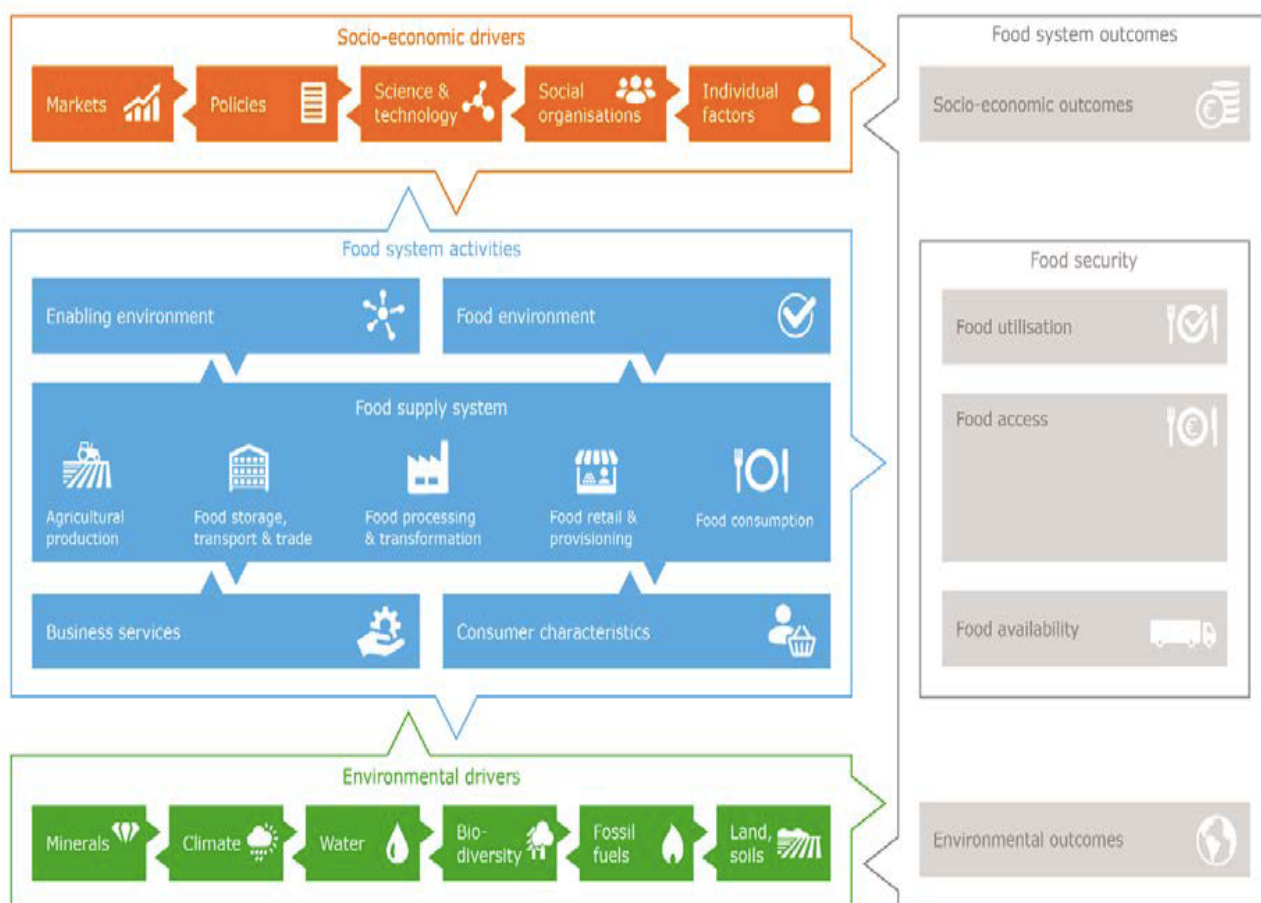
## 2. Sustainable food systems, diversification and indigenous vegetables: the SASS approach

### 2.1. Understanding the 'Sustainable Food System' concept

#### Food systems and their performance

The **Food Systems approach** is widely recognised as a broad conceptual framework, which allows for interdisciplinary research into the complex dynamics of food production, distribution, consumption (and recycling/disposal). In line with van Berkum et al. (2018), we define a food system as comprising all processes associated with growing, harvesting, storing, processing, packing, transporting, marketing, consuming and disposing of food as well as the political, economic, social, technological and cultural issues that drive and/or constrain their dynamics (See Figure 1). We also recognise that any food system operates within a socio-ecological and political landscape that facilitates and, at the same time, puts limitations to the food system's use of human and natural resources. In turn, the food system's use of resources may have a significant impact in terms of environmental deterioration, labour price hikes, waste disposal, conflicts over scarce resources, and so forth.

**Figure 1: Mapping the relationships of the food system to its drivers, constraints and outcomes**



Source: van Berkum et al., 2018

**A Sustainable Food System is a food system that continuously provides affordable, healthy, nutritious food for all, and does so in an economically, socially and environmentally sustainable manner.** Concretely, strengthening food systems is to contribute, amongst others, to Sustainable Development Goal (SDG) 2, target 2.4: “By 2030 ensure sustainable food production systems and implement agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen the capacity for adaptation to climate change, extreme weather; drought, flooding and other disasters, and that progressively improve land and soil quality” (SDSN, 2015: 41). As well as SDG 6, target 6.6: “By 2030, protect and restore water-related ecosystems, including mountains, forests, wetland, rivers, aquifers and lakes” (SDSN, 2015: 49). And SDG 12, i.e. 12.2: “By 2030 achieve sustainable management and efficient use of natural resources” (SDSN, 2015: 57). And SDG 13, target 13.1: “Strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries” (SDSN, 2015: 59). As a result, we will consider **the performance of a food system along four objectives for sustainable development:**

1. Food quality, availability and access: the provision of affordable, healthy and nutritious food, sourced both locally and externally through trade.
2. Environmental sustainability: efficient use of available natural resources and contributing to maintain, or where necessary, restore diverse natural ecosystems; this includes climate resilience of food system activities.
3. Economic sustainability: efficiently organised and diverse food VCs – production to consumption – capable of meeting the diverse nutritional needs of different segments of society in an economically viable manner over time including an adequate provision of jobs and incomes.
4. Social sustainability: effective, equitable gender-inclusive engagement of locally available human resources, as well as protection of health, social cohesion, security, freedom of choice and identity values.

### Diversification as a pathway for sustainable food systems

Most local food systems worldwide, and their combination into national and international food systems, are not sustainable today. The International Panel of Experts on Sustainable Food Systems (IPES-Food)<sup>4</sup> calls for “a *paradigm shift from industrial agriculture to diversified agroecological systems*” (2016: 7), as these latter systems can be competitive, perform particularly strongly under environmental stress, and pave the way for improved health. One key way to foster sustainability in our food systems is **diversification**. Concretely, this can be done through supporting the production, marketing and consumption of more sustainable food, in particular vegetables, including indigenous vegetables,<sup>5</sup> such as *amaranth*, *millet* or *Bambara groundnut* to better integrate them in food systems. This proposed pathway originates from an increasing body of literature on the benefits of indigenous vegetables: they are generally highly nutritious, commonly they have low requirement in terms of natural resources and farming inputs, and they can contribute to increasing (agro-)biodiversity and climate resilience. Their diversity also allows to generate income for the rural poor, especially for women who often cultivate, process and market indigenous vegetables (Baldermann et al. 2016; Chivenge et al. 2015; Rudebjer et al. 2014). Despite the myriad of advantages, indigenous vegetables have characteristics that make their cultivation, marketability and consumption difficult to expand. Two key problems are that agricultural markets often favour uniform varieties of a few high-yielding staple crops such as maize or rice, as well as the fact that indigenous vegetables must be sold fresh and cannot be easily stored and transported to distant markets without deteriorating. Other

<sup>4</sup> See: [www.ipes-food.org](http://www.ipes-food.org).

<sup>5</sup> For reasons of clarity and simplicity, this report uses the term ‘indigenous vegetables’ as the common denominator for all species and crops investigated and discussed by the SASS programme, including leafy vegetables (that are researched to the largest extent, e.g. amaranth) as well as pulses (that will be part of the discussion as well, but with a less strong focus compared to leafy vegetables, e.g. ‘Bambara groundnut’).



barriers to the cultivation of indigenous vegetables include limited seed availability, laborious processing and post harvest handling, and the lack of markets or the lack of awareness of market demand. In addition, indigenous vegetables carry the stigma of “food for the poor” for a large part of the middle class and the youth, with the current nutrition transition in the urban and periurban contexts limiting indigenous vegetables demand (Baldermann et al. 2016). Consequently, they risk to be wiped out in a world where about ninety percent of the food consumed comes from only fifteen plant species.

An enabling policy and investment environment that makes sustainable food production and diversity of diets both affordable and attractive to producers and consumers, can help to achieve food and nutrition security and sustainable food systems<sup>6</sup>. Improving **food systems sustainability is particularly urgent in Africa**, given not only the persistent problems of food and nutrition insecurity, but also the already serious depletion of Africa’s natural resources, due to deforestation, soil erosion, uncontrolled demographic growth and climate change, as well as increasing social and economic inequalities.<sup>7</sup> Diversified food systems, and in particular the growth of indigenous vegetables’ VCs within Africa, would also contribute to integrating territories along the urban-rural continuum, linking all actors in the food system, from producers to consumers, and enabling in particular smallholders and small service providers to better supply urban and regional demand, thus taking advantage of burgeoning African food economies (i.e. supplying the increasing food demand in urban areas, given high population growth rates and the increasing purchasing power, and the resulting changing diets with higher consumption of high-value food products). Smallholder farmers, informal rural entrepreneurs and agricultural small- and medium-sized enterprises can indeed be protagonists of both sustainable food systems and ‘private sector for development’, given their share within the total population, sustainability of their farming and trading practices, their growth potential and proximity to expanding urban areas (compared to food imports).<sup>8</sup>

Clearly, such shift towards diversified, and more sustainable, food systems requires a **complex transition**. More precisely, **transformative adaptation** in agriculture is needed – that is, broad, fundamental, systemic changes in food production, distribution and marketing systems- because it offers the potential to maintain and enhance food security and reduce the risk of crisis, especially given climate change. Transformative adaptation will require new tools and methodologies, as well as collaboration between various stakeholders, including national and subnational governments, development agencies, civil society, grassroot organisations, global institutions, and so forth. Finance can be targeted toward projects that are aligned to achieve transformative outcomes and are gradually phased-in through a series of short, medium, and long-term interventions to build transformative pathways (Carter et al. 2018).

Such transitions and transformative adaptations are particularly urgent in **African countries for adapting agriculture to climate change**, where support will be needed especially for smallholder farmers, who typically have the least resources to cope with great shocks. Looking at the geographical focus of this report, maize is a key staple food for the whole Kenya and the Nakuru County (between 61-80% of the County’s population is engaged in the maize value chain), but its current and prospective production is an example of

<sup>6</sup> For the sake of brevity, from now on in this report, we refer to “food security” as encompassing both food security and nutrition security which are equally important.

<sup>7</sup> There is no clear trend of the increase or decrease of equality within countries in Africa. However, although the average unweighted Gini for sub-Saharan Africa declined by 3.4 percentage points between 1991 and 2011, sub-Saharan Africa remains one of the most unequal regions globally (UNDP, 2017).

<sup>8</sup> Specialised cropping systems tend to have weak linkages with the socio-economic context: they usually develop to serve a demand which is broader than the local one. Moreover, they tend to rely for processing and marketing on a small number of corporate actors who control centralised assets and technologies. By contrast, diversified food systems can serve the local demand and be inclusive to many local actors, including smallholders and micro enterprises, as barriers to entry based on scale are less important. These systems rely on multiple linkages between different stages of the value chains. Diversified systems are coherent with short (i.e. local value chains), while specialization tends to be associated to long value chains (Marson and Vaggi, 2019).



a situation in which significant shifts in a major production system will become necessary. In Nakuru, maize productivity has traditionally been low, mainly due to the fact that maize is predominantly grown in smallholder farming systems under rain-fed conditions, making maize systems highly vulnerable to climate variability and change. Even small changes in rainfall patterns or amounts can lead to huge losses of yields. In addition, low yields in this region are largely associated with drought stress, low soil fertility, weeds, pests (e.g. Fall Armyworm that devastated maize in Africa over the last two years) and diseases (e.g. Maize Lethal Necrosis), low input availability and inappropriate seeds (MoALF, 2016). Future climate change is likely to exacerbate these conditions and enhance these threats. In fact, these impacts are likely to take place in the majority of maize producing regions in eastern and in southern Africa (Reynolds et al. 2015).

### Analysing both the hard and soft subsystems of the food system

From a governance perspective, we are interested in why and how human beings act to tweak the system to produce particular outcomes; we look for drivers as well as constraints that in the experience of relevant actors affect their actions vis-à-vis the most desired outcomes of the system. A **'driver'** we define as a parameter that encourages and/or causes system actors to contribute to conserving and/or improving the level (measured value) of a desired system characteristic (i.e. biodiversity gains). A **'constraint'** on the contrary, is a parameter that withholds/discourages system actors from acting to improve desired outcomes; or even forces/encourages actors to act in such a way that the measured value of the variable or system characteristic is reduced (i.e. biodiversity losses).

In order to develop a clear focus on the (self) governance, we look at food systems as (loosely) coupled systems, comprised of a hard (e.g. biophysical) and soft (e.g. social, economic, cultural and policy-driven) subsystem (Röling, 1997) Consequently, we distinguish on the one hand, the 'hard' biophysical parts of the food system where stakeholders engage in directly food-related processes: i.e. producing, harvesting, storing, processing, packaging, transporting, logistics, wasting and consuming. Our hard systems analysis focuses on these interlinked processes, which transform inputs into outputs and produce tangible outcomes in terms of food availability, access, utilisation and waste, as well as social and environmental impacts.

On the other hand, we recognize the 'soft' parts of the system where actors interactively engage in activities such as price setting, policy formulation and enforcement, regulation, research, advisory services, quality control, marketing, managing consumer expectations and customary behaviour that influence if not regulate, the way the 'hard' parts operate and relate to each other. Our **soft systems analysis** (in particular on the governance dimensions in sections 4 and 5) then focuses on the practices of, and interactions between, relevant social actors, networks and institutions that, consciously or unconsciously, drive and/or constrain the food systems' design and operations. The aim of the analysis is to try to understand the political economy behind the policies, market decisions and regulatory measures taken and the way in which these latter affect the operation and outcomes of the delivery subsystem as well as the impact of the food system as a whole.

## 2.2. The SASS research: objectives, questions and locations

### Research objectives and questions

This report aims to analyse the economic, social and environmental sustainability of the existing food system in the southern Nakuru county, with a focus on understanding the current **role of indigenous vegetables within this local food system and their potential to make it more sustainable**.

In order **to understand the 'hard' subsystem of the food system** that transforms inputs into outputs and delivers tangible outcomes in terms of food availability, access and utilisation, we will look at system performance, by doing an overall mapping of relevant elements of the food system from different disciplinary

angles: socio-economic, environmental, consumption and nutrition. Within the general food system, we highlight in greater detail, the part of the food system concerned with indigenous vegetables.

It is also key **to understand the ‘soft’ subsystem of the food system**, in which actors interactively engage in a variety of practices (e.g. policy formulation, regulation and reinforcement, creating expectations, building connections, etc.), because this influences or regulates the way the ‘hard’ part functions. This gives us the advantage of first, looking at the main actors whose actions and/or decisions most affect the performance of the system we are studying - i.e. farmers, women, middlemen, consumers, officials, entrepreneurs, and others, and second, understanding the drivers and/or constraints experienced by these actors, which make them act to maintain and/or improve/reduce the actual performance of the system. In other words, it allows to focus on those actors, activities and relationships within the food system that actually drive and/or block the intended transformation towards a sustainable food system. Similarly, to the hard subsystem research, we will also pay specific attention to the soft subsystem in light of the integration of indigenous vegetables into the food system.

This dual approach of analysing hard and soft subsystems gives us the opportunity to **apply adequate research approaches to each of these subsystems**. ‘Hard systems analysis’ focuses on the interlinked input/output processes required for the food and nutrition system to deliver tangible outcomes. ‘Soft systems analysis’, to the contrary, focuses on the activities of, and interactions between, social actors, networks and institutions who, consciously or unconsciously, determine how the delivery system functions. The big difference between the two is that the hard, delivery system can be modelled as tangible processes linked through their input and output flows, while the soft, governance system can only be understood by looking at interpretative human activities and the social relations and interactions between the actors involved in such activities (Checkland and Scholes, 1990).

Next, for each of the mapped parts in both subsystems we ask ourselves the following **questions**:

1. How does the system actually perform in view of the four stated objectives for sustainable development?
2. What are the drivers and/or constraints experienced by stakeholders, which make them act to maintain and/or improve/reduce the actual performance of the system, including the integration of indigenous vegetables?
3. Who are the stakeholders whose actions/decisions most affect the performance of the system we are studying - i.e. farmers, women, middlemen, consumers, officials, entrepreneurs, and others?
4. What are possible policy entry points for nudging/stimulating relevant system actors to contribute more and more systematically to a better performance of the system in relation to stated policy objectives, including the integration of indigenous vegetables?

The answers to the questions of these two steps provide us with input for an overall assessment of the performance of the local food system against four stated policy objectives for sustainable development and an analysis of the governance dynamics associated with it. This in turn allows us to define key governance issues – drivers and constraints, key actors – that might be tweaked to improve the performance of the system as a whole, and possible policy entry points to do so. Finally, on the basis of our findings, we will be able to answer the final key question: **what are possible policy entry points** for nudging/stimulating relevant system actors to contribute to a better performance of the system, including a better integration of indigenous vegetables in the local food system?

## Main research locations in the southern Nakuru County, Kenya

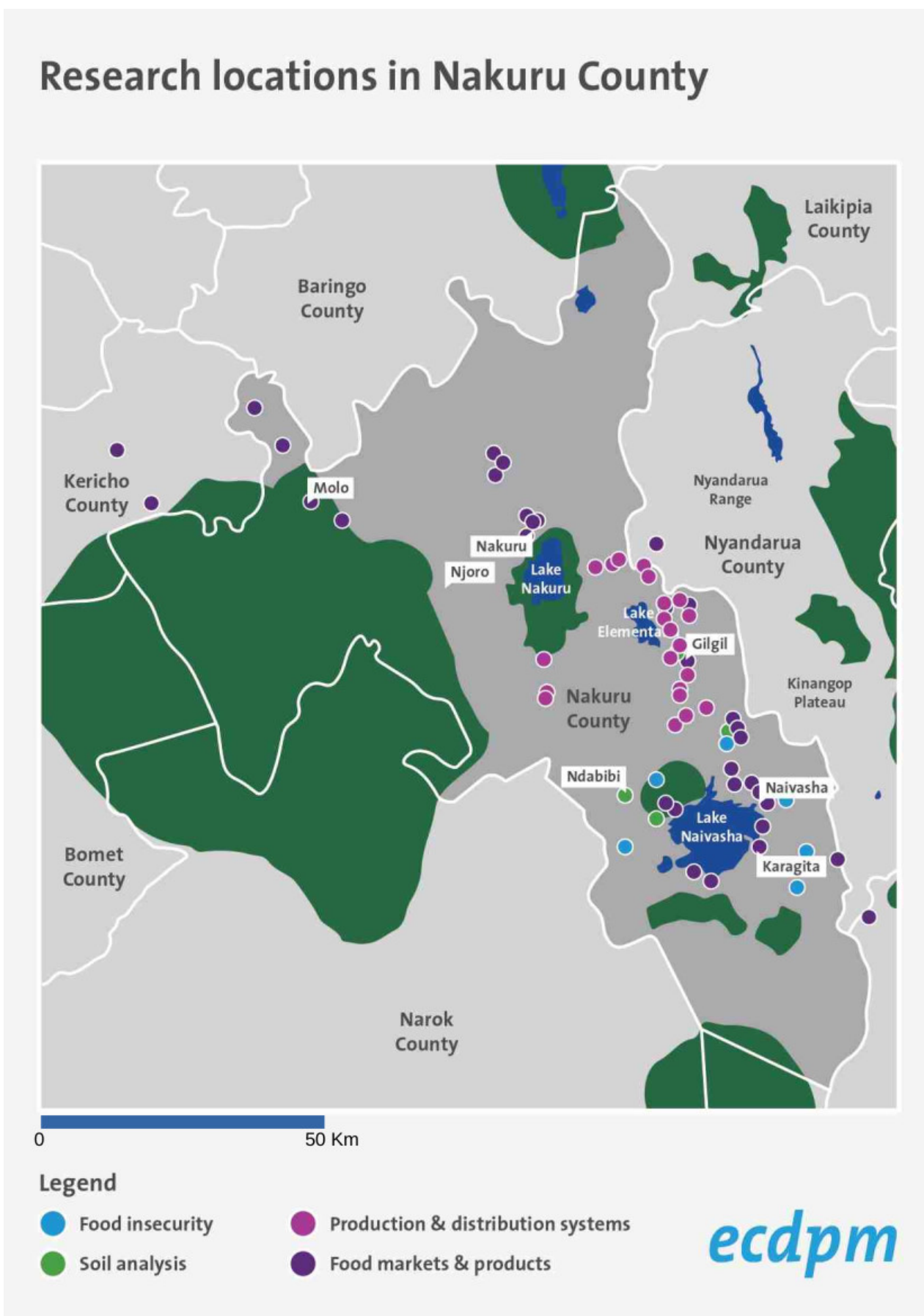
The Lake Naivasha Basin is located approximately 80 km northwest of Nairobi in the southern part of Kenya's Rift Valley. It covers an area of 3400 km<sup>2</sup> with a climate that is predominantly semi-arid.<sup>9</sup> The catchment is home to a diverse fauna and flora, that contributes to making the region a popular tourist destination (Mulatu et al. 2013). The Basin has a diversity of production systems, including large-scale horticulture, including export-oriented floriculture, large-scale wheat, as well as small-scale maize farms, spread out over 504 000 hectares of arable land. The Lake Naivasha Basin is located in the southern Nakuru County and it represents about 67% of the total land area within the County (MoALF, 2016). Nakuru County constitutes eleven constituencies or sub-counties, including Nakuru Town East, Nakuru Town West, Bahati, Rongai, Subukia, Kuresoi North, Kuresoi South, Gilgil, Naivasha, Njoro and Molo.<sup>10</sup> **The main research focus is on the Naivasha and Gilgil sub-counties and Naivasha, Gilgil and Nakuru towns, all located in the south of Nakuru County** (See Figure 2). From a socio-economic and market access perspective, these three towns (Nakuru is a city with 300,000 inhabitants; Naivasha and Gilgil are small and medium towns with 100,000 and 25,000 respectively) are all situated along the A104 Road, one of the most important highways in Kenya, connecting Nairobi, the capital and largest city in Kenya, with the border with Uganda.<sup>11</sup> Gilgil town is exactly in the middle, in turn 100 km separate it from Nairobi. The Gilgil Sub-County covers an area of 1348.4 km<sup>2</sup> and it borders the sub-counties of Naivasha to the South East, Nyandarua to the East, Subukia and Nakuru to the North, Narok to the West and Njoro to the North West.

<sup>9</sup> According to USAID (2011), Nakuru county falls within High Rainfall Area (HRA) which is defined as an area whose rainfall exceeds 870 mm per year. Government publications are more cautious: MoALF (2016) reports a more nuanced picture for the southern part of Nakuru County, which includes area between 500 and 870 mm of rain per year. The National Agricultural Investment Plan (Government of Kenya, 2010a) does not identify exactly the counties within each area, but considers 870 mm rain per year as a lower bound threshold.

<sup>10</sup> See: <http://www.kenya-information-guide.com/nakuru-county.html>.

<sup>11</sup> This road, together with the Nairobi–Mombasa Road, is part of The Great North Road, which connects Burundi, Eastern DR Congo, Rwanda, Uganda and South Sudan to the Kenyan coast at Mombasa, on the Indian Ocean. To give a sense of the size of the area analysed by SASS, 80 km separate Naivasha town and Nakuru town along the A104.

Figure 2: SASS research locations



## 2.3. Methodologies

### A multidisciplinary approach

The different SASS teams undertook various **research missions in these locations, analysing different parts of the Nakuru food system, from a multi-disciplinary perspective**, through: (1) households survey by one of the UNIPV economists team (included a related but separate gender analysis) on the food insecurity situation in seven clustered locations in and around the Lake Naivasha Basin (Kiburuti, Leleshwa, Ngano-Ini, Gathengera, Lower Nyamathi, Tumaini and Kanjogu); (2) analysis of input and output market systems and profitability of different farms and constraints to agribusiness development along the VC, by another team of UNIPV economists (3) analysis of food market outlets and products in more than ten markets in and around Naivasha, Nakuru and Gilgil by one of the UNISG anthropologists team; (4) investigation of food exchange networks among migrant flower-farm workers and other informal settlements around the lake, by UNISG anthropologists; (5) analysis of smallholder production and distribution systems in Gilgil by UNIMIB sociologists; (6) assessment of environmental sustainability of different agronomical practices (with focus on soils) in farms around the Lake Naivasha by UNICATT agronomists and microbiologists supported by the Naivasha Basin Sustainability Initiative; (7) plant and insect biodiversity assessment by UNIMIB biologists, supported by NBSI.

These various types of thematic expertise of the SASS consortium, research methods and focus on specific locations were **selected to analyse and represent key dimensions of ‘sustainability’ (economic, social and environmental) and the different parts of the food system (production, distribution, consumption)**: the food insecurity research looks at the social and livelihood aspects of the system and included consumption; the analysis of food markets and that of production and distribution systems look at economic sustainability; the soil analysis and biodiversity assessments contribute to understanding the performance of the food system from an environmental point of view; and so on.

Lastly, the SASS research consortium adopted a **Responsible Research and Innovation (RRI)** process that should help scientists and innovators to identify four dimensions in their activities: anticipation, reflexivity, inclusion and responsiveness (Stilgoe et al. 2013). This process should allow to anticipate how the current processes will affect and define future needs; examine and reflect on actions and consequent effects concerning all aspects of research and innovation: from daily routines, planning assumptions and personal interactions, all the way up to institutional values and strategies. RRI is about including all actors in all stages of research and innovation policy development, because this will strengthen science and innovation. The ‘anticipation and reflection’ dimension allows to discuss the kind of future we are working towards and how research and innovation may shape that future. Lastly, the ‘responsiveness and adaptive change’ aspect allows to respond to new knowledge, views and circumstances in terms of behaviour, thinking and structure of organisations. In sum, the RRI strategy aims to create policy driven by the needs of society and the engagement to societal actors by inclusive participatory approaches that will be discussed next.

### Actor mapping and participatory methodologies

An important exercise in the analysis of the soft subsystem of the food system is to understand who the **main actors are and how they are connected**. In the first phase of the SASS programme we created actor maps, defined as *“a visual depiction of the key organisations and/or individuals that make up a system, including those directly affected by the system as well as those whose actions influence the system.”*<sup>12</sup> Actor maps are sometimes referred to as stakeholder maps, but they are different. Certain actors can be important

<sup>12</sup> See: <https://www.fsg.org/tools-and-resources/guide-actor-mapping>.

influencers (e.g. policy makers), without necessarily being “stakeholders in a system’s change initiative”. Therefore, we use the term ‘actor maps’ for the purpose of this paper. Actor maps are aimed to identify opportunities to improve a system’s overall performance: the food system in the southern Nakuru County in this case. This could be done by observing where connections are weak or where gaps could be filled.<sup>13</sup>

The first step in an actor mapping exercise includes identifying the main topic of the map and setting boundaries around that topic. This report will produce two types of maps: a **first type of actor mapping will show key actors in the indigenous vegetables’ VC in the southern Nakuru County and their vertical inter-relations with other actors**.<sup>14</sup> Vertical linkages connect actors involved in different activities and stages of the VC, from input suppliers to producers, processors, wholesalers, distributors, exporters, and so forth, all the way to the consumer. Vertical linkages are the commercial relationships involved in bringing the product up through the VC (Dunn, 2014, cited by Stein and Barron, 2017). In other words, the focus there is on key VC linkages, including production, processing, distribution and consumption. The **second type of actors mapping will shed light on the horizontal inter-relations among actors of the same category**. Horizontal linkages connect actors performing the same activity within the VC. An example of horizontal linkages would be producer groups. Important functions of horizontal linkages include more cost-effective access to inputs, services and information; and the empowerment of farmers to advocate for change. In short, horizontal linkages show how producers and other VC actors are embedded in a VC, but are frequently not included in VC analysis. So, in this second type of actor mapping, the focus is on cooperation, influence and knowledge exchange.<sup>15</sup> The first step is to identify and list all actors relevant to a programme or policy. Second, to get a detailed overview of the different actors, applying the **methods of the 4 A’s**: (1) Actor: what is the actor’s name, what is his function?; (2) Agenda: what is the actor’s mandate, what is his mission?; (3) Arena: in what field is the actor active, where is he present?; (4) Alliances: with which other actors is the actor allied, how is he interconnected?.<sup>16</sup> Answering these questions allows to understand the role and importance of the various actors in a system. Alliances and levels of cooperation become visible and the researcher can get a first indication of the dynamics of the stakeholder landscape.

These are two important exercises, because the livelihood of agricultural producers is not just dependent on what they produce on the land, but also their ability to access resources such as fertilisers, seeds and other inputs ‘upstream’ in a VC as well as markets to sell their surplus produce ‘downstream’ of where they are situated in a VC. How producers are embedded in a VC has implications for their **ability to access resources, information and markets**. In the literature and in practice, various terms can be found to describe people whose livelihood is mainly based on household level, small-scale agricultural production. In this report, we use ‘**smallholder farmers**’ as a term that is immediately understandable by both local actors and international stakeholders and perceived as being inclusive of small- and micro-scale farmers. While the

<sup>13</sup> *Ibid.*

<sup>14</sup> A value chain is “the set of value-adding activities through which a product passes from the design to the consumption stages. The worth of the product increases at each point of the process, hence the term value chain” (McCormick and Schmitz, 2001: p. 155, cited by Stein and Barron, 2017). Value chain analysis is about understanding how activities and actors that are involved in bringing a product from production to consumption are linked. “There is a simple element at the heart of value chain analysis, - the idea of a chain is a metaphor for connectedness. It highlights the point that most goods and services are produced by a complex and sequenced set of activities” (Stein and Barron, 2017: 1). For vertical connections, the LINK methodology is very useful: <https://cgspace.cgiar.org/handle/10568/49606>

<sup>15</sup> “Influence” can exist in many forms, including financial, informational, technical, advocacy or hierarchical types of influence.

[https://docs.google.com/presentation/d/1dkdyxmf3O\\_A2pe9pmTLPvybZ3En\\_t8xBNH-fS83hc/edit](https://docs.google.com/presentation/d/1dkdyxmf3O_A2pe9pmTLPvybZ3En_t8xBNH-fS83hc/edit)

<sup>16</sup> The Swiss Agency for Development and Cooperation developed this tool for actor analysis, from which this report will draw. See: [https://www.shareweb.ch/site/Learning-and-Networking/sdc\\_km\\_tools/Documents/Stakeholder\\_Analysis\\_PEDNetwork.pdf](https://www.shareweb.ch/site/Learning-and-Networking/sdc_km_tools/Documents/Stakeholder_Analysis_PEDNetwork.pdf). We apply the same categories of “alliances”: A: Institutionalised relation, B: Regular exchange of information, C: Coordinated activities, D: Co-production using joint resources.

dimension of the plot is not the only variable that identifies this social group, we prefer 'smallholders' to 'subsistence farmers', which is perceived to be too negative by most local actors and does not account for important interactions of nearly all farmers with the market. We also avoid 'household farming', which refers to the practice of 'farming' rather than to the actors or the 'farmers' and might sound unclear to many stakeholders. Nonetheless, a few times in this report we may refer to the category 'subsistence farmers' as part of the official (sub-)county classification system.

Actor mapping is also an important component of the **participatory methodologies that the SASS consortium adopted across the board, both for the research and dialogue activities**: in line with RRI, working closely with local actors is a precondition for both a comprehensive understanding of the food system performance and the possibility to contribute to solution pathways based on local knowledge and preferences. Participatory methodologies were used during the multi-stakeholder workshops organised by SASS in southern Nakuru as well as by all SASS researchers through their choice of research techniques (such as focus group discussions, interviews, participation in local events, and so forth). Finally, a participatory approach will also characterise the concluding phase of SASS and the identification of the interventions to improve food system sustainability. Indeed, we refer to them as "pathways" not "solutions" since all such ideas need to be further analysed with rigour and further discussed with local stakeholders, to test their desirability and feasibility.

### 3. Mapping the Nakuru County food system

#### 3.1. The socio-economic landscape

##### **A rapidly increasing population**

The population of Kenya was enumerated at 38.6 million during the 2009 Kenya Population and Housing Census (the latest census). It was estimated to be increasing at a rate of 1 million people each year representing a growth rate of about 2.9% annually. According to the same census, the **Nakuru County population was 1,602,637 and is expected to rise to 2,400,367 in 2030 and 3,013,869 in 2050** (NCPD, 2017). In 1999, the total population of the Naivasha Basin was estimated to 650,000 people, of which approximately 160,000 lived around the lake itself.<sup>17</sup> In the decade between 1989 and 1999 (during the boom of the horticulture industry), the population of the basin grew by 64%. The rural population of the county is estimated today to be at 62%, while 38% live in urban areas. Some data are also available at sub-county level. For instance, the **Gilgil sub-County has a population of nearly 180,000 people** (2009 census/data provided by Agricultural Officer), see Table 1 for the population per ward in Gilgil sub-County.<sup>18</sup>

<sup>17</sup> See: <https://www.knbs.or.ke/download/nakuru-county/>. The latest population census was done in 2009. To date, no more recent data has been produced (See: <http://worldpopulationreview.com/countries/kenya-population/>).

<sup>18</sup> See: <https://docs.google.com/document/d/18NuqRJQ1ygb53oKPHV01ROqP3UE7eB8M64S5ToJitWQ/edit#>.



**Table 1: Naivasha and Gilgil sub-County per ward, the area and population and population density**

Naivasha sub-County Population			
<i>Ward</i>	<i>Area Size Km<sup>2</sup></i>	<i>Population</i>	<i>Pop. Density (per Km<sup>2</sup>)</i>
Biashara	64	17,728	277
Hell's gate	91.2	44,297	486
Lakeview	16.2	22,688	1400
Maai mahiu	544	33,662	62
Maella	427.8	31,100	73
Olkaria	345.5	28,738	83
Naivasha East	90.9	23,594	260
Viwandani	105.8	51,418	486
Gilgil sub-County Population			
<i>Ward</i>	<i>Area Size Km<sup>2</sup></i>	<i>Population</i>	<i>Pop. Density (per Km<sup>2</sup>)</i>
Gilgil	84.3	53,780	638
Elementaita	213.1	31,073	146
Mbaruk/Eburru	621	37,728	61
Malewa West	274.1	24,759	90
Morendat	155.9	24,499	157

Source: [The County Government of Nakuru](#)

Closer to the lake, population density is higher to the eastern and southern parts of Naivasha sub-County with Lakeview, Hell's Gate and Viwandani Wards having the highest density (i.e 1,400; 486; and 486 people per sq km respectively), as shown in . Gilgil sub-County has the highest population density (638 people per sq km).<sup>19</sup> However, the **high population density in Nakuru County is causing an unprecedented demand for housing, commerce, and infrastructure**. Hence, land units are small and declining, averaging less than 2 ha per capita. One key reason is that large numbers of children per family has resulted in less land available per child, less land ownership and more land leasing.<sup>20</sup> This trend is attributed to the culture inheriting and subdividing land among offspring and siblings.<sup>21</sup> The region also exhibits rapidly expanding urban centres (Sheahan et al. 2013).

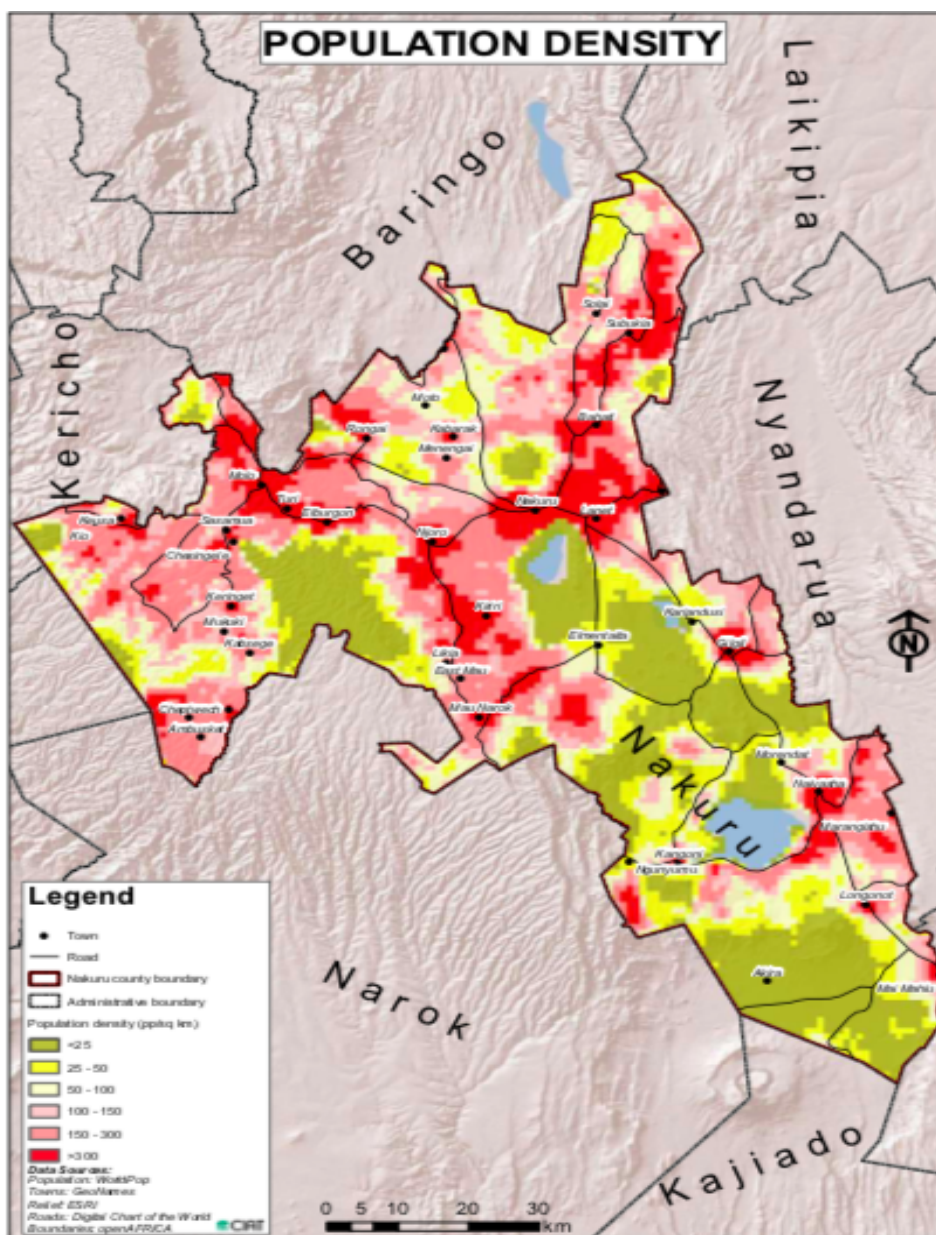
<sup>19</sup> See <http://nakuru.go.ke/govt-services/subcounties/>

<sup>20</sup> In fact, land is leased in most cases, which has proven to hinder farmers' investments in land conservation techniques (Multi-stakeholder workshop, Naivasha, June 2017).

<sup>21</sup> Multi-stakeholder workshop, Naivasha, July 2018.



Figure 3: Population density in Nakuru County



Source: Nakuru County Map book

Those aged 18-34 years constitute about 30% of Kenya's total population, while those aged 0-34 years constitute 78% of the population.<sup>22</sup> Also in Nakuru County, the **youth is a major demographic group**.<sup>23</sup> In 2009, the proportion of the population below age 15 was 41.9%. It is projected to reduce to 31.7% in 2030 and further decrease to 24.0% in 2050 (NCPD, 2017).

Nakuru County has a fertility rate of 3.7 children per woman. **Nakuru County is at the onset of a fertility decline as 49% of households have 0-3 household members**.<sup>24</sup> Despite this fact, the population is

<sup>22</sup> The United Nations uses the terms youth and young people interchangeably to mean people aged 15-24 years with the understanding that member states and other entities may use different definitions. The Constitution of Kenya (2010) defines youth as those individuals who have attained the age of 18 years but have not attained the age of 35 years (NCPD, 2017).

<sup>23</sup> Nakuru County has a population of which the 0-14 year olds constitute 43% of the total population. See: <https://www.knbs.or.ke/download/nakuru-county/> (p. 10).

<sup>24</sup> See: <https://www.knbs.or.ke/download/nakuru-county/>.

increasing, due to growth as well as constant migration. Two main patterns of internal migration can be identified, responding to different push and pull factors. The first type concerns internal migrants arriving in Gilgil and other sub-counties, looking for cheaper and available land plots. In particular, land in the Gilgil Sub-County is less expensive than in other areas of the country, due to lower crop yields, compared to other parts of Kenya (Gilgil Sub-County hosts a semi-arid environment that is less favourable to agricultural activities). Migration is also driven by political push factors. Since 2007, the Naivasha Basin has been one of the top destinations for many of the internally displaced people fleeing the post-election violence that followed the presidential election (the majority belonging to the Kikuyu tribe). Also, population growth encourages the conversion of agricultural land for the creation of new settlements. As a consequence of all these factors, land prices are peaking, especially in the towns' outskirts and near the main communication roads (Borrelli and Benegiamo, 2019).

### Main economic trends: important sectors competing for essential resources

The economy of Nakuru County is anchored in the agricultural sector. The floriculture and horticulture export industries as well as the dairy sector are especially strongly represented in the Naivasha Basin. The well-developed dairy sector, comprising very small, medium and large producers and cooperatives, serves the Kenyan, East African and international markets, and has benefitted also from large public investment programmes. The floriculture and horticulture export sector is owned by international commercial agribusiness, and the produce is mainly sold to European, and increasingly Asian, supermarkets. A number of factors have led to the establishment and growth of this industry, including the availability of and easy access to freshwater resources for irrigation, the availability of large farms for large-scale commercial production, the soils and climate conducive for horticultural production and the relative proximity to Jomo Kenyatta International Airport. The floriculture and horticulture industry employs approximately 25,000 people directly and an additional 25,000 indirectly. Most of the large commercial farms pay more than the minimum wage and provide auxiliary services and facilities such as clinics, houses, schools and sports facilities, making this even more attractive for migrants, who have a high dependency ratio on their remittances (WWF, 2012). The commercial farmers that grow vegetables for export have had an increasing share of Kenya's total vegetable export market, but they have also started establishing 'outgrower' schemes over the past decade that enable smallholder farmers to gain access to more profitable, export-oriented supply chains. It is estimated that there are approximately 5,000 smallholder farms associated with the commercial farming/export vegetable industry in the Naivasha region.

Annual vegetable exports from Kenya have increased from approximately KSh 2.5 billion in 1996 to approximately KSh 16 billion (United States (US) \$230 million) in 2008. The **Naivasha Basin accounts for 70% of Kenya's cut flower exports and generates more than 9%** or KSh 27.8 billion (approximately US\$400 million) **of Kenya's total foreign exchange revenue.**<sup>25</sup> It is estimated that 45% of the revenue generated by a typical cut flower farm is spent on production costs at the farm. This would imply that the contribution of the floriculture industry to Lake Naivasha's local economy is approximately KSh 12.6 billion (US\$180 million). Vegetable production in the Naivasha Basin contributes just over KSh 6.65 billion to the Kenyan Gross Domestic Product (GDP). The Naivasha Basin's local GDP is estimated to be in the order of KSh40 billion (US\$570 million). GDP per capita was estimated to be KSh62,500 a year, compared to the national average of KSh54,895 (WWF, 2012). However, the **cultivation of flowers competes with local food production not only due to the process of conversion of land, but also due to the access to water.**

<sup>25</sup> The flower farms surrounding the lake grow 1,900 hectares of cut flowers, of which 1,200 are grown in greenhouses. Roses make up about 75% of Kenya's annual flower production, followed by mixed flowers (8%), hypericum (3%) and carnations (2%) (WWF, 2012).

The **contribution of the farming sector to employment is very significant**: the sector directly accounts for about 40% of Naivasha's local economy.<sup>26</sup> The majority of trades and services in the basin are directly or indirectly linked to the agriculture sector; be it in terms of providing goods and services to the farms themselves or to supporting those who work on the land. Table 2 illustrates **the number of people employed, by sector**, in the seven investigated clusters in the Lake Naivasha Basin (Sassi and Zucchini, 2018). This indicates that the number of jobs related to the large floriculture and horticulture farms are mostly temporary employment and part-time contracts and are often indicated as 'casual works', with many rural household members seeking jobs in this sector only outside the harvesting time. In terms of share of people employed, this type of jobs is in general second only to the 'agriculture' sector that in most cases indicates self-employment in the small family farm. The table shows indeed that in the clusters where floriculture and horticulture represent the major economic activity, such as Leleshwa and Tumaini, the 'casual jobs' there constitute by far the largest employment source, while the share of jobs in the household small farms is negligible.

