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SUSTAINABLE
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KENYA & THE NETHERLANDS

Working together towards circular agriculture in Kenya



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INTRODUCTION

Agriculture is all an integral part of the **Kenyan** way of life. While Kenya exports a lot of agricultural produce, many families have small pieces of land upcountry for personal use.

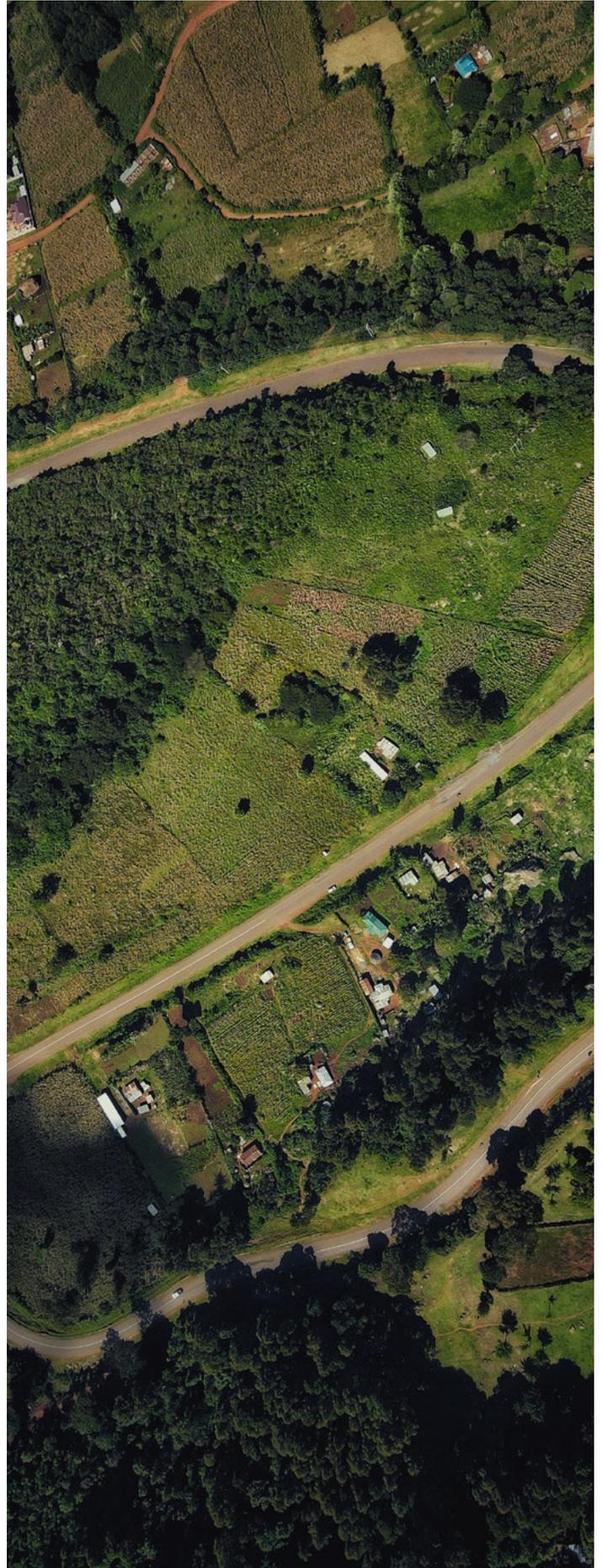
Kenya has space and a good climate to grow horti and flori cultural produce. To mitigate climate change; increase food quality and security in Kenya, the uptake of adoption of sustainable, green, climate-smart, regenerative, circular, organic, and inclusive practices both on a larger scale commercial farming and on private level would contribute greatly.

It is clearly high on the agenda of Kenya to become more sustainable. This is shown by the solid legislations as well as the good practices. Essential aspects to improve and create a sustainable, circular, regenerative agriculture are soil quality, produce nutrition, natural fertilizers, farm to market improvements and innovative growing techniques that are in harmony with nature.