**Table 2: Percentage of people employed per sector (in February 2018)**

Sector	Kiburuti	Leleshwa	Ngano-Ini	Gathengera	Lower Nyamathi	Tumaini	Kanjogu	Total
Agriculture	57.39	-	60.94	42.11	46.67	2.78	63.51	46.64
Livestock	2.27	2.47	-	1.32	2.50	-	1.42	1.50
Fishing	-	1.23	-	-	-	11.11	-	1.04
Craftsman and industry	2.84	3.70	8.59	2.63	7.50	-	2.84	4.17
Casual works	24.43	65.43	12.50	32.89	19.17	52.78	14.22	26.39
Merchant and trade	4.55	3.70	8.59	9.21	10.00	16.67	6.64	7.75
Transport and services	5.68	12.35	3.91	7.89	6.67	11.11	7.11	7.18
Civil servant	-	3.70	-	1.32	0.83	1.39	-	0.69
Teaching works	-	1.23	2.34	-	1.67	1.39	1.42	1.16
Pension	-	-	0.78	-	0.83	-	0.47	0.35
Other activities	2.84	6.17	2.34	2.63	4.17	2.78	2.37	3.13

Source: Sassi and Zucchini, 2018

Table 3 illustrates the different types of **household expenditures** (in Kenyan Shillings) for three categories of households, ranging from food secure to severely food insecure. Interestingly, the share of consumption over the total of both cereals (mostly maize) and indigenous vegetables (called "traditional species" in this SASS household survey) grows with the level of food insecurity.

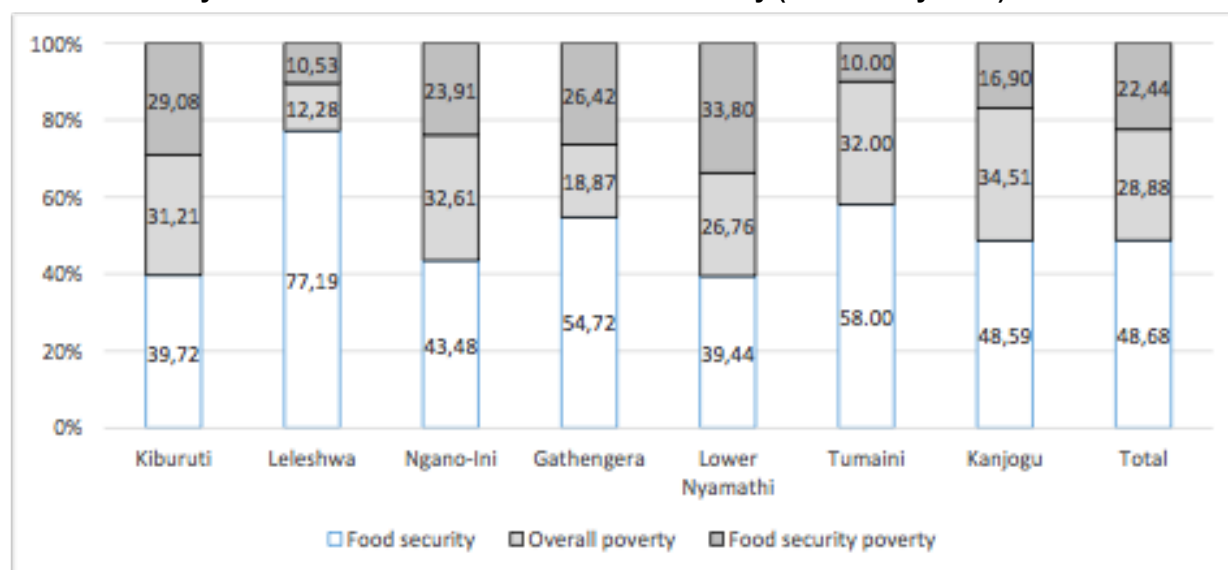
<sup>26</sup> However, according to a 2012 WWF study, the contribution of the agriculture sector to Naivasha's local economy is likely to be about 75% (WWF, 2012).

**Table 3: Average adult equivalent household expenditure in KSh and percentage share of total expenditure in brackets (in February 2018)**

Expenditure item	Food secure	Moderately food insecure	Severely food insecure
Cereals	916 (11.63)	684 (25.58)	390 (29.85)
Traditional species	266 (3.38)	153 (5.74)	94 (7.19)
Total food expenditure	1,924 (24.43)	1,294 (48.41)	757 (57.97)
Education, school, fees, uniform	1,936 (24.58)	291 (10.90)	78 (6.00)
Total non-food expenditure	5,950 (75.57)	1,379 (51.59)	549 (42.03)

Source: Sassi and Zucchini, 2018

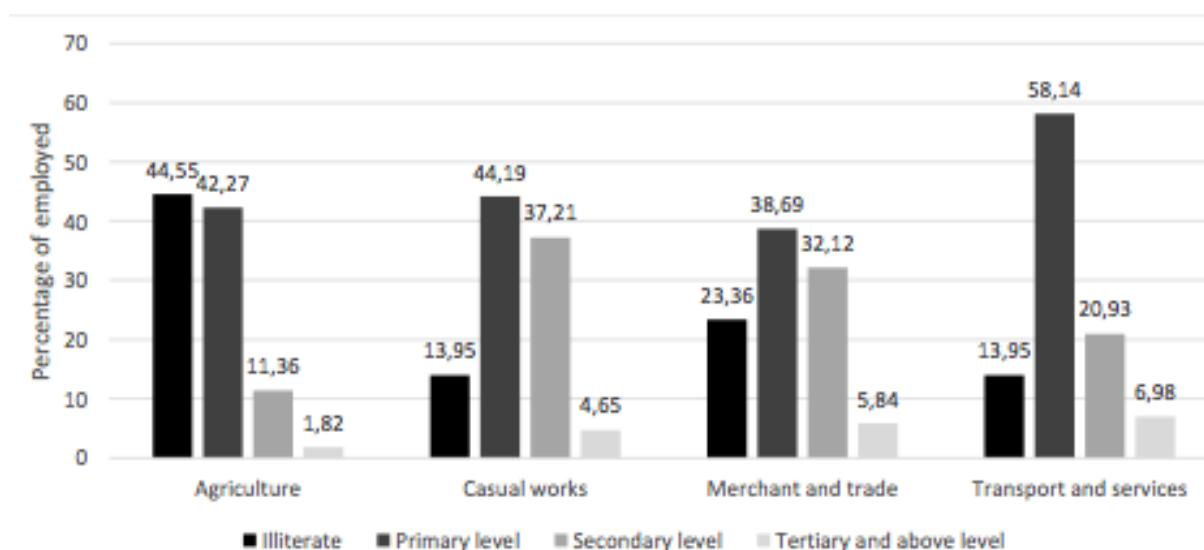
According to the same SASS economic and food security research, **the level of income inequality in the Lake Naivasha Basin is much higher than at the national level**, with a GINI index of 0.6571 against 0.368. Table 4 shows that there are significant differences in poverty status in the seven locations investigated in Nakuru County (Sassi and Zucchini, 2018).

**Table 4: Poverty status in seven locations in Nakuru County (in February 2018)**

Source: Authors' elaboration.

Source: Sassi and Zucchini, 2018

In many areas in Nakuru County, farming techniques are basic and poor. According to Sassi and Zucchini (2018), these are mostly due to low level of education, as shown in the following Table 5.

**Table 5: Education levels within four sectors**

Source: Sassi and Zucchini, 2018

In Nakuru County, **more than a quarter of the young people are farmers and sell their produce in local markets** (NCPD, 2017). Many of them consider this as a ‘natural choice’ and they are attracted to the idea of being self-employed. However, overall, the participation of the youth in entrepreneurship and agriculture is hampered by lack of knowledge on agricultural production, a lack of incentives, land ownership issues and a lack of capital. Farming also bears a negative image for the youth (e.g. labour-intensive, not profitable) and most of them prefer ‘quick cash’.<sup>27</sup>

The adult female population (42%) provides the largest share of family labour, while hired labour for livestock production is dominated by the youth. In the marketing of crops, 39% of the households in the Nakuru County had contractual agreements with buyers of their produce. The main crops sold by households on contract were maize (34.4%), Irish potato (27%), pulses (11.7%), and green peas (11.7%). Livestock products sold on contract were milk (56%), live animals (15%) and eggs (21%) through informal (61%) and formal (39%) agreements (Government of Kenya, 2014, cited by MoALF, 2016).<sup>28</sup>

Important to note is that the **agriculture sector creates an interesting job market for migrants** seeking work on the shores of the lake: these migrants have moved to the Lake Naivasha Basin during the last twenty years in search of job opportunities in the expanding large-scale and export-oriented farms that were established in the Lake’s surroundings due to the availability of water, land and cheap labor (Corvo and Fontefrancesco, 2018). The vast majority of SASS-informants in this category of ‘migrants’ came from rural areas in other counties of Kenya (Western Kenya, Eastern Kenya, Laikipia, Meru), and belong to farmers’ families, working their fields in a primarily subsistence-oriented economy before moving to the urban areas in the Naivasha Basin. As flower farm workers, they earn 200-300 Shillings per day and are just about at the poverty threshold. They live in 15 sq. mt. single rooms with their families and are often food insecure (cabbage and *sukuma wiki* constitute the biggest part of their diet). Their main reason to migrate and work in the flower farms is to earn enough money to send children to school and, in the long term, to invest in their own business. However, the high cost of life (food, rent, health care) in the Naivasha Basin affects their food security and capacity of paying their children’s school fees, who often have to drop out, let alone their capacity

<sup>27</sup> Typically government institutions pay at a later stage. For example, the National Cereals and Produce Board of Kenya only pays one year later. Multi-stakeholder workshop, Naivasha, June 2017.

<sup>28</sup> See here for details on Nakuru County Staple Crops Macro Data:  
[https://docs.google.com/spreadsheets/d/1Jbwz0gWkR6vKLU2NTZpH222m\\_GvCillmj77sFdF0jpQ/edit?](https://docs.google.com/spreadsheets/d/1Jbwz0gWkR6vKLU2NTZpH222m_GvCillmj77sFdF0jpQ/edit?)

to put money aside to invest. This explains why the horticulture labour force is continuously moving and shifting: farm workers are given contracts, but they soon move away to look for other opportunities. Migration towards the Lake Naivasha Basin is likely to continue as long as there is a perception of livelihood opportunities in the area. This perception is especially strong among women as the commercial farms can provide employment for them, while they have greater difficulty in finding alternative employment. As more and more people enter the area, competition over available resources will become more and more acute (WWF, 2012).<sup>29</sup>

In addition to the agriculture sector, **Lake Naivasha Basin is a premier tourist destination and property development hotspot.** It offers excellent wild animal and bird viewing opportunities, together with boat rides and three gated golf communities on the outskirts of the lake. It also provides second homes to members of the Nairobi political and economic elites (WWF, 2012). This last factor deserves extra attention: **growth in the national economy and its proximity to overpopulated Nairobi** (with improving roads and soon a railway connection) **has led to an increasing amount of property development in the Naivasha Basin** (with several consequences in sustainability dynamics as explained throughout this report). High value residential property around the lake range from approximately US\$4000 to US\$60,000 an acre. This typically translates to a construction and residential economic activity of about 5% of GDP (WWF, 2012).

These broad economic growth dynamics also provide an opportunity for the local agriculture sector, especially for **nutritious food value chains like vegetables that are increasingly demanded by affluent citizens in medium and large towns.** The enabling environment for, and competitiveness of, the horticulture export industry in Nakuru could be exploited to serve the profitable markets of Nairobi and Nakuru county towns at much larger scale, with food products like vegetables and fruits. As illustrated in Box 1, this would contribute also to urban-rural integration, especially along the good transport infrastructure **linking Nakuru and Nairobi.**

#### **Box 1: Urban-rural integration via vegetables value chains, linking Nakuru and Nairobi**

Increased urban demand for vegetables can improve diets and drive a change of monocultural agri-landscapes towards more diversification, against the backdrop of urbanisation in Kenya (with currently about a third of the population residing in cities, but which is estimated to rise to 54% by 2030). Nairobi is dependent for 80% of its food needs on other regions, with a significant contribution from metropolitan counties such as Nakuru (FAO, 2018). As a result, the agri-landscapes of Nakuru County can be linked with changes in Nairobi's demand, especially in terms of nutritious foods like vegetables. In Nairobi, malnutrition is rising, especially in the informal settlements and slumps: a more diversified diet can combat common types of malnutrition. As much of Nairobi's food comes from the metropolitan counties, the availability of fresh and nutritious food for Nairobi is linked with the agricultural diversification of counties such as Nakuru. For instance, the availability of African Nightshade (*Managu*) strongly increased between 2013 and 2017. But the supply chains to Nairobi are hampered by inefficiencies, price information asymmetries, and lack of transparency in quality and dispute resolution. To enhance local food supply, collaboration regarding value chain governance between Nairobi and Nakuru County would be necessary. This collaboration can enhance farmers' livelihoods and provide Nairobi with local, safe, affordable and nutritious food. The access to markets for Nakuru farmers, and the role of middlemen to supply these markets, would be key. More recognition of the role that informal markets play in urban food and nutrition security could also improve the distribution networks of Nairobi. In summary, the food systems of Nairobi and Nakuru County are intertwined. Increased coordination and better food governance to promote indigenous vegetables value chains can help smallholders in Nakuru diversify their production and income opportunities, while providing safe, nutritious, and affordable food to an expanding Nairobi.

<sup>29</sup> One need only look at the violence in Naivasha after the disputed 2008 elections, or the historical violent conflicts over water between pastoralists and smallholders in other parts of the country, to see the damage that social unrest can do the economy, social fabric and by implication the horticultural industry (WWF, 2012: 22).



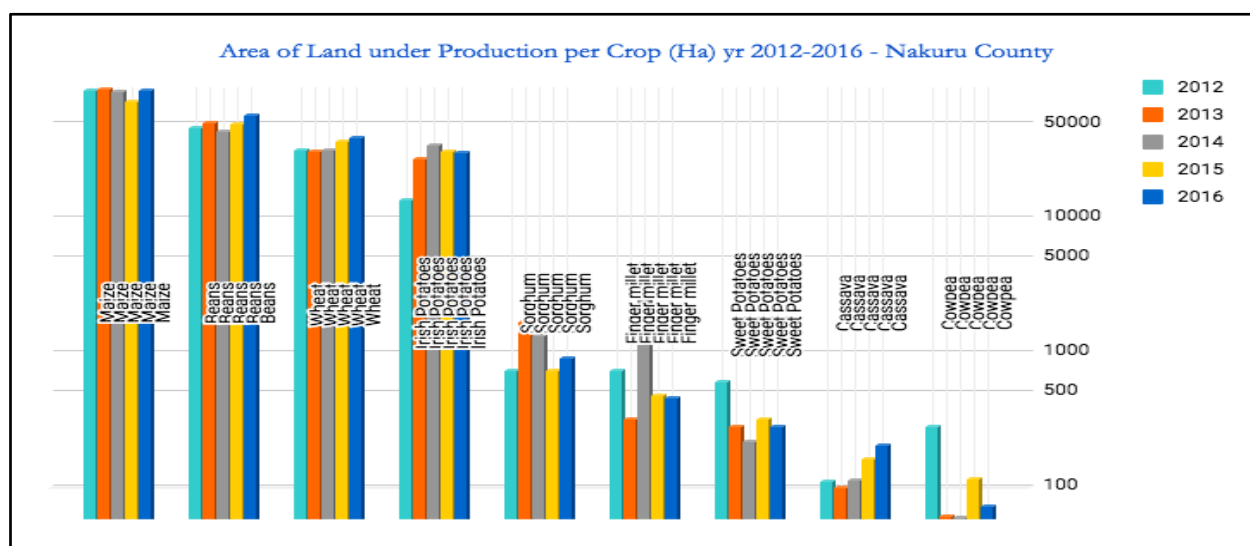
## Farming systems and main crops produced

The **main food crops in Kenya** are maize (*Zea mays*), wheat (*Triticum aestivum*), beans (*Phaseolus vulgaris*), peas (*Pisum sativum*), bananas (*Musa spp.*) and potatoes (*Solanum tuberosum*) (Wambugu and Muthamia, 2009). Maize production is highest among all cereals (2 900 000 tonnes produced in 2016). It is the basis of the Kenyan diet, mostly used for 'ugali', a dish made with maize flour. It is highly likely that maize will remain the main staple food in Kenya and its consumption is expected to increase. Maize also features strongly in Kenya's Agricultural Investment Plan.<sup>30</sup> This strong preference for maize and a few other (staple) crops is against an estimated total of 7500 plant species growing naturally in the country which offers great opportunity for crop diversification. **Kenya has been shifting from having diverse production systems and diets to increasing specialisation** with maize being by far the most cultivated crop, covering 54% of total cultivated area (Kimenju and Tschirley, 2008).

In 2012, **the main food crops produced in Nakuru County included maize** (250,065 tonnes), Irish potato (270,986 tonnes), wheat (58,000 tonnes), and beans (22,614 tonnes) valued at 6.5 billion Kenyan shilling (KES), KES 4.7 billion, KES 1.7 billion and KES 1.2 billion respectively (MoALF, 2016). In the same year, the main livestock products were milk (182 million litres), beef (120,600kg), mutton (86,400 kg) and eggs (33,242 trays) (Government of Kenya, 2015, cited by MoALF, 2016). **The main source of food for the population in Nakuru County is produced on their own farms.** The County is almost entirely food sufficient. Storage facilities, such as silos, farm stores and warehouses, are not adequate, creating post-harvest losses (Hivos, 2018b).

In Nakuru County, maize takes the largest portion of cropland under cultivation (42.8% average), while other crops share the remaining land that is less than 2% (See and 7). **The County contributes about 5.5% of Kenya's maize production, 4% of beans, and, notably 20% of Irish potatoes and 24% of wheat.**<sup>31</sup>

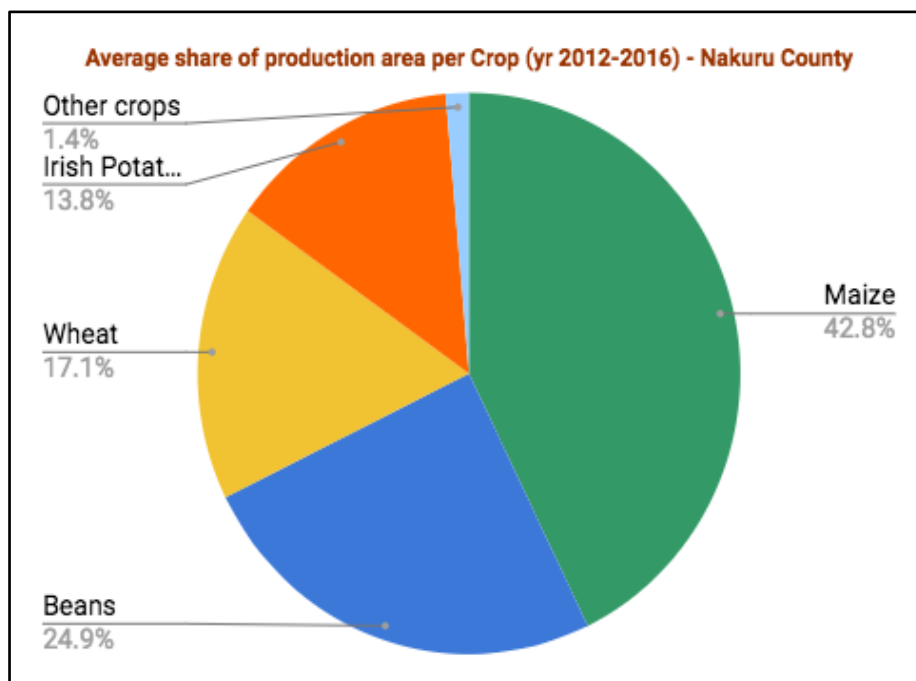
**Figure 4: Cropland in Nakuru County**



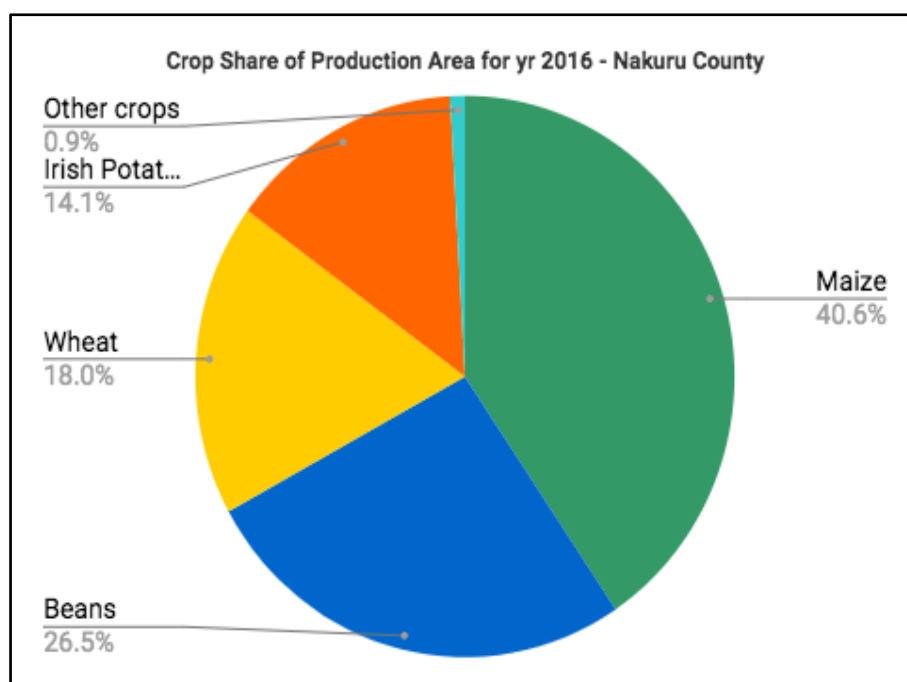
Source: Wanjala, 2018

<sup>30</sup> See: <http://www.nepad.org/sites/default/files/kenya-investment-plan-aug-14-2010.pdf>.

<sup>31</sup> Land under irish potato cultivation in 2016 was 30,501 ha falling within the highest cultivated area range of the eAtlas mapping estimates (19,671 - 34,155 Ha) with a high production output of 22, 5479 tons still recording one of the highest output in the eAtlas range (14,9220 - 24,8290 tons). 37,005 Ha of land was under wheat cultivation, still falling within the highest range (16868 - 68135 Ha) with a production output of 120, 603 tons as compared to the highest eAtlas range (44908 - 135038 tons).

**Figure 5a, b: Percentage of crop cover in Nakuru County (2016)**

Source: Wanjala, 2018



Source: Wanjala, 2018

**The same trend can be found at the sub-county level.** For instance, the main staple foods cultivated in Gilgil sub-county are maize, beans and Irish potatoes, cumulatively taking a share of approximately 86.4% of cropland. Vegetable and horticulture production only takes less than 5% of the cultivated land (MoALF, 2016).

**Most of the cultivated land is rainfed, particularly among smallholders.** Only in some areas where there are natural springs and rivers, or illegal connection to existing water supply systems, irrigation is practiced



by commercial farms (i.e. farming businesses with hired workers at the big, medium and small scale) and by many smallholders farmers. For example, irrigated areas are estimated to account only for 20 to 30% of total area devoted to horticulture in Gilgil Sub-County and the percentage is likely to be much lower for cereals and pulses. This means that production by most smallholders is limited to the rainy season, which implies the well-known challenges both for self-consumption and for marketing: households cannot store food to consume it throughout the year, due to the lack of storage facilities for grains and pulses and to the lack of processing for fresh produce. For this reason, and to address their cash needs (e.g. health expenditures, school fees), most households, and the poorest particularly, are forced to sell their products soon after harvesting, which is when the market prices are lowest. Conversely, farmers run out of stocks in the season when the prices get higher and peak in the pre-harvest. It often happens that seasonality drives financial constraints that turn into economic deprivation.

According to a Hivos Baseline Survey (2018a), the majority of households in the Nakuru County reported growing maize; including several households in the urban areas (See Table 6). **Intercropping is practiced by about 50% of the households** with either of the following crops: beans, peas, bananas, cabbage, Irish potatoes or sweet potatoes. During expert interviews, it was explained that even where other crops were grown, some residents would sell other food items and buy maize. Therefore multiple cropping may not always result in greater dietary diversity and better nutrition outcomes.

**Table 6: Maize production among households**

Sub County	Number of households						Grand Total
	Rural			Urban			
	Intercropped		Total	Intercropped		Total	
	No	Yes		No	Yes		
Bahati	-	5	5	-	1	1	6
Gilgil	3	6	9	-	-	-	9
Kuresoi North	4		4	-	-	-	4
Kuresoi South	11	2	13	1	-	1	14
Molo	6	3	9	2	2	4	13
Naivasha	1	4	5	1	1	2	7
Nakuru Town West	1	-	1	2	-	2	3
Njoro	1	3	4	-	-	-	4
Rongai	9	7	16	-	-	-	16
Subukia	-	7	7	1	3	4	11
Grand Total	36	37	73	7	7	14	87
%	49.3	50.7		50	50		

Source: Hivos, 2018a

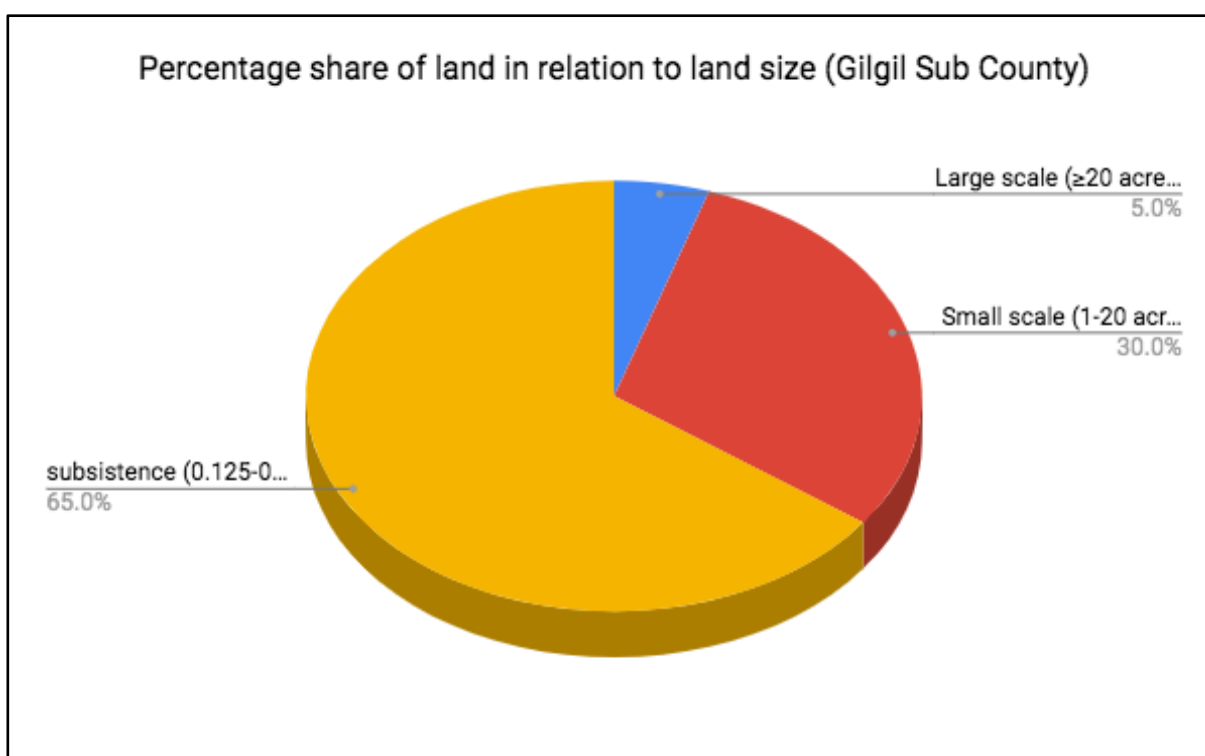
In the **marketing of crops**, **39% of households in Nakuru County has contractual agreements with buyers and maize was the most sold crop** (34,4%). Between 61-80% of Nakuru County's population is engaged in the maize VC (MoALF, 2016). Further, the maize produced in Nakuru County, as well as in the rest of Kenya, is sold to local households, traders, millers, large private companies (e.g. animal feed manufacturers) and public sector institutions.<sup>32</sup> The Government buys maize directly during the harvest season to keep stocks for periods of food shortages or to influence prices, particularly for electoral reasons (Kiriimi et al. 2011). One of the main reasons for the popularity of maize are exactly these decades-long governmental subsidies to the maize sector. These subsidies have taken various forms: subsidies to production to the lower of consumer prices by providing fertiliser or other inputs for free or below the market

<sup>32</sup> For a detailed overview of the maize value chain in Kenya, see: USAID, 2010.

price, subsidies by direct purchase by the state at prices above market rates, or even subsidies for maize import from other countries in times of shortage.<sup>33</sup>

**65% of farming in most sub-counties of the Nakuru County, like in the Gilgil sub-County, is classified as 'subsistence farming'**, capturing cultivation on parcels of land with subdivisions of between 0.125 - 0.5 acres. **Thirty percent is classified as small-scale**, capturing land falling between 1 - 20 acres while parcels of land that are above 20 acres fall under the large-scale farming category. Figure 6 shows the percentage share of agricultural land subdivision and percentage share of land in Gilgil sub-County. As mentioned in section 2.3, this categorisation as 'subsistence' is relevant to differentiate 'very small' and 'micro-scale' farmers from 'small' and 'large', and we refer to it as part of the official (sub) county classification. However, the picture emerging from our research is that very few farmers and households are truly 'subsistence producers', because the vast majority of them have varying degrees of interaction with the market.

**Figure 6: Classification of plot size in Gilgil sub-County**



Source: Wanjala, 2018

According to field research in Gilgil Sub-County by Borrelli and Benegiamo (2019) from UNIMIB, **smallholder farmers produce their agricultural products for two main reasons: self-consumption and commercialisation.**<sup>34</sup> The largest part of them produce more for self-consumption than for commercialisation. Many farmers own their land and rent land when they cultivate a second plot. The owners of the land are generally men: around 55% of owners are men and less than 30% are women. The smallholder agricultural system is based on a relatively diversified production: the most produced crops are maize, potatoes and beans and the most produced fruit is avocado.

<sup>33</sup> See: <https://medicalxpress.com/news/2017-10-kenya-short-term-wont-maize-crisis.html>.

<sup>34</sup> The size of the field of small-scale farmers differs among locations. In Kenya for instance, a small-size farm is maximum 1.20 ha in size, while it is 2.2 ha in Tanzania. See: Rapsomanikis, 2015: 3.

In the Naivasha Basin, there is a **prevalence of smallholder farmers who implement crop-livestock integrated systems with various degrees of self-consumption and commercial production**. The farms are characterised by multi-cropping systems and the markets are both formal and informal. Generally, these systems require low input, but they also generate low output. Due to the semi-arid climate, water scarcity, and the lack of irrigation facilities, agricultural **production is predominantly seasonal and limited**.

The **seed system in Kenya** involves different ways by which farmers can access seeds. Both formal and informal ways of accessing seeds are recognised. Under the formal system, various components of the seed chain (e.g. breeding, seed production, distribution) are managed by public or commercial actors, while informal seed production, selection and exchange depend on grass-root farmers' networks. Kenya is embracing an "Integrated Seed Sector Development" approach under an overarching national seed policy (Munyi and de Jong, 2015). Generally, farmers in southern Nakuru County face **difficulties in accessing quality seeds**, which constrains their production and trade possibilities. The current policy and legislative framework in Kenya does not allow flexibility or opportunities. It is forbidden to commercialise local seed that is not registered. However, sourcing seeds from licensed dealers can be expensive for smallholder farmers. Therefore, most farmers obtain their seed from informal sources through exchange or local seed trade (Munyi and de Jong, 2015). Nakuru County belongs to the so-called High Potential Maize Zone, where, according to Sheahan et al. (2013), maize farmers' application rates of inorganic fertiliser sometimes exceed rates that maximize profitability.

## Markets

The **Kenyan food market is expanding due to internal demand**, in particular, by expanding economic possibilities of urban middle class. Investments and development policies are leading to an intensified industrialisation and standardisation of productions on a domestic and regional level. The organised food retail industry answers primarily to the needs of urban class and foreigners (Western and Asian people). Traditional food markets play a crucial role in urban areas, as well as in rural areas, in supplying food for low and middle income classes (Corvo and Fontefrancesco 2018). However, generally indigenous vegetables play a limited role in the Kenyan market.<sup>35</sup>

Research by Corvo and Fontefrancesco (2018) in nineteen rural, peri-urban and urban markets in Naivasha, Nakuru, Gilgil and Molo found that the structure of markets is fragmented: **formal and informal markets co-exist**. Formal markets are regulated, including supermarkets as well as town/street markets. Informal markets include street vendors and informal exchange networks, based on gifts and opportunistic selling. Despite differences concerning commercial structure and forms of entrepreneurship involved, formal and informal markets offer similar products in terms of vegetables: the core part of them are commercial crops, such as tomatoes, onions, carrots. Indigenous crops have a marginal role in the markets, in particular in the smaller ones, due to their use as fresh vegetable and the scarce infrastructure in terms of refrigeration that dramatically reduce their shelf-life. Indigenous crops are, however, commonly cultivated in kitchen gardens being used for market purposes and household consumption. Therefore, indigenous vegetables are eaten at home and only their surplus is sold to street vendors and middlemen.<sup>36</sup>

**Market actors in Nakuru County face multiple challenges that hinder their activities and the wider goal of moving towards a sustainable food system.** The most persistent issues can be summarised as follows:

<sup>35</sup> See: [https://docs.google.com/presentation/d/1BWXXH7tB\\_CFIQmaMaT0EBB-jNx7b4d2JLHzif6yi4Q5c/edit#slide=id.p5](https://docs.google.com/presentation/d/1BWXXH7tB_CFIQmaMaT0EBB-jNx7b4d2JLHzif6yi4Q5c/edit#slide=id.p5).

<sup>36</sup> See: [https://docs.google.com/presentation/d/1BWXXH7tB\\_CFIQmaMaT0EBB-jNx7b4d2JLHzif6yi4Q5c/edit#slide=id.p11](https://docs.google.com/presentation/d/1BWXXH7tB_CFIQmaMaT0EBB-jNx7b4d2JLHzif6yi4Q5c/edit#slide=id.p11).

- Market information: there is a permanent lack of market information and farmers are in many cases unaware of market demand. Choice of crops for commercial production is largely influenced by Non-Governmental Organisation (NGO) initiatives, private companies or middlemen and lacks continuity once these actors leave.
- Finance: input costs are high and farmers and other entrepreneurs lack access to credit<sup>37</sup>.
- Infrastructure: the local road network is in need of maintenance, especially in the more remote areas. The County Government of Nakuru recently launched an ambitious “Boresha Barabara”<sup>38</sup> infrastructure development programme to enhance connectivity and market access by farmers.
- Value addition and storage: storage and preservation techniques are lacking, because they require costly investments (e.g. no solar drying in the rainy season) and middlemen benefit from that; produce is also seasonal; and, there is a lack of storage techniques with low energy input. VC actors lack knowledge on processing techniques and cultural habits prevent food preservation techniques, such as fermentation that could hold potential for extending shelf life of several farming products, for example: cabbage and indigenous vegetables.
- Contracts: even though contracts exist, there is a lot of side selling and contract breaching.
- Policy and regulation: policies on price fluctuation are lacking; farmers are not protected by regulation from the middlemen; there is a general lack of policy enforcement.<sup>39</sup>

### Gender disparity

Agriculture is a gendered activity, as shown by field research in Gilgil Sub-county by UNIMIB (Feb.-March 2018). **Fields are in many cases cultivated by women**, who often work alone on the family’s land (called ‘shamba’ in Swahili), but they are rarely the legal owner of the land. The work is often conducted alone while other household members, most notably the husband, have other job-occupations or are unemployed. Working alone is one of the causes of reduced agricultural performance. Despite agricultural activities being conducted by women, it is rarely a women’s business: **women are often excluded from product selling and from managing contracts with buyers**. Finally, extension advice is often provided to male farmers, who represent the main target of training activities, although the majority of the farmer population effectively working on the farms is composed of women. This often leads to missed information transmission between farmers and extension services (Borrelli and Benegiamo, 2019).

## 3.2. Environmental conditions

The different sub-areas of the southern Nakuru region, analysed by the SASS researchers have very different climate and ecological characteristics, which have an influence on the general food system and food security conditions in each location. In dry and lowland areas like Moi Ndabi, for instance, scarce rain and the nature of soils makes it very difficult to grow crops. Higher altitude areas, like to the North of Gilgil town have better water availability and richer soils, making production easier, especially of vegetables. This section summarises the main environmental features of the Nakuru food system.

### Local climate

The Nakuru County tends to have a dry season that lasts from December to March, and August to September, and is characterised by moderate rainfall and excess evaporation during most of the year. The two rainy seasons occur between April and July and between October and November (See Figure ).

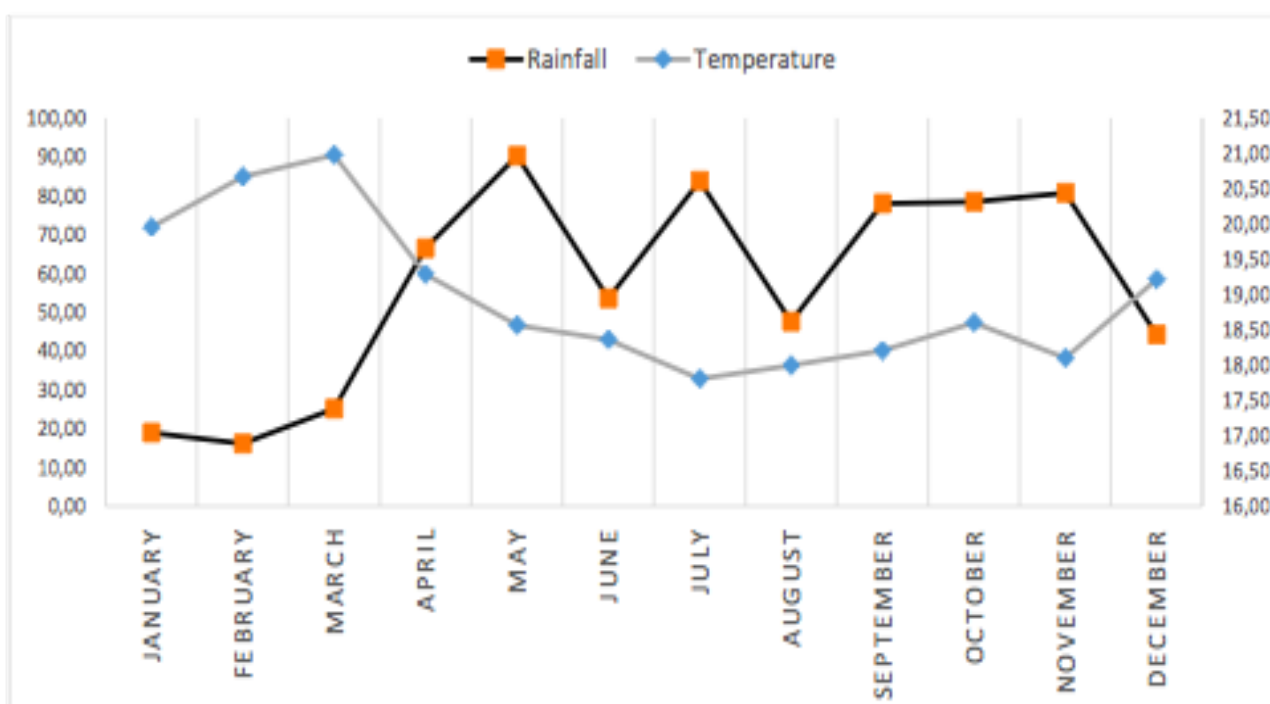
<sup>37</sup> Banks refuse to lend money to farmers at 13%, the maximum interest rate set by Government.

<sup>38</sup> See: <http://nakuru.go.ke/departments/> and <https://hivisasa.com/posts/kinyanjui-launches-sh35m-boresha-barabara-project>

<sup>39</sup> Information gained during the Multi-stakeholder Workshop on 8 July 2018, NBSI Headquarters, Naivasha.

**Unpredictable weather, exacerbated by the effects of climate change**, is historically the major constraint to farming and pasture within the area. According to residents of the Naivasha Basin, a shorter and more intense rainy season has occurred in recent years. This has increased soil erosion and landslide risks. Longer periods of drought have also been experienced recently, and they have a serious impact on rain-fed agriculture.<sup>40</sup>

**Figure 7: Average five-year rainfall and temperature in Nakuru County**



Source: Sassi and Zucchini, 2018

## Water use

**Lake Naivasha, in the Great Rift Valley, provides livelihoods, food and water to thousands on its shores and beyond.** The lake supports a tremendous biodiversity, but it is also supporting a powerful horticulture industry, a growing population of flower farm workers, geothermal energy production<sup>41</sup>, intense fishing and a runaway building boom. Clearly, as water availability is one of the key drivers for economic profitability, many stakeholders claim access to this shared resources: the water used by smallholders to irrigate their crops in the catchment north of the lake may be perceived as a direct opportunity cost to the commercial farmers on the shores of the lake that demand water for their flowers, and vice versa. The discharge of municipal waste water and irrigation return flow pose threats to the water quality in the lake. The direct use of lake riparian wetland areas for the cultivation of horticulture, cattle ranching and game during drought periods may be perceived as having detrimental consequences for the lake's ecological functioning as an important Ramsar wetland. The lake environment and water resources can therefore not be separated

<sup>40</sup> Information gained during the Multi-stakeholder Workshop on 8 July 2018, NBSI Headquarters, Naivasha. The explanation by various stakeholders are perceptions, rather than established scientific facts, but they all have a basis in reality.

<sup>41</sup> The Naivasha Basin is gradually becoming a key energy generation hub for the whole Kenya, with geothermal projects booming and infrastructure being planned to bring power/gas lines/conversion from mega-projects in Ethiopia and South Sudan into Kenya (as part of the LAPSET Corridor). This will also have an increasing impact on environmental sustainability, with farmers already lamenting that new geothermal energy production is causing acid rains, e.g. in the Eburru area.

from the local and national political economy, nor should the importance of water governance and institutional arrangements be ignored (WWF, 2012).

In the Lake Naivasha Basin, **rain shortages and rain unpredictability are common**. Anthropogenic impact interferes with the water cycle because of deforestation and land use change leading to catchment degradation. The ratio of water runoff to precipitation is increasing, because of a reduction in water infiltration within soils. Consequently, temperatures increase because of this decrease in evapotranspiration. In addition, water pollution is increasing, because of fertiliser and pesticides use and the increasing use of groundwater containing high amounts of sodium carbonate, fluoride and other salts.<sup>42</sup> As confirmed by field research in Gilgil Sub-county by Borrelli and Benegiamo (2019), smallholder farmers are strongly constrained by water scarcity and unreliable rainfall. A scarce rainy season can damage crop maturation and engender harvest failure. The upper groundwater is too deep and demands high investments to be reached. Though the sub-county is slowly developing water ponds and pans, the majority of smallholders practice rainfed agriculture (Borrelli and Benegiamo, 2019). Water management is indeed often named by local stakeholders as a key issue in the region: there is **a lack of coordinated river management** in the Naivasha Basin and unlicensed abstraction is common. A stronger role by the Water Resources Authority could alleviate this problem.

As mentioned above, **symptoms of climate change are evident in large portions of the Lake Naivasha Basin**. As reported by local farmers, highland temperatures are increasingly mild; this allows growing beans at higher altitudes than 2 decades ago, but at the same time it increases the spreading of agricultural pests. The occasional frost and temporary ice cover have disappeared from the mountain tops (Mau and Aberdare forests) and even the permanent glacier present on Mount Kenya itself (5,199 m a.s.l.) has virtually entirely vanished. While the majority of scientists as well as official Kenyan and International authorities believe that impacts such as these should be ascribed to changes in the composition of the atmosphere, in particular the rise in the concentration of CO<sub>2</sub>, monitoring conducted in the Lake Naivasha Basin underlines the connection between changes in temperature and deforestation. A recent concept, known as the Biotic Pump mechanism, provides a background theory by means of which deforestation, temperature changes and drought can be connected.<sup>43</sup>

There are **significant medium-term economic and social risks related to water use of Lake Naivasha** for the agricultural sector and for local residents in the Basin. These arise from the primary risk of deterioration of the lake's water quality, quantity and ecosystems, leading to secondary risks such as reputational loss, withdrawal of existing investments and loss of future investment potential. This has potential consequences that include loss of jobs, loss of foreign exchange earnings and (maybe as important) withdrawal of those investors in the basin that are considered forerunners with state-of-the-art environmental and social practices. It is therefore of utmost importance that the government, business and civil society stakeholders define an appropriate and constructive response to the threats at hand, based on a vision that provides for long-term attractive economic, social and environmental perspectives (WWF, 2012).