Terminology

In this document, we use the term circular agriculture, but many words describe the same or overlapping concept, like climate-smart agriculture, resilient agriculture, regenerative or conservation agriculture. These terms all refer to food systems that are in harmony with nature, focus on maintaining and improving soil health and biodiversity, facilitate carbon capture by natural processes, and are fair and just.



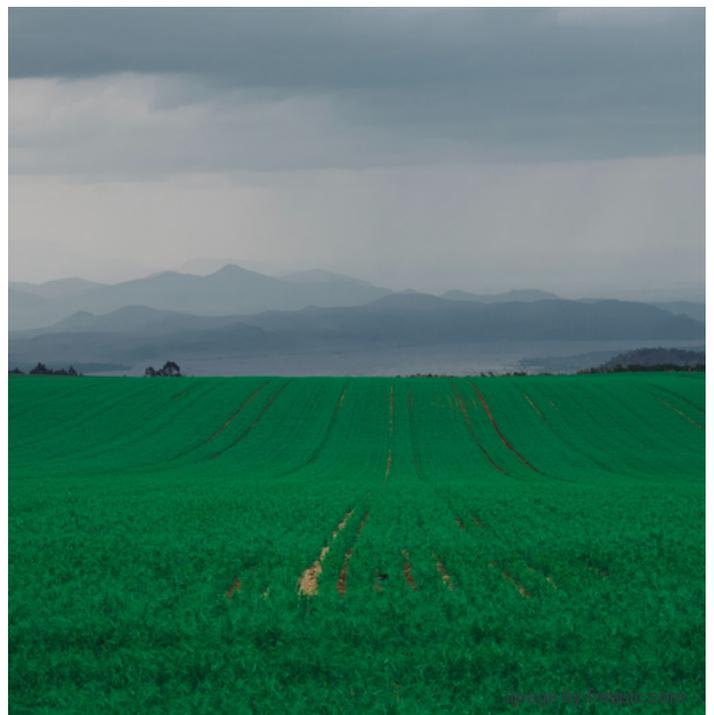
The **Netherlands** places a strong emphasis on agriculture and food, and it is the world's second-largest exporter of agricultural commodities. The governments shift from aid to trade has necessitated the change in approach and relations with partner countries. The Netherlands Embassy in Kenya's Food Security portfolio (from producer to consumer), is distinguished by a value chain focus and a market-led approach. The initiatives aggressively integrate Dutch knowledge providers and experience, as well as technology transfer, therefore contributing to the availability of safe, nutritious, and affordable foods for both domestic and Dutch markets.

Agriculture and horticulture in the Netherlands rely greatly on research and innovation. Dutch agri-food companies and research institutions are pioneering in several areas; including sustainability, climate-smart agriculture, irrigation, and nutrition.

The Dutch Embassy in Kenya has identified five sub-value-chains; aquaculture, horticulture, animal feed, potatoes, and dairy, that can speed up the adoption of circularity in the agriculture sector.

This Trendreport shows how Agriculture is moving to a sustainable, circular, and more regenerative practice in Kenya. The good practices featured, show the way forward, highlight the opportunity areas, and the mind shift as well. The beauty of Kenya is that change is possible. Where there are chances – Kenya will take the lead, explore and pioneer. The Dutch influence is mostly in smart solutions and smoothening organisational processes that will guarantee success in implementation.

As one of the biggest promoters of a circular economy, [The EllenMacArthur Foundation](#) showcases some good practices in Regenerative Agriculture in Kenya.



Opinion: Food system urgently needs transformation

TORONTO, Canada, Nov 2 2021 (IPS)

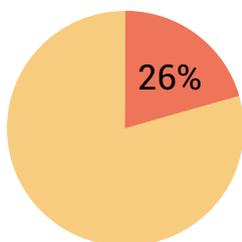
– Unless food systems transformation is put at the center of climate action, commitments governments have already made, and could make at COP26, will be jeopardized. Today's industrialized food system – which includes the growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal of food and food-related items – makes us ill, doesn't meet the needs of the global population, and has adverse effects on climate change.