Lake Naivasha has been under intense scrutiny over concerns about how its environmental integrity can be maintained while still supporting a valuable and growing economy and society. Yet, **the degree to which there is currently an ecological concern is hotly debated**, as are interactions between lake and groundwater resources. The combination of water abstraction (leading to declining lake levels), water quality deterioration and riparian zone degradation pose a significant long-term risk to this internationally recognised Ramsar site. Land use change, often due to deforestation, and increasing abstraction to meet agriculture

<sup>42</sup> Information gained during the Multi-stakeholder Workshop on 8 June 2018, NBSI Headquarters, Naivasha.

<sup>43</sup> See: <http://www.naivasha.info/climate-change/>.



and urban demands has reduced the amount of water reaching the lake and recharging its underlying aquifers. The stresses from reductions in water availability have been compounded by concerns about water quality deterioration caused by increasing siltation, human waste discharge and agricultural runoff (WWF, 2012).

## Land use

Resident stakeholders in the Naivasha Basin include traditional pastoralists, smallholder farmers, dairy and beef farmers, and high-tech international commercial vegetable and cut flower farming operators (WWF, 2012). As with water, the **way that land is used by all these stakeholders is putting high pressure on natural resources**. There are six important reasons for this:

1. Lake Naivasha and the surrounding area is internationally renowned because of its biodiversity and natural beauty, which attracts thousands of local and international **tourists**;<sup>44</sup>
2. **High levels of population growth**, due to high birth rates and migration, and economic development cause land and water use competition. **Especially urbanisation causes problems**: urban centres have increasingly been created on fertile soil and the number of slums, detrimental to the environment, is also increasing. There has also been a strong expansion of urban centres that tend to follow major road networks. In addition, Nakuru county belongs to the High Potential Maize Zone, where farmers' application rates of inorganic fertiliser on maize sometimes exceed rates that maximize profitability (Sheahan et al. 2013, cited by Marson and Vaggi, 2019);<sup>45</sup>
3. **Export-oriented large-scale flower and vegetable farms around the lake**, besides using land and water that may otherwise be used for small-scale farming providing food to locals, support the settlement around the lake of a growing human population of unskilled and cheap laborers, who are food and economically insecure and may put further stress on Naivasha Basin's ecosystems;
4. **Local land cover in Naivasha and Gilgil sub-Counties has evolved over the past fifty years** (See Annexes, Figure 1 and Table 1). These changes in land use cover are a clear indication that land use change in both Sub-Counties is taking shape with the emergence of non-agricultural forms of land management.<sup>46</sup> They threaten the future of agriculture as a preferred form of land use (Wanjala, 2018). Further, the upper catchment of the basin which has historically consisted of indigenous forest and open woodland and savannahs has experienced significant changes in land use over the past 50 years as the forest has been converted into rainfed smallholdings. Trees are cut for charcoal purposes. This has had a direct impact on the water resources of the lake. This deforestation has had a marked effect on the hydrology of the basin as flows have become more extreme with intense flooding in the wet season and low volumes in the dry season. Rapid runoff has led to higher rates of siltation, while water quality concerns have been further compounded by poor farming methods in the upper catchment. Land management has severe repercussions for the soil: chemical fertilisers and pesticides use result in acidic soils and they are also labour-intensive to apply. Also, lack of terracing on hillsides and overgrazing by cattle and goats leads to catchment degradation, contributing in turn to poor water and soil quality (WWF, 2012)<sup>47</sup>. Lastly, the landscape is experiencing **rapid land subdivision and**

<sup>44</sup> The Lake Naivasha Basin accounts for a very small proportion of the total tourism industry in Kenya. There are approximately 4,000 accommodation beds in Lake Naivasha that cater across a range of markets from international political and business delegations to truck drivers carrying freight to Uganda. The total value of the tourism sector in the Naivasha Basin was estimated to be approximately KSh600 million a year in 2010, which is relatively small (less than 5%) compared with the horticulture industry (WWF, 2012: p. 12).

<sup>45</sup> Information gained during the Multi-stakeholder Workshop, June 2017, NBSI Headquarters, Naivasha.

<sup>46</sup> Viwandani, Lake View, Biashara, Hell's Gate and Gilgil Wards will continually experience growth in non-agricultural forms of land use. Whereas Maiella, Elementaita, Eburru and Morendat Wards will likely still provide lands for agricultural use, though they still face continued rise in population growth and density which would result in land subdivision (Wanjala, 2018).

<sup>47</sup> Information was also collected during the Multi-stakeholder Workshop on 8 July 2018, NBSI Headquarters, Naivasha.

**fragmentation and linked to this: degradation.** Continued subdivision has degraded much of the agricultural land thus resulting in diminishing yield output and impacting on agricultural productivity in smallholder farms. Both Naivasha and Gilgil Sub-Counties are experiencing an increase in the share of land parcels that are below one hectare. This trend is taking shape across most regions of the country (Kebaso, 2015).<sup>48</sup> Soils around Naivasha and parts of Gilgil Sub-Counties consist of ancient volcanic ash, have low water retention capacity and are easily eroded. As a result, some farmers (e.g. in Hell's Gate Ward) often experience crop failure.

5. **Land-use issues are closely related to population growth in rural areas, access to farmland, and its consequences for farming.** It is also **projected to evolve as population density increases.** In Kenya, only 0.4% of its underutilised non-forested land resources are potentially suitable for agricultural development (Jayne et al. 2014).<sup>49</sup> The majority of Africa's smallholder farms are below 1.5 ha in size and in Kenya's high-density rural areas they have reached 1.2 ha (Jayne and Muyanga, 2012). The average size of farms has been steadily decreasing in the country since independence, as a consequence of demographic growth, to the extent that in much of the customary rural areas, such as the Central Highlands, crowding has become commonplace. Decreasing plot sizes have been documented by government statistics and by academic research. Some 40% of Kenya's rural population resides on 5% of its arable land, and over half of Kenya's rural population lives in areas exceeding 250 persons per square kilometre, a situation common to neighbouring East African countries and to Nigeria. In Kenya's case, cultivated land per person in agriculture has declined from 0.462 ha in the 1960s to 0.219 ha in the 2000–08 period. In 1977, the average farm size was comprised between 2.10 and 3.48 ha, by 2010 it had decreased to 1.86 (Jayne and Muyanga, 2012). Jayne et al. (2012) estimated that in Kenya, an increase in population density by 100 persons per km<sup>2</sup> is associated with 9% smaller farm sizes. A similar increase in population density reduces area cropped per adult equivalent by about 8%.
6. **Poor land governance at both household and government level** has disenfranchised parts of the population on engaging in agriculture as an economic activity. Land ownership is not only male dominated but also hugely confined in ages of over 40 year old people, whereas the weak governance of physical planning and coordinated land use and urban growth threatens the agricultural development and growth. The poor land governance has also resulted in land hoarding, with speculative inflation of land prices. Planned economic investments by the government has stirred speculative purchase and sale of land within the Naivasha Basin, resulting in continued sharp rise in land prices. High land prices/value will progressively render local food production unprofitable, because of competition with other sectors (Wanjala, 2018).

### Other bottlenecks to environmental sustainability

**Decreasing plot sizes, due to population growth and other factors, bear consequences also on the environmental sustainability of farming practices.** Farmers are pushed to increase productivity by reducing fallows and using more fertiliser to restore soil fertility.<sup>50</sup> Maize tends to be abandoned in high density areas to the advantage of more profitable crops (vegetables); some of these destined for export (e.g. snow peas, French beans). The decrease in plot sizes is limited by the minimum size that is needed to

<sup>48</sup> See:

[http://erepository.uonbi.ac.ke/bitstream/handle/11295/101619/Kebaso\\_Effects%20of%20Land%20Subdivisions%20to%20Food%20Security%20Case%20Study%20Kaputiei%20North-%20Kajiado%20County.pdf?](http://erepository.uonbi.ac.ke/bitstream/handle/11295/101619/Kebaso_Effects%20of%20Land%20Subdivisions%20to%20Food%20Security%20Case%20Study%20Kaputiei%20North-%20Kajiado%20County.pdf?)

<sup>49</sup> Several authors, as well as institutions such as the FAO, support the idea that African farmland is still underdeveloped and in need of a new technological revolution that would boost its hidden agricultural potential. This could be argued at continental scale, but it is not true for Kenya.

<sup>50</sup> Based on data on agro-ecological potential of farmland, Binswanger and Pingali (1988) attempted to calculate an agroclimatic population density based on the potential kilocalories that can be produced by farming. When this calculation is done, Nigeria and Kenya appear to be more crowded than Bangladesh is today.



maintain a family on a plot of land<sup>51</sup>. For this reason, Jayne et al. (2012) warn that the rate of population outflow towards cities is likely to rise sharply in the near future in those regions, such as the portion of Nakuru County that belongs to the high rainfall Central Highlands region, where plot size is rapidly declining until farming goes below subsistence levels. Diminishing plot size is associated with diseconomies of scale in input acquisition, reducing the demand per ha of farming inputs and technology for farming intensification.

**Soil degradation, because of overexploitation, may reduce soil fertility** to the extent that soils become acidic and unresponsive to fertilisers or to the planting of improved crop varieties (Tittonell et al. 2007).

**Smaller plot size also increases vulnerability to drought, abnormal seasons and climate change impact.** When the harvest season is past, crowded farming areas tend to behave as urban areas, by becoming very soon food deficient and in need of food imports. Beyond a minimum size, land value starts diminishing. As a general rule, net farm income per ha increases with population density, however in Kenya this relationship has been observed levelling off and starting to decrease above 680 people per km<sup>2</sup>. Crowded areas tend to produce a high outflow of labour towards urban suburbs. Land prices rise while labour value tends to decrease.

**Lack of knowledge about environmentally sustainable farming further exacerbates environmental problems:** farmers lack awareness about adequate use of manure, various types of composting, organic farming practices, proper use of pesticides, fertilisers and water, and soil conservation. Short-term thinking also creates problems. Furthermore, the choice of maize as the main crop is dominant and many farmers have scarce knowledge of local varieties of possible alternative crops. There is a general loss of indigenous knowledge around sustainable natural resources management. Despite some capacity building for farmers on environmental sustainability is conducted by other farmers and extension officers, the rate of adoption of improved practices is very low. There are important reasons for that: farmers prefer quick and easy solutions (e.g. apply chemical fertiliser, broad range pesticides) instead of lengthy processes (e.g. applying organic fertiliser/composting manure and plant residues or introducing natural enemies of pests into their plots and providing them refuge through buffer zones). Some farmers also assert that it is more profitable to sell organic manure and in turn buy chemical fertiliser, then apply it. It is important to stress that the rhetoric and initiatives for improving environmental sustainability have been increasing in the Naivasha Basin area since the 1990s, with many cases of awareness campaigns for using organic fertiliser, agroforestry. But this was not enough to significantly address the problem of widespread environmental stress in southern Nakuru County.

Importantly, these **bottlenecks to environmental sustainability are also linked to limiting other types of improvements in the food system;** through not only the worsening 'water abstraction' as explained above, but also the use of chemical fertiliser that may have consequences on **health**. For instance, recent projects in the northern part of the Nakuru County have found a significant relation between using organic fertiliser and the nutrient content of the indigenous vegetables cultivated there.<sup>52</sup> Negative impact on soil fertility and the quality of food in the medium to long term can be exacerbated by a limited or absent utilisation of organic fertilisers.

The **SASS agronomic research** (by UNICATT) is still ongoing in twelve fields in the Naivasha Basin, analysing options to make farming systems more environmentally sustainable from various points of view. The farms selected for this research include different types of farm management systems, with parameters such as: no tillage versus tillage; incorporation of post-harvest plant residues back into the same field;

<sup>51</sup> Beyond a minimum size, threshold effects pile up, as land becomes too fragmented to be profitably farmed to produce a surplus or to be developed for other uses; it may become too small to be offered as asset for obtaining loans.

<sup>52</sup> Analysis conducted by MACE Foods in 2017 found that Zinc and Magnesium in indigenous vegetables increased with amount of organic manure applied (correlation = 0.81). Manipulating fertilisers application is therefore also important for nutritional outcomes (MACE Foods, 2018)

homemade plant protection mixtures versus synthetic ones; compost, manure and fertiliser use; rotation and intercropping; water source (irrigation using groundwater, river water or rainfed agriculture). Physicochemical conditions and microbial communities developed under such different farm management practices, and the choice of plants cultivated on the sampled fields (only maize, legumes, or indigenous vegetables; or their intercropping) will lead to consequences in terms of soil health, biodiversity and the ability of sustainable agricultural practices to reduce the net amount of greenhouse gas emissions from soils. **Preliminary results from the soil analysis show clear differences between farms:** total organic carbon levels for instance were found to be higher in the fields where practices such as no-till, recycled on farm soil amendments and soil cover were applied.

### 3.3. The consumption and nutrition dimensions

#### Food (in)security, consumption and livelihood issues

It is extremely important to **tackle malnutrition, including undernutrition, because it has repercussions through the life cycle and across generations.**<sup>53</sup> Young children, adolescent girls, pregnant and lactating women are especially vulnerable to nutrient deficiencies because they have increased nutrient requirements and children have less control over their choice of diet. The "first 1000 days", from conception through a child's first two years of life, are the most crucial period for influencing long-term nutritional and health outcomes. There is thus a strong need to focus on the prevention of malnutrition in early life that is further stressed by the concept of the foetal origins of adult disease in which early exposures have profound impacts on adult health outcomes. Especially in sub-Saharan Africa, where nutrition levels are low, there should be **a special focus on the nutrition of women and their substantial role in providing for their children's subsistence**, either through food production or off-farm income-generating activities. In sub-Saharan Africa, the majority of households depend on maize-based diets and other starchy staples, mainly cereals. This supplies more than 70% of the energy intake of rural households but with a low consumption of meat, vegetables and fruit, thus providing insufficient key micronutrient intake (Cena, 2018).

**Kenya is considered a food insecure country with high prevalence of malnutrition:** 8.8 million Kenyans were believed to be undernourished between 2014 and 2016, especially children as well as pregnant and lactating mothers.<sup>54</sup> On average, Kenyans consume vegetables relatively frequently, but often not the species that provide most of the required nutrients. For instance, widely consumed cabbage is nutritionally poor when compared with indigenous vegetables like African spider plant (*Gynandropsis gynandra*) that is rich in vitamins A and C.<sup>55</sup> Overweight citizens stand at 0.6 million, while the obese are 1.4 million, caused by the increased dominance of high carbohydrate foods. The main food crops include cereals (maize, wheat, sorghum, millet, and rice), grain legumes (dry beans, pigeon peas, green grams, lablab), root and tuber crops (potatoes, sweet potatoes, cassava, yams and arrow roots), vegetables (cabbage, carrots, leafy vegetables, such as kale, spinach as well as indigenous vegetables) and fruits (mangoes, guavas, bananas). Maize is the main staple of the Kenyan diet, as discussed in more detail above.<sup>56</sup>

<sup>53</sup> The WHO defines "malnutrition" as follows: "Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. The term malnutrition addresses 3 broad groups of conditions: undernutrition, which includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age); micronutrient-related malnutrition, which includes micronutrient deficiencies (a lack of important vitamins and minerals) or micronutrient excess; and overweight, obesity and diet-related noncommunicable diseases (such as heart disease, stroke, diabetes and some cancers)" (WHO, 2018, See: <http://www.who.int/topics/malnutrition/en/>).

<sup>54</sup> This can result in nutrient-deficiency diseases such as night blindness, scurvy and rickets are common in rural areas and slums.

<sup>55</sup> See: [https://www.biodiversityinternational.org/fileadmin/biodiversity/publications/Web\\_version/500/ch10.htm#TopOfPage](https://www.biodiversityinternational.org/fileadmin/biodiversity/publications/Web_version/500/ch10.htm#TopOfPage).

<sup>56</sup> Maize accounts for about 65% of total staple food caloric intake and 36% of total food caloric intake.

According to SASS research in seven locations in southern Nakuru County by Sassi and Zucchini in February 2018, **more than one quarter of the population was ‘moderately’ and ‘severely’ food insecure** (as measured by the food consumption score), with 9% of them severely food insecure. **Seasonality** of the main crops however significantly affects food security levels, with the percentage of ‘severely’ food insecure population moving towards zero during the harvest season (around May-June and October-November). Illustrating the local food security situation in February therefore is particularly useful as part of the preliminary results of the SASS food system analysis presented in this report, since this part of the year represents the “worst case scenario” but also the most recurrent situation during the year, with around one quarter of the population food insecure for about eight months of the year.

The Kenyan government does not consider the Nakuru County one of the food insecure counties to be supported as priority, given the much worse situation in other counties (especially the ‘arid and semi-arid lands’ in the north) that leads to the worrying average figure of one third of the Kenyans being severely food insecure (according to the Global Hunger Index 2018). Yet, according to the Resakss e-atlas for the period 2014-2015, the Nakuru County was rated ‘worse than average’ in Kenya on matters such as **access efficiency** (i.e. “the relative performance in converting food production to food acquisition”).<sup>57</sup> These findings are also confirmed by a Baseline Survey, recently conducted by Hivos (2018a) that concluded that there is low dietary diversity and low consumption of protein-rich foods in Nakuru County, especially insufficient protein intake, including due to low consumption of animal source food (also associated with high levels of stunting among children below five years). Most households reported consuming food from most of the food groups, but few households consumed fish and meat. In many cases, the low nutritional levels are caused by limited nutritional knowledge. Further, there was **minimum variation in food consumption patterns between rural and urban households and between male and female households** (Hivos, 2018a).

Income differences determine different levels of food insecurity. The households survey conducted by SASS confirms this, together with the fact that a higher quality diet, hence nutritional outcomes, is positively correlated with income levels, hence food expenditure and nutrition are also correlated with **income inequality**. Employment in floriculture for instance helps integrating the household's income and is thus positively correlated in general with improving food security. On the other hand, however, such employment is not sufficient, with aggregate food insecurity found to be higher in the Naivasha basin clusters with higher presence of floriculture. The same survey finds that households with higher share of self-consumption, who tend to be those living in remote areas without employment opportunities such as in **floriculture**, are in a better food security situation than households who rely more on the market to acquire their food, like those who live and work in the floriculture areas.<sup>58</sup>

More broadly, according to the household members surveyed by SASS researchers, **various factors can explain their food security situation**, through impacts on food availability, economic and physical access to food and food utilisation, as shown in Table 5.

<sup>57</sup> See: <http://eatlas.resakss.org/Kenya/en/>.

<sup>58</sup> These findings will be confirmed, with more detailed information, when the food security SASS research by UNIPV economists will be published in peer-reviewed journals, with a full year of monthly data collection for this household survey.

**Table 5: Causes for the lack of food security (in February 2018)**

Food Availability	Economic access to food
- Drought and lack of rain	- High food prices
- Poor and lack of land	- Low income
- Human and wild animal conflicts	- Lack of jobs, unemployment or laziness
- Lack of inputs and their poor quality	- Household composition
- Lack of capital and Knowledge	<b>Physical access to food</b>
- Poor farming techniques, methods and strategies	- Far away markets
- Poor infrastructure especially roads	<b>Utilisation</b>
- Poor market access, transportation and relationship with brokers	- Diet composition
	- Health and House environment

Source: Sassi and Zucchini, 2018

Finally, vulnerability of households to food insecurity is fuelled by a lack of food, but also by the exposure to **food price variability**, as depicted in Table 6.

**Table 6 - Average price variability per crop in seven clusters (in February 2018)**

Cluster	Maize	Rice	Sweet potatoes	Cabbages	Tomatoes	Kales	Cluster efficiency
Kiburuti	0.35	0.15	0.72	0.61	0.28	0.46	0.43
Leleshwa	0.25	0.2	0.60	0.53	0.19	0.46	0.37
Ngano-Ini	0.25	0.12	0.60	0.56	0.23	0.33	0.35
Gathengera	0.31	0.11	0.33	0.48	0.21	0.42	0.31
Lower Nyamathi	0.28	0.13	1.15	0.44	0.28	0.57	0.48
Tumaini	0.22	0.14	0.49	0.67	0.12	0.49	0.36
Kanjogu	0.16	0.12	1.25	0.69	0.23	0.52	0.50
Crop efficiency	0.26	0.14	0.73	0.57	0.22	0.46	

Source: Authors' elaboration. Note: values are the coefficient of variation of the average price for each crop.

Source: Sassi and Zucchini, 2018

### 3.4. The value chain of indigenous vegetables

#### Production, distribution, consumption and nutritional value

While maize is central in farming and livelihood systems in Nakuru County, it is increasingly being integrated into a diversified intercropping system as a strategy for dealing with the challenges of increased rainfall variability and drought, and according to some stakeholders this trend is increasing.<sup>59</sup> Field research by Borrelli and Benegiamo (Nov. 2017 - Feb. 2018) shows that there is a diversification of production in Gilgil Sub-County: in recent years, smallholder farmers have been producing staple crops, such as maize together with vegetables and often also indigenous vegetables. The same research group also found that in the food system in Gilgil Sub-County, the **majority of smallholder farmers produce small quantities of indigenous vegetables**, such as *amaranthus (terere)*, *black nightshade (managu)*, *cowpea (kunde)* and *spider plant (saget)*; mostly only twice a year during the rainy seasons and mostly for self-consumption.<sup>60</sup> In recent years, smallholder farmers have also started to sell them at markets. **Informants produce at least one of the indigenous vegetables, the most common ones being African nightshade (managu) and amaranthus (terere)**. They are mostly used for self-consumption and a smaller share is sold to middlemen at the farmgate. Large-scale growers in Nakuru County, producing for export do not hold a

<sup>59</sup> There exists also a considerable varietal diversification within maize itself (Brooks et al. 2009).

<sup>60</sup> According to an agricultural officer in Gilgil, e.g., only 15 acres are dedicated to the intensive cultivation of indigenous vegetables around Gilgil town.

strong interest in indigenous vegetables, because there is no demand for them from overseas markets (Borrelli and Benegiamo, 2019).

Table 7 shows the percentage of households consuming **indigenous vegetables in the seven clusters** (Sassi and Zucchini, 2018). This is low as the survey was conducted in February 2018 during the dry season (upcoming research by the same SASS researchers will reflect seasonality better by comparing different months). Interestingly, the households in Ngano-Ini, the most rural area, show the most diversified consumption of traditional species.

**Table 7: Percentage of households consuming indigenous vegetables in seven clusters in Nakuru (in February 2018)**

Crop	Kiburuti	Leleshwa	Ngano-Ini	Gathengera	Lower Nyamathi	Tumaini	Kanjogu	Total
Amaranth	4.26	5.26	3.26	1.89	2.82	10.00	3.52	4.13
Black night shade	7.09	7.02	11.96	1.89	1.41	12.00	7.04	7.10
Kunde	0.71	5.26	1.09	-	-	12.00	-	1.82

Source: Sassi and Zucchini, 2018

In the central markets of Naivasha, Gilgil and Nakuru towns, women often sell indigenous vegetables, picked from the surrounding fields during the rainy season, or coming from other parts of Kenya during the remaining part of the year. Also in the street **markets** around in the Nakuru County, there is a **consistent but limited presence of indigenous vegetables** (Corvo and Fontefrancesco, 2018)<sup>61</sup>. Part of the increased presence of indigenous vegetables is due to the efforts by Bioversity International that has been promoting traditional leafy vegetables' production and consumption since the mid-1990s, as illustrated in Box 2.

### Box 2: Promoting traditional leafy vegetables and related benefits

In the early 1990s, scientists in Kenya noticed that traditional African leafy vegetables were rapidly disappearing from farmers' fields and people's tables. Between 1996 and 2004, work was undertaken by Bioversity International to collect, characterise and analyse their nutritional values before identifying priority species, enhancing genetic material, and improving horticultural practices, marketing and processing. **About 12 additional African leafy vegetable species were introduced into the formal market in Kenya. Seeds were made available and over 450 farmers were trained in good practices for growing African leafy vegetables.** As a result, the area under African leafy vegetable cultivation increased by 69%. An impact assessment study in 2007 showed that nearly two-thirds of households growing African leafy vegetables had increased their income, with women being the main beneficiaries. In almost 80% of the households surveyed, it was women who kept the income from sales of the leafy greens. The percentage of farmers planting at least one species of African leafy vegetables increased by almost 23%, while nearly half of the households surveyed had increased their direct consumption of leafy vegetables. Today, farmers and local groups are continuing to spread knowledge of how to grow leafy vegetables and share seeds. The impact of this long-term programme is evident on farms, on tables and in markets, where production and use of African leafy vegetables has increased.

Source: van Etten et al. 2018

<sup>61</sup> The increasing demand seems to be the result, at least partly, of a successful program for indigenous vegetables' awareness carried out by Bioversity International and the Kenyan Government during the last 20 years. In nineteen markets surveyed in and around Naivasha, Nakuru and Gilgil towns, IV included managu (*Solanum nigrum*), terere (*Amaranthus* sp.), thabai (*Urtica massaica*), kunde (*Vigna unguiculata*), wimbi (*Eleusine coracana*) and muhia (*Sorghum bicolor*).

When looking at consumption, diversifying diets with traditional African food is a sustainable way to provide a range of nutrients able to fight macro/micronutrient malnutrition protecting long term health, in poor rural households and urban ones. This is because indigenous vegetables could be a reliable and alternative source of micronutrients or amino acids and complex proteins. For instance, *nightshade* (*Solanum* spp.) is high in iron, *amaranthus* is high in calcium. *Lablab* and *cowpea* contain high levels of amino acids and proteins (Cena, 2018). However, when encouraging the use of indigenous vegetables, it is important to consider two aspects: first, the presence of nutritional elements is additionally affected by food processing. For example, thermal processing of leafy vegetables could reduce the level of ascorbic acid, but it enhances the bioavailability of vitamin A. Second, for many leafy indigenous vegetables, the post-harvest loss of micronutrients can be high. There is a need to find suitable food processing/food storage techniques to preserve their high nutritional value.

From the economic sustainability point of view, it is important to note that some of the indigenous vegetables studied by SASS offer a **double production and market opportunity**: farmers can use both the grains and the leaves, e.g. with *amaranthus*, pigeon pea, and *cowpea*. Farmers can enjoy as cheap sources of quality protein the leaves as a vegetable as well as grain (or seeds) from the same plant. This dual purpose can be transformed into a double production to be sold on the market, which is an important incentive to increase production of indigenous vegetables, in addition to other benefits such as nitrogen fixation and soil organic matter improvement.

Overall, the **VC of indigenous vegetables in Nakuru County faces important challenges**, including the lack of water and the lack of access to seeds. *Amaranthus*, *black nightshade* and *cowpea* in particular need **irrigation** and therefore most smallholder farmers only produce them during the two rainy seasons. Although the Kenya Seed Company has selected and registered seeds for the main indigenous vegetables, it is not easy to find such seeds at the local agrovet shops. This is because the demand for indigenous vegetables is considered unreliable and insufficient to make a viable business for seed companies (Borrelli and Benegiamo, 2019). In addition, the **VC of indigenous vegetables is largely informal, with a high number of unregistered actors and so-called spot markets with no formal contracts or tax collection**.<sup>62</sup> Because of this high level of informality, there are widespread information asymmetries on spot markets. Furthermore, VCs can be relatively long in terms of distance, but compared to other VCs, the number of actors and chain nodes is limited due to the perishability of the product. In addition, there is a strong price volatility over time (this volatility depends on the seasons but it can also depend on the hours of the day) and variability across markets (Marson and Vaggi, 2019).

If such challenges could be overcome, the overall economic growth trends both in Nairobi and in the Nakuru County provide an opportunity for nutritious food value chains like indigenous vegetables that are increasingly demanded by affluent citizens in medium and large towns. Southern Nakuru smallholder farmers could **provide indigenous vegetables to profitable markets of Nairobi and Nakuru county towns at much larger scale**, as illustrated in Box 1 above.

A summary of the “strengths, weaknesses, opportunities and threats” (**SWOT**) for indigenous vegetables value chains is presented in Table 2 in the Annexes. This table can also be useful to help stakeholders identify and prioritize interventions to promote these vegetables, as part of the efforts to improve the

<sup>62</sup> Spot markets refer to straightforward transactions. This means that there is a buyer and a seller and the seller makes delivery of the commodity promptly, when the transaction is settled. This differs from a transaction in which the buyer and seller agree to exchange the commodity at some point in the future, often supported by contracts (Marson and Vaggi, 2019).

economic, social and environmental sustainability of the southern Nakuru County food system, including **given the worrying prospects of future maize production** in Eastern Africa due to climate change<sup>63</sup>.

### Ethnic diets and indigenous vegetables

According to research by Corvo and Fontefrancesco (2018), **low income migrant communities are often food and nutritionally insecure and could hardly afford indigenous vegetables**. Their diet is based on a few staples, i.e. maize ugali, cabbage, sukuma wiki and potato. The narrative of indigenous vegetables as being beneficial to health is widely shared across all ethnic groups and classes and it seems to have been encouraged by the health care system. However, migrants' dietary diversity has decreased since they migrated, often because they have to pay for their food as opposed to grow and harvest foods from their family farms.

**Despite homogenisation of their diets, migrants also integrate new foods in their diet as a result of moving to the southern Nakuru County:**<sup>64</sup> they learn about edible new resources and how to process them thanks to their proximity with other ethnic cultures (e.g. Kisii people teach other tribes about Spider plant and how adding milk makes it less bitter; Luo and Luhya teaching other tribes' fellow workers how to cook and appreciate fish, Luhya teaching others how to catch and eat termites).<sup>65</sup> Also, **migrants informally bring food back from their counties of origin to the Lake Naivasha Basin** (to sell, for home consumption and to share with neighbours). This seems to be a coping mechanism to counterbalance the scarce availability and the high cost of traditional foods in the markets. It has therefore contributed to household dietary diversity. These foods include a large variety of vegetable products (e.g. Bambara groundnuts) as well as animal products. Some of these ethnic-specific foods end up being cultivated locally, contributing, albeit modestly, to diverse food systems and agrobiodiversity.

Furthermore, the diversity of species and dishes making up the Nakuru County food system is hardly represented in local formal markets, where there is a majority of exotic species and commodified staples. In markets, there seems to be a **consistent high presence of indigenous vegetables and demand is high**. One of the main reasons is probably a successful programme to promote vegetables, carried out by Bioversity International and the Kenyan Government in the course of the early 1990s.<sup>66</sup> As a consequence of this programme, the narrative that vegetables are beneficial to health has been widely shared across ethnic groups and different social classes.

Kimiywe et al. (2008) did research on the utilisation of indigenous leafy vegetables in urban and peri-urban Nairobi and they found that there was a significant difference in the type and the level of consumption of indigenous vegetables between households with members **originating from different tribes** and households whose members originated from the same tribe (See Table 8).

<sup>63</sup> Different studies show that in coming decades maize yield losses due to climate change in eastern and southern Africa could be serious, becoming dramatic towards the end of the 21st century, e.g. (Jairos Rurinda et al, 2015)

<sup>64</sup> This is true not only for indigenous vegetables, but also in many cases for vegetables that they had never seen before, grown for export to Europe: cucumber, broccoli, courgettes, cauliflower, leeks and lettuce.

<sup>65</sup> Traditional knowledge is circulated among neighbours, food and recipes are exchanged, modified, and adapted, cultural values negotiated. This sharing and circulation has increased household dietary diversity for low income communities - with limited purchasing power, and it has strengthened cultural identity and wellbeing, fostering cultural integration, while countering the ongoing homogenization of local food systems due to displacement of local varieties by exotic high yielding (and high inputs) varieties (Corvo and Fontefrancesco, 2018).

<sup>66</sup> See:  
<https://www.bioversityinternational.org/e-library/publications/detail/the-impact-of-bioversity-internationals-african-leafy-vegetables-programme-in-kenya-1/>.



**Table 8: Consumption of indigenous leafy vegetables by ethnicity**

Indigenous vegetables	Embu (0.9%)	Meru (2.3%)	Kamba (11.3%)	Kikuyu (42.5%)	Kisii (4.6%)	Luo (13.3%)	Luyha (17.6%)	*Others (3.4%)	**X2 Sign.gn
<i>Crotalaria</i> sp./'mitoo'				0.4		1.3	2.0		0.01
Amaranth	0.3	0.6	1.9	9.4	0.5	2.5	2.7		
Cowpea leaves	0.4	0.5	3.7	7.7	1.4	5.6	10.0	0.3	0.02
Spider plant ('saget')					1.9	3.7	2.9	0.3	0.01
Pumpkin leaves			1.4	3.7		0.3	0.9		
Night shade	0.6	1.9	1.4	10.0	3.7	2.9	3.4	0.6	
Jute ('mrenda')					0.9	3.9	3.7		0.03

Note: Only consumption by more than one respondent (0.1%) indicated.

Figures in parenthesis represent percentages of respondent's ethnic group.

\*\* Chi-square tests. Significance at  $p < 0.05$

Source: Kimiywe et al. 2008, p. 29

### 3.5. Sustainability performance of the Nakuru County food system

As explained in section 2.1, we present a brief analysis of the performance of the food system in southern Nakuru, with respect to four 'sustainable development objectives': economic, social and environmental sustainability, as well as food quality, availability and access. What emerges from the 'food systems approach' and the multidisciplinary research applied by the SASS programme, is that these four dimensions are strictly interrelated. They will be presented separately, drawing on the key messages from section 3, so to explain important individual sustainability dimensions; but they will also be clearly linked so to offer a perspective on the whole food system, with its drivers, constraints, outcomes and feedback loops.

#### Economic sustainability

- **Agriculture in the Nakuru County constitutes 75% of the local economy**, and its contribution is very important for the national economy, with 20% of total Irish potato produced in Kenya, 24% of wheat and 20% of total Kenya vegetable exports. Nakuru County contributes about 5.5% of Kenya's maize production, which takes the largest share of cropland under cultivation in this county (43%; one of the main reasons for the popularity of maize is the decades-long governmental subsidy to the maize sector). Approximately 65% of farming in this county is very small-scale, about 30% is small and medium scale, and 5% large scale.
- **Growth in other sectors risks to have a negative impact** on the longer-term economic sustainability of the food and agriculture sector in southern Nakuru County. This is specifically linked to the features of southern Nakuru County's economy and its role in the national economy. On the one hand, **tourism and real estate** are developing faster due to booming population in Nairobi and improving roads (and soon a railway connection), with the Naivasha Basin becoming trendy for affluent citizens who are buying land/properties to spend their weekends outside the city (and soon to possibly live in the Naivasha Basin and commute to work in Nairobi). This is causing land prices to become so high that it is difficult for small- and medium-sized farmers to make agricultural investment profitable, either because they have an incentive to sell their land, or it is too expensive to buy land. On the other hand, the **flower and horticultural export farms** (i.e the 5%, large-scale, part of the sector) are a major contributor to the local (and national) economy, employing approximately 50,000 people directly and

indirectly (thus offering often a temporary integration of incomes, including for some smallholders off the harvesting seasons, hence a coping mechanisms against food insecurity), but they also pose long term threats to its sustainability. A number of factors have led to the establishment and growth of the flower and horticulture export industry, including the availability of and easy access to freshwater resources for irrigation, the possibility of large-scale commercial production, the soils and climate conducive for horticultural production and the relative proximity to Jomo Kenyatta International Airport. The cultivation of flowers and export horticulture competes with local food production not only due to the process of conversion of land, but also due to the access to water; indeed this prevailing agribusiness model seems to lead to decreasing quality and quantity of land and lake's water and more broadly to a deterioration of local ecosystems.

- The production structure of the rest of the sector (the micro-, small- and medium-sized farms) is **very concentrated on a few dominant crops, including maize** (e.g. in Gilgil Sub-County, 86% of crop-land is dedicated to maize, potato and beans). Also in this case, there is a pattern of increasing homogenisation of production due to the growing national demand for a few staple crops (the Kenyan food market is expanding indeed due to internal demand, in particular, by expanding economic possibilities of urban middle classes). This is an incentive that has consequences in further limiting diversification in the production, distribution and consumption of food also in the medium and small part of the sector, leading in turn to higher economic risks and environmental threats (farmers' dependence on one or few crops and deterioration of their key economic asset, land, via decreasing soil health and productivity).
- **Indigenous vegetables** are in most instances produced, traded and consumed in small quantities, and mostly during the rainy season, when compared to staple crops such as maize. The typical challenges of smallholder agriculture also apply to these vegetables, both for self-consumption and for marketing, e.g. households cannot store food to consume it the whole year round. Opportunities exist however: to expand production of indigenous vegetables to serve the Nairobi and other urban markets where demand is increasing (exploiting the same conditions just mentioned that led to the success of the horticulture for export), for agribusiness development and processing (e.g. drying and fermentation).
- The analysis of rural communities in the Nakuru County reveals a **grassroot economic structure that differs from the one that is often assumed in development policies**. Even very small-scale agriculture is not a separated sphere of exchange and production. It develops accordingly with the needs of food markets and farmers; women are willing participants of this monetised form of economy. However, the participation is not driven by a mere desire for accumulation either, rather it should be seen as a necessary piece of a more complex system of activities aimed at sustaining the household, which need financial resources to be granted. Agricultural products are sold to achieve a first source of financial income and complement eventual others, such as remittances. The research shows that this form of market participation is mostly passive and linked to a fragmented knowledge of the market, its rules and articulations.
- The **market structure for food is indeed characterised by a high degree of fragmentation**. The large majority of farmers, including those cultivating less than 1 acre, interact with markets by selling small quantities of surplus to local middlemen. They are just the first level of an articulated series of exchanges and economic intermediaries that link producers to local middlemen, rural wholesalers, urban wholesales, local traders, supermarkets, shop owners and street sellers and informal sellers. In these different steps of a product along such fragmented markets, a single piece of good can happen to move many hundred miles back and forth before reaching the final consumer, with large part of the fresh produce going to waste.

In summary, these preliminary research results show that **the performance of the Nakuru County Food System is poor in terms of medium to long term economic sustainability**. In the short term, jobs and incomes are being created in the county thanks to economic growth and to the possibility for many farmers to access (urban) markets (albeit with difficulty, given fragmentation of markets). There are significant medium-term economic risks for the agricultural sector and for the local residents in the Naivasha Basin. These arise from the inability of this system to allow the vast majority of smallholders to adequately invest to improve production and productivity, thus remaining financially vulnerable (with seasonality driving their financial constraints and often turning into economic deprivation during the dry seasons). Moreover, the deterioration of natural resources, meaning land and water quality and quantity and more broadly local ecosystems, lead to risks such as reputational loss, withdrawal of existing investments and loss of future investment potential. In turn, a lack of inclusive growth causes both social and political tensions. It also severely limits the quality of human capital and its purchasing power. All this has potential medium to long term consequences that include loss of jobs and incomes, loss of foreign exchange earnings and possibly the withdrawal of those few investors in the Basin that are considered forerunners with state-of-the-art environmental and social practices. This shows that poor economic sustainability is closely linked to poor social and environmental sustainability of the local food system.

### Social sustainability

- Economic **development in Nakuru county is far from inclusive**: while Nakuru city was recently named second richest in Kenya after Nairobi, and booming real estate and commercial vegetable and export flower sectors are providing jobs in this county, the majority of smallholders remains locked into risk-prone, low-output farming systems, with little support from advisory and financial services for the necessary transformation towards a more entrepreneurial agriculture. This is also reflected in our finding that the level of income inequality in the Lake Naivasha Basin is much higher than at the national level.
- The **population is growing fast, driven mainly by youth immigrants** from other parts of Kenya attracted by employment opportunities in the export-oriented floriculture and horticulture sector. At the same time, rural out-migration among the youth is increasing and the majority of them is not interested in farming. The youth that have entrepreneurial interests in agricultural production are hampered by a lack of knowledge on agricultural production (and value addition) techniques and a lack of capital.
- Interestingly, the increasing multi-ethnicity of southern Nakuru County as a consequence of migration from other counties also leads to the relative 'shrinking' of food markets, in the sense that foods that are acceptable to all ethnicities end up on the market as a safer bet for producers, traders and sellers. On the other hand, despite this **overall homogenisation of diets** through markets, migrants also integrate new foods in their consumption habits as a result of moving to southern Nakuru: the informal exchanges of traditional foods, including **indigenous vegetables**, and traditional knowledge (e.g. recipes) among neighbours from different ethnicities help foster, to some extent, household-level food and nutrition security and community resilience.
- These demographic trends and the growth of high-class holiday homes for rich Nairobi elites encourage the conversion of agricultural land into real estate land for tourism, property development and the creation of new settlements. Consequently **land prices** around Lake Naivasha are peaking, especially in the town's outskirts and near the main communication roads. In addition, the high cost of living (food, rent, health care) in southern Nakuru County's urban and peri-urban areas affects the labourers' food security and ability to pay their children's school fees, who often have to drop out, let alone their capacity to put money aside to invest.

In summary, these preliminary research results show that **the current performance of the Nakuru Food System is poor in terms of social sustainability**. The exclusion of a significant part of the population from

economic growth and inadequate remuneration of human resources in the various parts of the food system, symptoms of scarce economic sustainability in the medium term, coupled with little diversity and quality in food production and consumption as well as increasing deterioration of and competition for the limited natural resources, all constitute a serious threat to the health, social cohesion, wellbeing and traditional values of citizens.

### Environmental sustainability

- Southern Nakuru County, including the area around Lake Naivasha, is characterised by a very diverse climate and **different ecosystems features** that have an important influence on the overall food system and food security conditions in each location. Historically, unpredictable weather is the major constraint to the agricultural and pastureland productivity of the area.
- **The environment is under severe stress**, with deforestation and land clearance for construction, increasing urbanisation, decreasing soil quality, competition for land and water (e.g. among traditional pastoralists, smallholder farmers and high-tech international commercial vegetable and cut flower farming operations), and so forth, strictly related to economic and population growth, and to the widespread use of farming practices, crop choices and agrochemicals inputs that are environmentally unsustainable.
- These problems, which comprise **biodiversity loss including of indigenous vegetables** (that tend to help environmental sustainability via low requirement of natural resources and chemical inputs), can be worsened by climate change, through droughts and more intense weather variability. This strongly influencing economic sustainability as well, since water availability is also one of the key drivers for economic profitability.
- Poor environmental sustainability is indeed related to economic and social trends. Decreasing plot size due to population growth tends to be associated with soil overexploitation such as **excessive use of fertiliser**, as well as with vulnerability to drought, abnormal seasons and climate change impact. And the 'system bias' in favour of maize creates an adverse incentive structure encouraging farmers to grow maize on marginal lands, when drought resistant crops might have been more suitable, thereby further depleting natural resources and compromising food security.
- These problems are particularly serious for the Lake Naivasha Basin, internationally renowned because of its biodiversity and natural beauty, and attracting thousands of local and international tourists. While rain shortages and rain unpredictability are common, anthropogenic impact seriously and **increasingly interferes with the water cycle** due to deforestation and land use leading to catchment degradation, lowering water quality and availability, raising ambient temperature, thus threatening both the agriculture and tourism industries.

In summary, our preliminary assessment is that, at an aggregate level, the performance of the Nakuru Food System is **poor in terms of environmental sustainability, also due to the current social and economic developments**. The environmental status is vulnerable, worsened by climate change, and water and land degradation, biodiversity loss, etc. are likely to reach a scale that exceeds the absorption capacity of the ecosystems. If unchanged, this may severely reduce the health, productive potential and attraction of the Lake Naivasha Basin's ecosystem.

## Food quality, availability and access

- **Food insecurity in Nakuru County is high**, especially due to inadequate nutritional values. While average caloric intake is less inadequate compared to other counties in Kenya, food insecurity worsens during the dry seasons, and is further fuelled by poorly diversified diets, mostly consisting of maize and kale, limited nutritional knowledge, exposure to food price variability and fragmented markets. The degree of food insecurity varies in different areas and sub-counties, but our research shows that on average around one quarter of the population in southern Nakuru County is food insecure for the eight dry months of the year; with 9% of them severely food insecure (this number however moves towards zero during the harvest season, around May-June and October-November).
- Food production in Nakuru County is mainly segmented in two: small scale own production (mostly staples) from own small farms; large scale production by commercial farms destined for export out of the county or out of the country (mainly Irish potato, wheat, horticulture for exports). Despite the former, including the frequent sale of small quantities of surplus production to (largely informal) markets, seems to be the main source of food for the majority of the population in the county (thus considered to be almost food self-sufficient by some observers), the Nakuru County is rated **worse than average in terms of food access efficiency**, due to several problems such as inadequate storage facilities, fragmented markets and considerable postharvest losses.
- Own food production in Nakuru County is mainly concentrated on staples with high preference by smallholder farmers to produce maize, but at the same time, intercropping maize with other crops such as kale, beans, peas or potatoes, is often practiced. **Poor dietary diversity and low consumption of protein rich foods** (associated with high levels of stunting among children below five years) remain a key problem for the vast majority of the population, given the continuing preference for maize-based diet and the correlation between dietary diversity and income levels. Indeed, it was found that even where other crops were grown, many small farmers would sell other food items and buy maize; hence, multiple cropping may not always result in greater dietary diversity and better nutrition.
- The **knowledge of indigenous vegetables as beneficial to health** seems widely shared across ethnic groups and social classes and this narrative seems to have been strengthened by the health care system, which has led to an increasing demand (especially among the urban middle classes). However, indigenous vegetables, being fresh produce in low supply, are generally more expensive than staples like maize (and kale) sold on the market. Hence, they are more difficult to afford for the majority of people. Indigenous vegetables as processed products (dried or fermented leaves) are very rare on the market, due to uncertain demand. Yet, when processed properly, they could be available all-year-round (unlike in their fresh form, when they are only sold twice a year during the rainy seasons) with clear benefits in terms of nutrition outcomes.

In summary, these preliminary research results show that the **performance of the Nakuru Food System is currently poor in terms of food quality, availability and access** for the local population, and this is also clearly related to the poor performance of this system in terms of economic, social and environmental sustainability (according to the factors outlined in this section).

## Food system outcomes

In conclusion, the **economic social and environmental outcomes of the Nakuru food system are currently poorly sustainable**. The production, distribution and consumption of food, originating both within and outside the area and destined for the county and beyond, taken as a system, do not sustainably generate adequate quantity and quality of food for the large majority of the local population. Many bottlenecks, including crop specialisation, poor storage facilities, food price variability, lack of attention to diversity in food production and consumption, lack of integration of local smallholders into high VCs, low productivity of

smallholder farmers, aggravated by unpredictable weather conditions, natural resource constraints as well as challenging delivery to urban markets, conspire to create high levels of vulnerability to food insecurity for a significant proportion of citizens in Nakuru County. Significantly, our research results also show that the **weaknesses in terms of the three types of sustainability reinforce one another**, making economic, social and environmental threats interconnected and eventually jeopardising the sustainability of the food system.

This weak environmental, social and economic sustainability performance of the local food system is not only due to its 'hard' sub-system, i.e. the processes transforming inputs into outputs and producing tangible outcomes in terms of food availability, access, utilisation, but is also **related to its 'soft' sub-system**. The practices of, and interactions between, relevant social actors, networks and institutions -starting with the overall 'political economy of southern Nakuru' (i.e. the role and the features of the Naivasha Basin's economy in the national economy)- consciously or unconsciously influence, if not regulate, the way the 'hard' local food system operates. And to these governance issues we now turn our attention.

## 4. Governance dimensions of the Nakuru County food system: mapping policies and actors

The food system approach envisages to capture the complexity of the food system and how the hard and soft subsystems interact with one another. It also reveals the non-linear nature of many cause-effect pathways (van Berkum et al. 2018) and the role of "governance" i.e. the political economy, political and institutional arrangements between various actors of the food system. This section analyses these dimensions, by mapping policies and institutional frameworks in section 4.1, and then by identifying main food system actors in section 4.2.

### 4.1. Policy and institutional frameworks

Before discussing the various sectoral policies that are relevant to the food system, it is important to understand that Kenya has undergone a recent significant political transition: with the adoption of the **New Constitution in 2010, Kenya implemented devolved governance**<sup>67</sup>. The national government remains responsible for overall coordination and policy formulation but increased responsibilities are delegated to the 47 County Governments – elected in March 2013. The Constitution devolves responsibility for key agriculture sub-sectors, including crop and animal husbandry, plant and animal disease control and fisheries, to these sub-national levels. The Ministry of Devolution and Planning has authority for national planning and coordination.

<sup>67</sup> Under the former constitution, Kenya was divided into 8 provinces, which were further subdivided into 46 districts (excluding Nairobi) and then 262 divisions. Divisions were in turn subdivided into 2,427 locations and then 6,612 sub-locations. With the enforcement of the new constitution, provinces have been abolished and Kenya provided for devolution of political and administrative authority to 47 semi-autonomous counties. Counties are smaller than the former provinces and mostly coincide with the administrative district boundaries up to 1992 under the former Constitution. Counties are then subdivided into sub-counties that generally coincide with the electoral constituencies created under article 89 of the Constitution of Kenya (2010). Sub-counties are further divided into divisions, and then locations, which generally coincide with Civil Wards, and sub-locations. Gilgil sub-County borders Naivasha sub-County and consists of five wards: Mbaruk/Eburu, Elementaita, Gilgil, Morendat and Malewa West (Benegiamo, fieldwork results).



Devolution promoted valuable opportunities for the implementation of policies and action plans for agricultural development at local level. At the same time, this political transition occurred rather abruptly, leaving little time for the county governments to adequately prepare in terms of human and technical capacities, creating conflicting mandates between the two levels of government, that lack an effective intergovernmental coordination mechanism, and thus partially compromising the capacities of county governments to deliver on their mandates. It has also created problems for the delivery of knowledge and timely information to farmers, because of further downscaling of the funding, devoted to agricultural extension services.<sup>68</sup> Examining and building the **capacity of county governments** will thus be fundamental to better understand and seize the opportunities offered by the devolution mechanism (FAO, 2015; World Bank and CIAT, 2015).

## Development policies

**Kenya Vision 2030** was launched in 2008 as the new long-term development blueprint for the country, aimed at transforming Kenya into a *“newly industrialising, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by 2030”* (Government of Kenya, n.d.). In the Vision, agriculture is identified as one of the key sectors of the economic pillar in achieving the envisaged annual economic growth rate of 10%, thus contributing to hunger and poverty reduction. Under this framework, smallholder agriculture should be transformed from a semi-subsistence activity, characterised by low levels of productivity and value addition, into *“an innovative, commercially-oriented, internationally competitive and modern agricultural sector”* (FAO, 2015: 2). Vision 2030 is being implemented in 5-year rolling Medium Term Plans (MTPs). Furthermore, the **Kenyan President recently launched the ‘Big Four’ agenda** for the period 2018-2022: one of the big four areas of focus is ‘Food Security and Nutrition/Agriculture’.<sup>69</sup> Initiatives are aimed both at enhancing large scale production and at increasing smallholder productivity, as well as increasing food affordability.<sup>70</sup>

Kenya also adheres to two important regional development frameworks. The **Sustainability Strategy for Regional Development Authorities (2010)** aims to promote integrated economic development through sectoral VCs, spatial concentration of infrastructure facilities and better connections between these facilities. It also aims to enhance productivity and skills as well as firm competitiveness and expansion of export markets and diversification of export products (Kingdom of the Netherlands, 2017). Kenya subscribed to the **Treaty of the East African Community (EAC)**, in which Chapter 18 lays down the rules for regional cooperation on agriculture and food security (Articles 105-110). This type of cooperation will require all Partner States to work towards a scheme for the rationalisation of agricultural production with a view to promoting complementarity. Efforts should be put to work towards the creation of a common agricultural policy, food sufficiency within the EAC, post-harvest preservation, and so forth. All members should cooperate in the areas of seeds, livestock, plant and animal diseases control, water management and food security (EAC, 2007). Furthermore, on a more global level, Kenya is aiming to contribute to the achievement of the **SDGs** and the objectives of **African Union (AU) Agenda 2063**. Both agendas are in the process of being mainstreamed in the third MTP (2018- 2022) and the second generation of County Integrated Development Plans (CIDPs).

<sup>68</sup> According to Chief Agricultural Officer of Gilgil sub-County, the scaling-down of extension services has had negative consequences. Since 2013, the number of extension staff has decreased. Moreover, there is lack of budget to cover transport costs. As a result, there is no possibility to assist and follow up individual farmers, but only groups of farmers or farmers targeted by development projects are reached. Moreover, even farmers can be required to cover transport costs. Unfortunately, this has become a general trend of public extension services in Kenya (Marson and Vaggi, 2019).

<sup>69</sup> The other impact areas are manufacturing, universal health coverage and affordable housing. See: <http://www.president.go.ke>.

<sup>70</sup> See here: <http://www.president.go.ke/food-security-and-nutrition/>



## Agriculture-related policies

In 2010, Kenya committed to the implementation of the **AU Comprehensive African Agricultural Development Programme (CAADP)**.<sup>71</sup> This implies ambitious targets like 6% annual growth in agricultural GDP, and an allocation of at least 10% of public expenditures to the agricultural sector. Kenya only committed for 8% of public expenditure for agriculture (Government of Kenya, 2010). The **Agricultural Sector Development Strategy (ASDS) 2010-2020**, the main tool for the implementation of CAADP and Kenya's overall national strategy document for the agricultural sector ministries and other stakeholders, set a target for the annual growth of agricultural GDP of 7% (Government of Kenya, 2009). Kenya's current annual growth in agricultural GDP stands at 4.8% – just below the country target (World Bank and CIAT, 2015; AfroNet, 2017).

The paradigm shift from (semi-)subsistence to market-oriented agriculture envisioned in Kenya Vision 2030 is at the basis of the ASDS, which is the overall national strategy document for agricultural sector ministries and other stakeholders in Kenya. The **ASDS focuses on five strategic areas**: (1) reforming agricultural sector institutions; (2) increasing productivity of crops and livestock through provision of inputs and services to farmers; (3) promoting sustainable land and natural resources management; (4) promoting private sector participation in agriculture; (5) increasing market access through value addition. Further, the **ASDS is operationalised through Medium-Term Investment Plans** (FAO, 2015). The ASDS aims to achieve an agricultural growth rate of 7% per year between 2013 and 2017. In addition, the ASDS recognises the need to transform smallholder agriculture from low-productivity semi-subsistence activities to innovative agribusiness enterprises; research on drought-tolerant crop varieties as well as organic farming are considered instrumental in achieving this target (World Bank, CIAT, 2015).

**By signing the CAADP, Kenya committed to identifying priority VCs to orient the investments.** However, the 2010 Medium-Term Investment Plan failed to select specific VCs (Government of Kenya 2010a). The CAADP country review report pointed to the need for supplementary analysis to define priority commodities in each of the rainfall zones (high rainfall zone, semi-arid zone, arid zone).<sup>72</sup> The ASDS has identified priority VCs in each county, in line with the decentralisation initiative. Each county identified three or four VCs; the livestock related and fish VCs account for 60% of the prioritised VCs. In total, Kenyan counties selected 143 different VCs, so that the intention of prioritisation has weakened effective results, leading to poor coordination and a high degree of fragmentation among counties.

Other key policies and legislations in the agricultural domain include the National Agricultural Sector Extension Policy (2012), the National Agricultural Research System Policy (2008), the National Horticulture Policy (2012), the National Agribusiness Strategy (2012), and the Kenya Youth Agribusiness Strategy (2017-2021).<sup>73</sup>

**The seed industry in Kenya is guided by the National Seed Policy and associated laws.** The National Seed Policy aims at developing, promoting and regulating a modern and competitive seed industry. The principal law that guides the Kenyan seed industry is the Seeds and Plant Varieties Act (Cap 326) of 2016. This law comprehensively addresses all legislative issues relating to seeds and plant varieties and seeks harmonisation with other related acts and international agreements where Kenya is a signatory. Some recent

<sup>71</sup> CAADP is the African Union (AU) policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity for all. It emphasizes land water management, capacity building, food security and research and technology dissemination/ adoption, livestock, forestry and fisheries. See: <https://au.int/en/caadp>.

<sup>72</sup> See: <http://www.resakss.org/node/5619>.

<sup>73</sup> See Annexes, Box 1 for a detailed overview of the objectives of the respective policies and strategies in the agricultural sector.

amendments of the Act and of its implementing regulations have been undertaken to authorise specified seed certification activities on behalf of the regulator, provide for governance of forestry seeds and other species including domestication of wild plants, and establish a Plant Genetic Resources Centre (Access to Seeds Foundation, 2018). **The importance of seed diversity is laid down in various policies and legislation**, including Article 11 of the Constitution of Kenya (2010) that provides for “protection of indigenous seeds and plant varieties, [...]”, the National Seed Policy (2010), the Seed and Plant Varieties Act (2013), the Crops Act 2013, and the Plant Protection Act (Hivos, 2018b).<sup>74</sup>

Munyi and de Jonge (2018) explain that **the description of seed systems in the 2010 National Seed Policy follows the formal/informal dichotomy**. The informal seed system is defined as *“farm-saved seed, seeds purchased, multiplied or marketed locally between farmers and seed accessed through civil society organisations, or imported by unregistered seed dealers and relief agencies”*. This system is identified as a problem for the quality of seeds and seed certification is presented as the main tool affecting quality control. Therefore, the policy envisages targeting of the informal seed systems through *“provision of advisory services with a view to transform it to the formal sector”* (Government of Kenya 2010a), to make farmers appreciate the benefits of using good quality seed. The 2012 Seed and Plant Variety Act Amendment of the 1972 Seed and Plant Variety Act aims at upgrading the plant breeders’ rights system in Kenya from it being based on the 1978 Act of the International Convention for the Protection of New Varieties of Plants (UPOV) to being framed under the stricter 1991 Act of UPOV (UPOV 1991). Plant breeders’ rights are now largely based on UPOV 1991 principles with the expectation that this will stimulate local breeding as well as the introduction of foreign varieties into the country, and that ultimately this will bring more varieties to the market. Plant breeders’ rights are the main tool to encourage plant breeding by granting them exclusive rights on the commercialisation of their varieties. This is expected to provide incentives to public and private breeding and facilitate the introduction of foreign-bred varieties, supporting farmers access to a wider range of improved varieties. However, **the UPOV system is exclusively aimed at supporting formal seed systems and ignores the informal systems**. Furthermore, UPOV 1991 is likely to affect the informal sector as it does not allow for the exchange of farm-saved seed of protected varieties through the sales of seed surpluses on the local market (De Jonge, 2014, cited by Marson and Vaggi, 2019).

Lastly, the subsidy system in Kenya is governed by the National Cereals and Produce Board that purchases maize above the market rate. It is expected to subsidise farmers, who then transfer part of the benefit to consumers. Farmers are supposed to deliver their maize at the National Cereals and Produce Board, but since collection points are in centralised locations that can be remote for farmers, most farmers sell to traders who in turn, sell to the board.<sup>75</sup> A farmer who wants to make use of the subsidy needs a document, issued by the sub-county that certifies that he/she is a farmer, allowed to sell to the Board and who can qualify for its subsidy. However, traders, like most people in the country, are also farmers and getting a certificate is by no means an obstacle. This makes it possible that traders sell at subsidised rates even maize imported from abroad, thus indirectly subsidising imports. The World Bank (2018) has criticised the current Kenyan policy of maize purchase, stating that **price support to maize farmers is regressive as it benefits large and medium sized farmers and small farmers who are located close to the storage depots**. Moreover, the artificially high maize prices, induced by the producer subsidy, serve as a tax on consumers, including to poor households, many of whom are net buyers of maize — the main staple food. Further, the higher price of maize creates an adverse incentive structure encouraging farmers to grow maize on marginal lands, when drought resistant crops might have been more suitable, thereby depleting natural resources and compromising food security. Given these adverse environmental and social-economic consequences, and

<sup>74</sup> See Annexes, Box 2 for an overview of the content and objectives of these seed policies and laws.

<sup>75</sup> See the regional map: <http://www.ncpb.co.ke/index.php/about-us/region-map>. Interview by Marta Marson with Head of Agriculture Office, Gilgil Sub-county, September 2018.

its exorbitant fiscal cost, the World Bank concludes that there remains significant scope for reform. Specifically, the re-allocation of public spending from supporting producer subsidies to investing in high return public goods (research and development, advisory or extension services, rural infrastructure — roads and irrigation etc.) to boost agricultural productivity (World Bank, 2018).

There is also an **input subsidy programme that works through the sale by the same board (National Cereals and Produce Board) of subsidised inorganic fertiliser to farmers**. It is expected to subsidise farmers, who then transfer part of the benefit to consumers. Input subsidy programmes remain one of the most contentiously debated development issues in sub-Saharan Africa. Phased out during the 1980s and 1990s, they resurged since the early 2000s. By 2010, at least 10 African governments initiated a new wave of subsidy programmes that were designed to overcome past performance challenges. Jayne et al. (2018) have assessed the performance of these second generation input subsidy programmes, in terms of total fertiliser use, food production, commercial input distribution systems, food prices, wages, and poverty. They found that input subsidy programmes can quickly raise national food production, and that receiving subsidised inputs raises beneficiary households' grain yields and production levels at least in the short-term. However, the overall production and welfare effects of subsidy programmes tend to be smaller than expected, due to crowding out of commercial fertiliser demand and lower than expected crop yield response to fertiliser on smallholder-managed fields (Jayne et al. 2018). The **present input subsidy programme represents a step back, when compared with the previous subsidy programme**. From 2007 to 2010, the National Accelerated Agricultural Inputs Access Programme (NAAIAP) provided targeted input subsidy for inorganic fertiliser and improved seed in Kenya Based on nationwide survey data, the effects of NAAIAP participation on Kenyan smallholders' maize production and poverty severity were found to be sizeable, despite some crowding out of commercial fertiliser demand. NAAIAP's success in targeting resource poor farmers and its implementation through vouchers redeemable at private agro-dealer shops likely contributed to its success. (Mason et al. 2015; 2017) The input subsidy programme however in Kenya also led to more maize-centric production systems (Jayne et al. 2018). The NAAIAP, as a centralised programme, was phased out with the devolution process (see further). Other examples of smart subsidies from Africa are the **Zambian Food Security Pack Program**. First, it is not regressive, because it is not based on land. Second, participating farmers are trained in conservation farming techniques and are required to adopt them. Last, it includes inputs other than maize seeds and fertiliser (rice, sorghum, millet, legumes, sweet potato, cassava depending on the agro-ecological areas and considering diversification and diet needs) (Goyal and Nash 2017). Therefore, input subsidy programmes should allow vouchers to be used for crops other than maize and even for other crop inputs and farm equipment to put farmers in the driver's seat and promote diversification. (Jayne et al. 2018).

## Environment-related policies

Kenya's **National Land Policy (2007)** aims to guide the country towards efficient, sustainable and equitable use of land for prosperity and posterity. Key issues the policy addresses are constitutional, land tenure, land use management, land administration, and land issues requiring special intervention. The Land Act (NCLR, 2012) mandates the National Land Commission to reorient the use of land as a productive asset, rather than a prestige title. This could increase access to land through renting for productive purposes and innovations.<sup>76</sup>

The **Climate Change Act 2016** highlights climate change response measures and actions, the roles of each of the stakeholders in adapting to the impact of climate change and how to engage the public.<sup>77</sup> The **Kenya Climate Smart Agriculture Strategy (KCSAS, 2017-2026)** has four specific objectives: (i) enhance adaptive capacity and resilience of farmers, pastoralists and fisher-folk to the adverse impacts of climate change; (ii)

<sup>76</sup> See also: <http://www.focusonland.com/countries/kenya/kenyas-national-land-policy-and-land-reform/>.

<sup>77</sup> See: <https://sustainabledevelopment.un.org/memberstates/kenya>.

develop mechanisms that minimise greenhouse gas emissions from agricultural production systems; (iii) create an enabling regulatory and institutional framework; and (iv) address cross-cutting issues that adversely impact climate-smart agriculture (CSA). The coordination framework and implementation mechanism for KCSAS is harmonised with the intergovernmental coordination structure. For example, the Government will especially involve women and youth to raise awareness and strengthen their capacity to undertake CSA activities.<sup>78</sup> The KCSAS is accompanied by the Kenya Climate Smart Agriculture Implementation Framework for the period 2018-2027 that provides concrete options to implement the KCSAS. It offers concrete practices for CSA in sectors such as crop production, livestock or fisheries.<sup>79</sup> Lastly, the Government actively seeks to reduce vulnerability to droughts and risk of emergencies in 23 arid and semi-arid regions by 2022 through sustainable development as opposed to repeatedly reacting to the effects of droughts. This is articulated in the **Common Programme Framework for Ending Drought Emergencies**.

### Nutrition-related policies

The **Kenyan Constitution 2010** pays attention to the importance of diverse and nutritious diets, as art. 43.1b states that every Kenyan has the right to “*be free from hunger, and to have adequate food of acceptable quality*”. Art. 53.c reinforces this right indicating that every child has the right to “*basic nutrition, shelter and health care*” (Sassi and Zucchini, 2018). The government also has a well-articulated **multi-sectoral Food and Nutrition Security Policy (Government of Kenya, 2011)**<sup>80</sup>, a **National Food and Nutrition Security Policy Implementation Framework (2017-2022)**,<sup>81</sup> and a **National Nutrition Action Plan (2012-2017)**<sup>82</sup>. These policy frameworks and decisions have **increasingly emphasised the importance of traditional food species from a nutritional perspective**, e.g. the Food and Nutrition Security Policy states that the use of traditional high value crops should increase by 10% by 2020 as one of the solutions to food insecurity, poverty-based food insecurity and transitory food insecurity caused by emergencies.

Further, the government has enacted laws for **mandatory fortification of cereal flours and vegetable oils** as well as a commitment to the **protection and promotion of appropriate infant feeding practices** through passing of the mother milk substitutes regulation and control bill (2012). The semi-autonomous nature of counties however means that national government policies and plans cannot be directly enforced. Arid and semi-arid counties are reportedly more engaged in the National Nutrition Action Plan although their engagement reportedly varies as nutrition competes with other county level priorities.

The creation of a multi-sectoral Food Security and Nutrition Secretariat to ensure broad based, cross-sectoral coordination and monitoring of nutrition initiatives was envisaged as a key structure in the Food and Nutrition Security Policy. This has however not been established to-date.<sup>83</sup> The **Nutrition Interagency Coordinating Committee** which is chaired by the Head of the Nutrition and Dietetics Unit in the Ministry of Health oversees progress with the implementation of the National Nutrition Action Plan. Thus nutrition specific actions are well coordinated. However, there is no coordination mechanism for nutrition-sensitive actions. The Nutrition and Dietetics Unit does not have convening power over other line ministries and their attendance at the Nutrition Interagency Coordinating Committee meetings is voluntary. In recognition of the need for much greater inter-ministerial engagement in nutrition, the Ministry of Health recently wrote to nine

<sup>78</sup> See: <https://www.adaptation-undp.org/resources/plans-and-policies-relevance-naps-least-developed-countries-ldcs/kenya-climate-smart>.

<sup>79</sup> See: [http://www.ke.undp.org/content/kenya/en/home/library/environment\\_energy/Climate-smart-Agriculture-Framework.html](http://www.ke.undp.org/content/kenya/en/home/library/environment_energy/Climate-smart-Agriculture-Framework.html).

<sup>80</sup> See: <https://europa.eu/capacity4dev/hunger-foodsecurity-nutrition/document/national-food-and-nutrition-security-policy-kenya>.

<sup>81</sup> See: <http://extwprlegs1.fao.org/docs/pdf/ken170761.pdf>.

<sup>82</sup> See: <https://scalingupnutrition.org/wp-content/uploads/2013/10/Kenya-National-Nutrition-Action-Plan-2012-2017-final.pdf>.

<sup>83</sup> See: <https://www.enonline.net/nex/7/kenya>.

nutrition - relevant ministries to request that they nominate a Nutrition Focal point in order to help generate a stronger discourse concerning nutrition- sensitive approaches. Furthermore, nutrition is given serious attention in other policies and frameworks, such as the **Common Programme Framework for Ending Drought Emergencies** that has the potential to operationalise comprehensive approaches to addressing undernutrition that combine nutrition-sensitive and nutrition-specific interventions.

The **Scaling Up Nutrition networks in Kenya** under the leadership of the Scaling Up Nutrition focal point seek to obtain political commitment and accountability for addressing malnutrition and raising the profile of nutrition by emphasising its role in ensuring overall health and well-being. A recent development is that the Nutrition and Dietetics Unit, with the support of the main development partners, successfully secured the agreement of the First Lady to act as Nutrition Patron in Kenya.

The **Kenyan public health and food safety control system is multi-sectoral in approach** and is embodied in various statutes implemented by various Government ministries/departments and regulatory agencies. There are more than twenty legislations for food safety and quality under the various Acts of parliament, implemented by the different agencies.<sup>84</sup> The main policy is the **National Food Safety Policy** that aims to establish and maintain a rational, integrated farm-to-fork food safety system and ensure the protection of public safety and food trade in a manner consistent with the World Trade Organization's sanitary and phytosanitary measures, and other international requirements.<sup>85</sup>

Kenya has issued a number of **policies and programmes to promote nutrition and health through education**, including the National School Health Strategy Implementation Plan (2011-2015), the School Nutrition and Meals Plan, the National Strategy on Infant and Young Child feeding (2007-2010), the Kenya National Guidelines on Healthy Diets and Physical Activity, and so forth.<sup>86</sup>

## Market-related policies

### Food Prices Regulations

Kenya has the **Price Control Act (2010)** that gives the Government the authority to determine the price of essential commodities such as maize.<sup>87</sup> However, this policy has been considered inefficient and some economists are skeptical about price controls as they distort the allocation of resources. Price ceilings, which prevent prices from exceeding a certain maximum, cause shortages. On the other hand, price floors, which prohibit prices below a certain minimum, can cause surpluses.<sup>88</sup>

### Trade and investment policies

Kenya's Ministry of Industry, Trade and Cooperatives has developed a **National Trade Policy (2017)**, titled "Transforming Kenya into a Competitive Export-Led and Efficient Domestic Economy". This Policy was created against the background of governance changes since the new constitution (2010) and particularly the devolution process, with a special emphasis on using trade to eradicate poverty, through connecting micro, small and medium enterprises to global trade.<sup>89</sup> Chapter 4 on "Micro and Small Enterprise Trade" is

<sup>84</sup> See Annexes, Table 3 for a list of Kenya's main public health and food safety regulations.

<sup>85</sup> See: [http://www.fao.org/fileadmin/user\\_upload/agms/news\\_events/Pre\\_CCAFRICA\\_KenyaEN.pdf](http://www.fao.org/fileadmin/user_upload/agms/news_events/Pre_CCAFRICA_KenyaEN.pdf).

<sup>86</sup> See Hivos, 2018b (p. 21-22) for a full list of all policies, plans, legislation and strategies related to sustainable diets.

<sup>87</sup> See:

<http://kenyalaw.org/lex/rest/db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/P/Price%20Control%20Essential%20Goods%20Act%20No.%2026%20of%202011/docs/PriceControlEssentialGoodsAct26of2011.pdf>.

<sup>88</sup> See: <https://www.standardmedia.co.ke/article/2001299241/is-kenya-sliding-into-scary-market-controlled-economy>.

<sup>89</sup> The National Trade Policy consists of four sections: section A presents background and context; section B focuses on domestic trade policies; section C looks at international trade; and, section D is on complementary policies and measures, including e-commerce, intellectual property rights, gender and youth (MoALF, 2017). The National Trade Policy aims to provide an overarching policy framework for other key policies, including the Agriculture Sector Development Strategy and the Investment Policy (p. xiv).



relevant for the expansion of trade of indigenous vegetables.<sup>90</sup> The Medium and Small Enterprises (MSE) sector is generally characterised by ease of entry, unregistered outfits, reliance on indigenous resources, family ownership, small-scale operations, intensive use of labour, extensive use of adaptive technology, and skills acquired outside the formal sector.

Being largely unregulated, most of the MSE sector operations have led to some undesirable social and environmental impacts such as environmental degradation or non-observance of health standards, whilst heavily relying on self-supporting and informal institutional arrangements. The **Micro and Small Enterprise Act No.55/2012** provides an opportunity to address these challenges by facilitating recognition of MSEs for purposes of being facilitated through provisions of services and infrastructure that enable them to comply with public health and environmental standards, as well as business development outreach initiatives that are foreseen in the Act.<sup>91</sup>

One of the notable intervention measures that the Government put in place was the **Sessional Paper No.2 of 1992 on Small Enterprise and Jua Kali Development in Kenya**.<sup>92</sup> The Paper emphasised the need to create an enabling environment through an appropriate legal and regulatory framework. It also highlighted a need for facilitative measures to promote the growth of the sector. However, these measures did not yield the expected impact, largely due to their inappropriate design and weak implementation. In addition, another government intervention, which is currently being implemented, is **Sessional Paper No.2 of 2005 on the Development of Micro and Small Enterprises for Wealth and Employment Creation for Poverty Reduction**. Significant achievements arising from the implementation of this policy include among others reforms in the legal and regulatory framework. This effort has been geared towards addressing the cumbersome laws and regulations that are out of step with current realities and deemed hostile to the growth of the MSE sector. Furthermore, under the EAC and COMESA programmes, the government is facilitating the implementation of a **simplified trade regime** to enhance facilitation of cross border trade among the MSEs. The simplified trade regime entails the use of a simplified customs document, simplified certificate of rules of origin on selected commonly traded items with a threshold value of up to US \$2,000 under the EAC and COMESA simplified trade regime.

Under Chapter 6 “Complementary Support Policies and Measures”, one section is dedicated to “Agricultural Sector Linkages to Trade Development” (6.4). It argues that the challenge that the country faces is **how to exploit the export potential through sustained agricultural development, targeting moving agricultural products up the VC through value addition**. The Kenya Industrial Transformation Program as well as the proposed National Export Strategy has singled out the following agricultural products as holding promise for Kenya’s quest for diversification of exports: Agriculture (horticulture, fruits, vegetables, nuts, floriculture, tea, coffee, pulses, honey, pyrethrum), in addition to livestock and fisheries (Ministry of Industry, Trade and Cooperatives, 2017).

### Nakuru County policies

Following the devolution process, the Nakuru County Government prepared the first **County Integrated Development Plan (CIDP)** for the period 2013-2017. The CIDP is the reference framework for the allocation

<sup>90</sup> Chapters 2 and 3 look at the wholesale and distribution sectors, and the retail sectors respectively, for which trade liberalisation measures have been undertaken. However, because they have less immediate relevance for the trade expansion of indigenous vegetables, when compared to the Medium and Small Enterprises (MSE) sector, they are not discussed in detail here. For further information, refer to: Ministry of Industry, Trade and Cooperatives, 2017.

<sup>91</sup> In addition, the sector plays a key role in cross border trade through activities of informal cross border traders. In recognition of the role that these traders play in cross border trade, especially in trade of food stuff, the EAC and COMESA developed a Simplified Trade Regime geared towards enhancing cross border trade through simplified customs documents with requirements that are easy for informal cross border traders to meet (MoALF, 2017).

<sup>92</sup> “Jua Kali” refers to “informal sector” in Swahili.

of resources to priority projects and programmes articulated in sectors of intervention. **Agriculture and food security were among the priority areas identified in the CIDP**, and several national and local policies<sup>93</sup> have been in place to address problems affecting the sector (MoALF, 2016).<sup>94</sup> According to the first CIDP, the problem of poverty, as one of the main barriers to food access, could be addressed by investing in modern agricultural techniques and promoting appropriate skills to improve crop and animal sustainable production and encourage entrepreneurship supported by public-private partnerships.<sup>95</sup> Other recommended interventions aimed at improving food production included agro-technology programmes, the intensification of extension services, and support to environmental conservation efforts.<sup>96</sup> Importantly, the first **CIDP promoted traditional high value crops as one of the strategies to address hunger in Nakuru, to reintroduce orphan crops**, and to support school feeding programmes by enhanced nutrition. The strategies to achieve these specific goals were most notably: the formation and capacity building of farmers groups and cooperatives to ensure economies of scale (e.g. on safe and responsible use of pesticides), the improvement of food security in urban and peri-urban areas, the promotion of greenhouses and post-harvest technologies, and the reduction of postharvest losses. The **2017/2018 Nakuru County Annual Development Plan** is the latest plan that actualises the Nakuru CIDP.<sup>97</sup> It is the reference framework for the allocation of resources to priority projects. In line with the CIDP 2013-2017, this Plan outlines specific targets, such as 'the exhibition of traditional cuisines' (Government of Kenya, n.d.; Sassi and Zucchini, 2018).<sup>98</sup>

The recently revised and updated **Nakuru CIDP for the period 2018-2022** has identified nutrition as a key issue.<sup>99</sup> Its vision is to become a food secure, industrialised and wealthy County, by attaining food security, applying sustainable land management techniques and improving market access and trade. The nutrition related outcomes for the County include: improve livestock food safety to enhance food and nutritional security; improved nutritional status of urban dwellers; enhanced farmers knowledge on nutrition and food security; and, the promotion of agri-nutrition. Furthermore, the County has adopted the SDGs. However, there is no specific mentioning of traditional high value crops or orphan crops, that were cited by the previous CIDP.

<sup>93</sup> The eleven programmes aimed at supporting the agricultural sector in Nakuru County include the Smallholder Horticulture Development Project that aims at helping farmers with income generating activities and the Traditional High Value Crops Promotion Project that promotes these crops through seed multiplication units. For full details, see: MoALF, 2016.

<sup>94</sup> Note that Nakuru County developed policies in other food related sectors. For instance, the county developed the Nakuru County Public Health and Sanitation Bill (2016) that provides for food safety by making provisions for food hygiene, prohibition against the sale of unwholesome poisonous or adulterated food, food hygiene licence and meat not to be wrapped in newspaper (See: <http://kenyalaw.org/kl/fileadmin/pdfdownloads/bills/2016/2016/NakuruCountyPublicHealthandSanitationBill2016.pdf>)

<sup>95</sup> The CIDP stated that the food poverty index was at 41%, meaning that a significant proportion of people were suffering from hunger. Poverty is caused by low agricultural productivity, due to high input prices and a lack of capacity for value addition, in combination with high unemployment rates.

<sup>96</sup> Among the project proposals in the agriculture sector, they aimed for supporting organic farming, through training, with the aim of reducing stress on the environment through reduced use of chemical fertilisers while increasing yields for subsistence agriculture (Government of Kenya, n.d.).

<sup>97</sup> See: <http://www.nakuru.go.ke/wp-content/uploads/2017/09/PDF-DOC.-DRAFT-ANNUAL-DEVELOPMENT-PLAN-2017.2018.pdf>.

<sup>98</sup> The Nakuru County Government is in the process of developing a "Climate Strategy" for Nakuru, but the authors have not yet viewed a finalised document.

<sup>99</sup> See: <https://nakuru.go.ke/wp-content/uploads/2018/11/NAKURU-COUNTY-CIDP-2018-2022-FINAL..pdf>. Note that the importance of "nutrition" is also recognised in other policies. For instance, in the Nakuru County Fiscal Strategy Paper (2016), the government prioritised nutrition through investments in health with the primary focus on prevention and promoting its linkages to nutrition, sports and physical activity. In addition, the Nakuru County Government has recently launched a Nakuru Countrywide Sanitation Strategy that is - according to a researcher on-the-ground - likely to have an important impact on household food and nutrition safety (March 2019). The authors have not yet been able to view this document. In addition, the Naivasha Water Sewerage and Sanitation Company has developed a Naivasha Sub-County Sanitation Vision recently (See: <http://www.naivashawater.co.ke/>).



As mentioned above, the ASDS requires each county to identify priority VCs. **For Nakuru County, the priority VCs are dairy, fish and pyrethrum.** The first three are very much in line with other Kenyan Counties' priorities, while the selection of pyrethrum is the only noticeable deviation. Local vegetables were only identified as priority VCs by Nyamira County in western Kenya (bordering Lake Victoria), in a basin where indigenous vegetables are produced to be exported at a national scale, and Mombasa County in eastern Kenya, at the coast, where demand is currently not being met through local production, and it is supplemented by purchases from other neighbouring counties (Marson and Vaggi, 2019).

Despite ambitious policies, **Nakuru County, like many CAADP signatories, was not able to allocate 10% of its budget to agriculture.** In 2017, the Nakuru County agriculture expenditure accounted for less than 5% (0.048) of total public expenditure.<sup>100</sup>

Lastly, the Nakuru County food system policies map (Figure 8) brings together all policies, on a continental (African Union), regional (the level of the East African Community, or EAC), national (Kenya) and local (Nakuru County) level, that have a direct or indirect impact on the food system in Nakuru County. This is a comprehensive, but non-exhaustive overview of key policies. Due to space limitations, not all the policies in the policy map have been referred to, or discussed, in section 4.1.<sup>101</sup>

### Assessment of policies' performance in support of a sustainable food system

The policies presented here, all emphasise the importance of food and nutrition security for all Kenyans. But **to what extent has there been progress on the four main objectives of sustainable development, including food quality, availability and access, environmental, social, and economic sustainability?** More precisely, are the current policies and institutional frameworks promoting the transformation from smallholder agriculture as a largely subsistence activity with levels of productivity and value addition, into "an innovative, commercially-oriented, and modern agricultural sector from which all VC actors can benefit"? And, are they supporting diversified agricultural systems in which special attention is given to indigenous vegetables?

It is positive to see that the **importance of diversified systems has been reflected in a number of (older) national policies**, such as the National Food and Nutrition Security Policy (Government of Kenya, 2011) and in the Crops Act (Government of Kenya, 2013) that aims to "promote competitiveness in the crops subsector and to develop diversified crop products and market outlets" (Part I, Art. 3). Indigenous vegetables including black nightshade and spider plant, are scheduled by the Crops Act (2013), as virtually any other crops (Munyi and de Jonge, 2015), but, with the exception of cowpeas, they are all in the third part of the schedule which is the one for crops with no breeding programme (i.e. with lowest priority).<sup>102</sup> Beyond such broad policy statements, specific legislative instruments to support crop diversification are very limited. In the CIDP for the period 2013-2017, specific attention went to traditional high value crops as well orphan crops, but in the current CIDP for the period 2018-2022, this referencing has been dropped.

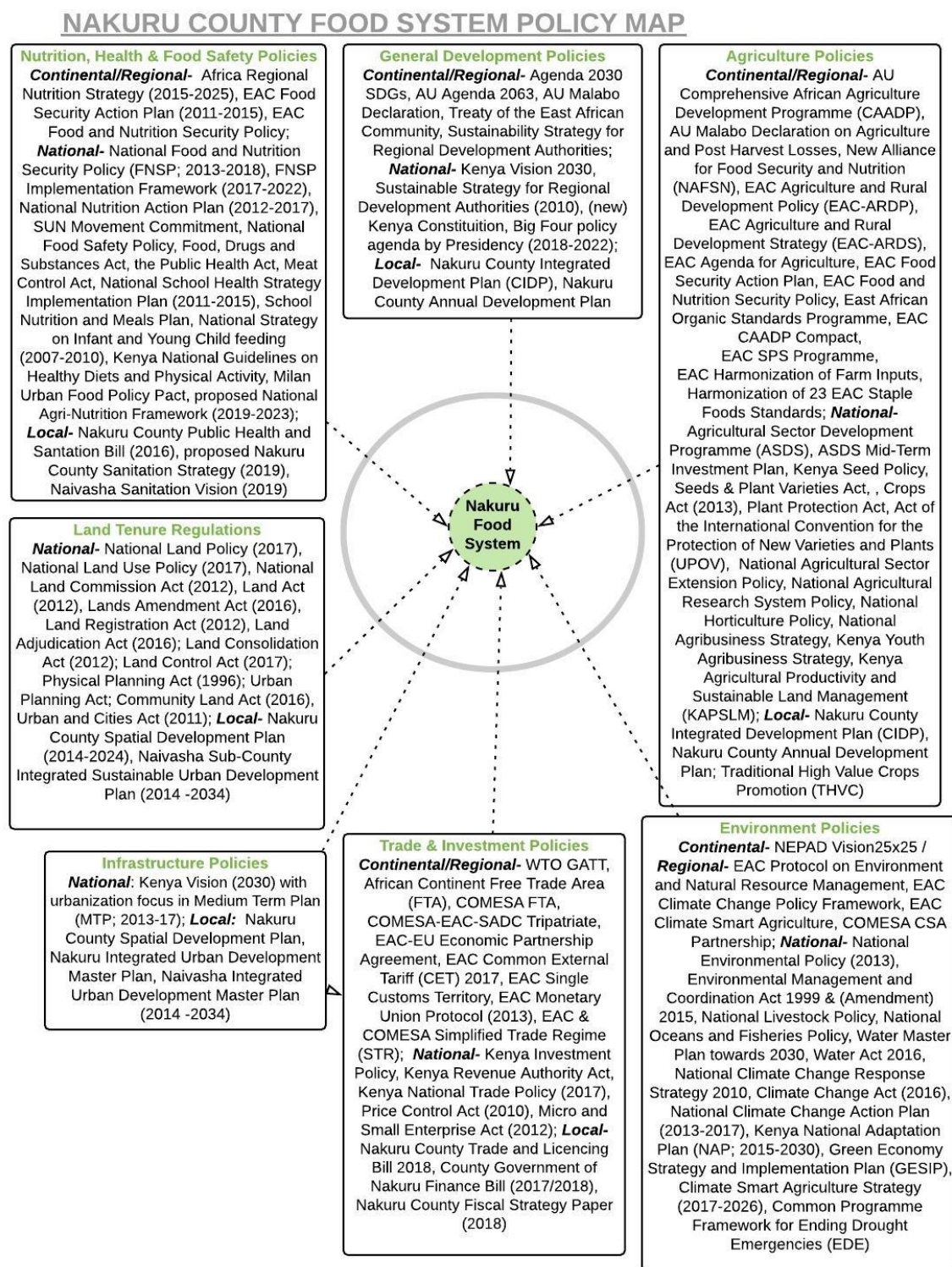
Overall, **Kenyan policies that could directly or indirectly contribute to the development of a sustainable food system, still have a long way to go if these policies aim to achieve their stated objectives.** One of the main reasons is that the Kenyan government is still failing in its commitment to the CAADP with regards to the proportion of public budget to be spent on agriculture.

<sup>100</sup> See (p. 24): <https://www.nakuru.go.ke/wp-content/uploads/2018/02/COUNTY-BUDGET-REVIEW-AND-OUTLOOK-PAPER-FINAL-2017.pdf>

<sup>101</sup> Note that the acronyms and periods of launch of the policies or the duration of implementation are not given for all policies, due to space limitations.

<sup>102</sup> See: <http://www.kenyalaw.org/lex/actview.xql?>

**Figure 8: Overview of continental, regional, national and local policies in Kenya with (in)direct impact on the food system in Nakuru County**



In Nakuru County, there has only been limited-progress on the main policy objectives that could support the various forms of sustainability (also including inclusiveness, building farmers' organisations, and so forth). There are three main reasons for this:

**Weak governance at the national and county level** constitutes an important barrier to policy implementation: predictable, stable, effective and consistent regulation may be thwarted by limited resources, inadequate institutional capacity or political interference by vested interests. Regulatory failure obviously poses significant risk to the private sector, but also manifests itself in increased bio-physical and economic risks (WWF, 2012). To illustrate this, an analysis by the United Nations Development Programme explains that Kenyan policy implementation has scored rather poorly in the area of CSA policies and wider natural resources and environmental management: *“weak policies, legislations, enforcement, and overlap of mandates among institutions involved in regulation coupled with poor coordination among institutions and stakeholders in CSA have contributed to the country’s inability to effectively address vulnerability and greenhouse gas emissions. Further, cross-cutting issues such as inadequate financing of CSA activities; limited capacity of women and youth, and vulnerable groups to participate in CSA activities; unsustainable natural resource management and utilisation; limited human resource capacity to undertake CSA; limited CSA research technology development and innovations; and inadequate data on CSA have also led to poor implementation of CSA activities.”*<sup>103</sup>

Although the aim of the 2010 devolution process was to give more responsibility to county governments, **local public officers have shown limited capacity to deliver on their mandates**: their human capacity is decreasing and they are plagued with limited funding. There is also **limited public support to the cooperative movement** that could assist in strengthening farmers' position and in better linking farmers to markets, as will be explained in greater detail in the next section. Further, decentralisation has allowed counties to choose their own priority VCs, but with a lack of national coordination this could hamper the creation of cross-county trade of certain commodities.

There is **limited investment**, from public as well as private sources, in the agricultural sector, especially to support growth and mechanisation, technology and knowledge-led agriculture. Also, the promotion of agricultural trade, that could enable job creation, especially important for the youth, has been far below expectations. One important reason for the low levels of investment is that many activities in the agricultural sector take place within the **informal system**, as illustrated above by the informal seed system. Due to this informality, regulations and policies are not implemented. For instance, as Marson and Vaggi explain (2019), *regulation* in the food industry is critical in Kenya, and more broadly in Africa, as hygiene and quality standards are necessary, but sometimes not existent or not implemented. At the same time, there is a risk to raise regulatory standards above the reach of the existing enterprises, that might lack the skills and the access to finance to ensure timely compliance, also resulting in loss of jobs (Brook et al. 2013, cited by Marson and Vaggi, 2019).

In conclusion, increasing resources for agricultural and rural development in Kenya will provide a significant contribution to the national economy and will yield positive impacts on economic growth and food security, becoming part of a broader structural transformation agenda. If the expenditure in support of food and agriculture would meet the **10% target, an increase of around 1.5% in GDP is estimated by 2030**. According to scenarios analysis by Boulanger et al. (2018), these increased resources should go particularly to the following interventions:

- An increase of capacity to create rural jobs and absorb a significant number of workers coming from urban areas;

<sup>103</sup> See: <https://www.adaptation-undp.org/resources/plans-and-policies-relevance-naps-least-developed-countries-ldcs/kenya-climate-smart>.