KEY CHARACTERISTICS OF AGRICULTURE IN KENYA AND THE NETHERLANDS

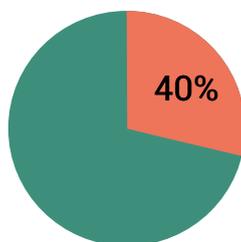
[According to data by the FAO](#), "Agriculture is key to Kenya's economy, contributing 26 percent of the Gross Domestic Product (GDP) and another 27 percent of GDP indirectly through linkages with other sectors. The sector employs more than 40 percent of the total population and more than 70 percent of Kenya's rural people.

Agriculture in Kenya is large and complex, with a multitude of public, parastatal, non-governmental, and private sectors. The sector accounts for 65 percent of the export earnings, and provides the livelihood (employment, income and food security needs) for more than 80 percent of the Kenyan population."

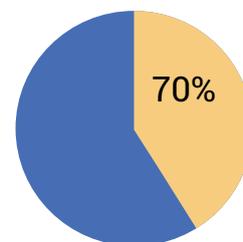
Food Nutrition Security (FNS) is one of the top priority areas for Kenya, as highlighted in the big four agenda. Agriculture is the second-largest contributor to the country's GDP after the service industry. The demand for food is on the rise, evidenced by the increased population, with the country having 47 million people (2019 Census); this is a growth of 23% from the last census conducted in 2009.



Agriculture accounts for 26% of Kenya's GDP



Agriculture employs more than 40% of Kenya's total population



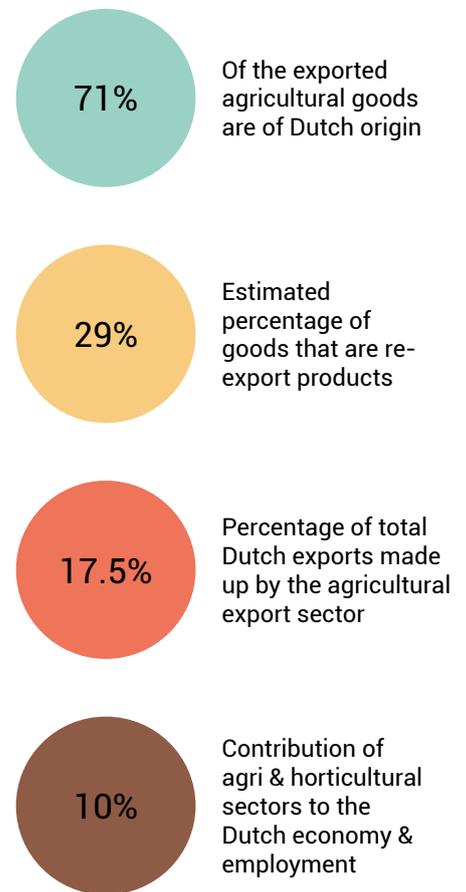
More than 70% of Kenya's rural population is employed in agriculture.

To sustain its population, Kenya is keen to adopt technologies and innovations that will increase the productivity per acre as well as the nutritious value, efficient use of resources, and reduce post-harvest loss, while conserving biodiversity.

The adoption of circularity in the agriculture sector is seen as a game-changer. Food loss is linked to the amount of greenhouse gas emissions, hence a great potential in contributing to the achievement of the Nationally Determined Contributions (NDCs). As of the end of 2020, Kenya committed to reducing its GHG by 32% by 2030. To date, it is crystal clear that food security and food safety have to go hand in hand. Short-term increase of production will not lead to long-term better yields. It is time to look at soil quality, regenerative techniques, climate-smart solutions to produce better and more food with only a positive impact on the earth that provides for us (and our health).



The Netherlands is the second biggest agricultural exporter worldwide. According to the Dutch government's website, the Netherlands exports "65 billion Euros worth of vegetables, fruit, flowers, meat and dairy products each year's". In 2020, the export value of the agricultural sector was estimated at 95.6 billion euros a year. This number is mainly due to price increases, as the volume of export has decreased. Approximately 71% of the exported agricultural goods are of Dutch origin, with an estimated 29% of the goods being re-export products. On average, the agricultural export sector makes up for 17.5% of the total Dutch exports. Ten percent of the Dutch economy and employment depends on the agricultural and horticultural sectors.