- Input subsidies, because they show the greatest effect on production increases for smallholder farmers and food staples;
- Strengthening of extension services, because investments in extension have proven to boost food crop production and incomes in semi-arid and high rainfall areas in Kenya;
- The public investment strategy for more spending in agricultural production should be coupled with rural infrastructure expenditure, mainly the development of rural roads, because it can boost agricultural value addition, mainly cash crops. Investments in rural roads benefit both agricultural and non-agricultural sectors by reducing transaction costs;
- Supporting rural health and education, because these have shown to generate the highest positive impact on employment creation and wage increases for skilled workers;
- Strengthening trade liberalisation, because it benefits the entire agricultural sector with a slightly more positive effect on export crops than on food staples (Boulanger et al. 2018).

At the time of writing, the Kenyan Government is in the process of developing an **Agriculture Nutrition Implementation Framework for the period 2019-2023** that aims to provide a mechanism through which the government, private sector, NGOs and other stakeholders will facilitate the implementation of actions to improve and ensure the food and nutrition security (e.g. better dietary diversity) of Kenyans at household level. This will contribute to the Big Four Agenda on reduction of household hunger. More broadly, this Framework aims to ensure coherence among all policies on agriculture and nutrition. Six technical focus areas have been identified as primary opportunities for enhanced nutrition-sensitive agricultural actions: (i) Strengthened leadership, advocacy, and coordination; (ii) Strengthened service delivery systems for provision of equitable and quality nutrition sensitive interventions at the household level; (iii) Increasing access to dietary diverse foods at household level; (iv) Harnessing private sector resources for strengthened service delivery for nutrition sensitive interventions; (v) Community empowerment for improved dietary diversity at household level; (vi) Strengthened monitoring, evaluation and knowledge management. For each respective focus area, technical subcommittees have been created to define objectives, specific actions and outputs, strategies and activities, and indicators to measure progress in the envisaged activities.<sup>104</sup>

## 4.2. Mapping the main food system actors

### Main actors in the Nakuru food system: an overview

Agriculture is the backbone of Nakuru County's economy. In Gilgil sub-county for instance, major economic activities include dairy farming, maize production, horticulture (cabbage, kale, tomatoes) and nomadic pastoralism.<sup>105</sup> These sectors are also largely represented in the other sub-counties of Nakuru County and involve a large number of actors. This section presents a non-exhaustive overview of the main actors in the food system in Nakuru, as well as their interlinkages, depicted in Figure 8.

<sup>104</sup> For instance, the draft document for Focus Area IV describes the results of a first meeting, attended by various stakeholders, including from MoALF, GAIN and World Vision. The activities aim to achieve nutrition-sensitive agriculture (NSA) (by engaging with the private sector. Concretely, this involves them in research, mobilising resources and investments by the private sector to achieve NSA, building their capacity, and so forth. The latter, for example, aims to achieve this increased capacity by developing NSA incubation programmes, the promotion of cross-learning of best practices, and so forth. The subcommittee also proposed concrete indicators to measure progress, including by counting the number of NSA capacity building strategies mainstreamed in the education sector, the number of cross-learning ventures implemented, and so forth. See: <https://drive.google.com/drive/folders/1bahPdc9VAaavJZOXQQxsrOSaNk911XAC>.

<sup>105</sup> Few industrial activities are also present. These include the Gilgil Diatomite Industries and the manufacturing of farm equipment, especially maize milling machines and ploughs, as the Ndume Farm Machineries (Borrelli and Benegiamo, 2019).



**The private sector in the Nakuru food system consists of a diverse group of actors**, including smallholder farmers, big export-oriented horticulture companies, medium-sized organic food companies, processing companies, seed companies, middlemen, wholesale and retail companies, supermarkets, and so forth.<sup>106</sup> This section discusses a number of key actors, most of whom have been met or interviewed by SASS researchers.

As mentioned, the core of key actors is represented by a **large group of smallholder farmers that produce for own consumption as well as to sell on the market**. The majority of these farmers produce maize.<sup>107</sup> A large part of these small-scale farmers operate within the informal system. They use their own seeds, usually of low quality and or spoiled due to poor storage systems.

While most smallholders are active in the maize sector, some farmers do promote diversification and organic farming.<sup>108</sup>

Nakuru County, especially the Naivasha Basin, is well known for its strong **horticulture and flower export industry**, with companies such as Stokman Rozen Ltd. or Interveg Nature's Best, that mainly export to the European Union.

Further, there is a **well-developed dairy sector that has benefitted from large investments**. The Kinangop Plateau, a raised plateau extending for a length of some 30 km at 2300-2500 m above the Rift Valley in the South-East of the Naivasha Basin, is considered as prime dairy landscape and part of the national dairy belt exporting milk and dairy products throughout the country as well as abroad. Milk production, collection, processing and marketing is done mainly through Muki Farmers Cooperative Society Ltd., based at Ndunyu Njeru in South Nyandarua District some 40 Km away from Naivasha town. Muki counts some 25,000 farmers as associates and 3 associated companies: MUKI savings and credit cooperatives, MUKI investment and Kinangop Dairy Limited, all involved in milk processing. Through Muki, farmers receive extension services, which instruct farmers about more profitable ways of managing their livestock and farm. Furthermore, several other organisations, such as the Netherlands Development Organization (SNV), or the Bill Gates Foundation, access farmers through Muki contacts and focal points.

Another important category of players in Nakuru County consists of **large agricultural estates**, such as Marula, 10,000 ha and employing between 2500 and 3000 workers; they are primarily dairy producers who lend part of their land to other farmers (2,000 ha irrigated), including 3 companies producing flowers, and 6 producing horticulture. For instance, Sunripe Ltd does organic broccoli and green beans for export; the rest is conventional production, some for export, some for local market (cabbage, alpha alpha, maize for cattle).<sup>109</sup><sup>110</sup> The products of Marula are sold only to intermediaries, who transport them to Nairobi and Mombasa.

<sup>106</sup> In Nakuru County, there are many opportunities in the agriculture sector which can be exploited to ensure the vibrant youth (18-60 years) who represent a large proportion of the population.

<sup>107</sup> The maize market is a segmented market, with 2 totally different segments. First, there is the millers market that buys maize to be milled. This type of maize must be a hybrid variety, of good quality and white, standardised, etc. Given these conditions, it is more difficult to serve for smallholders. Second, there is the government market that buys maize directly from farmers during harvest to keep stocks for emergencies and to use the selling of maize to influence prices. Ultimately, the latter option is used for electoral reasons.

<sup>108</sup> A perfect example is the entrepreneurial farmer Josphat Macharia, who established the Ndabibi Environmental Conservation Centre. This is a 5.2 acres farm that is entirely self-sustained and organic. The key aim is to create a self-sufficient sustainable agro-ecosystem. This farmer organises classes and trainings, widely attended by Kenyan farmers, African, European and American students.

<sup>109</sup> See: <http://www.sunripe.co.ke/>.

<sup>110</sup> Marula is also actively supporting biodiversity conservation by keeping some of its land reserved for wildlife. Recently it engaged in the planning of a large biocorridor across the Rift Valley between Naivasha-Elementeita and Nakuru in cooperation with other private landowners.

Among **small and medium-sized farms** in Nakuru County, a good example is Ecoscapes, an **innovative organic farm**, with an estate of 150 hectares (100 hectares as animal sanctuary and ecotourism and 50 hectares devoted to organic agriculture). Demand of organic products is still limited in southern Nakuru County, and the produce of Ecoscapes is sold in Nairobi at the weekly organic Market Garden directly to middle and high income families. In 2018, due to the increasing number of customers, Ecoscapes opened two more weekly market gardens in Nairobi.

Important farming input suppliers are **seed companies**.<sup>111</sup> A major player in Nakuru County is Kenya Seed, a state-owned company that researches, develops and markets field crop and vegetable seeds, pesticides and fertilisers. The Nakuru branch specialises in cereals.<sup>112</sup> There is also Leldet Seed Ltd. that grows seeds and bulbs in bulk to distribute through Central Kenya and beyond. They make most profit from maize seeds. Furthermore, Koppert Ltd. Kenya is a Dutch company that specialises in pest control, natural pollination, monitoring seed treatment, and that is present in Nakuru County as well.

At present, the subsidy for maize purchase in Kenya works through the purchase of maize above the market rate by the **National Cereals and Produce Board** (3000 KES per 90kg bag, against 2000 KES average), as described above in more detail.<sup>113</sup> There are also some **processing companies**, including MACE Foods Ltd. that produces dehydrated spices and indigenous vegetables for export.<sup>114</sup> The company controls the full supply chain from the seeds through agricultural production, processing, logistics up to the delivery into the customer's warehouse. They work with small, medium and large-scale farmers, as well as NGOs, farmers' organisations, research facilities, and so forth (MACE Foods, 2018).<sup>115</sup>

**Supermarkets** also play an important role in the Nakuru food system. Commercial farmers sell in wholesale markets, often located in urban centres such as Nairobi, or to local supermarkets. Some of these commercial farmers do not sell only their own production, but they also act as **middlemen** for other farmers. Moreover, most of these farmers acting as middlemen and accessing wholesale markets and supermarkets, buy from irrigated farms. This is explained by the fact that they resort to production other than their own to reach the volumes demanded by their customers. In the case of supermarkets such volumes are defined by the buyer, in the case of wholesale markets, big volumes are necessary to justify transport costs. Traders need reliable partners, who do not only supply year-round, but who can also cope with unexpected dry spells during the rainy season (Marson and Vaggi, 2019). Well known supermarkets in the region are Tusky's, Naivas, SPEAR supermarket, Uchumi or Self Service Stores LTD. The latter deal with a set of brokers for buying vegetables

<sup>111</sup> Kenya is a party to international organizations that govern seed production and trade. These include: the Organization for Economic Cooperation and Development, the International Seed Testing Association, the International Union for the Protection of New Plant Varieties (UPOV), the International Seed Federation and the International Treaty on Plant Genetic Resources for Food and Agriculture. Additionally, the African Seed Trade Association governs seed trade at the continental level while the Seed Traders Association of Kenya governs the national level. The Association for Strengthening of Agricultural Research in Eastern and Central Africa has a programme working on harmonisation of seed trade in the East African region. Kenya subscribes to both the Organization for Economic Cooperation and Development and the International Seed Testing Association guidelines. Both formal and informal seed sectors exist, as will be explained in the next section of this report.

<sup>112</sup> The Rift Valley Institute, situated some 7 km from Nakuru develops demonstration plots on behalf of the Nakuru Kenya Seeds branch. The Kitale Headquarters release the funds necessary for developing the field trials and for organizing farmers' field days. During these events, farmers are also connected to private companies supplying fertilisers and pesticides.

<sup>113</sup> Kenyan TV announced on 23/11/2018 that a government commission has established a new price of maize: 2300 Kshs per standard sack (90kg), and that government agreed to immediately buy 2 million sacks at this price. In early 2019, this led to protests among maize farmers. President Uhuru Kenyatta revised the price up by 200 shillings to 2,500 shillings. The limit was set at 400 (90 kg) bags from each farmer. The government will be able to purchase 2,000,000 bags of maize, and farmers will still be stranded with the surplus as the harvest during the last season is estimated to be at 16,000,000 bags.

<sup>114</sup> MACE Foods Ltd. is based in Eldoret, but it processes vegetables that are produced in Nakuru County as well as elsewhere.

<sup>115</sup> See: <https://www.macefoods.com/>.

and fruits. The supermarket makes an offer to the brokers and has a contract with them stating that they are compelled in taking back 8% of the unsold and exchange it with new fresh products. Furthermore, open-air markets are held in all towns and cities, such as the Naivasha farmers market.

**A large group of international NGOs, local NGOs and other types of civil society organisations, such as cooperatives, are active in the food system in Nakuru county.** The group of International Non-Governmental Organisations (INGOs) is quite crowded. To name a few key ones: Farm Concern International works in Nakuru County, where they focus on VCs development of onions, tomatoes, potatoes, common beans, snow peas, fish, dairy and beef, among others. Concretely, they work to enhance capacity development of farmer organisations, provide technical support for partner organisations, etc.<sup>116</sup> The Dutch NGO Hivos is implementing the Sustainable Diets for All programme in Nakuru County: it builds the advocacy capacity of civil society organisations to challenge unsustainable practices and incentives in food production and consumption. The programme takes evidence directly to policymakers and international institutions so their policies, market practices and legislation will promote diets that are diverse, healthy, fair and based on environmentally sustainable production methods.<sup>117</sup> Slow Food, active in Kenya since 2004, is a strong network defending food biodiversity, promoting sustainable food production and consumption and creating links between producers and chefs.<sup>118</sup> The association collaborates with local and international organisations, government and learning institutions and the media. In Nakuru County, Slow Food focuses on several traditional varieties (beans, maize, millet, sorghum, sweet potato, pigeon pea, cowpea both leaf and seed), and aims to help farmers with commercialisation. Also active in Nakuru County, is WWF Kenya. Most recently, WWF is implementing a project on contract farming, named "Green Horticulture at Lake Naivasha (Goalan) Project", funded by the SWITCH Africa Green Programme of the European Union.<sup>119</sup>

Kenya joined the global movement **Scaling Up Nutrition** in 2012. The platform recognises that nutrition is a precondition to achieving goals of eradicating poverty and hunger, reducing child mortality, improving maternal health and combating disease. The focal point (Head, Nutrition and Dietetics Unit in the Ministry of Health), brings people together in a multi-stakeholder platform, which includes: Civil Society Network/Alliance, Donors Network, Business Network, Government Partners Network, United Nations Network, Technical Community Network and the Academia Network/Research Community. The multi-stakeholder platform works to align and coordinate action across sectors, including health, women's empowerment, education, poverty reduction and employment agriculture and social protection. The other key organisation is the Global Alliance for Improved Nutrition (GAIN) that is driven by the vision of a world without malnutrition.<sup>120</sup>

**A number of local NGOs specifically support organic agriculture**, such as the Participatory Ecological Land Use Management Kenya and the Network for Ecofarming in Africa, a community-based NGO promoting ecologically sustainable land management. The Network for Ecofarming in Africa works with resource poor community members, government institutions, local and international partners and schools. Kenya Organic Agriculture Network encourages diversity of food by intercropping. On gender, many women practice organic farming and prefer organic foods as by nature, wishing to have the best for their families.

**Local cooperatives and farmers organisations**, such as: Farmers Group Makongo, Farmers Group Eburru, Farmers Group Langalanga, the Ng'ati Farmers Cooperative and Chemichemi Women Group, are generally weak in Nakuru County. Better organised farmers organisation can be found in the dairy farming

<sup>116</sup> See: [https://www.farmconcern.org/images/about\\_us/FCI\\_Country\\_Profiles-web.pdf](https://www.farmconcern.org/images/about_us/FCI_Country_Profiles-web.pdf).

<sup>117</sup> See: <https://www.hivos.org/program/sustainable-diets-4-all/>.

<sup>118</sup> Slow Food Kenya does not use a certification system, only product-protocols that they check informally.

<sup>119</sup> See: <https://www.wwfkenya.org/>

<sup>120</sup> GAIN website: <https://www.gainhealth.org/about/>.



sector, such as the Muki Dairy Farmers Cooperative Society.<sup>121</sup> Given the absence of well-established cooperative organisations in Nakuru county, the only way in which farmers can improve the marketability of their produce is to join a Self Help Group (SHG). This is explained in more detail in the following section.

Seed Savers Network (SSN) is an example of a successful **social enterprise** that works with smallholder farmers to improve seed access and agro-biodiversity conservation, created in 2009. The network has worked with over 50,000 farmers across Kenya in various programmes which include seed saving at farm level, ecological agriculture, capacity building and advocacy for food sovereignty.<sup>122</sup>

The **media can also play a supportive role in promoting sustainable food systems**. Front runner media include Nakuru Health Digest. Several media outlets have experience on agriculture and nutrition issues. There are multiple media outlets and channels in Nakuru and more widely in Kenya that promote healthy food and sustainable food systems. Also, social media is quite active in the country. The social media platforms include Twitter, facebook, blogs, websites, Instagram and to a small extent whatsapp.<sup>123</sup> There are also several mobile apps from Google Playstore and Applestore that deal with food and nutrition issues.<sup>124</sup> Finally, as for online media, the top five leading media are Tuko, The Standard Newspaper, The Daily Nation, The Star and SDE.

The third category of actors consists of **technical and financial partners active in the food and agriculture sector**: bilateral donors; international organisations providing various types of support such as FAO, including on food system sustainability<sup>125</sup>; other development agencies such as the Dutch SNV implementing relevant initiatives e.g. the Kenya Market-led Horticulture Project (combining private sector expertise with social impact solutions to build sustainable, inclusive, climate resilient, horticulture VCs that benefit small and medium-sized farmers).<sup>126</sup>

Another group are the **financial institutions**, such as Kenyan Banks, including the Equity Bank Kenya Ltd. and Cooperative Bank of Kenya that have branches in Nakuru County. Furthermore, there are a number of microfinance institutions, such as the ASA Limited Group, the Kenya Women Microfinance Bank and the Rameen Bank, that all focus specifically on women. The National Bank Kenya also has a division for microfinance. Lastly, there exist village community banks that are community based semi-formal table banking structured schemes.

<sup>121</sup> For example, the Eburru Fruit Farmers, registered as a community-based organization (CBO), are trying to keep livestock for dairy. These farmers also cultivate crops. Given the drought in the Eburru region, farmers are constantly looking for ways to collect, save and reuse water. Drip irrigation is too costly for the average Eburru farmer, so is building pan dams for water harvesting. Collective purchases hold potential. The quality of borehole water also varies from place to place. Furthermore, the milk that is produced, is sold at the local market. Brookside, the dairy leader in Kenya, came to discuss the purchase of milk from the Eburru farmers, but the volumes that the farmers could offer were too small, so no deal could be made. The larger the volume, the more Brookside would pay, but the farmers face challenges, not only in terms of their low productivity, but also their lack of organisation.

<sup>122</sup> See: <https://seedsaverskenya.org/>.

<sup>123</sup> Some of the leading blogs on food and nutrition issues include <https://www.diet-blog.com/> and <https://healthylivingkenya.wordpress.com/>. There are facebook pages that address nutrition issues, such as Let's cook Kenyan meals - <https://www.facebook.com/letscookkenyanmealsactivities> by Pamela Oduor.

<sup>124</sup> Examples are: Diet Plan for weight loss, Lifesum, Healthy Diet Help Guide, Health, Nutrition and Diet Guide and Diabetic Diet Plan.

<sup>125</sup> Although they are not directly active in Nakuru County, it is worth to mention the NADHALI project team of the Food and Agriculture Organisation (FAO) that is investigating the urban food system in Nairobi (and links with surrounding counties), in an effort to launch an urban food system strategy for the city. It also does capacity building for local Government and it helps to establish a Multi-stakeholder Platform, chaired by the Municipality. Their methodology is "Rapid Urban Food System Analysis", and they are currently i) assessing key VCs bringing food to Nairobi, starting from surveys in the major wholesale fresh produce markets; ii) collecting data on where major flows into Nairobi of tubers, meat, rice, maize, potato come from; iii) mapping infrastructure and safety issues according to actors along the VCs; and iv) surveying consumers on food accessibility and other concerns (FAO, 2018).

<sup>126</sup> See: <http://www.snv.org/project/hortimpact>.

**The public sector plays a key role in the Nakuru food system, because it sets agricultural policies and explicitly supports rural development.** The Agriculture Division of Nakuru County is responsible for the development of the agricultural sector in the area. Interestingly, the office has worked on the promotion (e.g. marketing) of indigenous vegetables. Extension officers, often sent out by the Nakuru County Agriculture Division, operate in the area, but they face a number of challenges that are discussed in detail in the following section on “business support services”.

**Kenya Plant and Health Inspectorate Service (KEPHIS)** offers seed testing services for the informal seed sector. KEPHIS is the National Designated Authority with the following roles: variety evaluation, release and registration, Plant varieties protection, seed certification, phytosanitary measures, development and implementation of seed standards.

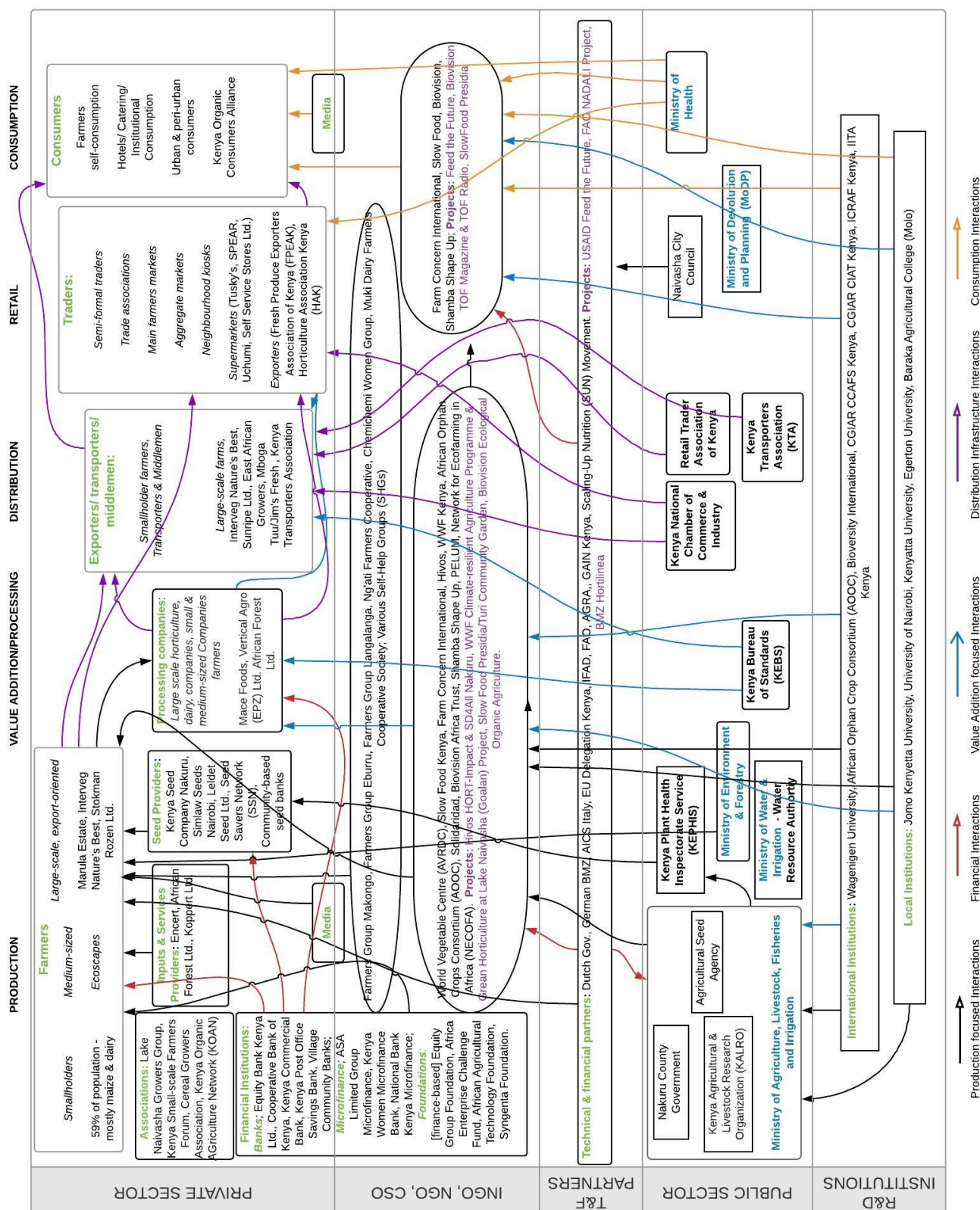
**The Dairy Training Institute** is a national institute under the Ministry of Agriculture, Livestock and Fisheries (State Department for Livestock), based outside Naivasha town within a 1000 acres compound. The Institute has 32 trainers, specialising in Animal Production, Dairy Technology, Animal Health and Agribusiness-extension services, and as many as 250 students per year, on average. Most students are sponsored by County as well as Central government, IFAD, FAO, Dutch Government, Muki, Brookside and cooperatives. Many demands are turned back for lack of sufficient facilities at the training institute.

**A final, important group is constituted by research and development institutions.** First, there are a number of Kenyan universities that conduct research on various aspects of the food system, including Jomo Kenyatta University of Agriculture and Technology, Egerton University, and Baraka Agricultural College. Lastly, the main actors, who operate in the Nakuru food system are shown in Figure . They are grouped in five main categories: private sector, INGOs, NGOs and civil society organisations, technical and financial partners, public sector and research and development institutions. The arrows show their five types of interlinkages: production, financial, value addition, distribution/infrastructure, and consumption interactions.

### **Nakuru farmers and business support services: an example of weak institutional arrangements**

Beyond a discussion on policies and actors, a key role in governance dynamics is taken by the **institutional arrangements among actors**. An important example of such institutional arrangements is the support to farmers by government and the way that farmers organise themselves. The scope of this report prevents us to analyse all institutional arrangements for the entire food system. Therefore, in this sub-section we limit ourselves to a more general illustration of institutional arrangements among farmers and their business support services, such as farmers' organisations or extension officers. In section 5, we discuss governance dynamics and relevant institutional arrangements, but only in light of the integration of indigenous vegetables into the food system.

Figure 9: Main actors in the Nakuru food system and their interlinkages



According to van Berkum et al. (2018), the food supply system is imbedded in an **enabling environment** that creates the conditions in which the system functions.<sup>127</sup> Business services, while not at the heart of the VC, provide services and goods to the actors in the chain. This can involve training, agricultural inputs, technical support or financial services. In this section, we look specifically at various kinds of support services and institutions, including extension services, cooperatives and self-help groups.

First, extension service refers to the provision of technical advice offered to farmers by extension staff and other service providers. The actual Kenyan extension system is based on a traditional top-down, supply-driven approach, aimed at improving farm productivity. It aims to spread the use of improved seeds and agrochemicals and it takes a specific crop-approach.<sup>128</sup> Despite existing policy frameworks officially give a central role to extension services in fostering agricultural development, **extension services in southern Nakuru County, and also more broadly in Kenya, face a number of constraints**, including the following:

- There is a structural lack of adequate funds and investment resources. This deficiency is amplified by the fact that resources tend to be skewed towards high potential regions and high-value crops. Farmers growing low-value crops with little marketable surplus are poorly served (Muyanga and Jayne, 2006, cited by Borrelli and Benegiamo, 2019).
- Farmers that reside in remote areas, such as Gilgil sub-county or that are poor producers struggle to access and receive support from extension services.
- On the farmer's side, the perceived high costs required to receive specific support is often indicated as the principal obstacle/barrier to delivering such services. Despite agricultural extension being a public service, agriculture officers have no extra funds for their visits to farms. Therefore, farmers are asked to contribute by covering travel fees and by providing a meal when receiving an agriculture officer at their farm.
- An additional issue is the very low number of agricultural officers in relation to the farmers' population. Only 20 agricultural officers are available for the whole of Nakuru County (Borrelli and Benegiamo, 2019).
- The decentralised officers in Gilgil sub-county and other counties are poorly connected to a national strategy, leading to a project-based approach. Extension officers tend to focus strongly on maize as well as on seeds and agro-inputs adoption. The latter is connected to a productivity-focused orientation, which is not always in line with the farmers' needs. However, despite shortcomings, all interviewed farmers confirmed that they would welcome more frequent visits by extension officers and the advice of these officers is always highly appreciated (Borrelli and Benegiamo, 2019).

<sup>127</sup> According to van Berkum et al. (2018), food system activities consist of five components: the food supply system (the value chain), the enabling environment, business services, the food environment, and consumer characteristics. The food supply system is imbedded in an enabling environment that creates the conditions in which the system functions. Transport, regulation, institutions and research infrastructure are part of this environment. In this report, we will focus on regulation and institutions in section 4.1.

<sup>128</sup> Public agricultural extension services in Kenya date back to the early 1900s. However, a poor enabling environment strongly limited their effectiveness and prevented further improvement. The late 1960s and early 1970s, registered greater activity of agricultural extension services as they have been involved in the dissemination of hybrid maize technology (Madhur, 1999, cited by Borrelli and Benegiamo, 2019). In the early 1980s, the World Bank introduced in Kenya the training and visit approach (Benor et. al, 1984, cited by Borrelli and Benegiamo, 2019), through the First and Second National Extension Projects, intended to reform and expand the functioning of extension services. Today, this system of management still provides the dominant frame in which agricultural officers operate. It is based on visits to farmers and in-service training of field staff, the emphasis is put on disseminating unsophisticated, low-cost improved practices to boost crop production (Axin, 1988, cited by Borrelli and Benegiamo, 2019). Criticised for their top-down and production oriented approach, as well as for lacking cost-effectiveness and their questionable efficiency, their role has long been debated (Haug, 2007; Davis, 2008; Faure et al. 2012; Taye, 2013, cited by Borrelli and Benegiamo, 2019).

Second, **agricultural cooperatives in Kenya have a long history that is mainly linked to the development of cash crop production** among local smallholders farmers.<sup>129</sup> The principal goal of a cooperative is to increase the marketability of farmers produce. In the Naivasha Basin, cooperatives are **not supported by a governance system** to tackle key issues that farmers face (Borrelli and Benegiamo, 2019). **Overall, cooperatives in Kenya are classified into two main categories: non-agricultural and agricultural.** The non-agricultural cooperatives are involved in service-provision and are active in the financial, housing, insurance, consumer, crafts and transport sectors. Particularly relevant is the role of savings and credit cooperatives. The cooperative movement is vertically organised into a four-tier pyramidal structure that links up primary cooperatives at the local (lower) level to the national (higher) level. In the agricultural sector, these organisations are principally involved in the marketing of the principal cash crops (particularly cotton, pyrethrum, sugarcane) and dairy products (Wanyama 2009: 7-8, cited by Borrelli and Benegiamo, 2019). In the dairy and coffee sectors, cooperatives have also engaged in value-added manufacturing operations.

**In Gilgil sub-County, the cooperative sector is relatively underdeveloped.** The main reasons are the relative absence of established cash crop chains, mostly because of the climatic and environmental characteristics of this semi-arid area, and the features of the smallholder farmer sector. **The only fully developed VC for a cash crop in this area is pyrethrum,** which however experienced a steady decline in recent years, due to the delays in payments by the Pyrethrum Board of Kenya, the sole authorised purchaser of the crop. Consequently, this has pushed many smallholders to abandon production. **The only active and well-developed cooperative movement is found in the dairy sector,** where cooperatives collect and bulk members' milk to sell it to processors.<sup>130</sup> Maize has an already well-established market; maize is principally bought by government boards and the millers market.

In order to understand the consequences of the **lack of cooperatives in the vegetables sector in Gilgil sub-County**, it is important to stress the specific conditions needed in setting up a cooperative organisation: these are a consistent production rate, with a certain degree of product uniformity, adequate production infrastructure and technologies – such as irrigation, and water access. All these features are missing among the majority of smallholders in Gilgil sub-County that are rather characterised by low production rates and no initial asset. Furthermore, the reduced land size per-capita would require joining hundreds of small farmers to reach consistent production volumes necessary for achieving an interesting market value (this is actually what takes place in the cash crop sectors). Low and inconsistent production rates are not sufficient to generate enough income justifying the initial investment that is needed to set up a cooperative. Furthermore, the high vulnerability that characterises smallholder farmers prevents them from taking investment risks or introducing new varieties without having a yet established market.<sup>131</sup> Next, financial, administrative and

<sup>129</sup> Similarly, to other sub-Saharan African countries, the history of Kenyan cooperatives can be subdivided into two main periods. The post-independence era, attesting to the creation and substantial growth of cooperatives under state control as instruments for implementing government socio-economic policies. The second period coincides with the adoption of the structural adjustment in the 1980s by many sub-Saharan African States. This political turn fostered the progressive liberalisation of the cooperative sector requiring withdrawal of the State from its support services (Borrelli and Benegiamo, 2019).

<sup>130</sup> The effective cooperatives that exist in Lake Naivasha Basin are dairy focused. These include Ngati Farmers Cooperative, based in Maiella, Muki Farmers Cooperative (outside our study area, in the Northern part of the basin, but in Nyandarua County) and Tulaga Farmers Cooperative Society (Wanjala, 2018).

<sup>131</sup> The only sector in which the rise of a cooperative movement seems possible and desirable is the potatoes sector: potato farmers reach a high production rate, they are numerous and have basic assets. However, they face challenges. An example of this can be provided by the case of the 50kg bag lobby action carried out by the Kenya National Farmers' Federation (Kenaff). In past years, Kenaff has been active in the promotion of the policies that have standardised packages for potatoes in 50Kg bags to augment potato prices at the farm gate. This was passed and gazetted in November 2014 and is now law. However, a lack of enforcement of the law results in that brokers still purchase higher quantities (bigger bag) at the same prices of the 50kg bag. The situation is particularly worsened by the poor organisation between potatoes producers (Borrelli and Benegiamo, 2019).

management related challenges limit the effectiveness and expansion of cooperatives. An important reason is that the majority of members are semi-literate peasant farmers. Despite these challenges, the Nakuru County Government plans to establish and strengthen farmers' cooperatives.

Third, given the absence of cooperatives in the cash crop sector in Nakuru County, **the only way in which farmers can gather to improve the marketability of their produce is by joining a SHG.**<sup>132</sup> SHGs are the principal form of community organisation in Kenya, both in rural and in urban areas (Njeri, 2012, cited by Borrelli and Benegiamo, 2019). SHGs can be defined as voluntary community associations gathering people to solve common daily life issues through mutual support. Through SHGs, people are able to organise themselves for collective action, acquire and exchange information, learn skills and increase financial resources (Thomas, 1982; Njeri, 2012, cited by Borrelli and Benegiamo, 2019). In addition, being part of a registered SHG facilitates members to be recognised and contacted by organisations providing extension services, development programmes and NGOs. SHGs have played a great role in allowing a great number of smallholder farmers to improve their agricultural knowledge and to gain access to peculiar market niches.

SHGs are classified in many ways depending on their principal goals, including financial, investment or welfare goals. The most common groups in Kenya as well as in Gilgil sub-County are the financial SHGs. These can be of two kinds: rotating savings and credit associations, known locally as 'Merry Go Round', and 'accumulating savings and credit associations', locally called 'Table-Banking' (Impio et al. 2009, cited by Borrelli and Benegiamo, 2019). These are both forms of grassroots mobilisation for mutual financial benefit, based on self-reliance practices. In the case of rotating savings and credit associations, group's members commit to contributing with a fixed amount of financial resources to a common fund. For the case of accumulating savings and credit associations, once the money is collected, savings are lent out to a former group member or even a non-group member that will return them to the group with a small interest rate. In the Gilgil sub-county, rotating savings and credit associations are the more common form of financial SHGs. They are also **the principal tool through which rural inhabitants try to access strategic knowledge and support to improve their agricultural performance and secure market access.** These knowledge/assets are mainly conveyed by development programmes/projects provided either by public or private organisms. To come into contact or have a chance to be involved in development projects or programmes, people form and register SHGs. Indeed, SHGs can be either informal or registered. Registration occurs through the Ministry of Gender, Children and Social Development. The registration allows the group to be legally recognised, transact business in its own name and own property on behalf of the members. In fact, SHGs play a key role, because standard banks refuse to lend money to smallholder farmers. The reason is that these banks require title deeds as a guarantee and they also tend to refuse lending money at the official government capped rate, as they consider this rate to be too low (Borrelli and Benegiamo, 2019).

In conclusion, there is great potential in improving the way smallholders get organised to cooperate around the production and marketing of their crops. SHGs are currently the most important form of community organisation in the Naivasha Basin: they have proven to allow a great number of smallholder farmers to increase their agricultural knowledge and get their voices heard with local authorities; but they have not been

<sup>132</sup> Also called 'chama' in Swahili (meaning 'group' or 'organization'), SHGs have a long tradition in Kenya. Their creation has been encouraged by the post-colonial government that, under the so-called Harambee Movement (meaning 'pull together'), that stressed the importance of grassroots organisations and mutual assistance in the development process (Thomas, 1982; Smith, 1999; Njeri, 2012, cited by Borrelli and Benegiamo, 2019). SHGs members generally share a common provenance or they have established links (e.g. neighbours, colleagues). This allows for mutual trust among the members and it strengthens the sense of accountability (Yunus, 1999). Primarily women are SHG members, but men are increasingly taking part as well (Kilavuka, 2003, cited by Borrelli and Benegiamo, 2019). SHGs can allow its members to have informal savings and credit. In fact, this is the most common form of accessing credit in Kenyan rural areas and especially in Gilgil. Further, as in most countries, Kenya has money lenders, called shilocks. They are very common in rural areas.



able - unlike cooperatives in other countries - to provide the type of business services that smallholders need, notably the negotiation of better prices with middlemen, obtaining credit or gaining direct access to profitable market. Therefore, a possible solution would be to **strengthen smallholders organisations, making SHGs more business-oriented by adopting a model inspired by cooperatives with marketing functions**, possibly in cooperation with local small traders associations (as e.g. put forward during the SASS multi-stakeholder workshops). This would allow smallholders to access key services and participate in product aggregation schemes, market information, contract negotiations, access to credit lines and to profitable local and national markets; thus also making it cheaper and easier to produce and distribute indigenous vegetables, for the benefit of consumers by improving the sustainability of the whole food system.

### Summary of key governance dimensions: policies and actors

Section 4 addressed the key governance dimensions, looking at the policy landscape and key actors, of the unsustainable performance of the Nakuru food system. It pointed **to key drivers and to constraints experienced by stakeholders** that create situations in which they act to maintain and/or improve or reduce the actual performance of the system. However, the space limits of this report and the scope of the SASS programme do not allow for a full political economy analysis of the whole food system. It is important nonetheless to reiterate that the overall governance of the Nakuru farming economy is characterised by incentives to produce, market and consume maize as well as horticultural and floriculture crops destined for export; with income and employment opportunities (often more attractive than any other alternative opportunity) for the youth, for women and for migrants, especially in the large-scale flower and horticulture industries. It can be assumed (as many stakeholders mentioned during interviews and workshops) that the economic power of these agricultural sub-sectors, including the revenue they generate for both companies and the Government, drives decisions related to natural resources management in Nakuru County (e.g. cropland allocation, water use, subsidies' policies), despite the Government's declared policy to focus its support to smallholder farmers. This, as well as other features of the food system (as seen in section 3), result in unsustainable outcomes of the food system, including environmental stress, food insecurity, and continued economic and social marginalisation of the 65% smallholder farmers majority. Together with a summary of who are the stakeholders whose actions and decisions most affect the performance of the local food system, the analytical focus of section 4 was on weak institutions and policies:

- The **policy landscape** is characterised by a multitude of ambitious and well-conceived policies (on paper), including on food security, nutrition, smallholder farming stimulation, diversification and sustainability, but “the money is not put where the mouth is” and implementation tools and policy enforcement are often lacking. For instance, national subsidies and effective policy actions are largely dedicated to maize and few other crops (mostly dedicated to export), leaving the vast majority of farmers (smallholders farmers) at the margin of the strong Nakuru agricultural economy.<sup>133</sup> Another important reason for the lack of implementation at local level relates to the 2010 Kenyan devolution process: although the intention was to create opportunities for more effective implementation on-the-ground, it has had the opposite effect to a great extent. Because this political transition has occurred rather quickly, it left little time for the county governments to adequately prepare in terms of human

<sup>133</sup> Maize features strongly in Kenya's Agricultural Investment Plan. Also in Nakuru County, maize is a key staple food and a major contributor to livelihoods. Between 61-80% of Nakuru County's population is engaged in the maize value chain (MoALF, 2016). Further, the produced maize in Nakuru County, as well as in the rest of Kenya, is sold to local households, traders, millers, large private companies (e.g. animal feed manufacturers) and public sector institutions. In the latter case, the government buys the maize directly during the harvest season to keep stocks for periods of food shortages or to influence prices, particularly for electoral reasons (Kirimi et al. 2011, cited by Knaepen, 2018). In fact, one of the main reasons for the popularity of maize are exactly these decades-long governmental subsidies to the maize sector. These subsidies have taken various forms: the lowering of consumer prices, subsidies for fertiliser or other inputs or subsidies for maize import from other countries (Knaepen, 2018).



and technical capacities; and an effective intergovernmental coordination mechanism has been lacking. This has created problems for the delivery of knowledge and timely information to farmers.<sup>134</sup>

- **Weak governance on the national and county level** constitutes an important barrier to policy implementation: predictable, stable, effective and consistent regulation may be thwarted by limited resources, inadequate institutional capacity, lack of coordination or political interference by vested interests. Regulatory failure obviously poses significant risk to the private sector, but also manifests itself in increased bio-physical and economic risks.
- **Local institutions** that could stimulate a more diversified and sustainable local food system are very weak, particularly farmer organisations, Nakuru County services and extension services more broadly. Another reason for the lack of efficient local institutions is the fact that a lot of the activities within the agricultural sector, especially the smallholder sector, take place within the informal system. This lack of formality makes the sector unattractive to investments, from public as well as private sources, especially to support growth, technology (e.g. mechanisation) and knowledge-led agriculture. Efforts to link smallholder farmers with the market, thereby promoting agricultural trade, that could in turn lead to more job creation, have been far below expectations. Due to this informality, regulations and policies are not implemented.

In conclusion, the **performance of the ‘soft subsystem’** of the food system, namely the policy landscape, relevant institutions, and the related networks of key actors, with their focus on a few high yielding crops and a flourishing export sector, is **strong in supporting ‘the role of the Nakuru economy in the national economy’, but it is weak in addressing the poor environmental, social and economic sustainability** of the system. In particular, there is a lack of regulatory policy in a context where smallholder farmers compete for scarce resources with capital intensive ventures (often driven by foreign investors). Such soft subsystem characteristics, including key actors’ relations and interests, also contribute to a particular ‘system bias’ against the production, distribution and consumption of indigenous vegetables (the focus of the following section).

## 5. Governance analysis of the integration of indigenous vegetables into the Nakuru County food system

### 5.1. Nakuru actors map for indigenous vegetables

Various actors, coming from five sectors, including the private sector, INGOs, NGOs and civil society organisations, technical and financial partners, public sector and research and development institutions, are directly or indirectly involved in VC activities of indigenous vegetables, as shown in Figure 10. The arrows show their five types of interlinkages: production, financial flows, value addition, distribution/infrastructure, and nutritional relationships.

<sup>134</sup> Note that the crisis of the extension service has already started in the early 1990s, when the International Monetary Fund (IMF) imposed to the Moi Government to fire thousands of forestry and agriculture extension officers to reduce government spending and to become more ‘cost effective’. For more information on agricultural services and decentralisation in Kenya, see: Poultrou, 2010.

## 5.2. Understanding system performance: Agendas, Arenas and Alliances

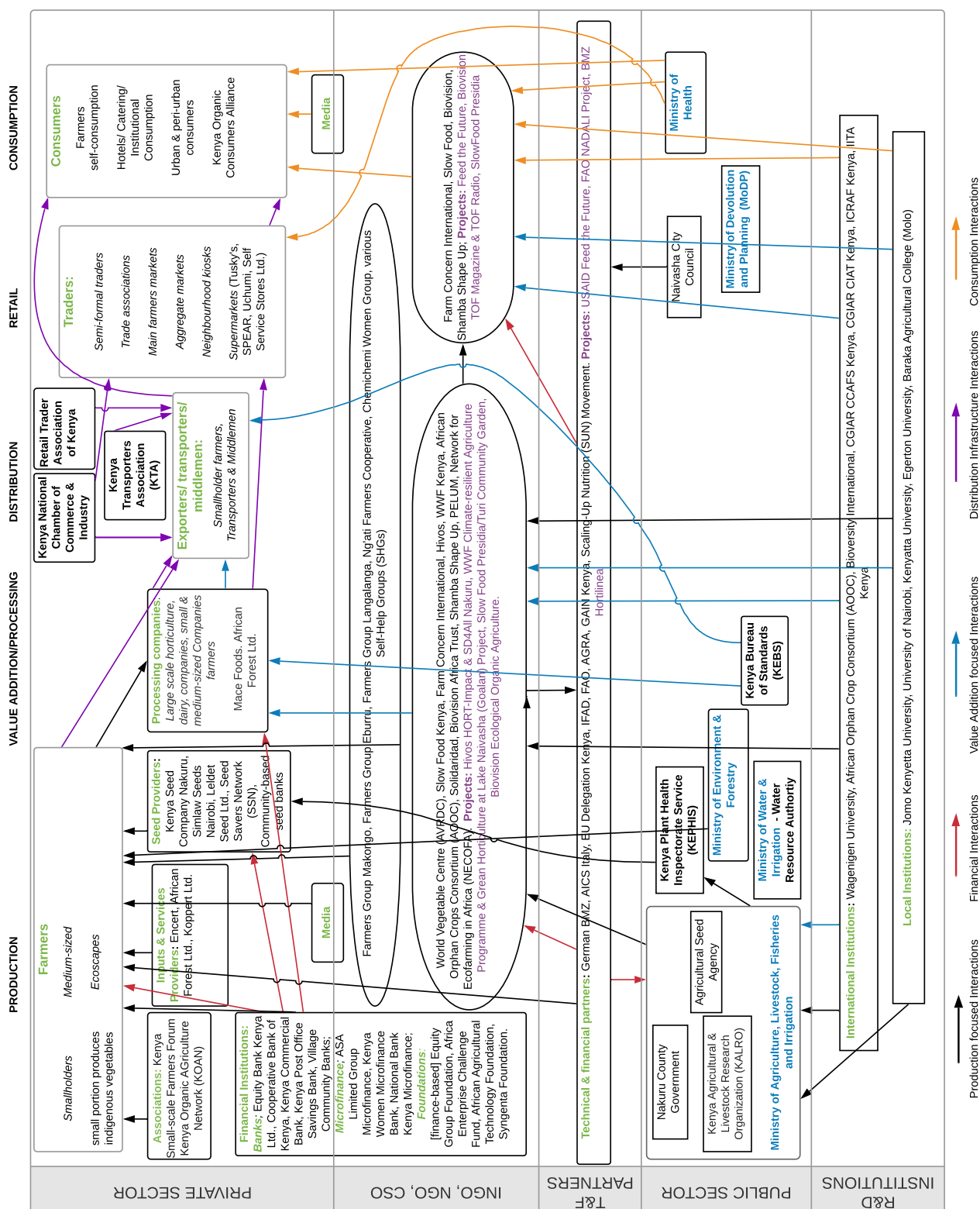
Section 3 described the hard subsystem of the food system in Nakuru County, by doing a mapping of key elements of the food system from three disciplinary angles: the socio-economic, environmental, consumption and nutrition angles. This section looked at the wider food system and it also zoomed in on the hard subsystem aspects of the VC of indigenous vegetables. Then, **section 4** on the soft subsystem of the food system introduced the main actors and their relevance for the local food system. It also dedicated special attention to the Nakuru business support services and their horizontal linkages (e.g. the weak cooperatives in the vegetables sector in Gilgil sub-county). In this section 5, we present **the vertical and horizontal relations between actors in relation to indigenous vegetables**, in order to analyse the governance of the food system. As explained in section 2, vertical linkages connect actors involved in different activities and stages of the VC, from input suppliers to producers, processors, wholesalers, distributors, exporters, and so forth, all the way to the consumer. Vertical linkages are the commercial relationships involved in bringing the product up through the VC (Dunn, 2014, cited by Stein and Barron, 2017). Horizontal linkages, on the other hand, connect actors performing the same activity within the VC. An example of horizontal linkages would be producer groups. Important functions of horizontal linkages include more cost-effective access to inputs, services and information, and the empowerment of farmers to advocate for change. In short, horizontal linkages show how producers and other VC actors are embedded in a VC, but are frequently not included in VC analysis. By looking at **vertical and horizontal inter-linkages, we try to understand bottlenecks to the integration of indigenous vegetables within the food system and we point to actors, and interlinkages, that can be drivers of change** and improve its economic, social and environmental sustainability. This section explains the horizontal interlinkages between actors within the seed, production, processing, distribution and consumption sub-systems. Further, it explains the vertical interlinkages between actors and systems and how aspects of these interlinkages block or drive the ultimate purpose of integrating indigenous vegetables into the overall food system. At the end of each sub-section, we summarise key characteristics, based on four parameters:

- **Actor** (i.e. name/function);
- **Agenda** that refers to the actor's mandate, mission and strategic objectives;
- **Arena** of influence, meaning the field of action, span of outreach; and,

**Alliances**, thereby explaining the type of relations that the actor has with other actors. These relations can be **institutional relations (A), regular exchange of information (B), coordinated activities (C), and co-production using joint resources (D)**.<sup>135</sup>

<sup>135</sup> For more information, refer to: [https://www.shareweb.ch/site/Learning-and-Networking/sdc\\_km\\_tools/Documents/Stakeholder\\_Analysis\\_PEDNetwork.pdf](https://www.shareweb.ch/site/Learning-and-Networking/sdc_km_tools/Documents/Stakeholder_Analysis_PEDNetwork.pdf).

**Figure 10: Main actors involved in the indigenous vegetables food system in Nakuru County and their interlinkages**



## The seed system: a case of biased vertical linkages

An important dimension of the food system bias against indigenous vegetables relates to the seed system. **Farmers in the Nakuru region are plagued by limited supply of and a lack of access to seeds of indigenous vegetables.** There are various reasons to explain these problems, mostly due to vertical linkages, including the market system's bias towards hybrid seeds and conventional crops and the little interest of commercial seed companies in indigenous vegetables; the restrictive laws on selling seeds and the high royalties required to pay, when selling seeds; the costly certification process for seeds; the limited research on indigenous vegetables; and the strong position of a big parastatal company, called Kenya Seeds, in the seed market.

Understanding the governance of the seed system in Kenya, and specifically in the Nakuru County, is not easy, because the system is characterised by many actors - big and small - conducting activities that take place within the **formal, informal and intermediate areas**.<sup>136</sup> The seed industry is regulated by the National Designated Authority on seeds, the Kenya Plant Health Inspectorate Service. There is a seed traders' association with membership from both the private and the public sector. At present, several types of seed systems co-exist, with different actors having different interests and linkages therein, and with some actors playing a role in, and influencing, different types of seed systems.

The **formal seed system is characterised by a multitude of public, parastatal, non-governmental and private players** that follow regulations approved by the government, generally based on international standards. They provide certified seeds of registered, distinct, uniform and stable varieties of maize, wheat, rice and, to a lesser extent, sorghum, cassava, banana/plantain, other vegetables and pulses and specific export crops. Currently there are 144 registered seed companies in Kenya, 85 of which are actively dealing in cereals, pulses, oil crops, horticultural, industrial and forestry seeds. Twenty out of these 144 companies are based in the Nakuru County (Access to Seeds Index, 2018).<sup>137</sup>

**Kenya Seed Company is Kenya's biggest seed company in terms of average volume of seeds traded in the last three years.**<sup>138</sup> It is a parastatal company that researches, develops and markets hybrid and open pollinated variety field crop and vegetable seeds. Figure 11 shows the various activities and connections that Kenya Seed Company has. The company is based in Kitale with branches in other cities, such as Nairobi and Mombasa.<sup>139</sup> Each branch has its own speciality. Importantly, there are **various ways in which Kenya**

<sup>136</sup> van Etten et al. 2017 "The contribution of seed systems to crop and tree diversity in sustainable food systems" which appeared in Mainstreaming agrobiodiversity in sustainable food systems – scientific foundation for an Agrobiodiversity Index, which is summarised in: [https://www.biodiversityinternational.org/fileadmin/user\\_upload/campaigns/CBD/Mainstreaming\\_Agrobiodiversity\\_Sustainable\\_Food\\_Systems\\_Summary.pdf](https://www.biodiversityinternational.org/fileadmin/user_upload/campaigns/CBD/Mainstreaming_Agrobiodiversity_Sustainable_Food_Systems_Summary.pdf)

<sup>137</sup> The liberalisation of the seed industry (mid-1980s - 1996) has seen a rapid expansion of seed companies (Kiambi and Muggo, 2016). See: <http://www.kephis.org/images/Merchants/listofseedcompanies.xlsx>.

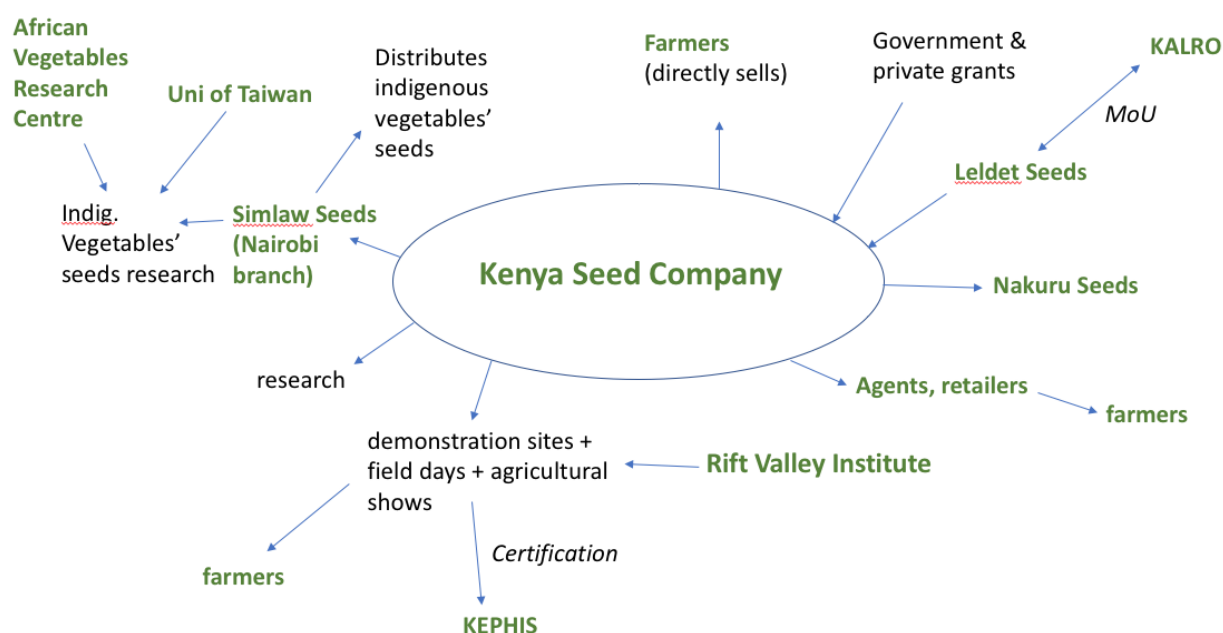
<sup>138</sup> The volumes are based on data for import and local production (Access to Seeds Foundation, 2018). Kenya Seed Company is the biggest company in terms of volumes of seeds traded. The other four top companies in Kenya are the following. First, Western Seed Company is a privately-owned hybrid and OPV field crop company with an integrated seed business model and partners with international research institutes to obtain germplasm for varietal development. Second, Monsanto has seed production activities in Kenya and is active in hybrid and genetically modified maize and vegetable seeds. The company does collaborative research with local and regional partners dedicated to the development of traits that are potentially useful for smallholder farmers in the region. Third, East African Seed is a privately-owned company conducting research and development and is considered the top vegetable seed company in terms of volume of seeds traded. It has a breeding station where it also does research on local vegetable crops such as amaranth. Fourth, Kenya Highland Seed operates exclusively as a distributor of vegetable seeds (Access to Seeds Foundation, 2018).

<sup>139</sup> It was created in 1956 by the colonial administration to distribute seeds to farmers and to develop local varieties of seed adapted to local climatic conditions. The company was opened in Kitale, which is still the national headquarters of Kenya Seeds today. Apart from Kitale and Nakuru, Kenya Seeds holds branches in several other major cities (Nairobi, Mombasa, etc.).

**Seed Company interacts with farmers, mostly promoting seeds of maize (the company controls 75% of the market share of maize seeds) and other commercial and conventional crops (Kiambi and Mugo, 2016). Only in exceptional cases, it promotes the seeds of indigenous vegetables.** Other features include:

- Each branch of Kenya Seeds is compelled to develop 20 demonstration sites. The seeds produced and distributed are grown according to preset protocols, including frequency of irrigation, use of fertilisers and pesticides.
- Farmers are invited to participate in ‘field days’ during which they learn how to grow the varieties of crops distributed by the company according to the most effective growing protocols. Farmers can then also meet private companies supplying fertilisers and pesticides.
- Kenya Seed branches participate actively in agricultural shows.<sup>140</sup> The Rift Valley Institute, close to Nakuru, develops demonstration plots on behalf of the Nakuru Kenya Seeds branch. The Kitale Headquarters release the funds necessary for developing the field trials and for organising farmers’ field days.
- Kenya Seeds distributes seeds directly to farmers that visit the company premises, or through agents, stockists and retailers that negotiate a particular price with the main office. Sometimes better deals can be obtained by negotiating through private agents. Farmers that cannot afford to buy seeds, can negotiate a credit period of 1-2 months with the management.

**Figure 11: Key actors in the formal seed system and their linkages**



**Kenya Seed Company sells seeds within Kenya, both directly and through private agents who buy in bulk and are able to negotiate a convenient price for carrying out distribution.** All seed varieties distributed under Kenya Seed Company are grown within Kenya and nothing comes from abroad. Kenya Seeds stipulates contracts with private outgrowers that produce seeds on behalf of the company. Before being commercialised, the seeds are processed through specific techniques that sometimes include disinfection, fumigation and fertilisation, under inspection by the Kenya Plant Health Inspectorate Service (KEPHIS). During the final step, they are certified. The company’s policy fulfills the mandate to serve farmers within the country, export is not contemplated. However, when needed, KEPHIS can issue an ISTA certificate so seeds can be exported abroad.

<sup>140</sup> In Nakuru, the show is usually staged in early July, while in Nairobi it is in September of every year.

The **working of Kenya Seed Company is characterised by inefficiencies**: although the company is generally known to be a solid and stable national seed distributor with a large capacity and affordable prices, its mode of operation is sometimes inefficient: seeds are not always available in adequate amounts and the quality can be less than declared, especially for non-standard crops. Yet, as a 'parastatal', the company can afford to be economically inefficient and even go at a loss, provided it fulfils its political mandate.<sup>141</sup> As a result, there is **currently no company or organisation in Kenya that can provide a reliable, adequate source of seeds for indigenous vegetables throughout the country**. Although some companies and grassroot organisations provide seeds for indigenous vegetables, this provision is still scattered.

As mentioned, Kenya Seed Company consists of several branches. The Nakuru branch specialises in cereals, in particular wheat. The Nairobi branch belongs to a subsidiary company called Simlaw Seeds. Besides several varieties of conventional horticultural crops (tomatoes, kale, coriander, salads, ...) **Simlaw Seeds distributes leafy vegetables' seeds**, including two varieties of *managu* (large and narrow-leaved nightshades), two varieties of *terere* (large and small-leaved *Amaranthus* sp.), one *saget* (spider plant) and one *mrenda* (climbing vine whose leaves are consumed as green vegetables). The company also develops several peas (including cowpea, *Vigna unguiculata*) and beans, but no *njahĩ* (*Lablab purpureus*). Simlaw Seeds conducts research on new local varieties jointly with foreign research institutes, including the African Vegetable Research Centre and the University of Taiwan. Although exceptions exist, there are generally no strong linkages between Simlaw Seeds and local research institutes/universities for joint research on indigenous vegetables.

It is interesting for the analysis here to look at **small private seed companies** like Leldet Seeds Ltd. that produces seeds for Kenya Seed Company with a formal outgrower contract. It is based near Nakuru town. Leldet farms cover about 700 hectares. The company has a Memorandum of Understanding with the Kenya Agriculture and Livestock Research Organisation and owns its own seed crop. The best returns on investment are obtained when Leldet produce maize. At some point, they invested in growing indigenous vegetables' seeds, for pigeon peas and cowpeas, because these could be conveniently used in rotation with maize. They had planned to sell these seeds, but seed certification requires field trials and taxes. They had to abandon a business plan to commercialise a certified local pigeon pea variety because Egerton University requested a royalty of 7.5%, which was too costly for Leldet Seeds Ltd. By contrast, Simlaw Seeds would not ask farmers for royalties derived from the use of Simlaw deposited varieties. Only private producers of 'breeder seeds' could request for a royalty-added value.<sup>142</sup>

At the other extreme of the range, **informal systems are managed by farmers and their communities, where seeds of preferred varieties and crops are multiplied, saved for production on the farm or distributed to other farmers largely based on customary and informal practices, rules and regulations**. The informal seed system prevails in many countries around the world, also in Kenya and specifically within the Naivasha Basin: farmers get the majority of the seed they use from their own farms or from informal sources, such as relatives, friends, neighbours or local markets. In many cases, farmers are both the producers and consumers of seed and part of the grains produced on the farm become the seeds sown the following year. In this case, renewal of seed stock in terms of crops and varieties occurs when farmers face seed loss, seed degeneration or when farmers want to switch their crop or test different varieties. These circumstances encourage farmers to obtain seeds from other farmers or from local seed markets. However, **while the present legal system forbids sale and even barter of seeds, the law is not enforced against smallholders**. Seeds production, multiplication and exchange remain common practice

<sup>141</sup> Interview Leldet Seeds Ltd., by SASS researcher, 16 July 2018.

<sup>142</sup> Interviews conducted by SASS researchers in Nakuru with representatives of Leldet Seeds Ltd. (16 July 2018) and representative of Simlaw Seeds, Nairobi (17 July 2018).

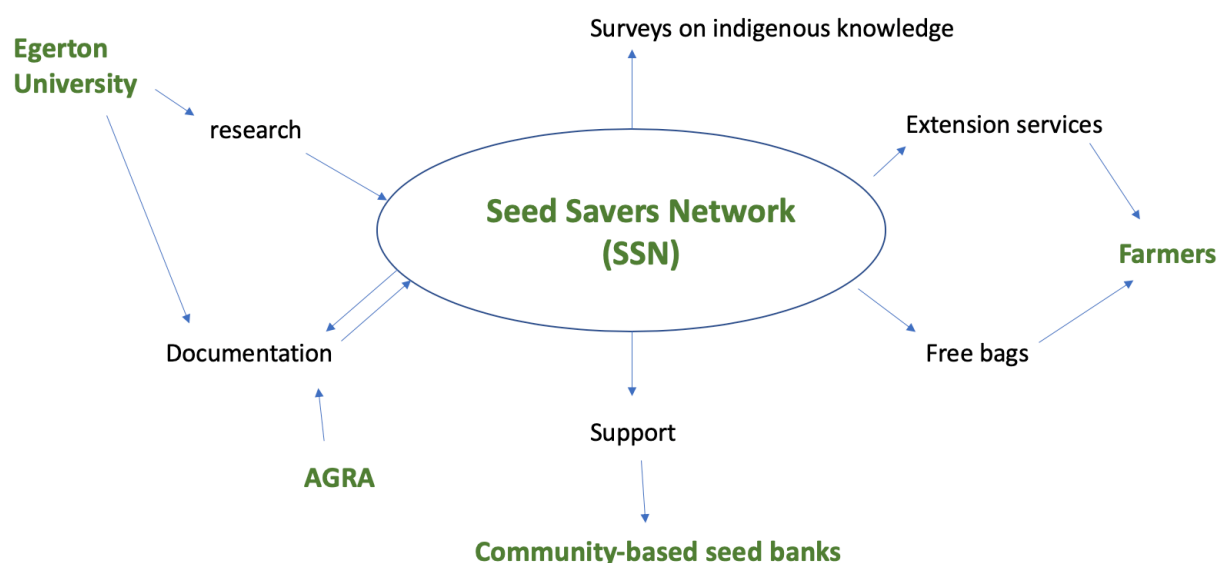
with informal seed sectors accounting for approximately 80% of the seed planted (Kiambi and Mugo 2016, cited by Marson and Vaggi, 2019), farmers simply exchange seeds pretending them to be grains and there seem to be no institutional initiatives to sanction against these practices at the small scale by rural farmers. This is not necessarily good news. While the lack of enforcement allows for business as usual functioning of informal seed systems, it nonetheless prevents projects, programmes and formal initiatives to develop these systems by improving the quality of seeds and their distribution. The official rhetoric of certified seeds blames farmers seeds for poor quality, but poor quality is likely to be a result, not a cause of the existing legal restrictions that prevent farmers seeds' systems to be targeted by development initiatives (Marson and Vaggi, 2019).

Between the formal and informal seed systems, **intermediate systems have emerged in Kenya. They integrate formal and informal elements.** For example, farmers and farmer groups, working outside the formal channels that are regulated by public agencies, multiply and distribute improved varieties developed by the formal sector. Non-governmental organisations and projects provide support to the certification and distribution of farmer-produced seed, in line with national rules and regulations. In the Nakuru region, the SSN is one of the actors operating in the intermediate system, as shown in figure 12.<sup>143</sup> SSN is a grassroots farmers' organisation working to improve seed access and preserve agro-biodiversity (including indigenous vegetables).<sup>144</sup> It also collaborates on documentation of traditional varieties including with Egerton University, that is doing the analysis of seeds of local millet, beans, chickpeas and pigeon peas, with plans to research other indigenous vegetables (this characterisation, gives info on yield, drought tolerance, nutrition content). **Tensions that can arise between grassroot organisations like SSN and the seed research community like universities illustrate some of the governance problems in the seed system, and in particular its biased vertical linkages.** The seed characterisation information collected by universities is also the information needed to register the seeds according to Kenyan Law (at the Kenya Plant Health Inspectorate Service-KEPHIS). Once a seed is registered, the intellectual property rights of the seed variety are owned by the breeder, in line with international seed law models (UPOV91), for instance, a professor who undertook research and characterised the plant variety. If this person does not want to exploit the seed commercially, then the seed information becomes public. But if he/she decides for commercialisation, patenting the seed, then anyone else can use/sell that seed only upon authorisation of the breeder. Smallholders find this certification system bad for them, and organisations like SSN are fighting against it, since it prevents them to sell traditional varieties of seeds, while certification is too expensive and complicated (up to 8 years) for small players; with result of limiting access to/availability of indigenous vegetables' seeds. Therefore, smallholders have indigenous vegetables and/or organic seeds, but the law only allows them to sell such seeds as grains, not as seeds since they are not formally registered/certified. Entry-points therefore exist towards the development of a more effective and inclusive seed system, by reforming such laws or developing community-based seed banks as those supported by actors like SSN.

<sup>143</sup> SSN aims to become a Social Enterprise, but only if the regulations and certification procedures in the region would improve (SSN already has a seed merchant licence). SSN provides various extension services for their members, including support to community-based seed banks, and distribution for free of (6 kg) bags of seeds of local millet, beans, chickpea, pigeonpea to farmers (which SSN receives back from them the following season).

<sup>144</sup> SSN documentary about the difficult access to seeds: challenges facing farmers in accessing seeds: <https://youtu.be/DFvgzqTaJEM>.



**Figure 12: Seed Savers Network and linkages (semi-formal system)****Table 9: Overview of seed actors, their agenda, arena and alliances**

Actor (name, function)	Agenda/Relevance (mandate, mission, strategic objectives)	Arena/influence (Field of action, outreach)	Alliances/Linkages (Relations with other actors)
Kenya Seed Company / Simlaw Seeds	Strong market power (parastatal company); seed selling, research, organisation of field days, agricultural shows and set up of demonstration sites	Farmers, agents, retailers, stockists	Private outgrowers ; Kenya Plant and Health Inspectorate Service ; fertiliser and pesticides companies ; Rift Valley Institute , all company branches
Leldet Seeds Ltd.	Outgrower for Kenya Seeds	Farmers, Kenya Seed Company	Memorandum of Understanding with the Kenya Agriculture and Livestock Research Organisation
Seed Savers Network	Improving seed access, surveys, research, seed conservation and documentation (semi-formal company)	Farmers (support through community-based seed banks or free bags)	Extension services ; Egerton University

Despite the imbalance of power within the seed system and the many factors limiting seed access, the **governance or ‘food system software’ allows for entry-points towards solutions**. First, while the present legal system forbids sale and even barter of seeds, the corresponding laws are often not enforced against smallholders. The current constitution and law provisions could allow for some special treatment of

traditional vegetables seed, paving the way for indigenous vegetables to be proposed as a pilot for local seeds systems development. A potential legal solution to pilot initiatives for farmers' seed system development should be investigated. Poor seed quality is a likely result of legal restrictions that prevent supporting farmers seeds' systems through development initiatives. Second, community seed banks play an important role in distributing seeds of indigenous vegetables among farmers. Third, there is a growing demand for indigenous vegetables that could create a strong market for these vegetables. This may gradually change the incentives to liberalise the seed market for indigenous vegetables. Fourth, new types of research on seeds, conducted in partnership with local universities such as the Jomo Kenyatta University of Agriculture and Technology or Egerton University, are expanding in scope and results may feed into the expansion and liberalisation of the Kenyan seed market.

### The production system: fragmented horizontal linkages and unbalanced vertical linkages

Agriculture is the mainstay of Nakuru County, where we can identify three types of farming systems: smallholder farming systems in which farmers produce mainly for their own subsistence and only partially for markets, medium-sized farming systems, and large-scale corporate farms. The **smallholder system is the dominant farming model in Nakuru County with almost 60% of the population employed in agricultural production.**<sup>145</sup> A very small proportion of these smallholders grows indigenous vegetables or picks them from their plots, when they sprout spontaneously. In most cases, these vegetables are used for household consumption (about 35%), but a certain portion of these traditional vegetables are sold on the market (about 35% is sold on the domestic market, the rest is destined to export markets).

Borrelli and Benegiamo (2019) reported on small-scale farmers in Gilgil sub-County, where they investigated the production and use of indigenous vegetables. They found that indigenous vegetables are increasingly consumed in Gilgil Sub-County in both rural and urban areas and among different social classes. Some people are advised by certain doctors and advertising campaigns to consume them. However, **there are draw-backs**: although their demand is increasing (especially among the growing middle class in urban areas), supply remains limited: most indigenous vegetables grow spontaneously and only a small number of farmers have started planting them specifically for the market.<sup>146</sup> Most vegetables are harvested and consumed by farmers and their families. **Developing market-oriented production of indigenous vegetables would in the first place target urban consumption among the middle class, among who demand is increasing. Indigenous vegetables hold potential for nested markets development and can play a central role in further improving urban-rural linkages.** Box 3 reports on how farmers take their indigenous vegetables to the market.

#### Box 3: Gilgil rainfed farmers and means to access the market

Rainfed farming producing indigenous vegetables in Gilgil sub-County involves mostly women in their forties and fifties. They often sell their indigenous vegetables to farmgate buyers and have limited experience of direct access to local markets. They estimate the price mark-up at these markets as 100% of the farmgate value. Overall, they appreciate the middlemen they work with, because these accept the small quantities they produce. **Farmers recognise that direct access to markets is costly, due to transport, tax collection, and time.** *Beba-beba* boys are market intermediaries who receive farmers at the market gate and offer their services to carry the produce and to connect to a buyer (*beba-*

<sup>145</sup> The primary occupation of the households is crop and livestock production (71%), where 42% of the adult male youth, 13% adult females and 16% men rely on this for their livelihoods. 72% of male farmers have title deeds, but not a single female farmer benefits from title deeds (MoALF, 2016).

<sup>146</sup> Large-scale export-oriented growers are not interested in producing indigenous vegetables, considering them not having a strong market potential. According to an agricultural officer of Gilgil sub-County, at present, 15 acres are dedicated to the intensive cultivation of indigenous vegetables around Gilgil town (Borrelli and Benegiamo, 2019).

*beba* means *carry-carry* and comes from the word they repeat to attract customers). Farmers referred to beba-beba boys as an additional cost to access the market and some reported to have been cheated on by them. Farmers tend to work with a trader they trust, and they call this trader when the produce is ready to be harvested (in some cases, traders harvest the produce themselves). A certain degree of competition among traders within same areas exists and farmers do have alternative middlemen who come to the farmgate. Farmers tend to charge higher prices to alternative traders, who might ask for their produce when they experience undersupply by their usual suppliers. The reference traders instead enjoy better prices, but in turn must ensure regular collection. Farmers do not perceive those traders to be rich, with their most cited means of transportation being motor-bikes. In many cases motor-bikes are actually functioning as taxis and they are not owned by the traders. Other common means of transportation are bicycles (*boda-boda*) or on foot.

Source: Marson and Vaggi, 2019

Farmers experience a number of challenges in producing indigenous vegetables, most notably the **lack of water, seeds and plot size**. Most indigenous vegetables, notably *amaranthus*, *black nightshade* and *cowpea*, need constant irrigation (reason why the majority of farmers only grow them during the two rainy seasons). The majority of farmers explained that they select seeds on-farm, an activity that can require quite some time, if big quantities are needed. It is difficult to find seeds in local agrovet shops and when they are available they are sold in small packages (25 grams). According to staff of the Nakuru Branch of the Kenya Seed Company, this is due to the fact that their demand is considered unreliable and insufficient to make a viable business for the companies producing them. Moreover, according to research by Bymolt and Delnoye (2012), who worked in the Naivasha Basin, **risk aversion among farmers** prevents them from switching to a different crop, or to invest in one single crop alone. Farmers make rational decisions about the crops to grow and those decisions are based on their own experience, neighbour's behaviour, recommendations from extension agents, contracts from large growers. To be convinced they need information about production costs, expected yields and returns, which is often lacking for indigenous vegetables (Bymolt and Delnoye (2012), cited by Marson and Vaggi, 2019). Indeed, another obstacle is that the size of land that farmers are willing to dedicate to growing of indigenous vegetables is small, also considering the trend of decreasing plot sizes.

All these constraints, including the lack of water (rainfall), seed availability and space to grow indigenous vegetables, as well as the uncertain demand (or, lack of knowledge of demand) and difficult market access, unavoidably lower the interests by a large group of smallholder producers to grow indigenous vegetables. The **agenda** for smallholders within the production part of the food system is to produce for their own household consumption and to sell the surplus on the market. In terms of horizontal linkages, farmers are rather scattered and unorganised, as discussed in section 4.2 (see second part on Nakuru business support services). It can therefore be said that they have weak **alliances** among themselves, which results in their weak negotiating position vis-a-vis traders, middlemen or other actors with whom they have some kind of business relationship. In terms of vertical linkages, farmers receive some support from NGOs or seed companies such as SSN, discussed in the previous sub-section, or extension officers. The latter however, complain about not being adequately equipped to meet the needs of all farmers, due to a lack of personnel and funding for extension services. As will be explained in the next sub-section on 'processing', relations between producers of indigenous vegetables and potential processing companies (e.g. companies that could 'dry' indigenous vegetables and make them available for consumption throughout the year) are largely non-existent in the southern Nakuru area. Further, the linkage between farmers and consumers is very weak, in many cases due to physical constraints (i.e. bad road networks, high costs of transportation, and so forth, result in a lack of communication and mutual unawareness of possible and/or existing demand as well as supply). Due to all these factors, the **arena** of influence of smallholder farmers is extremely narrow, as they are very dependent on so many factors as well as actors, as explained above.

**Table 10: Overview of different farmers, their agenda, arena and alliances**

<b>Actor</b> (name, function)	<b>Agenda/Relevance</b> (mandate, mission, strategic objectives)	<b>Arena/influence</b> (Field of action, outreach)	<b>Alliances/Linkages</b> (Relations with other actors)
Smallholder farmers	Self-subsistence and commercialisation	Production and selling if surplus (weak influence, due to being remote, scattered and a lack of support, etc.)	Weak alliances: horizontal among farmers due to fragmentation, and vertical with other actors in the food system such as traders or middlemen.
Medium farmers	Expanding profits and reducing risk	Production and selling (medium influence, being closer to urban consumers)	Sometimes alliances with traders and large farms

Overall, the many constraints create a high level of reluctance among farmers, especially smallholders, to diversify their produce and grow indigenous vegetables. They need strong incentives to diversify production and to meet demand, although unstable, for indigenous vegetables and the difficult market access. As seen in previous parts above, various types of indigenous vegetables can sprout spontaneously and they also generate a higher farmgate price, compared to conventional crops.

The many constraints that farmers face can be summarised by the fact that there exists an **imbalance of power with farmers being the weak link in the chain**. They are the group of actors, who need most support to strengthen their position within the food system, including better access to seeds, more adequate extension services, better physical connections to the market, better connection to processing companies that could process the indigenous vegetables, and so forth. A viable **option for smallholders to overcome some of the identified challenges would be to produce indigenous vegetables ‘as a group’**, although membership in a group does not guarantee that farmers can easily sell the produce. As will be explained in the following section, the high perishability of indigenous vegetables (they must be sold/consumed within 24 hours after harvesting), means that producing large quantities without a guaranteed market is likely to create food losses. Therefore, investments in processing techniques of indigenous vegetables are needed. So far, commercialisation of indigenous vegetables has remained mostly local.

Lastly, Box 4 tells two positive stories of production of indigenous vegetables, one by the Langalanga farmer group and one by a single farmer in Munori in Gilgil sub-county.

#### **Box 4: Production of indigenous vegetables by a group and by an individual farmer**

Story 1: the Langalanga farmer group is a self-help group composed of 25 members, of which 90% are women. The group started as a rotating savings and credit group (see section 4.2) and then became interested in receiving training in organic farming as a means to prevent crop diseases and pest. The group received the support from the NGO Biodivision that helps farmer groups with getting organic certification by EnCert, a Kenyan certification body. In 2012, the group has been also initiated the cultivation of indigenous vegetables with help by Seed Savers Network (SSN). SSN provided them with both training advice and a market output by connecting farmers to local buyers. At the present, only 16 members are cultivating indigenous vegetables, thanks to their access to water or irrigation systems. They grow organic amaranthus (terere), black nightshade (managu) and spider plant (saget) for the local market. They dedicated only a small part of their field to the cultivation of these traditional vegetables (i.e. half an acre or a quarter of an acre). Members have received group training on growing indigenous vegetables, but they sell individually because of different production rates.

Story 2: a farmer, who is a former buyer of indigenous vegetables, based in Nairobi, has set up intensive and market-oriented production of indigenous vegetables near the Turasha river at Kimbo village in Nyandarua County. He is renting

four acres and has dedicated part of them to growing amaranths and black nightshade. He takes water from the Turasha river, pumping it and carrying it to fields by pipelines. He has sixteen employees, working on the field, while he takes care of the transport to the Modurua market in Nairobi where he directly sells the vegetables. He brings around 80,000 bunches of both amaranths and black nightshade to the market by himself, on a daily basis. Black nightshade is harvested every two weeks while amaranths are harvested once a month. The owner bought the seeds in agrovet stores in Nairobi. The characteristics of this business enterprise show the difference in production potential and organisational capacity compared to those of the small farmers in the Langalanga groups.

*Source: Borrelli and Benegiamo, 2019*

In conclusion, there is a **strong imbalance of power in the vertical linkage between smallholders and traders**, as well as a weak, direct vertical link between producers and the 'final markets' in the Nakuru region. Furthermore, farmers operate in a context where remoteness of farmers and difficulties to reach them were reported as main constraints and therefore strongly depend on traders or middlemen. In conclusion, strong support systems for farmers are required, such as cooperatives, self-help groups or a professional network of extension officers.

### **The processing system: well-established horizontal linkages, but missing vertical linkages**

The **potential** for processing indigenous vegetables is high, including encouraging results in terms of the nutritional content of derived products. For example, the inclusion of amaranth in breads, films, and gluten-free products has been researched: in bread, a mixture with 15% amaranth flour adds proteins, which is especially important for children, while not affecting the taste or form of the bread. (Perez-Rea and Antezana-Gomez, 2018).

**Processing indigenous vegetables into dried products with long shelf life, still preserving most nutritional values, is perfectly technically feasible** (Kome et al. 2015, cited by Marson and Vaggi, 2019). This could even be done at a small scale, with simple solar drying techniques. However, processing indigenous vegetables in Nakuru County is not a very common practice. The main constraint to developing processing lies in the size, features and location of the demand markets. Dried indigenous vegetables can be exported to diaspora communities or sold in the urban centres to the middle and upper middle working class. These consumers rely on formal channels for trade and distribution, which results in high volume and high-quality requirements. Such requirements, jointly with compliance to food safety standards and trade licences, can hardly be met by farmers groups (Marson and Vaggi, 2019), as illustrated in Box 5.

#### **Box 5: Small scale drying of vegetables, a failure story**

Diatomite Budget group is a group of women from Diatomite area, an irrigated farming area close to Gilgil. The group started its operations in 2003 with 15 members and at present they are 20. In 2013, upon the submission of a written project proposal, the group was provided with a solar vegetables dryer by a development initiative managed at the sub-county level by the local office of the Ministry of Agriculture. Request for a solar dryer was justified, because group members intended to exploit price seasonality by preserving the vegetables and extend the shelf life of their produce. The price of the drier was 50,000 KES fully paid from the grant. The processing capacity of the dryer was around 30 kg of leafy vegetables per cycle and a drying cycle lasts 2 days. The dryer functioned, but after the purchase eventually it ended up being used only 4 times to produce samples. **The problem was the demand.** Demand for dried vegetables was reported to be high in overseas countries where Kenyans and other Africans migrate to; the Agriculture office administration tried to create a market connection through Kenyans living abroad. This proved to be a failure and the group never received any order. It is likely that, even in the case of orders, they would have failed to comply with international trade standards and procedures. Now the group is engaged in a voluntary savings and loans scheme and it purchased a gazebo and chairs to let for rental for events. This story is a good example of a failed development

intervention targeting smallholder farmers and farmers groups, because of a lack of demand and poor observation of international trade standards. Premium and export markets require marketing skills, connections and quality standards far beyond the reach of such actors.

**Development interventions promoting value addition and processing and improving marketing are an urgent necessity** for the development of African agribusiness. Moreover, farmers are very likely to benefit from trickle down effects of more structured VCs and value addition. This does not imply that farmers themselves can become processors or traders. Running a processing business or a trading activity requires knowledge, skills, and entrepreneurial attitudes that are rare even among educated urban dwellers and there is no reason to expect rural Africans to master them, even after a short training. Another important reason for the lack of small-scale production is that there are no national standards for indigenous vegetables production that would ensure their quality, hence supply of indigenous vegetables to the processors remains highly unpredictable. In addition, small processors find abiding to statutory rules very costly and the informality of the non-export crop business makes contracts farmer-buyer-processor very difficult to enforce. Other constraints include a lack of locally adapted storage and processing technology, inadequate research on new potential products and on the health benefits of processed indigenous vegetables.

**Promoting processing at the medium to large scale seems more viable** than targeting the smallholder farmer scale, but it can entail important trickle down effects on smallholder farmers. If we consider processing into longer shelf life products as an alternative to off-season production, it becomes clear why most vegetable processors buy mostly in the rainy season. Processing plants can support the demand during the main production season, when supply gluts of indigenous vegetables tend to draw down the prices. As vulnerable rainfed producers can only sell in this period, they are likely to benefit from sustained demand and prices in this period.

In the **Nakuru County**, there are three main investors operating in the vegetable sector, but none of them has invested in the processing of indigenous vegetables: first, the **Kenyan Ordonnance Factory Corporation (KOFC)** is a drying plant for green vegetables in Gilgil.<sup>147</sup> It has a processing capacity of 7 tons per line per day multiplied by 3 lines resulting in a total capacity 63 tons per day. This capacity refers to 24 hours functioning with 3 shifts. Additionally, there is a line for tomato sauce. The technology used is steam, using electricity as their source of energy. The plant is expected to cater for the army self-consumption, avoiding outsourcing which is now felt to be insecure as it increases vulnerability to terrorist attacks through poisoned food. However, KOFC is also planning, and making local trials, to sell its dried vegetables on the market and outside the army.<sup>148</sup>

Second, **Njoro Canning Factory Ltd.** is owned by an Indian businessman producing in Njoro, close to Nakuru.<sup>149</sup> The firm was created in 1948 and, for a long time it enjoyed a strong position in the market, because it was the only vegetables processing plant in East Africa. Competition from inside and outside the country has been challenging business profitability. While the firm diversified in many directions other than

<sup>147</sup> See: <https://www.kofc.co.ke/>.

<sup>148</sup> This stands in sharp contrast with the target, clearly stated in the Agricultural Sector Development Strategy 2009-2020 (Government of Kenya, 2010b: xiv) of “*divestiture in all state corporations dealing with production, processing and marketing that can be better done by the private sector.*”

As a matter of fact, dried Sukuma was available at Delamere shop, outside Naivasha town, with 500 grs sold for 1,000 KES. The label declares a ratio of 6 kgs raw Sukuma to 1 kg of dried product, so that 500gr correspond to around 3 kgs. Dividing 1,000 KES by 3 kgs we can see that each raw Sukuma kg is sold at 330 KES. With farmgate price of Sukuma at around 10 KES/kg (source AFA), average wholesale prices in Nakuru around 20 KES/kg, supermarket price around 47 KES/kg in September 2018 this is quite a big mark-up, but an assessment of profitability should be based on data on processing costs.

<sup>149</sup> See: <https://www.njorocanning.co.ke/>.

dried produce, the dried vegetables production line is not producing at present or it is producing far below capacity, due to the loss of a main contract with the Kenyan Army that replaced outsourcing from Njoro Canning Factory with own production by the Gilgil new plant facilities in 2018.<sup>150</sup> Both KOFC and Njoro Canning originally engaged in dried vegetables business for the demand of the army, which is for a standard storable product, so that they did not yet consider or explore the demand by the urban middle and upper class, and the diaspora. Indigenous vegetables have a potential for both diversification (i.e. a new product from the same firm and with the same technology in this case), and for differentiation (e.g. a product with a special feature, such as being 'indigenous' that is appreciated by a group of customers willing to pay more than for the standard product). **The timing could be appropriate for both KOFC and Njoro to consider indigenous vegetables**, because both are now still in the process of defining their strategy: KOFC has just started operating and the idea to serve markets other than the army is still new, while Njoro just lost its contract with the army and needs to explore alternative markets.

Third, **Frigoken** is based in Nairobi with 100 collection centres all over the country.<sup>151</sup> It is a supplier of many important European brands of canned French beans. It buys beans from farmers in Gilgil sub-county, but it does not process the produce in Gilgil. Its main concern is to ensure constant and reliable quality and quantity of fresh produce.

These three centralised processing facilities all make use of **contract farming schemes**. For contract farming, all of them reported to be oriented towards medium to large scale farmers and farmers with irrigation because of difficulties encountered in working with small producers. It was reported that working with smallholder farmers is complicated, because they often fail to provide the defined quantities, due to crop failures (particularly relevant for rainfed farmers) or to opportunistic side selling, so that the investment in inputs and technical assistance by the buyer becomes a loss; they are typically scattered over large areas; and, it is difficult to monitor small producers in terms of their compliance with export standards set by the Agriculture and Food Authority (AFA).<sup>152</sup> These standards refer to inputs and agronomic practices adopted, but also to set requirements like the availability of toilets in the fields which can hardly be fulfilled by small scale farmers. An important element of horticultural guidelines issued by AFA is the Horticulture Code of Conduct, which should regulate contractual agreements between producers and buyers in the industry.<sup>153</sup> Such Code organises producers engaging in contract farming into groups (in the case of small-scale farmers) or registered legal entities (for bigger producers). It also mandates the buyer to provide the necessary extension services, to establish means and ways of financing the producer and to be responsible for traceability of the product. The buyer should relate directly to the producer and not engage sub-dealers.

In conclusion, the processors who could technically process (e.g. dry, ferment) indigenous vegetables have diverging interests and agendas. Although most of them have the technical capacity to process these vegetables, thereby increasing their shelf-life and the possibility of selling them throughout the year, only few

<sup>150</sup> This is mainly due to the loss of a main contract with the Kenyan Army that replaced outsourcing from Njoro Canning Factory with own production among Gilgil new plant facilities in 2018

<sup>151</sup> See: <https://frigoken.com/about/>.

<sup>152</sup> The AFA is the successor of former agricultural boards that were merged into Directorates under the Authority, with the commencement of Crops Act (2013). These were Coffee Board of Kenya, Kenya Sugar Board, Tea Board of Kenya, Coconut Development Authority, Cotton Development Authority, Sisal Board of Kenya, Pyrethrum Board of Kenya, Horticultural Crops Development Authority. While such Boards operated through direct interventions in the market, by purchasing and selling products, AFA's role is now evolving towards regulation. The main concern of the Horticultural Department is to ensure standardisation and food safety for compliance with export standards. In principle, AFA regulation should cover all production and actors in the sector, but the officers do recognise that outside the export oriented sub-sectors, standards might be too demanding for farmers and a challenge to their food security. For this reason and for the practical feasibility of monitoring compliance of thousands of scattered producers, AFA regulations are currently only enforced for investors.

<sup>153</sup> See: <https://www.agricultureauthority.go.ke/hcd-code-of-conduct/>.



of them make the investment (e.g. MACE Foods, but in the northern part of the Nakuru county). The **agenda** of processing companies is to sell goods to a guaranteed market at a profit. In terms of horizontal linkages, all these companies have a relatively well established and strong market position. In terms of vertical linkages, the example of Diatomite Budget group explains that a disconnection between supply and demand can lead to business failures. The **arena** of influence of the processing companies can be quite wide, because they are in a position to influence demand, if they have an effective marketing strategy. Lastly, most processing companies struggle with weak links with producers and distributors. They have **alliances**, through contract farming, with medium- to large-scale farms, due to a variety of reasons, including the lack of constant supply by smallholder farmers.