The Dutch agricultural sector produces mostly cereals (wheat in particular), feed crops (such as fodder maize), and potatoes. The horticultural sector focuses on vegetables and flower bulbs. Dutch greenhouses produce mostly vegetables and flowers like sweet peppers and roses. These facts explain why there is a great link, exchange, and collaboration between the Dutch and the Kenyans in the Agri space. Though a small country, The Netherlands has the desire to optimize, maximise and make the best out of land use. Kenya can borrow quite a lot from the experiences gained.



Sources

1. [Record-high Dutch export of agricultural goods in 2020](#)
2. [Agriculture](#)
3. [Agriculture and horticulture](#)
4. [Value added of the agriculture sector to the Gross Domestic Product \(GDP\) at current prices in Kenya from 2015 to Q3 2020](#)
5. [Agriculture Statistics](#)



POLICY REVIEW

Even though circular regenerative agriculture is not yet dominant in our food systems, it is clear that on a policy level, the ambitions go in that direction. Kenya, the Netherlands, and the EU, among others, recognize that the side effects of conventional agriculture are unsustainable. Climate change, food insecurity, the loss of biodiversity, and the depletion of soil call for innovations. The overview of Kenyan, Dutch, and EU policy documents shows that respective governments are gradually embracing circular agriculture as the way to go. The new policies also underline collaboration as climate change can't be fixed per country; it requires a globally aligned approach. Let's look at the overlap, similarity, ideas, and plans in place.

POLICY IN KENYA

Circular agriculture may not yet be mainstream in Kenya (yet), but relevant acts, laws, and regulations support this new concept. A chronological overview shows that the goals of the Kenyan government are firmly in line with the realization of more sustainable food systems.

2010-2014

[Agricultural Sector Development Strategy 2010-2020](#) is the overall national policy document for the ministries and stakeholders in the agriculture sector with the overarching goal of achieving a progressive reduction in unemployment and poverty, and an increase in food security.

[National Food and Nutrition Security Policy 2011](#) directs the promotion of sustainable food production systems with particular attention to increasing soil fertility, agro-biodiversity, organic methods and proper range and livestock management practices.

[The Agriculture, Fisheries and Food Authority Act, 2013](#) provides for the consolidation of the laws on the regulation and promotion of agriculture. It also provides for the establishment of the Agriculture, Fisheries and Food Authority, to make provision for the respective roles of the national and county governments in agriculture excluding livestock and related matters.

2015

[The Environmental Management and Co-ordination \(Amendment\) Act, 2015](#) is the overarching legislation on Environment in Kenya. It recommends crop production to be done depending on recommended agricultural practices and appropriate technologies. It further provides that agricultural waste/effluent treatment be designed to avoid pollution of lakes and other water bodies.

[National Spatial Plan 2015-2045](#) promotes shift from traditional farming and livestock keeping methods to modern practices. The Plan also promotes intensifying land use and expanding the acreage of land under irrigation.

2016

[Forest Conservation and Management Act, 2016](#) provides for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country. The Act stipulates that all farms must attain at least 10% tree cover.

[The Water Act, 2016](#) covers water services and water resource management. It promotes increased land under irrigation for increased agriculture production.

2017

[Kenya Climate Smart Agriculture Strategy 2017-2026](#) guides transformation of Kenya's agricultural system through an integrated approach to agriculture, climate change, development, environment, and food security.

2018

[National Climate Change Action Plan \(NCCAP\) 2018-2022](#) is the second 5-year nationwide sectoral plan to guide Kenya's climate change actions, including the reduction of greenhouse gas emissions.

2020

[Nationally Determined Contributions \(NDCs\)](#) was update in December 2020 to reflect Kenya's ambitious contribution to climate change action as per the [Paris Agreement](#). It sets out to abate greenhouse gas emissions by 32% below business as usual scenario by 2030.

[National Livestock Policy 2020](#) aims at achieving sustainable development of the livestock industry through, inter alia, promotion of good animal nutrition where it directs diversification of feed base, including utilization of crops residues, rangeland management with fodder and forage conservation, research in better-performing forage, and integration of commercial feed millers.

POLICY IN THE NETHERLANDS

The Dutch ministry of agriculture has emphasized that the degradation of soils, landscapes, water, and biodiversity resources, as well as increasing urbanization, has deepened the gap between farmers and urban citizens. To curb this environmental and social threat, the government has engaged in a transition program towards circular agriculture between 2015 and 2030.

"There are numerous fast-growing partnerships (...). Farming, horticulture and fishing are undergoing many changes and aim to meet the demands being made of them by society, nature, the soil, water and the ecosystem."

HIGHLIGHTS FROM POLICIES AIMING AT CIRCULARITY IN THE AGRICULTURAL/HORTICULTURAL SECTORS:

In the most ambitious and impactful set of policies The Netherlands is implementing for a more sustainable agriculture system, several are actively contributing to the circular transition of the local system. The set of delta plans implemented by The Netherlands is reportedly quoted as a *"great policy success"* (see Paul 't Hart and Mallory Compton's Great Policy successes Published to Oxford Scholarship Online: October 2019).

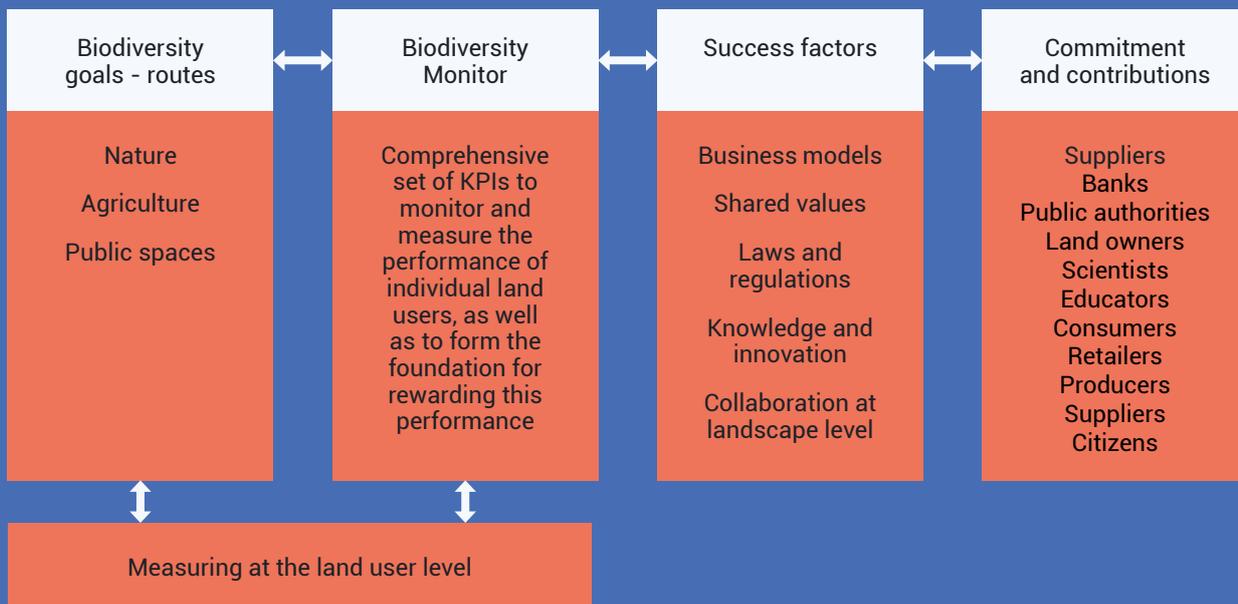
Among the milestone partnership opportunities, the most relevant for circular transition are the following:

- The Delta Plan for Restoring Biodiversity.

The 2030 sustainability goals addressed by the Netherlands have a Biodiversity action plan for the agriculture industry. It encourages and facilitates private/public partnerships in this regard.