**Table 11: Overview of processors and processing companies, their agenda, arena and alliances**

<b>Actor</b> (name, function)	<b>Agenda/Relevance</b> (mandate, mission, strategic objectives)	<b>Arena/influence</b> (Field of action, outreach)	<b>Alliances/Linkages</b> (Relations with other actors)
MACE Foods Co Ltd. (in Northern Nakuru)	Process and sell indigenous vegetables	Limited to affluent consumers (and diaspora)	No links with producers and distributors in southern Nakuru
3 processing companies (KOFI, Njoro Canning Factory Ltd., Frigoken)	Vegetable processing (not yet indigenous vegetables)	Kenyan Army (KOFI, Njoro Canning Factory Ltd.), export (Frigoken)	Medium- to large-scale farms

### **The distribution system: weak vertical, but strong horizontal, linkages**

As outlined in various sections above, an important dimension of the food system bias against indigenous vegetables relates to food distribution channels, and therefore to relations between farmers, distributors ('middlemen') and different types of 'final' markets in the area.<sup>154</sup> In a nutshell, the bias against indigenous vegetables in the food distribution system in Nakuru County is that **they have limited access to the different types of markets which in turn restricts production and consumption**. As further elaborated below (also using evidence collected by SASS researchers, referred to e.g. in section 3, especially Marson and Vaggi, 2019), this is the consequence of the current nature of the vertical and horizontal linkages between key actors within this part of the food system, in turn largely determined by the various interests, opportunities and constraints confronting those actors; in few words, the consequence of the current governance of the distribution system in Nakuru County.

First, **smallholders face numerous marketing constraints**, with bottlenecks accentuated in the case of fresh vegetables: perceived exploitation by traders concerning pricing (price is determined by middlemen through visual estimation only); lack of standard methods for determining weight and packaging of fresh produce; lack of market price information; lack of storage facilities and weak road infrastructure (especially the feeder roads leading to farms), which make it hard for farmers to access markets directly and also increase post-harvest losses. Yet, in the Naivasha basin there are at least 5,000 smallholder farms associated with the commercial farming and export vegetable industry, in a context where maize, export horticulture and indigenous vegetables represent very different markets, but markets that can be supplied often by some of the same farmers and traders. According to some estimates, on-farm consumption accounts

<sup>154</sup> According to participants in a multi-stakeholder workshop organised by SASS researchers in June 2017 in Naivasha, there is a perceived "cartel" between middlemen and transporters, while farmers are extremely vulnerable, because they sell individually and in smaller quantities. Another problem is that, to maximise their profits, middlemen demand from farmers to supply their produce packaged in 'oversize bags', that is: bags that are well above (+25%) market standard size. The multi-stakeholder consultation, at which no middlemen were present, also concluded that middlemen cannot be demonised as they are an integral and very important part of the value chain. Their role should be better regulated and supported as they hold market intelligence and other expertise that are very important for connecting smallholder producers to buyers.

for about 35% of vegetables production, and the rest is sold, most of which ultimately for export markets and around 35% for the domestic ones.

Given their high perishability (must be consumed within 24 hours after harvest) and unstable prices, indigenous vegetables tend in the first place to be produced for self-consumption and to a lesser extent for commercialisation. This, together with their dependence on rain patterns as well as some trust issues among consumers (e.g. safety and origin, as elaborated in the following section), in turn lead to **unpredictable aggregate demand for indigenous vegetables**. When selling some of the indigenous vegetables surplus, rainfed farmers prefer to sell to middlemen at farmgate, because the costs and risks associated to direct access to markets are disproportionate to volumes. Yet, compared to conventional horticulture, indigenous vegetables tend to be more profitable as they attract a higher price at farmgate (as observed by SASS researchers) and also imply lower production costs due to less chemical input. But to both farmers and middlemen, uncertain demand for indigenous vegetables and difficult market access (compared to other crops like maize or kale or export horticulture), coupled with perishability, make it less attractive to market indigenous vegetables than other crops, and also not worth investing in changing such bias and produce and trade more indigenous vegetables. For instance, for many middlemen this would mean changing targeted market and likely encountering new taxes or costs (e.g. trading licence) in more formalised markets.

Second, **key constraints for wholesalers and retailers (small shops, open air markets or supermarkets)** include: inadequate storage facilities that makes food purchases of fresh vegetables a daily arrangement/procurement (without cold stores, quality and freshness cannot be preserved and wastage through decaying is common); the need to deal with numerous suppliers, who tend to provide differentiated quantity and quality of the same crop at every delivery (thus often fuelling a lack of trust); inadequate modes of transportation (e.g. pick-ups, motorcycles, tuk-tuks and small vans which are not suitable for fresh produce). For example, in the Naivas supermarket in Naivasha town, given such constraints, fresh vegetables, including indigenous vegetables, are a fast, on-demand segment of the market organised along a daily demand assessment.<sup>155</sup> In case of gaps between demand and local supply, the supermarket can check with Naivas branches in other parts of Kenya and get supplies from them. In the case of indigenous vegetables, they are typically sourced from Western Kenya. Naivas only buys indigenous vegetables from registered traders, not any (informally operating) middlemen, nor directly from farmers. Such registration takes place at Naivas Headquarters in Nairobi and this represents a disincentive for middlemen to enter such formal arrangement. Moreover, rejection rates of fresh produce tend to be high in supermarkets, another disincentive to the trade in indigenous vegetables.

Third, the **constraints faced by middlemen crucially contribute to the bias against indigenous vegetables within the distribution system**. Not only unpredictable demand, hence prices fluctuation, but also lack of contracts and institutions to enforce them, discourage new types of entrepreneurship, and encourage incumbent traders to exploit rent positions by remaining only in the type of market and location they currently serve. So the largely preferred informal nature of interactions between actors leads each trader to “keep his/her spot”, without venturing out to other markets hence competing with others, creating a sort of informal and spontaneous cartel system. Moreover, most traders find it difficult and unappealing to scale up and to formalise their business. While e.g. informal traders and sellers in the local market places and informal markets don’t need a trade licence and only pay a ‘barter tax’, the licence for a grocery shop in Naivasha costs 3000 KES per year, and shops in town pay a land rate of 2000/3000 KES. Barriers to start supplying bigger and more formal businesses are thus also related to low investment capacity of the middlemen. For example, trade licence and PIN number from the revenue authority are needed to supply Naivas

<sup>155</sup> According to interviews, the middlemen get “letters of supply” every day by email (November 2017, field work Naivasha Basin).

supermarket, and the trader is required first to bring samples to the Naivas headquarters in Nairobi, where he/she needs to get registered (this procedure is meant to assess the middlemen's capacity to provide reliable quality and quantity). Such 'costs of formalisation' contribute to keeping informality in the governance of the distribution system, and therefore to enhancing the uncertainty of the demand in particular for indigenous vegetables (given the combination of their seasonality and perishability and price/volume uncertainty). Thus, the traders in the case of indigenous vegetables, and especially when dealing with supermarkets and small shops, are not guaranteed what they consider a small but secure profitability thanks to the rule of thumb margin guaranteed by other crops: "buying for one at farmgate and selling for two". And this weak governance of the distribution system indeed seriously limits the market access for indigenous vegetables.

**All these constraints create diverging interests and agendas for the actors** in different parts of the indigenous vegetables' VC. This, combined with the current status of the linkages and alliances (or lack thereof) among the main actors as well as their different ability to influence various parts of the food system, currently restricts the production, distribution and consumption of indigenous vegetables. The **agenda** for smallholder farmers within the distribution part of the food system is to sell more quantities and at higher/stable prices; but this conflicts with the agenda of traders to keep/increase their profit margins by keeping farm-gate price down and final price up and to keep their respective niches in serving specific markets/outlets. In terms of horizontal linkages, traders seem better than farmers at creating **alliances** among themselves. This determines which markets are covered by different groups of traders and what price they can offer at farmgate; while on the farmers side the horizontal linkage is weak and they tend not to create organisational forms to aggregate and store their fresh produce, hence fail in obtaining better prices and lower rejection rates. The **arena** of influence of the traders is wider than the farmers' since with their business and behaviour, they influence all parts of the food system, i.e. giving incentives on what gets produced, determining directly what is distributed and ultimately influencing what gets consumed. Their choices therefore have an indirect but strong impact on food system sustainability. Smallholder farmers, by contrast, only influence directly the production side of the food system, and only marginally the distribution and consumption sides that are strongly influenced by traders (who in turn affect farmers' production choices). Therefore, though via their choices farmers have an influence (e.g. on the relatively concentrated nature of what is found in the markets and on the safety and nutritious content of consumers' diets), they have a direct but weak impact on the food system sustainability.

**Table 12: Overview of various "distributors", their agenda, arena and alliances**

<b>Actor</b> (name, function)	<b>Agenda/Relevance</b> (mandate, mission, strategic objectives)	<b>Arena/influence</b> (Field of action, outreach)	<b>Alliances/Linkages</b> (Relations with other actors)
Middlemen/traders	Buy goods at low price and sell with profit	Dominant position vis-a-vis farmers	Vertical links with farmers and marketers
Supermarkets, e.g. Naivas supermarket	Sell fresh vegetables (under strict food safety and formal registration conditions)	Influence demand, set food safety/traceability conditions	Registered traders; weak links with consumer organisations

All this seems to suggest that an important part of future efforts for improving sustainability of the Nakuru food system (via increased production, distribution and consumption of indigenous vegetables), lies in **improving the governance of the distribution system and in providing incentives to middlemen**, in order to stimulate their propensity to increase the supply of indigenous vegetables to the different types of local markets. Indeed, as shown above, the system-bias against indigenous vegetables is largely determined by difficult market access and to a certain extent by unstable demand (compared to other crops like maize,

kale or export vegetables), not by lack of supply capacity or low profitability of the indigenous vegetables' production and sales. Given this current nature of indigenous vegetables' demand, both farmers and middlemen seem not to find it worth investing in changing such bias and produce and trade more indigenous vegetables (for middlemen e.g. this may mean changing targeted market including encountering taxes in markets or costs for trading licenses). But in the case of the **traders**, at least they **have more options than farmers for benefitting from this status quo**, given their better ability to collude (i.e. their stronger horizontal linkages) as well as the many sources where consumers go and purchase their food: small shops, informal open-air markets, small neighbourhood groceries, town markets, supermarkets, street vendors and informal redistributive networks (e.g. based on gifts and opportunistic selling, linked to consistent internal migration within Kenya).

This imbalance of power in the vertical linkage between smallholders and traders, as well as the weak direct vertical link between producers and the 'final markets' in the Nakuru area, make the distributors or middlemen always the target of strong criticism by smallholders themselves and often by other actors in the food system who want to help smallholders (e.g. NGOs, local governments and researchers). However, as seen in this section, middlemen are an integral and very important part of the VC (with big influence on the different parts of the food system). Therefore, this category should not be made the sole culprit for the problems in the VC. On the contrary, in a context where remoteness of farmers and difficulties to reach them were reported as main constraints (for extension services, for contract farming, for certification, etc.), **middlemen have an unexploited potential as links with the smallholder farmers**. Their business should be better regulated and supported as traders have market intelligence and other expertise that are very important to connect smallholders to consumers, and ultimately to make the access of indigenous vegetables to markets more stable and profitable for the benefit of the whole food system.

### The consumption system: unmet demand due to weak vertical linkages

**Indigenous vegetables are in the first place cultivated for self-consumption, but their market demand is growing** (as confirmed by different stakeholders during several field research visits). Market surveys, as mentioned in previous sections, show that the demand for indigenous vegetables is often not fully met in Kenyan urban and peri-urban markets. There are even potential regional and international markets. For instance, people in the diaspora in the United Kingdom and the United States are buying dried indigenous vegetables shipped from Kenya and have expressed an interest to get a wider variety of indigenous vegetables (Abukutsa-Onyango, 2010). In bigger cities, such as Nairobi, indigenous vegetables are sold to hotels and restaurants to be promoted as 'authentic, traditional dishes'. For instance, Amaica, a small but significant restaurant chain in Nairobi, buys its cowpea leaves and spider plant from groups of women growers. Amaica distributes the vegetables to its eateries in Nairobi, including its new outlet at Jomo Kenyatta International Airport. Other branches will soon be opened outside the capital.<sup>156</sup> The most significant amount of indigenous vegetables is offered in food kiosks neighbouring city markets throughout the capital. At the level of consumption, unlike production, maize and indigenous vegetables tend to be complementary in the plate, not competitors. The competitor for indigenous vegetables is kale.

**Despite demand growing in urban areas, aggregate demand generally remains erratic, from a formal market perspective.** This seems to be due to various reasons, including limited consumer awareness on indigenous vegetables' benefits (with exceptions in the educated upper classes or through some donor-funded projects promoting indigenous vegetables); food safety issues (real or perceived) and the related lack of trust; issues of origin (e.g. indigenous vegetables from Western Kenya are known to be safe and tasty vs stigma of indigenous vegetables from the Naivasha Basin, since it is known to be a hotspot for export-oriented horticulture, using chemical inputs); high prices of indigenous vegetables that originate from faraway

<sup>156</sup> See: <https://www.fairtrade.net/new/latest-news/single-view/article/rekindling-interest-in-african-vegetables.html>.

parts of Kenya and need to travel far between production phase and consumption phase; cultural inertia and a high price related to the consumption of processed indigenous vegetables even when they are more easily available than the more traditional fresh indigenous vegetables (e.g. the MACE-ARF Project shows that high income consumers are prepared to consume packaged and dried products; MACE Foods, 2018).<sup>157</sup>

In general, **when indigenous vegetables are not sold directly on the market, they are sold to middlemen, who set the price.**<sup>158</sup> Production, handling and marketing of indigenous vegetables are mostly done by women and profits can be considerably high: at each exchange point, over 75% could be made. In the Naivasha Basin, a very small segment of farmers, who have surplus tend to sell their indigenous vegetables via middlemen to supermarkets in Nairobi and Naivasha, depending on the prices and demand on a particular day.<sup>159</sup> A very small - almost insignificant in terms of quantity - segment of farmers have (indirect) access to organic markets, because they need to fulfil the conditions of certification schemes, as illustrated by the example in Box 6.

#### **Box 6: Karen Organic Market in Nairobi and required certification schemes**<sup>160</sup>

The Karen Organic market, on the outskirts of Nairobi, was set up in 2010, thanks to a fundraising initiative by John. M. Scully, an American (Marson and Vaggi, 2019). Although it is called a farmers market, it also hosts traders<sup>161</sup> and processors.<sup>162</sup> The market is held every Saturday. Sellers are required to pay a small fee (100 KES per day) to access the premises and use the facilities. No trade license is required. The organic market only recognises Encert organic certification,<sup>163</sup> although this scheme is quite demanding both in terms of costs and in terms of controls.<sup>164</sup> Mark-ups on vegetables from farmgate to Karen are estimated around 200% (two times farmgate value) for *sukuma wiki*. Generally, selling in Karen Organic Market happens at prices, comparable to supermarket prices (about double the farmgate price). An alternative, less costly and less demanding certification scheme is provided by the Kenya Organic Agriculture Network, whose approach “include group certification through Internal Control Systems, Participatory Guarantee System and Risk Based Quality Management”.<sup>165</sup> There also exist new organic markets that recognise the Kenya Organic Agriculture Network certification. These include the US embassy market, started 6 years ago by US embassy staff, the Bridges Organic Restaurant,<sup>166</sup> and the Upper Hill Market.<sup>167</sup>

A look at secondary data on farmgate prices and quantities (**Error! Reference source not found.**) supports the idea that **prices tend to be higher for indigenous vegetables**, when compared to common cabbage and *sukuma*: while volumes at country level tend to increase for all indigenous vegetables considered, the corresponding prices tend to increase as well. This can be explained by the fact that, in the considered periods and markets, the increase in the produced and supplied volume was more than offset by the increase of the demand. Also, inflation can be high (often at least 12%). While demand in urban areas is generally increasing, this does not exclude that in particular times of the year and in specific markets, oversupply can

<sup>157</sup> Chandarana's supermarkets patronaged by the wealth group recorded the highest sales (average of 2517 sachets per week) compared to, respectively, Tusky's and Uchumi's of 1235 and 1426 sachets.

<sup>158</sup> SASS Field Research, Gilgil area, June and November 2017.

<sup>159</sup> Only very few farmers sell to supermarkets, because they need to be registered suppliers and they must ensure quantity and quality.

<sup>160</sup> See: <http://ofmkenya.org/>

<sup>161</sup> See for example: <https://kalimonigreens.com/>

<sup>162</sup> See for example: <https://www.healthyu.co.ke/>,

<sup>163</sup> See: <http://www.encert.co.ke/>.

<sup>164</sup> The costs of Encert organic certification are 14,000 KES during the first year, then 4,000 KES per year for farmers who own land below 5 acres; 35,000 KES for farmers with land above 5 acres and farmers groups. These figures refer to some 7-8 year ago, but the current fee structure can be found at [http://www.encert.co.ke/fee\\_structure.htm](http://www.encert.co.ke/fee_structure.htm). Inspectors from Encert visit farms for annual inspection.

<sup>165</sup> See: <https://www.koan.co.ke/organic-standards/>.

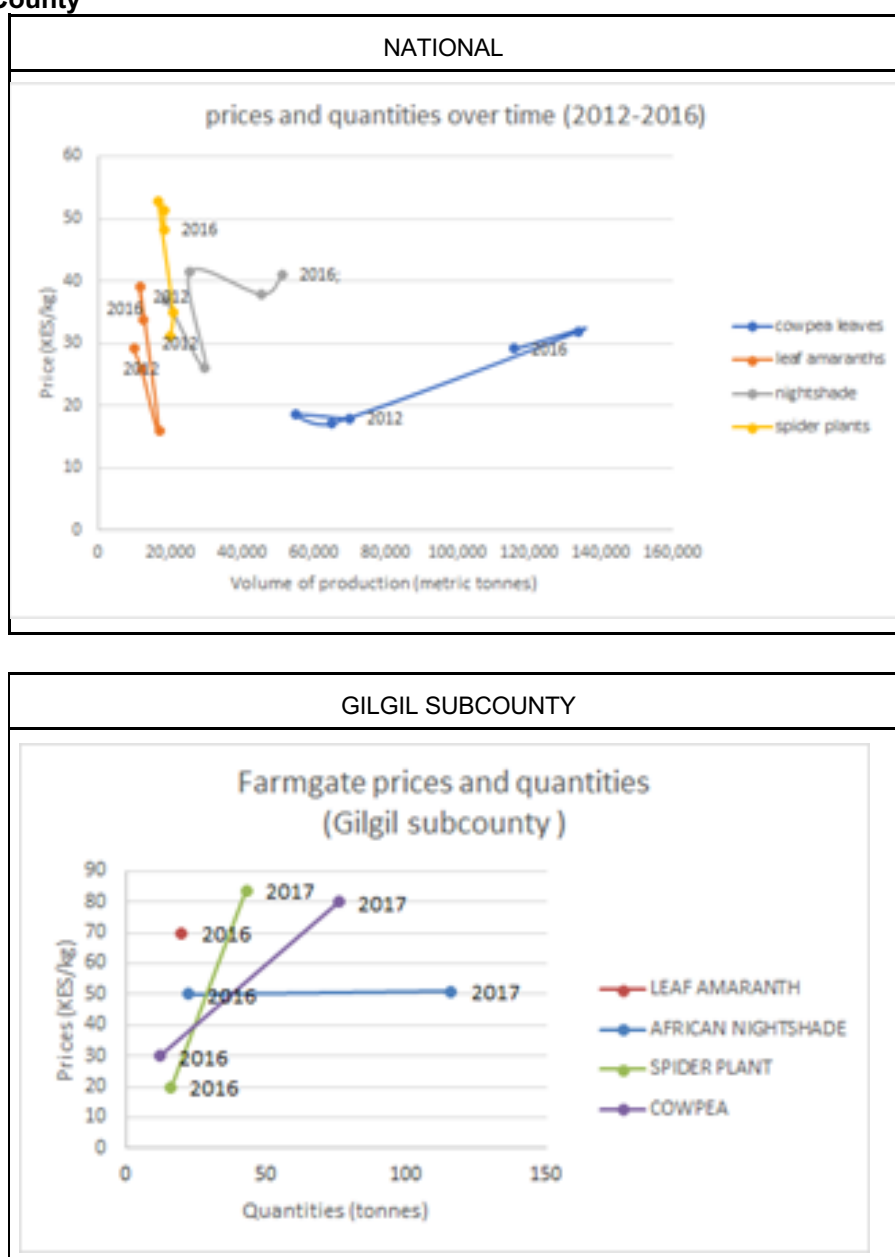
<sup>166</sup> See: <https://bridgesorganics.com/>

<sup>167</sup> See: <https://www.facebook.com/OrganicFarmersMarketNairobi/>

happen and important volumes of fresh product are wasted or sold at very low prices (Marson and Vaggi, 2019). At the same time, in some areas and periods, there is inconsistent and discontinuous consumer demand for indigenous vegetables.

SASS research points out that there is an increasing demand for indigenous vegetables, mostly among middle-class consumers in urban areas such as Nakuru and Nairobi cities, but also among an increasing number of urban poor. While the main agenda for consumers in general is affordability, their **agenda** is to consume these vegetables, motivated by health reasons (e.g. through health campaigns highlighting the nutritional benefits of indigenous vegetables) and with a willingness to pay a higher price.

**Figure 13a, b: Trends in prices and quantities at the national level (right hand chart) and at the level of Gilgil sub-County**<sup>168</sup>



Source: Marson and Vaggi, 2019

<sup>168</sup> Own elaboration by Marson and Vaggi (2019), based on data from Agriculture, Fisheries and Food Authority USAID 2015 and AGRICULTURE AND FOOD AUTHORITY 2017 and from Gilgil sub-county Agricultural Office.

There exists however broken linkages in the supply chain (vertical linkages) of indigenous vegetables, due to many constraints discussed above in this paper, including the scattered production of indigenous vegetables, inadequate infrastructure network, and so forth. Furthermore, consumers' **arena** of influence towards more sustainability in the food system can be large, including to increase production, distribution and consumption of indigenous vegetables, as they are in a position to set, increase or lower demand and therefore drive producers' and distributors' choices. However, this would require much stronger **alliances** between processors and the actors in the rest of the VC, which in turn would require much stronger consumers' organisations.

**Table 13: Overview of consumers, their agenda, arena and alliances**

<b>Actor</b> (name, function)	<b>Agenda/Relevance</b> (mandate, mission, strategic objectives)	<b>Arena/influence</b> (Field of action, outreach)	<b>Alliances/Linkages</b> (Relations with other actors)
Affluent urban consumers	Buy indigenous vegetables (health considerations)	Medium: demand creation due to willingness to pay; but relatively small in numbers	Weak vertical linkages; medium horizontal linkages (early examples of consumer organisations, including via social media)
Poor urban consumers	Buy affordable food (difficult to achieve diversified diet)	Medium: big in numbers; but little to spend hence little influence on demand	Weak vertical and horizontal linkages

### 5.3. Summary of the governance analysis of the 'system bias' against indigenous vegetables

Given the analyses of sections 3.5 and 4.3, this section explores in greater depth key governance issues to be solved concerning the (lack of) integration of indigenous vegetables within the local food system, as well as the main actors and key drivers and/or constraints involved. As mentioned before, indeed, one of the main hypotheses tested by SASS is that the 'diversification pathway' (i.e. a growth of the production, distribution and consumption of indigenous vegetables) can lead towards a more sustainable local food system (i.e. by addressing the various aspects of weak sustainability as presented in section 3.5). Despite this analytical focus on the indigenous vegetables VC, we do not intend to diminish the importance of compounding cross-cutting governance bottlenecks such as weak institutions (e.g. farmers' organisations) and policies outlined in 4.3. These will have to be solved as well, for a better integration of indigenous vegetables into a food system leading to improved sustainability. Key governance issues, following 'in order' the different parts of the indigenous vegetables VC, include:

- The **seed system** is geared towards the promotion of few staple crops and horticulture for export and it does not provide for indigenous vegetables VCs. Farmers in southern Nakuru County face limited supply of indigenous vegetable seeds. The current seed system is biased against farmers' informal seed exchange and there is no integration with formal seed distribution systems. This is an important bias, because most of the indigenous vegetable seeds are sold or traded within informal circles, not the formal seed system. Yet, formal seed producers are showing a growing interest in indigenous vegetables (Simlaw Seeds has started distributing leafy vegetable seeds). Another interesting evolution is that "intermediate seed systems" that integrate both formal and informal elements, seem to be emerging in Kenya. **Our analysis of the Agendas, Arenas and Alliances** related to seeds



points to a case of biased vertical linkages: the market power of the big parastatal company as well as the bias of both laws and formal markets towards hybrid seeds and conventional crops do not provide incentives to legally supply seeds of indigenous vegetables to producers, nor protect their informal seed systems. New dynamics exist however that could lead to new alliances among different actors to promote “intermediate seed systems” in favour of the strengthening of indigenous vegetables VCs. Organisations such as SSN, that bridge the formal and informal seed sectors, can help smallholders overcome the bottlenecks they face along the diversification pathway.

- **Production.** The largest group of indigenous vegetables producers consists of smallholder farmers, who often lack efficient production techniques and have little information about market demand. In addition, they are hindered by many other factors, including the lack of access to loans and the lack of effective market infrastructure. Most indigenous vegetables are produced for self-consumption: despite the fact that most smallholder farmers grow some indigenous vegetables during the two rainy seasons (only then, due to the general lack of irrigation means), production is low, post-harvest losses are high, and producers have difficulty in supplying regular quantity and quality even to a small group of few interested buyers. Indigenous vegetables VCs suffer from a certain degree of ‘cultural inertia’ as well, related to the ‘guaranteed market of maize’ (easy to produce, to store; subsidised; etc). Moreover, at the level of production, indigenous vegetables can compete with maize in the sense of choice of what crop to plant (in generally small and very small plots of land), though intercropping is also largely used. **Our analysis of the Agendas, Arenas and Alliances** related to production points to a case of fragmented horizontal linkages and unbalanced vertical linkages: smallholder farmers (the most prominent producers of indigenous vegetables) are rather scattered and unorganised, hence poorly supported by weak alliances among themselves and ultimately driven by the agendas of the rest of the actors in the VC, especially input providers and middlemen. This also explains a high level of reluctance among farmers, especially smallholders, to diversify their produce and grow more indigenous vegetables, which would in principle allow them to connect more effectively to processors and consumers in urban areas. As a consequence, the arena of influence of smallholder farmers, the weakest actor in the VC, is extremely narrow, even if they hold great potential to support improvements in the sustainability of the local food system, including through the diversification pathway (if anything, for their large share of the total population).
- **Processing.** Indigenous vegetables’ VC development is severely limited by the challenges posed by price seasonality and by the perishability of the product. Therefore, value addition and processing of these vegetables into products with longer shelf life would be a very important element for potential improvement. In the Nakuru region, vegetable processing companies (e.g. MACE Foods dries indigenous vegetables) struggle with weak links with producers and distributors. No national standards exist for indigenous vegetables production that would ensure their quality, hence supply of indigenous vegetables to the processors remain highly unpredictable. Lack of incentives for processing also relates to: erratic demand of processed indigenous vegetables; lack of locally adapted storage and processing technology; inadequate research on new potential products and on the health benefits of processed indigenous vegetables. It is very costly to respect statutory rules for small processors (who cannot afford bribes or exemptions); informality of the non-export crop business makes contracts farmer-buyer-processor very difficult to enforce; lack of business skills and production-discipline by most small farmers, which e.g. leads most small farmers of indigenous vegetables to choose to produce indigenous vegetables that grow faster (like *kunde*, 60 days) rather than those that grow longer (*managu*, 90 days) even if these fetch a higher price, being in much higher demand, especially in terms of processed product. **Our analysis of the Agendas, Arenas and Alliances** related to processing points therefore to mostly missing vertical linkages, with diverging agendas between few existing processors and the many potential producers of indigenous vegetables. In terms of horizontal linkages, all these companies have a relatively well established and strong market position, but weak

vertical linkages which in some cases have led to company failures (disconnect between supply and demand). In principle the arena of influence of the processing companies towards more sustainability in the food system can be quite wide, (including to increase production, distribution and consumption of indigenous vegetables) because they are in a position to influence both consumer demand and supplier's choices, but this would require much stronger alliances between processors and the actors in the rest of the VC.

- The **distribution** system is structured around maize and few 'other crops', with the vast majority of contracts between small farmers and buyers concerning maize. No aggregation centres nor a system of national standards are in place for non-export fresh produce like indigenous vegetables, while a lack of access to irrigation and market access are the main factor influencing production and consumption. Producing indigenous vegetables is a profitable business for farmers at the farm gate, but not yet proven to be profitable for marketers, as demand for indigenous vegetables is unstable (compared to other major crops), due to various market failures and other bottlenecks (e.g. the lack of standards for indigenous vegetables, leading also to impossibility to signal to consumers the origin and safety of indigenous vegetables). Ultimately, the bias against indigenous vegetables in the food distribution system in Nakuru County is that these vegetables have limited access to the different types of markets which in turn restricts production and consumption of indigenous vegetables as well. **Our analysis of the Agendas, Arenas and Alliances** related to distribution points to the fact that an important part of the future efforts for improving sustainability of the Naivasha food system (via increased production, distribution and consumption of indigenous vegetables), lies in improving the governance of the distribution system and in changing the incentives faced by middlemen, in order to improve access for indigenous vegetables to the different types of local market segments. Indeed, our analysis shows that the system-bias against indigenous vegetables is determined also by uncertain and unstable demand (in formal and semi-formal markets) and difficult market access, not by lack of supply (during the rainy season) or low profitability of the indigenous vegetables' production and sale. Given this current nature of indigenous vegetables' demand (compared to other crops like maize, kale or export vegetables), both farmers and middlemen don't find it worth investing in changing such bias and produce and trade more indigenous vegetables. Therefore, in a context where remoteness of farmers and difficulties to reach them were reported as main constraints (for extension services, for contract farming, for certification, etc.), middlemen have an unexploited potential as links with the smallholder farmers. Their business can and should probably be better regulated, but also supported as traders have market intelligence and other expertise that are very important to connect smallholders to consumers, and ultimately to make the access of indigenous vegetables to markets more stable and profitable for the benefit of the whole food system
- Consumption.** Demand for indigenous vegetables in Nakuru County is growing, especially in urban areas, but it is also an erratic demand (from a formal market perspective), due to: limited consumer awareness on indigenous vegetables' benefits (with exceptions in the educated upper classes or through some donor-funded projects promoting indigenous vegetables); some issues of food safety (real or perceived) and related a lack of trust; issues of origin and related 'sticky' consumer preferences and of lack of traceability. This is also due to weak horizontal linkages among consumers themselves, which makes it difficult for them to promote more information transparency in the indigenous VC. Other problems are: high prices of indigenous vegetables that originate from faraway parts of Kenya and need to travel far between production phase and consumption phase; cultural inertia and a high price related to the consumption of processed indigenous vegetables even when more easily available than the more traditional fresh indigenous vegetables. **Our analysis of the Agendas, Arenas and Alliances** related to consumption points to a case of weak vertical and horizontal linkages, with consumers having a strong agenda both on affordability and nutritious food, but little capacity to organise themselves and uniformly influence the market. Consumers' arena of influence towards more

sustainability in the food system can indeed be large (including to increase production, distribution and consumption of indigenous vegetables) as they are in a position to set, increase or lower demand and therefore drive producers' and distributors' choices, but this would require much stronger alliances between consumers and the actors in the rest of the food system, which in turn would require much stronger consumers organisations. For instance, an alliance could be envisaged between consumers and other stakeholders in the maize and in the indigenous vegetables VCs, aimed at more nutritious diets, for instance by promoting the systematic use of indigenous vegetables in maize meals. Such alliance could be based on the fact that at the level of consumption (unlike production), maize and indigenous vegetables tend to be complementary in the plate, not competitors, and that middle-class consumers in urban areas (but increasingly also poorer urban consumers) are increasingly looking to consume indigenous vegetables.

## 6. Pathways to solutions and entry-points for improving food system sustainability through diversification

As seen in Section 5, the food system approach reveals the underlying structures and the relationships within the food system. The analysis of the cause-effect patterns and of sustainability in specific parts of the food system is enriched by understanding feedbacks from other parts of the system that might otherwise be overlooked in the absence of a systemic approach. In an effort to identify the right policy entry points for improving sustainability, the **food systems approach offers not only a means to compare different intervention options but also a framework for systematically analysing synergies and trade-offs between various policy objectives** (van Berkum et al., 2018: pp. 24-25). Indeed, better governance of the food system can be constrained by the lack of accurate information on the system and its feedback loops, so policy design and enforcement can be supported by food system analysis and the information generated on likely impacts, synergies and trade-offs. Authorities responsible for policy design and implementation can thus better understand where regulations are being effective or are failing, and also continuously verify who the relevant food system stakeholders are for specific intervention options, including to respond to complaints about the trade-offs generated by a certain option, penalise transgressions, etc.

In this section, we discuss the preliminary '**pathways to solutions**' for a more sustainable food system in the southern Nakuru area as emerging from the food systems approach applied by the SASS programme, with a particular focus on increasing the production, distribution and consumption of indigenous vegetables. The research and policy dialogue conducted so far by SASS demonstrate that the debate on food system diversification, and better integrating indigenous vegetables into the local food system, is very timely and it is particularly welcomed by local actors as SASS completes previous efforts that were lacking a clear policy dimension (important projects e.g. by Bioversity, AOCC, WVC, KALRO, etc. have produced on-farm productivity gains and awareness tools for indigenous vegetables like training manuals; but not policy briefs, legislative proposals, etc.). **Most local stakeholders expressed therefore their interest to partner with SASS as it promises to help improving policies** for a more sustainable food system and to promote the production, distribution, and consumption of indigenous vegetables in Kenya. However, we refer to our suggested improvements as "pathways" not "solutions", since indeed SASS research and dialogue so far already stimulated useful ideas on what can be done better to enhance sustainability (both within the consortium and local stakeholders and partners); on the other hand, all such ideas need to be further analysed, and further discussed with local stakeholders, before they can be confirmed to be 'likely solutions' and 'final recommendations emerging from SASS' (including in relation to possible concluding evidence about diversification as an effective pathway for sustainable food systems).

This section identifies two sets of ‘pathways to solutions’ for improving food system sustainability: **i) improving the governance of indigenous vegetables value chains** and their integration in the local food system; **ii) a better crosscutting enabling environment to diversify the Nakuru food system (and food economy)**. Importantly, both sets of policy entry-points should be intended not simply as improvements in value chain efficiency (hence also addressing the bias of the system against indigenous vegetables), but as contributions simultaneously to the economic-social-environmental sustainability of the whole food system.

The suggested ‘pathways’ in particular address the bottlenecks to diversification (i.e. to better integrating indigenous vegetables into the Nakuru food system) **from a governance, or ‘soft’ system, perspective** (as outlined in Section 5) since the practices of, and interactions between, relevant stakeholders, networks and institutions consciously or unconsciously influence, if not regulate, the way the ‘hard’ local food system operates and determines its outcomes (including in terms of food quality, availability and access). Such governance perspective will be particularly important as any ‘pathway to solution’ or intervention option for the local food system needs to be put into the broader context of national and international economic trends that also affect this county, starting with the overall ‘political economy of southern Nakuru’ (i.e. the role and features of the Nakuru and Naivasha economy in the national economy).

SASS multi-disciplinary research aims to understand, as illustrated in Table 14 below, if the sustainability of the current food system can be enhanced through an overall diversification pathway and what synergies (likely positive simultaneous benefits) and trade-offs (possible negative consequences to be balanced) in terms of sustainability (social, environmental, economic) and outcomes (food quality, availability and access) should be taken into account when promoting a better integration of indigenous vegetables in the food system. This indeed implies also **exploring whether such diversification can promote a transition** from an export-oriented monocropping model, with a booming real estate sector around lake Naivasha (both currently dominating in terms of volumes of profit and political economy influencing the policy decisions made) to a more sustainable food economy model, based on smallholder agriculture and more differentiated production, feeding both Nairobi and the county markets, thus serving the majority of local people and the increasing affluent consumers moving to this area too (including tourists). The feasibility of this diversification and transition **will depend largely on its economic, social and environmental implications**: from the amount of jobs that such sustainable agriculture model could create relative to the export-oriented model; to the consequences in terms of local food and nutrition security; to the natural resources needed as inputs for the new value chains promoted (such as indigenous vegetables).

Following the logic of section 5, the preliminary ‘pathways to solutions’ emerging from the SASS multi-disciplinary research are presented in this section separately for different parts of the food system, but we suggest to consider them together as a **‘package’ of improvements** aimed at i) **maximising synergies** between different interventions for economic, social, and environmental parallel improvements, while ii) **minimising the trade-offs** associated with those measures to promote the indigenous vegetables value chains.

## 6.1. The seeds system

Better integrating indigenous vegetables faces a number of constraints in the input part of the food system, most notably: the market power of Kenya Seed Company, a big parastatal, focusing primarily on providing inputs for staple crops (e.g. maize seeds); the bias of both laws and formal markets towards hybrid seeds and conventional crops not providing incentives to legally supply seeds of indigenous vegetables; the presence of unregulated, informal market of seeds; and the strong subsidies to inputs for staple crops such

as maize. At the same time, the input system is being driven more recently also by positive factors, in particular in the seed sector. For instance, research, especially when conducted by international organisations, is being conducted on indigenous seeds and to some extent this guides the choices made by local seed companies. Also, 'intermediate seed systems' have been emerging and they can offer a window of opportunity to bridge the informal and formal seed sectors.

To overcome such constraints and building on these positive dynamics that reduce the 'system bias' against indigenous vegetables, this section presents a number of '**pathways to solutions**' with regards to seeds (emerging from SASS-related research and local multi-stakeholder dialogue), specifically to conserve and promote indigenous or traditional seed crop diversity.

**Table 14: Summary of the current food system performance and expected implications of the diversification pathway, in terms of sustainability and outcomes (positive + and negative -)**

	Characteristics of the food system	Social sustainability	Environmental sustainability	Economic sustainability	Food quality, availability and access (outcomes)
Current food system	High population growth; Migrant influx; Small-scale farming prevalence (n. of people); Export-oriented large farms prevalence (n. of jobs and revenues generated); High degree of staple production; Inadequate storage facilities; Fragmented markets; High biodiversity; Access to water; Tourism and real-estate development;	- Exclusion and marginalisation of small-scale farmers - High school fees - ...	- Natural resources competition - Deforestation - Soil quality - Land clearance - Water quality and quantity	- Scarce remuneration for smallholders - Rising land prices - Low output agriculture	- Quality of consumption - Limited nutritional knowledge - Price variability - Food access efficiency - Low protein consumption
		+ Inclusion of youth, women, and migrants in well-established sectors	+ Efficient large farms + Tourism can support biodiversity conservation	+ Employment and income generation	+ Importance for national food security
Diversification pathway	Stronger support for indigenous vegetables; Priority on short value chains; Policy environment conducive for indigenous seeds and production; Extension services support for smallholders; Rich agrobiodiversity;	- Gender related tensions from changing role in household production...	- Unlikely to affect environmental effects of large farms...	- Decreased jobs in large farms...	- Lower staple production with consequences on food security...
		+ Increased seed autonomy + Increased support for farmer organisations + Equal economic opportunities through inclusive value chains + Indigenous crops are gender-inclusive...	+ More resilience + Biodiversity conservation + Increased soil fertility...	+ New economic opportunities for smallholders + Diversification decreases risk-profile...	+ Improved nutrition + Awareness of health benefits via indigenous vegetables...

First, it will be key to improve **the legislative framework**, and in some cases create new rules, to favour indigenous vegetable seeds. Specific regulations should be designed to better enforce the already existing recognition that indigenous vegetable seeds need a ‘special treatment’<sup>169</sup>, so to gradually shift towards an open source seed system that allows the multiplication, processing, marketing, and distributing of a wide variety of seeds by smallholders. New legislation seems specifically urgent to protect local varieties of these vegetables from biopiracy and other predatory marketing practices (e.g. by informal, often illegal, agro-dealers), for instance by recognising such varieties as belonging to certain communities or territories. At a regional level, there is scope to improve accordingly the regional cooperation framework for seeds law harmonisation.

Second, input **subsidies** hold great potential, so the government (Ministry of Agriculture and Nakuru County) could subsidise the distribution of indigenous vegetables seeds and pilot a system of free vouchers for farmers (to be handled by farmers’ organisations not individuals, to avoid that they would be sold on the “black market”).<sup>170</sup>

Third, another important ‘pathway to solution’ is investment in **research** on indigenous vegetables that: documents and characterises farmers’ varieties of these vegetables seeds (also part of the ongoing agronomic and biodiversity SASS research) and the related benefits (including smallholders’ perceptions/preferences on cropping choices and farmers traditional knowledge); feeds into the input sector and creates stronger linkages between the business realities of seed companies and the research results (especially by local research institutes).

Lastly, a number of **technical assistance initiatives** on indigenous vegetable seeds in favour of smallholders will be key to make the seed system more inclusive: actively involve and strengthen the role of community-based seed banks and of small local (micro-insurance) financial intermediaries that can improve access to finance for smallholders’ seeds business; support local artisans and farmers’ organisations to develop and disseminate small-scale seed processing technology; assist smallholders with indigenous vegetable seed certification to the Kenya Plant Health Inspectorate Service (to allow producers to multiply and keep exchanging those seeds).

This ‘package’ of ‘pathways to solutions’ to strengthen the indigenous vegetables seed systems can generate many synergies with regards to economic, social and environmental sustainability, but also trade-offs. First, **from an economic sustainability point of view**, the suggested pathways to preserving and promoting traditional seed crop diversity can lead to higher productivity and yields as well as more market opportunities for smallholder farmers. Improving seed regulations and gradually formalising the seed sector can also generate more and stable government revenues (via taxation). On the other hand, public subsidies for the distribution of indigenous vegetable seeds hold the risk of “crowding out” private sector initiative and may hamper some other seed production companies. Second, **from a social sustainability angle**, there are multiple synergies to target: improving seed access and conservation management can preserve both farmers’ rights and traditional knowledge about indigenous vegetables, hence increasing community resilience; supporting indigenous vegetable seed diversity can also lead to more food diversity, and hence, better nutrition, more diverse food availability, that can support the eradication of poverty and hunger. However, formalising a value chain has proven in some cases to increase inequality. Thirdly, the **environmental benefits** are numerous: promoting indigenous vegetable seeds and crop diversity can bridge the efforts to restore agro-biodiversity with those to improve agricultural productivity; a growth of indigenous vegetables through easier access to their seeds would generate positive externalities for the environment (e.g. less soil degradation) since those vegetables need less chemical inputs.

<sup>169</sup> This would include enacting Kenya’s constitutional obligations regarding indigenous seed and plant varieties (Article 11 (3c) and Article 69 (1a) of the 2010 Constitution)

<sup>170</sup> Vouchers that allow the buyer to decide which seeds or other inputs to purchase, have proven to work better, as discussed by Goyal & Nash (2017).

Effective implementation of these pathways and proposed interventions requires identifying and working within **conducive policy frameworks** and with **drivers of change (or “champions”)**. Many existing frameworks and policy processes can be targeted to promote indigenous vegetable seed diversity and overcome some of the constraints discussed above. The key ones include the COMESA Seed Harmonisation Implementation Plan (COMSHIP) and Kenya’s Agriculture Nutrition Implementation Framework for the period 2019-2021 (within the framework of Kenya’s Big Four Agenda). Furthermore, various references are made to the importance of seed diversity in Kenyan policies and legislation, including the National Seed Policy (2010) and the Crops Act (2013). Finally, in order to follow and eventually achieve the above suggested pathways, it is important to work with the following actors, who have the potential to be drivers of change: at regional level, cooperation networks such as COMESA, for normative harmonisation; at national level, the Horticulture Directorate of the Agriculture and Food Authority, in charge of regulations, standardisation and food safety, as well as local research institutes (e.g. JKUAT, Egerton University, KALRO); at county level, the Nakuru County extension officers, who can promote seed diversity and indigenous knowledge; at the ground level, organisations like the Seed Savers Network that can bridge the formal and informal seed sectors, the community seed banks, as well as seed companies that could support the expansion of the indigenous vegetable seed market.

## 6.2. The production system

The **production of indigenous vegetables is hindered by a number of constraints**, including: low productivity; water scarcity; price seasonality; limited market information especially for smallholder farmers; post-harvest losses; financial constraints (e.g. limiting farmers’ ability to buy tanks for water harvesting); maize ‘competition’ and decreasing plot size; smallholders’ dependence on middlemen (who have a stronger market position). On the other hand, a number of **drivers in favour of increased production of indigenous vegetables** exist. For instance, demand for indigenous vegetables is increasing, especially among the middle-class in urban areas, mostly due to their nutritional value. Another driver is that indigenous vegetables can maximise the return on investment by smallholders from water harvesting, because they require less water input and respond much more strongly to improved water use, compared to maize and commercial horticulture.

To overcome the various constraints and capitalise on some positive dynamics that drive the production system towards indigenous vegetables, this section suggests various **pathways to solutions specifically with regards to production** (while other sections below present more cross-cutting pathways, such as the strengthening of farmers’ organisations, which are also going to be crucial for improved production of indigenous vegetables).