Biodiversity Monitor (comprehensive set of KPIs) as a tool for rewarding, encouraging, facilitating and recognizing the contribution of land users to biodiversity recovery



The Netherlands also counts other Delta plans and reliable certifications structuring production's transition, among which

- The Delta plan for Agricultural Water management

The DAW targets the water challenges of farmers. *"Besides promoting water quality, the DAW also focuses on the improvement of soil quality and the reduction of desiccation, flooding / waterlogging and soil subsidence. The DAW mainly operates through area planning processes and transfer of knowledge(...)."*





- The MSC Quality Mark

Sustainable fisheries are mentioned by the Dutch government in the report on nature and food quality perspectives. The certification has been ranked as the most reliable for fisheries in 2019, still highly ranked and used as a reference for sustainability steering in fisheries and aquaculture nationally.

- Sichting Boer Bewust

The national farmer association has launched an initiative to encourage and communicate on the sustainable practices of Dutch farmers.

- Beter Leven Keurmerk

A certification endorsed by the Dutch government to increase transparency and embed more action on animal welfare of all animal-based farming activities nation-wide.

The Ministry of Agriculture implemented a series of specific steering policies, aimed at starting the sustainable transition nationally.

In the greenhouse horticulture sector, the Netherlands aims at energy savings and gas consumption reduction. As part of the goal to achieve more sustainable agriculture, the government imposes to all new greenhouses built from 2020 onwards to be *"climate-neutral and produce zero carbon dioxide (CO2)"*. New constructions have to use innovation and green energy supplies to comply.

The government promotes the implementation of multifunctional agriculture by providing subsidies. Multifunctional agriculture includes farms that *"combine agriculture with nature management"*.

To make "organic farms" more competitive with regular agriculture, the government joined forces with the Dutch Confederation of Agriculture and Horticulture (LTO), supermarkets, and other relevant parties to promote organic products, as recorded in the covenant: Market Development Organic Farming.

Regarding the use of crop protection agents, Dutch farmers are required to use alternative measures before using crop protection products.

Using crop protection agents is only allowed if these alternatives are not effective. The use of crop protection agents always requires proof of competence.

On the topic of biomass: the Netherlands aims *"to replace 30% of the use of fossil materials by biomass (renewable energy)"*.



Circular agriculture in The Netherlands

The vision on the future of agriculture as highlighted in a 2018 report by the Netherlands Ministry of Agriculture dubbed; Agriculture, nature and food, stated that Dutch agriculture must switch to circular agriculture by 2030. Agriculture must then work according to the principles of circular agriculture where nothing is wasted and where residual flows are used to the maximum.

Circular agriculture has the following principles, as formulated by the Dutch Ministry of Agriculture, Nature and Food Quality:



Healthy soil is the basis



Animal manure first



Food waste as animal feed



Food production improves nature, environment and the climate



Cooperation in the region and agro chains

Sources

1. [Bron voor Groene Landbouw, natuur en voedsel: waardevol en verbonden 2.0 2015-2030](#)
2. [Circulaire systemen, Wageningen University, date](#)
3. [Minister Schouten: Kringlooplandbouw is de toekomst](#)
4. [Landbouw, natuur en voedsel: waardevol en verbonden](#)
5. [Omslag naar duurzame en sterke landbouw definitief ingezet](#)
6. [Verdienevullen natuurinclusieve landbouw, Wageningen University, May 2018](#)
7. [Agriculture and horticulture](#)
8. [Policy note on agriculture and food quality](#)
9. [Landbouwbeleid](#)
10. [Uitdaging voor de Nederlandse tuinbouw: Van innovatie naar transitie](#)



POLICY IN EUROPE

The vision on the future of agriculture as highlighted in a 2018 report by the Netherlands Ministry of Agriculture dubbed; Agriculture, nature and food, stated that Dutch agriculture must switch to circular agriculture by 2030. Agriculture must then work according to the principles of circular agriculture where nothing is wasted and where residual flows are used to the maximum.