First, it will be important to promote better **production management and techniques** (e.g. climate-smart agriculture, organic agriculture), including by promoting better water harvesting (thus extending production beyond the two rainy seasons) and agronomical practices that have a lower impact on soils (thus preserving and improving their physical, chemical, and microbiological quality). This can be done for instance by strengthening extension services promoting safe, environmentally friendly and nutrition-effective production techniques for indigenous vegetables.<sup>171</sup>

<sup>171</sup> This type of intervention recently proved to be successful in other counties, such as Turkana and Trans-Nzoia, where county authorities started to allocate funds for indigenous vegetables’ development and the extension officers included those among priority crops promoted; this led to farmers choosing to produce more indigenous vegetables and to other improvements in the value chain (MACE Foods, 2018).



Second, the government should tailor **public investment strategies** for agricultural production to the particular needs of the indigenous vegetables value chains. This should include rural infrastructure expenditure, for instance to invest in storage and aggregation centres specifically for indigenous vegetables, to combat post-harvest losses.

Third, smallholders should receive support, both in terms of **technical assistance and business brokerage**, to enter into, and effectively manage, fair contractual arrangements with indigenous vegetable market actors, so to better plan and increase production on the basis of more transparent and stable market access and profitability. An example could be to assist farmers acquire and handle telephone based 'one-stop' platforms for effective communication, monitoring and contract management with middlemen and processors of indigenous vegetables.

As described above for the seed system, these proposed pathways to solutions can lead to synergies as well as trade-offs. First, **from an economic sustainability point of view**, improved production management and techniques can lead to new market opportunities, reduced post-harvest losses and higher household incomes. Better contractual arrangements would ensure that producers obtain a fair share of the final price of the vegetables, that they can plan ahead their farming operations since they will be offered contracts already at the beginning of the planting season, and this could also possibly facilitate requests for investment loans. On the other hand, an example of trade-off is that the simultaneous success of many farmers in increasing production could also lead to oversupply of indigenous vegetables and the subsequent fall of their prices (with negative consequences on profitability; and in particular if market access would not improve in parallel). Second, **from a social sustainability point of view**, a positive synergy is that more diverse production and higher incomes can lead to broad livelihood improvements, as well as increased dietary diversity and better nutrition. However, trade-offs should also be taken into account: not only the risks for informal actors from the formalisation that comes with increased production, but also the possibility that, if increased production was to be sold mostly to the growing middle-class in urban areas (where demand is higher and financial return bigger), rural households could end up consuming less indigenous vegetables, thus worsening their diets. Thirdly, **the environmental sustainability** synergies from improved production techniques and public investment for indigenous vegetables are promising. Diversifying production, in itself, has proven to enhance climate resilience and agro-biodiversity. Indigenous vegetables moreover require less chemical inputs and their production helps soil fertility and the protection of ecosystem services also since it tends to be associated with more environmentally-friendly practices such as no-till, recycled on farm soil amendments and soil cover. On the other hand, significant public investment and increased productivity for indigenous value chains that did not sufficiently consider natural resources constraints could lead to negative trade-offs in terms of land-use change, deforestation, and water abstraction.<sup>172</sup>

Finally, the implementation of these pathways and proposed interventions requires working within **effective policy processes and cooperating with the right drivers of change**. As was the case above for the input system, the Agriculture Nutrition Implementation Framework for the period 2019-2021 offers potentially effective entry-points for diversified production. The CAADP and ASDA 2010-2020 also call for more investment in agriculture and references are made to sustainable land management, among others. Further, Kenya has agreed a number of environment-related policies (e.g. Kenya CSA Strategy 2017-2026) that promote diversification and sustainable agricultural value chains. In terms of actors to support and potentially build coalitions with, possible drivers of change include: local pioneers of organic farming and indigenous vegetables in Nakuru County; extension officers; the Ministry of Agriculture (in Nairobi and its representation

<sup>172</sup> Increased indigenous vegetable production, per se, would always impact the environment. It is for instance when this production substitutes maize production, which impacts more, that there will be environmental benefits relative to the alternative.

at the county level); agricultural cooperatives and Self-Help Groups that could become more business-oriented by adopting a model inspired by cooperatives with marketing functions.

### 6.3. The processing system

The **processing of indigenous vegetables faces a variety of constraints**, such as the difficulty of enforcing contracts due to the informality of the markets and weak links between producers and processors; absence of national standards for processed indigenous vegetables; general lack of appropriate storage and processing technologies; lack of investments in new food products that focus on indigenous vegetables; costly administrative compliance; uncertainty regarding supply, price, and quality of the fresh produce; uncertainty about consumer demand for processed products, which hampers investments; lack of dedicated distribution systems for indigenous vegetables; difficult access, for most entrepreneurs interested in processing, to the needed resources like energy, water, and other inputs.

However, **several dynamics could drive a growth** of the processing part of the indigenous vegetables value chains, including: its potential to access new high-value markets; existing processing capacity in Nakuru County, where processors of other vegetables could be interested in such high-value markets (having a relatively well-established market position in similar market segments) and thus the potential for business alliances with other actors in the indigenous vegetables value chain; readiness of several supermarkets to include processed indigenous vegetables in their product assortment; interest by the Kenyan government to explore the launch of national guidelines and regulations for blending maize flour with indigenous vegetables flour, and a related labelling system for indigenous vegetables; the existence of some traditional practices of vegetables drying (e.g. stinging nettle) that could facilitate small-scale investment by smallholders in processing indigenous vegetables.

**A number of different ‘pathways’ to overcome such constraints and build on these drivers** emerge from SASS-related research and local multi-stakeholder dialogue. Such potential solutions mostly address the governance bottlenecks related to better integrating processed indigenous vegetables into the Nakuru food system, and are aimed at constituting a ‘package’ that i) maximizes synergies between different interventions for economic, social, and environmental parallel improvements, while ii) minimizes the likely trade-offs associated with those measures to increase processing of indigenous vegetables. These proposed ‘pathways to solutions’ could take different form for different types of processing, such as drying or fermentation, or the preparation of new products based on indigenous vegetables (e.g. samosas, chapatis and other snacks, or maize-meals and wheat-breads containing flours of the grains of these vegetables), as well as for different scales of processing (large/medium/small operations). These different options, as well as the respective implications in terms of economic, social, and environmental benefits, synergies, and trade-offs of the proposed solutions to processing bottlenecks, will be explored in depth through further research and dialogue for the remaining life of the SASS programme. It is however important to already illustrate here this type of logic and analysis, including to make the link between the research presented in this report (on the bias against indigenous vegetables in the current food system and potential diversification pathways) and the possible realistic ‘entry points’ to make the proposed solutions likely to happen, both in terms of ongoing policy processes and local interested partners (‘drivers of change’ already working on similar solutions and new possible ‘alliances’ to be promoted).

The pathways emerging from this report can be grouped in solutions that promote better research, regulatory frameworks, technologies and governance arrangements, to overcome the constraints -and build on the drivers- for increased processing of indigenous vegetables.

**Better research** can first of all analyse -and recommend improvements for- different preparation, preservation and processing techniques, as well as measure the nutrient content of processed indigenous vegetables. This (which is part of the ongoing agronomic and microbiological SASS research) could help value chain improvements by comparing the nutritional value of fresh and processed products, thus potentially supporting increased production, distribution and consumption of the latter, if results proved that with processing the nutrients remain equal or increase and the pathogens decrease (confirming e.g. for drying and fermentation of indigenous vegetables what existing scientific evidence already shows for fermentation of many other crops). More research should also analyse systematically consumer preferences (in both rural and urban areas), estimate the potential opportunities for processed indigenous vegetables demand, and identify the opportunities for business champions and investors to capitalise on these opportunities. This would address for instance the constraint that processors and distributors have no incentive to invest in this market segment due to underdeveloped demand, and build on the interest indicated by some local supermarkets in selling more indigenous vegetables-based products.

**A second set of solution pathways relates to the regulatory framework** to incentivate processing. The government could enact a blending policy that requires maize flours to be mixed with indigenous vegetable flours, which will powerfully support the social, economic, and environmental benefits ascribed to more diversified food systems. Public or private standards for processed indigenous vegetables would help the processors get the standardised quality of fresh produce they require to operate, and also increase trust in this value chain among retailers and consumers (via improved transparency and traceability, including through a labelling system). Moreover, given the current uncertainty regarding supply, demand, and appropriate technologies, the government can reduce the risks for aspiring processing entrepreneurs through risk insurance and bank guarantees (via public seed capital to facilitate processing investment). Other regulatory improvements to incentivate processing could be the reduction of administrative bottlenecks to reduce the costs of administrative compliance, and the reduction of taxes for processors. This would address the constraints posed by the informality of the indigenous vegetables value chain and difficult enforcement of farmer-buyer-processor contracts, and capitalise on the existence of some well-established processors in similar market segments in Nakuru County.

**Technology-based solutions** are also important, to develop and disseminate processing technologies (including for fermentation, drying and flour milling) that can benefit both small farmers and entrepreneurs (hence simple and low-cost technology) as well as larger agribusiness development (when economies of scale and bigger investment are necessary). Newly introduced technologies for indigenous vegetables processing, at every scale, should be climate and environmental smart, especially regarding energy, water, and chemical intensity (e.g. solar drying should be incentivated over electricity-based drying). A better diffusion of value addition technologies would address a number of constraints highlighted in this report such as perishability of indigenous vegetables, and build, for instance, on the willingness of many youth to be entrepreneurs in the food sector if the technological base of it intensified, and the readiness of several smallholders to enter into contract farming arrangements with indigenous vegetables processors (both as risk reduction strategy relative to just own-production and to ensure higher demand even in the peak production season, when prices tend to be low).

Finally, an important set of pathways to solution relates to **improving the overall governance arrangements** in the indigenous vegetables value chain. This would include (as further described in the sub-section 'Crosscutting pathways' below) a multi-stakeholder platform to better coordinate around the value chain development, increase trust between producers, distributors, consumers and processors, as well as to enact a number of the solutions proposed above and below. Such platform would address the constraints around uncertain demand for processed indigenous vegetables and weak links between different value chain

actors, by for instance discussing issues of price offered by processors (that smallholders find too low) and improving awareness about the benefits of these processed vegetables (which most stakeholders are not familiar with, unlike the fresh produce). This would also capitalise on positive emerging drivers around processing opportunities, such as the willingness of some local producer cooperatives to be directly involved in processing products or facilities, and of some local processors to build stronger business alliances with the rest of the indigenous value chain operators.

This ‘package’ of pathways to increase processing of indigenous vegetables can create many **synergies between different interventions for economic, social, and environmental improvements**, but also lead to **trade-offs**. **Economically**, processing can create on-farm employment when the technologies are scale neutral, which supports small-scale entrepreneurship; or create off-farm jobs in the case of larger processing facilities. The development of a processing sector increases the demand for upstream suppliers, including packaging, canning, and marketing, and downstream suppliers, including distributors. These developments create more value and higher profitability margins within the value chain which contributes to local development, especially in combination with labels that signify regional origins, and this increases government revenue through taxation. Furthermore, the local economy becomes more diversified and resilient, especially when processed indigenous vegetables access international markets such as diasporas. However, there could be several economic trade-offs as well. Support for large-scale technologies might compete with smaller processors, such as small-scale millers. Labelling and standardisation are often too costly for the smaller processors, and the introduction of standards for processed indigenous vegetables may discourage the majority of family farmers to expand their production for fear that their ‘informal’ business may not meet those stricter requirements. Similarly, were the local supermarkets to sell more processed indigenous vegetable products, this might further marginalise informal sellers.

**Socially**, more processed indigenous vegetables can be beneficial for the nutritional outcomes of the food system, in two ways. Drying, fermentation and other types of processing would make these nutritious foods available all-year-round (while the fresh produce is generally available only twice a year during the rainy seasons) and contribute to diversification of diets. Processing can also increase the nutrient profile of the vegetables, improve food safety, and enhance convenience by reducing the necessary cooking time. Furthermore, the off-farm employment generated by value addition can be attractive to youth, thus empowering a new generation of food entrepreneurs. However, expensive processed products might be out of reach for poorer households, and certain types of processing can decrease the nutrient profile as well, by adding less desirable ingredients such as sugar, salt and saturated fats. Another trade-off that may negatively affect the social sustainability of the local food system could be related to the role of women and men in a value chain shifting to more processing and the associated higher degree of formality (which is part of the upcoming anthropological and sociological SASS research). On the one hand, more value addition activities, often in the hands of men, could hamper women empowerment, by taking away from them the control of the indigenous value chain business (typically in the hands of women in terms of the fresh produce); on the other hand, the risk could be that more processing of these vegetables, by promoting more market opportunities for women, could marginalise men thus causing the disruption of family life.

Finally, synergies for stronger **environmental sustainability** of the local food systems relate to the fact that more processing of indigenous vegetables can decrease food waste and losses by reducing perishability and improving storage capacity through lower volumes of the product, which influences the environmental impacts of food production and consumption. On the other hand, in case increased value addition came through large centralised processing plants, this would require additional transport activities from producers to processors with possible negative externalities for the ecosystem. Another possible trade-off to be carefully analysed relate to the fact that processing and packaging of indigenous vegetables may be resource

intensive, especially regarding energy, water, and chemical usage, with packaging requiring additional recycling efforts.

The effective implementation of the proposed interventions, while maximising the economic, social, and environmental synergies and minimising the trade-offs within these pathways, requires **working with local drivers of change** (possibly building new coalitions) and targeting the right **ongoing policy processes**. Examples include partnering with the 'posho' mills in the maize value chain (small-scale millers dotted around Nakuru County villages) when tapping into the willingness of some village-level producer cooperatives to be directly involved in processing, or when designing a possible regulation requiring to blend maize flours with indigenous vegetable flours. This would also require building on the experience of the Ministry of Agriculture that issued in 2013 a regulation for blending maize flours with cereal flours like sorghum and millet, as well as on the ongoing policy process led by the Kenyan Industrial Research and Development Institute to define appropriate standards for the production of blended flours (that will eventually be enforced by the Kenya Bureau of Standards). Another example would be that the above-mentioned research on consumer preferences and potential demand for processed indigenous vegetables should feed ongoing efforts to improve market arrangements, for instance through the efforts of Slow Food Kenya to establish 'farmers markets' in Nakuru city and target the tourism industry in the county as systematic buyers of these local processed foods.

#### 6.4. Distribution and consumption systems

The **distribution** of indigenous vegetables is **constrained** by limited market information throughout the indigenous vegetable value chains; difficulty to access certain producers and markets; limited allocation of space to indigenous vegetables at local markets; limited supply to markets due to the high rate of self-consumption by producers; and the lack of aggregation centres for indigenous vegetables. But distribution can grow thanks to demand by urban and international markets, particularly diasporas, which requires longer distribution linkages; and supermarkets indicated their interests in adding indigenous vegetable products to their product assortment.

**Consumption** of indigenous vegetables is constrained by limited awareness of consumers about the health benefits of more indigenous vegetable consumption; cultural bias against processed indigenous vegetables; negative perspectives on the food safety of indigenous vegetables, particularly for certain regions; and the high-prices for indigenous vegetables, especially for long-distance vegetables. However, increasing urban demand; potential new markets from diasporas; demand from high-valued chains such as urban restaurants in Nairobi; growing purchasing power; and the spread of technologies that reduce the costs of information sharing, all **drive** the increasing consumption of indigenous vegetables.

Given these constraints and drivers, this section proposes several '**pathways to solutions**' to support the distribution and consumption of indigenous vegetables. They emerge from SASS-related research and local multi-stakeholder dialogue and are also aimed at maximising synergies between economic, social, and environmental factors, while minimising the trade-offs between these factors.

Firstly, a **multi-stakeholder platform** dedicated to the indigenous vegetable chains (as further described in the sub-section 'Crosscutting pathways' below) would be particularly important to facilitate the distribution of more indigenous vegetables, and more effectively, since it can increase the sharing of all sorts of information between producers, processors, distributors, and consumers. The economic benefits of better distribution channels and stronger urban-rural integration include the generation of off-farm employment, while the

access to international markets can increase local economic resilience as market risks are more spread. However, distributing to international markets can have a social trade-off when these longer distribution chains exclude poorer households, partly due to costly compliance to international standards. Moreover, long-distance supply chains often have high environmental trade-offs, as this distribution is particularly fossil-fuel intensive.

Secondly, **market research** can estimate the extent to which markets currently underserve the needs of consumers, in rural areas as well as in small, medium and large towns, from the Nakuru County to the capital Nairobi. Research could investigate trends in two particularly interesting market segments: the bottom of the consumer pyramid, given indigenous vegetables can be an accessible form of nutrient-dense food for poorer households (compared to more expensive nutrient-dense foods such as meat); the tourism sector in Nakuru, constantly on the rise (this is part of the upcoming anthropological SASS research).

Thirdly, the difficult access for distributors to producers can be overcome by building upon the **maize distribution networks**, which, through a cascading web of (informal) traders, moves maize throughout the country. But with many middlemen in the chain, the share the farmers receive shrinks, which showcases the importance of adequate rural infrastructure to the commercialisation of small-scale farmers. Another example of insufficient rural infrastructure are the inadequate storage facilities for indigenous vegetables, so the government could invest in **aggregation centres** to strengthen the links between distributors and producers.

Lastly, the access to local markets can be supported by government, for example through **subsidising market licenses**. However, government subsidies often favour formal markets, so policies should be informal-sensitive not to suppress informal markets, a key livelihood provision for the poorest.

For consumption, firstly, smart **communication campaigns** about the health benefits of indigenous vegetables should be launched via national and local media (TV, radio, social media), drawing also on the relatively high adoption of cellphones in Kenya. Specialised information programmes should target Kenya's most vulnerable populations, which are most at risk for undernutrition and often lack access to information channels. These would target primarily undernutrition due to their nutrient-dense profile, but synergies could be created also in terms of improving economic and environmental sustainability by campaigning about the importance of the three types of sustainabilities together, since consuming more of these vegetables would also benefit smallholders' incomes and natural resources management. Taking into account current consumers' tastes and their inertia on dried and packaged indigenous vegetables, communication campaigns should also create awareness about cooking and other gastronomic dimensions of these value chains, and involve national and local opinion leaders to reach out also to the more conservative consumers.

Indeed, a second related possible solution would be the wide dissemination of indigenous vegetables **recipes**, bringing together information also based on different preparations used by various ethnic groups (e.g. enhancing the informal exchanges of traditional knowledge already taking place among neighbouring migrant communities living in the Nakuru County). Given modest literacy rates in Kenya, this should go beyond a recipe book, but act as a platform to organise cooking workshops, radio shows, newspaper articles, and drawings to communicate the many ways to prepare indigenous vegetables to a diverse audience. A possible general trade-off with environmental sustainability, however, could be that indigenous vegetables can require long cooking, which increases the energy used. When charcoal is used as a cooking fuel, this causes not only air pollution, but deforestation as well.

Thirdly, against a background of urbanisation and economic growth in the Nakuru county, the urban middle-class is rising and increasingly eating outside, which makes **restaurants** more important entry points for

healthy diets. While eating outside is linked with overnutrition, restaurants can profit from the increasing demand of affluent urban residents for healthier food by partaking in the indigenous vegetable value chains. While Kenya's middle class is growing, these restaurants and their demand for premium indigenous vegetables are likely to stay a niche market for some time due to their higher costs and the reported popularity of fast food in growing economies.

Lastly, a pathway to solution for both distribution and consumption relates to improving the **regulatory framework** in favour of indigenous vegetables. The government can increase consumption, and provide incentives for distributors, by establishing quotas in **public procurement**, such as school feeding, hospitals and army schemes for the purchase and provision of indigenous vegetables. These quotas can include preferences for local, small-scale, or female producers, to offset conventional biases towards commercial farmers and therefore avoid such economic inequality trade-off. Another regulatory improvement could be launching a **multi-dimensional label** for indigenous vegetables indicating production practices, origin, fair practices, food safety, nutritional value, and environmental impacts, to overcome consumers trust issues and the cultural inertia against certain indigenous vegetables and production regions.<sup>173</sup> This labelling scheme could combine synergistic goals, as the increased trust can reduce food waste, support farmers' income, and promote healthier diets and sustainable agricultural practices. However, the trade-offs of such labels could be higher consumer prices due to (third-party) certification compliance costs (impacting especially poorer urban and rural food consumers) and higher rejections rate by retailers of smallholders' produce if the related indigenous vegetables' safety standards were too strict. For this reason, the establishment of such labelling scheme should be accompanied by (origin-based) marketing strategies for smallholders and 'participatory guarantee systems' to involve farmers, consumers, intermediaries and other value chain actors in an inclusive/affordable certification for smallholders about the sustainability and safety of their produce.

Effective implementation of this 'package' of proposed interventions to improve distribution and consumption of indigenous vegetables requires identifying and working within **conducive policy frameworks and with (coalitions of) drivers of change**. For instance, pursuing the public procurement schemes 'pathway' should be based on the "School Meal Strategy" launched in 2018 by the Kenyan Ministries of Agriculture and of Education (postulating that all schools should own a kitchen garden and that each school should be supplied with local produce under the "zero km" concept). Possible drivers of change eager to support the above 'solutions' and build relevant coalitions and partnerships could include national and county governments; companies specialised in marketing and distributing high quality foods; producers organisations; churches; civil society organisations like Slow Food Kenya (e.g. when working with restaurants and the tourism industry, given the ongoing initiatives 'Slow Food Chefs Alliance' and 'Slow Safari'). It would be particularly innovative to assign a leading role in these coalitions to consumers organisations like the Kenyan Organic Consumer Alliance, given this is a package of pathways that aims to improve the indigenous vegetables value chains by considering not only the 'market' angle, but also the 'kitchen' one (i.e. behavioural change 'on the plate').

A particularly promising partnership opportunity that could involve the SASS programme would be the establishment of a **multi-dimensional sustainability label for indigenous vegetables**, in collaboration with the FAO Mountain Partnership Secretariat, the Kenyan Ministry of Agriculture and other local stakeholders (who explicitly expressed their interest for this). The upcoming SASS research could assess the status of existing labelling schemes in Kenya (fair trade labels, organic standard labels, etc.) and analyse the feasibility of integrating therein the sustainability benefits of selected vegetables, such as on-farm

<sup>173</sup> For more details, see this ECDPM Discussion Paper based on some of the research conducted by SASS so far: "Making Markets Work for Indigenous Vegetables - Towards a Sustainable Food System in the Lake Naivasha Basin, Kenya" (Knaepen, 2018)



agrobiodiversity conservation, climate resilience, nutritional gains, etc.<sup>174</sup> Based on such analysis, a pilot scheme could be launched in Nakuru County for a multi-dimensional sustainability and safety label for local cowpea, lab-lab, amaranth, spider plant and black nightshade, integrating their characteristics (economic, social and environmental sustainability, as shown by SASS scientific results) into a label, based on existing schemes such as the Mountain Partnership narrative label.

## 6.5. Crosscutting pathways to solutions

Two types of crosscutting solutions are important to complement all these 'pathways' relating specifically to solutions in one part of the indigenous vegetables value chain (seed, production, processing, distribution, consumption): an overarching 'governance arrangement' for all relevant stakeholders to discuss and coordinate a package of solutions to develop this value chain; the overall policy improvements needed to create an enabling environment for sustainable agriculture more broadly and that will also benefit the promotion of indigenous vegetables.

A **multi-stakeholder platform** is needed to regularly bring together all relevant actors to share information, discuss improvements, build trust, facilitate compromises, coordinate action and monitor development impact. This would not only improve transparency and the overall governance along the indigenous vegetables value chain; the platform should design an annual workplan around a set of objectives shared by all its members, to implement specific priority solutions or packages of actions, such as some of those mentioned in this section: better collaborations between producers, distributors and consumers of indigenous vegetables as part of broader urban-rural integration dynamics; facilitate a market information system for the value chains; monitor the application of new safety and sustainability standards for production and processing of the vegetables; facilitate on-farm and off-farm sharing of best practices ; oversee establishment of a multi-dimensional sustainability labelling scheme that would assure consumers of the controlled origin and quality of the produce; coordination of donor initiatives in support of indigenous vegetables; etc.

Beyond this specific value chain, a number of **measures to improve the overall enabling environment** for the agriculture and food sector will have to be put in place, both at national and at county level. The difficult scenario presented in this report, particularly for smallholders, of increasing land value but decreasing productivity, widespread (seasonal) food insecurity, natural resources depletion and climate change, weak access to markets and credit, requires overarching policy improvements and targeted government interventions to:

- enhance the profile of this sector in **overall government policy**, strengthen the means to more effective enforcement of food and agriculture policies and better targeted investments in favour of more profitable, diversified and sustainable practices throughout the food system in Nakuru County, by providing: cheaper farming inputs; better infrastructures for reaching markets; rationalisation of land ownership and land use issues; easier access to private finance for smallholders, their organisations, and small and medium food enterprises (SMEs).
- make **farmers organisations** and self-help groups more business-oriented by adopting a model combining the representation function with marketing and business services facilitation (possibly in cooperation with local business brokers and small traders or middlemen associations), since market

<sup>174</sup> Drawing on existing labelling schemes, rather than creating a completely new one, can increase legitimacy and reduce costs, hence possibly also contributing to lowering the final market price and keeping the price premium relatively low (Knaepen H., 2018).

participation for the majority of smallholders is mostly passive and linked to a fragmented knowledge of the market, its rules and articulations.

- substantially increase the quantity and quality of **extension services** for farmers (combining better water harvesting, carbon recycling, intercropping with legumes, biological pest control and agroforestry to promote on-farm biodiversity, protect pollinators and ensure correct nutrient cycling; etc.) as well as other relevant types of training (for public officials, local researchers, NGOs, SMEs, etc).

## 6.6. The way forward

This report presents the preliminary conclusions from the SASS multi-disciplinary research and dialogue activities about the current performance of southern Nakuru County food system in terms of sustainability (social, environmental, economic) and outcomes (food quality, availability and access), with a governance analysis about the bottlenecks and drivers along the diversification pathway (with a focus on indigenous vegetables). Drawing from such analyses and consultations, this section started exploring a number of pathways to solutions for improving sustainability through a better integration of such value chains within the local food system.

In its final phase, the SASS programme will explore in more depth such pathways and the different intervention options, as well as the respective implications in terms of economic, social, and environmental benefits, and possible trade-offs. All in all, one and a half year of work in Kenya seems to indicate that indeed SASS can contribute to local ongoing efforts to promote a transition from an economic growth model largely based on export-oriented agriculture, tourism and real estate to a more sustainable development approach, based on an innovative food economy with smallholder agriculture, differentiated production and diets, and Kenyan markets (starting with Nairobi) at its core. Such transition and diversification of the food economy has and is happening in other low-income countries, including in Africa. This “**quiet revolution of sustainable food value chains**”, linked to the rise of new technologies, the emergence of new distribution systems and more responsible consumers, the improvement of road transportation and cold chains, and overall increased value addition, is possible also in the Nakuru County. Whether this can happen will depend on the associated social and environmental challenges and especially on the economic costs and opportunities, hence the incentives that key food system stakeholders will face in the future. As recent developments in other parts of Africa and Kenya show, value addition and food processing can be located in small towns in direct connection with production in rural areas; agri-food industries are labour-intensive and have strong upstream and downstream linkages, fostering territorial development as an engine in the much-needed rural diversification and structural change. **SASS will help exploring these and other possibilities, and the related interventions needed, through various interconnected activities:**

- improving the understanding of the sustainability performance of the current food system, based both on further analysis of the already collected information and new data collection (especially in terms of environmental sustainability and climate resilience);
- refining the actors mapping, governance and political economy analyses around the role of indigenous vegetables in the food system, through further interviews, focus groups and literature reviews;
- providing better evidence about the related hypothesis that a stronger integration of indigenous vegetables in the food system contributes significantly to making such a system more sustainable;
- organising workshops and meetings with relevant actors and drivers of change, to disseminate the key messages of this multi-disciplinary report, as well as the more detailed research results of individual thematic SASS research teams that will become available over time via peer-reviewed

discipline-specific publications (depending on the processes and timeframes of the different academic journals);

- undertaking new research and multi-stakeholder dialogue, through different methodological tools (e.g. the Multi-Criteria Mapping as explained in Box 3 in Annexes), around the feasibility of the proposed pathways to solution, with a focus on the right entry points (drivers of change to partner with and adequate policy and investment processes to tap into) as well as what synergies (likely positive simultaneous benefits) and trade-offs (possible negative consequences to be balanced) should be considered when promoting a better integration of indigenous vegetables in the food system.

Minimising the costs from trade-offs and maximising the development benefits from synergies will depend on the behaviour of food system stakeholders and the **incentives** they face. For each proposed 'pathway to solution', therefore, SASS will study and discuss with relevant actors the governance and sustainability implications; as well as how to foster **inclusive and effective partnerships and promote the needed innovative policies and investments**, both public and private (with focus on stronger engagement of smallholder farmers, food SMEs and financial intermediaries in the relevant coordinated interventions). Better governance, regulation and enforcement can create the enabling environment that will incentivise private sector actors to produce, process, distribute and consume food in a more responsible way. Similarly, adequate partnerships enable the sharing of resources, skills and institutional knowledge, which build capacity and facilitate greater collaboration and enforcement of agreed actions, including through both public and private investments. Finally, individual stakeholders must also take responsibility for their actions and pursue better practices that are attuned to local socio-economic and environmental realities, and drivers of change in particular can lead the way in this respect. Indeed, a key step to promoting a more sustainable food system in Nakuru County is creating the incentives and disincentives for more responsible individual and collective action.

During this final phase of the programme, the ECDPM and the whole SASS consortium remain therefore committed to contribute to simultaneous improvements of the economic, social and environmental sustainability of the local food system. SASS will also aim to learn from the case of Nakuru County, so to help **facilitate more broadly multi-disciplinary research, policy dialogue and partnerships towards more sustainable food systems in the rest of Kenya, in Africa and Europe, as well as at the global level, in line with the debates and processes to achieve the SDGs.**

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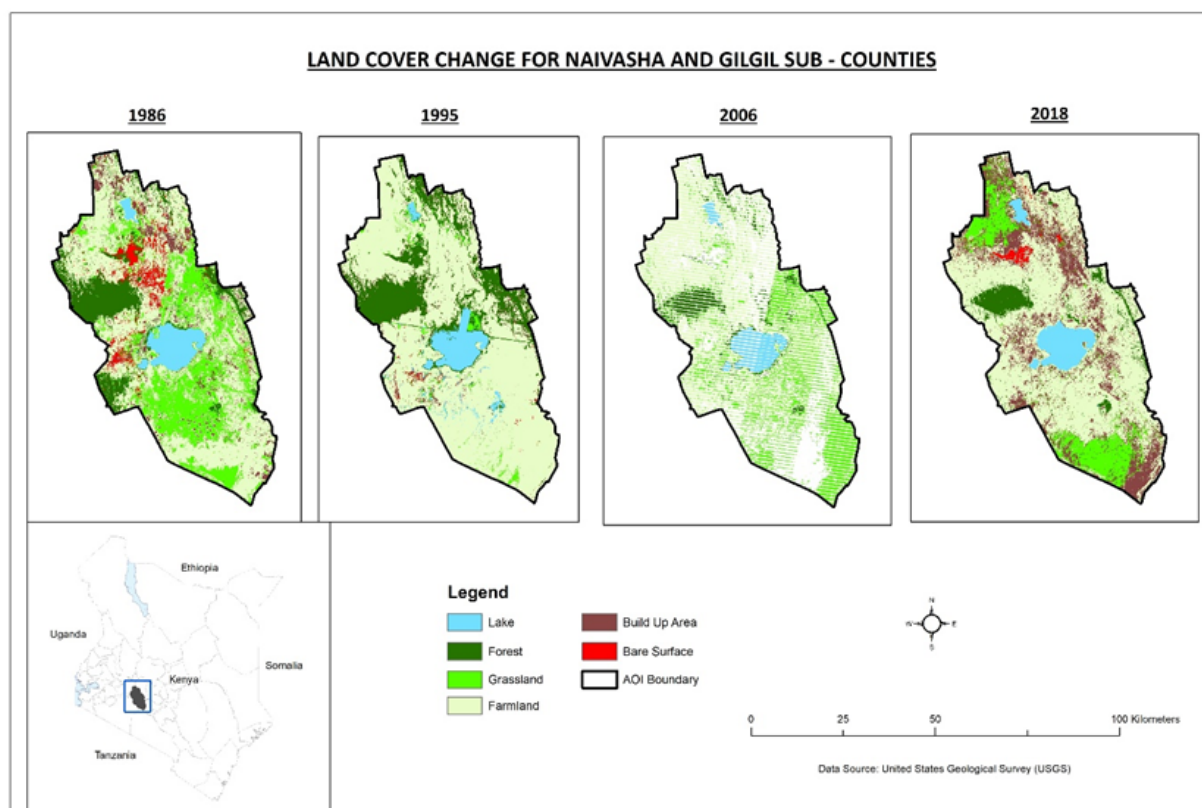
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## Annexes

**Figure 1: Land cover types and changes observed**



Source: Wanjala, 2018

**Table 1: Areas representing different land cover types**

1986 Classification		1995 Classification		2006 Classification		2018 Classification	
Class Name	Area (Ha)	Class Name	Area (Ha)	Class Name	Area (Ha)	Class Name	Area (Ha)
Bare Surface	12,547	Bare Surface	983	Bare Surface	25,109	Bare Surface	3,672
Build Up Area	17,092	Farmland	215,415	Built Up Areas	16,567	Build Up Area	61,161
Farmland	145,430	Build Up Area	8,502	Farmland	96,277	Farmland	169,804
Forest	37,904	Forest	50,576	Forest	12,120	Forest	16,088
Grassland	73,333	Grassland	7,500	Grassland	50,441	Grassland	34,288
Lake	15,246	Lake	18,211	Lake	10,354	Lake	16,168

Source: Wanjala, 2018

**Strengths, weaknesses, opportunities and threats (SWOT) analysis is a useful approach for helping stakeholders to identify and prioritise interventions**, and to further identify the strategies for achieving them. SWOT analysis can indeed be used to identify also strategies for improving a food system, including by helping compare different options. Table 2 provides a summary of a SWOT analysis around the economic, social and environmental dimensions of the food system in southern Nakuru County.

**Table 2: A SWOT table for indigenous vegetables in southern Nakuru County**

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• <i>Diversification of production;</i></li> <li>• <i>Highly nutritious;</i></li> <li>• <i>Additional source of income for poor households;</i></li> <li>• <i>Low use of pesticide;</i></li> <li>• <i>Climate-resilient;</i></li> <li>• <i>Attempts to reduce agro-chemicals inputs;</i></li> <li>• <i>High demand (more demand than supply).</i></li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• <i>Lack of irrigation;</i></li> <li>• <i>Lack of investment resources;</i></li> <li>• <i>Social organisations do not always support the access to credit and the commercialisation of small farmers' products, although there are exceptions (e.g. Rameen Bank in Naivasha town, providing micro-credit to women);</i></li> <li>• <i>Perishable/post-harvest losses, particularly for indigenous vegetables and other fruits and vegetables, due to almost nonexistent post-harvest agro-processing (65% of produce transported to MACE factory is lost);</i></li> <li>• <i>Lack of access to (quality) seeds;</i></li> <li>• <i>Low production;</i></li> <li>• <i>Access/Availability of water;</i></li> <li>• <i>No policies or official standards from central and local government (e.g. certification/standardisation at national level);</i></li> <li>• <i>Weak marketing system (e.g. no standard or labels that certify nutritional value, safety, etc);</i></li> <li>• <i>Lack of locally adapted technologies.</i></li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• <i>Many smallholder farmers are interested in producing indigenous vegetables;</i></li> <li>• <i>Consumption of indigenous vegetables, especially in urban areas, is increasing;</i></li> <li>• <i>The efforts of small farmers to be part of social organisation for being able to express their voice;</i></li> <li>• <i>The small farmers' attempts to reach food security, food sovereignty and improved food commercialisation;</i></li> <li>• <i>Public extension services in some sub-counties (e.g. Gilgil) are running special trainings to promote indigenous vegetables, based on a policy by the Ministry of Agriculture;</i></li> <li>• <i>Ministry of Agriculture and others (e.g. Bioversity International) have run public promotional campaigns on indigenous vegetables.</i></li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• <i>The large diffusion of plant disease and agricultural pests;</i></li> <li>• <i>Severe recurrent seasonal droughts;</i></li> <li>• <i>Barriers to distribution;</i></li> <li>• <i>High input market prices, price seasonality and price volatility;</i></li> <li>• <i>Information asymmetries and buyers' power;</i></li> <li>• <i>Physical access and constraints to mobility.</i></li> </ul>

**Box 1: Kenya's key policies in the agricultural sector**

- The **Agricultural Sector Development Strategy (ASDS) 2010-2020**: see part on “Agriculture-related policies” in Section 4.1 Policies and Institutional Frameworks.
- The **National Agricultural Sector Extension Policy (2012)**: its main objective is to encourage private provision and commercialisation of extension services, imparting knowledge and skills and changing attitudes to enhance technology and innovation adoption. In this regard linkages and partnerships with extension agents are crucial for deployment of comprehensive outreach strategies for the purpose of creating value.
- The **National Agricultural Research System Policy (2008)**: it aims at facilitating the prompt application of agricultural research results and services to enhance productivity and economic growth; and promoting private sector and non-state institutions engagement in research and technology transfer.
- The **National Horticulture Policy (2012)**: The broad objective of the policy is to accelerate and sustain growth and development of the horticultural industry in order to enhance its contribution towards food security, poverty reduction as well as employment and wealth creation. Specific policy objectives are to: facilitate increased production of high-quality horticultural produce; enhance provision of the sub-sector's support services like finances, insurance and technical advisory services; promote value addition and increase domestic and external trade; develop and improve infrastructure to support the horticultural industry particularly in major production areas; and promote horticultural investment in the ‘arid and semi-arid lands’ of the country.
- The **National Agribusiness Strategy (2012)**: its objective is to bring about a highly productive and efficient agribusiness sector, competitive both locally and internationally. The strategy emphasises the need to encourage private sector organisations in development of diversified agricultural and food products, which are essential for improving the competitiveness of the sector.<sup>175</sup>
- The **Kenya Youth Agribusiness Strategy (2017-2021)**: Kenya has a significant number of **youth** (35% of the total population), who are not actively involved in business and agriculture. This is because in many cases, the youth has a negative perception of agriculture and agribusiness or a strong disinterest, whereas more interest goes to formal wage jobs. Given these trends, the Kenyan Government has developed the **Kenya Youth Agribusiness Strategy 2017-2021** to support agribusiness development but more needs to be done to enable the youth appreciate and consider agribusiness as a form of employment.

Source: Kingdom of the Netherlands, 2017

<sup>175</sup> (NL Horticulture Study - Section 2.6.)

### Box 2: Kenya's key policies and acts on seeds and seed diversity

- **Article 11 of the Constitution of Kenya (2010)** provides for “protection of indigenous seeds and plant varieties, their genetic and diverse characteristics and their use by the communities of Kenya”.
- The **National Seed Policy (2010)**: it outlines the intervention measures to be implemented by the seed sub sector to provide guidance to the industry to sustain the availability of adequate high-quality seed and planting material to the users and harmonising all seed related activities.
- The **Seed and Plant Varieties Act (2013)** which is Act of Parliament to regulate transactions in seeds, including provision for the testing and certification of seeds; for the establishment of an index of names of plant varieties; to empower the imposition of restrictions on the introduction of new varieties; to control the importation of seeds; to authorise measures to prevent injurious cross-pollination; to provide for the grant of proprietary rights to persons breeding or discovering and developing new varieties; to establish a national centre for plant genetic resources; to establish a Tribunal to hear appeals and other proceedings; and for connected purposes. Under this act we have regulations such as the Seeds and Plant Varieties Regulations (Seeds Regulations), the Seeds and Plant Varieties Regulations (National Performance Trials Regulations).
- The **Crops Act 2013** is an Act of Parliament to consolidate and repeal various statutes relating to crops; to provide for the growth and development of agricultural crops and for connected purposes;
- The **Plant Protection Act** (Cap 324) which is an Act of Parliament to make better provision for the prevention of the introduction and spread of disease destructive to plants.

Source: Hivos, 2018a

### Box 3: Exploring policy options for diversification through Multi-Criteria Mapping

Serious challenges arise for governments when multi-level, multi-actor, multi-sector, and multi-disciplinary change is required, and when no single actor or breakthrough is likely to enact systemic change (Willett et al., 2019). Multi-Criteria Mapping (MCM) is a technique for systematically and transparently comparing policy options. This technique maps the debate and can foster the exploration of alternative outcomes (Stirling and Mayer, 1999), which starts from the premise that the inclusion of different perspectives and stakeholders can improve policy-making. MCM allows you to find out if options are criticised for being ineffective or politically unacceptable. This facilitates the opening and closing down of an issue. This 'heuristic' approach utilizes the advantages of a structured interviews framework by predefining a set of options for appraisal, while leaving interviewees free to select their own criteria for making their judgements (Stirling, Lobstein, and Millstone, 2007). The MCM interviewees are the key stakeholders of an issue, which for diversification can be policy-makers of the Department of Agriculture or Health, farmers groups, academic and research organisations, municipal planners, processing businesses, and other VC actors. The outcome of MCM makes implicit assumptions on different policy options explicit through the comparison of different stakeholder's perspectives. As a result, the MCM process bridges the formulation of policy options to the identification of possible support coalitions, and aid in identifying possible synergies and trade-offs between different policy options.

**Table 3: Food safety regulation in Kenya**

<b>SL</b>	<b>AGENCY</b>	<b>LAWS</b>
1	Department of Public Health	Public Health Act Cap 242(Rev.2002) Food Drugs Chemical Substances Act Cap 254(Rev. 2002) Radiation Protection Act Cap243 Liquor Licensing Act Cap 121 Traditional Liquor Act Cap 122 Meat Control Act Cap 356(Rev. 1980)
2	Government Chemists Department	Food Drugs and Chemical substances Act Cap 254 Liquor licensing Act Cap 121 Traditional Liquor Act Cap 122 Pharmacy and Poisons Act Cap 244
3	National Public Health Laboratories	Food Drugs and Chemical Substances Act cap 254
4	KEMRI	Science and Technology (Amendment) Act, 1979
5	Pharmacy and Poisons Board	Pharmacy and Poisons Act Cap 244
6	Department of Veterinary Services	Meat Control Act Cap 356 Animal Health Act Cap 364 Fertilizer and Animal Feedstuff Act Cap 345 Dairy Act Cap 336 Crop Production and Livestock Ordinance Act Cap 321
7	Department of Fisheries	Fisheries Act Cap 378
8	Pest Control Products Board	Control Products Act Cap 346
<b>SL</b>	<b>AGENCY</b>	<b>LAWS</b>
9	Plant Health Inspectorate Services	Agricultural Act Cap 318 Plant Protection Act Cap 324 Agricultural Produce Act Cap 319 Seed and Plant Variety Act Cap 326 Suppression of Noxious Weeds Act Cap 325 Fertilizer and Animal Feedstuff Act Cap 345 Control Products Act Cap 346
10	Agricultural Research Institute	Legal Notice under Science and Technology Act Cap 256
11	Horticultural Crops Development Authority	Legal notice under Cap 318
12	Department of Crop production	Cap 318, Cap 319, Cap 320, Cap 321
13	Bureau of Standards (KEBS)	Standards Act Cap 496
14	National Council for Science and Technology	Science and Technology Act Cap 256
15	Dairy Board	Dairy Act Cap 336 Public Health Act Cap 242
16	Coffee Board of Kenya and Coffee research Foundation	Coffee Act No. 9 of 2001
17	The National Biosafety Authority	Biosafety Act 2009

Source: [Kilonzo and Gathura](#)

***“Climate change threatens food security across sub-Saharan Africa. Diversification of food systems, starting with a better integration of indigenous vegetables, can help build climate resilience.”***

The performance of the food system in the southern Nakuru County is currently poor in terms of economic, social and environmental sustainability. The booming flower and vegetable export sectors and the strong market position of a few staple crops leave little room and incentives for smallholders to invest in improved and more diversified production and productivity. Deforestation and decreasing soil and water quality due to intensive production systems and large commercial farms have a visible impact on the environment. Our multidisciplinary research shows that the weaknesses of the three types of sustainability reinforce one another, making economic, social and environmental threats interconnected.

One way to improve sustainability of the local food system is diversification, starting with better integrating indigenous vegetables, such as spider plant or black nightshade, into the food system. These hold many benefits: they are nutritious, require low natural resources and farming inputs, and can contribute to climate resilience.

But how feasible is the transition to a more sustainable food system in Nakuru? The importance of diversified systems is already reflected in a number of policies, but implementation is poor. Local institutions such as farmers' organisations that could stimulate a more diversified food system are very weak, and governance bottlenecks create a particular 'system bias' against indigenous vegetables.

However, a number of entry-points for change exist in the food system. The Ministry of Agriculture could issue a regulation for blending maize and indigenous crop flours, which would lead to more demand and production for indigenous vegetables. Other options include improving the legislative framework to favour indigenous vegetables' seeds. Creating a multi-dimensional sustainability label for indigenous vegetables to draw consumers' awareness is another promising pathway to support a transition from export-oriented monocultural agri-landscapes towards a more diversified food economy primarily targeting Kenyan markets.