Following the adoption of the Farm to Fork strategy in 2020 by the EU Commission. On the 3rd quarter of 2021, the EU parliament debated and welcomed the Farm 2 Fork implementation strategy to which The Netherlands is at the pole position. Their main challenges will be focused on raising awareness and informing; facilitating the transitions locally and systemizing sustainable agricultural practices.

Ensuring sustainable farming tackles multiple sustainability topics:

↓
Healthier food (less to no pesticides, healthy diets, no overconsumption)

↓
Greenhouse Gas emissions management (improving natural carbon sinks through regenerative agriculture and soil management, improvement of biomass-based renewable energy)

↓
Animal welfare (towards no cage use for animals, EU harmonization on science-based targets, alignment of non-EU animal products)

The next key objective of the EU Commission, concerning the reform of Agriculture on the continent, is to boost the fast-growing organic production market to reach **25% of the total production by 2030**.

To reach that objective, the countries have to follow a set of 23 actions structured under the following three principles:

1. **Boosting consumption:** involving the sensitization of the consumers, promotion, incentive and fight against fraudulent organic products.
2. **Boosting production:** better funding, specified framework. One key tool will be the adaptation of the next CAP 2023-2027 backed by a budget of €38 to 58 billion, for the period 2023 to 2027). Other actions are key to boost the production: facilitating exchange of best practices.
3. **Improving sustainability:** by reducing the carbon footprint, the use of plastics, water and energy and improving animal welfare.



"We propose concrete measures to bring our food system back within planetary boundaries by stimulating local food production and by moving away from intensive livestock farming and crop monocultures with high a pesticide use. A sustainable food system is also crucial for the future of farmers"

- Anja Hazekamp
(The Left, NL), rapporteur for the Committee on Environment, Public Health and Food Safety.

Sources

1. [European Green Deal: Commission presents actions to boost organic production](#)
2. [New EU farm to fork strategy to make our food healthier and more sustainable](#)
3. [EU Green Deal | Good Food Good Farming Campaign To Get Citizens On Board](#)
4. [#GoodFoodGoodFarming](#)

SDGs

The transition to a circular, sustainable agricultural sector contributes to 5 specific Sustainable Development Goals. The 17 SDGs stress the main issues the world is facing today and urgently need to be addressed to live sustainably and in harmony.

- SDG2: Zero hunger
- SDG8: Decent work and economic growth
- SDG12: Responsible production and consumption
- SDG13: Climate action
- SDG15: Life on land



TRENDS IN CIRCULAR AGRICULTURE IN KENYA



Circular agriculture, also called climate-smart agriculture, resilient agriculture, regenerative or conservation agriculture, refers to a food system that is in harmony with nature and meets social needs at the same time.

The concept of circular agriculture contrasts with conventional or linear agriculture, which has been the dominant food system for the last decades. After World War II, the global transition from traditional smallholder agriculture to a large scale food production system greatly improved food security in large parts of the world, but in the first decades of the 21st century, it has become clear that this system cannot be sustained much longer.

Climate change, rapid deterioration of soil quality and the environment, loss of biodiversity, and deforestation are key challenges of the world today. Conventional agriculture is widely recognized as one of the main drivers of these issues, while not being able to provide affordable and healthy food for around 700 million people. A shift from conventional to circular agriculture is therefore direly needed.

However, fundamentally changing a global system requires time, and frontrunners who are determined to invest their knowledge, money and energy in this transition. They will be inspired by earlier frontrunners, like the 2004 Nobel Peace Prize winner Wangari Ma'athai. She founded the Green Belt Movement, and as an activist and intellectual greatly contributed to the advancement of ecologic awareness in Kenya and worldwide.

The Nairobi based World Agroforestry (ICRAF) also fits into the list of inspiring pioneers. ICRAF is the world's largest repository of agroforestry science and information and develops knowledge to ensure food security and environmental sustainability.

In this report, we have identified 11 trends that indicate a transition towards circular agriculture not only is possible, but is actually happening. We also showcase some best practices that may inspire others. These entrepreneurs are not solitary loners, they all represent an undercurrent that clearly indicates the business opportunities of circular agriculture.

Get a flavour of circular coffee



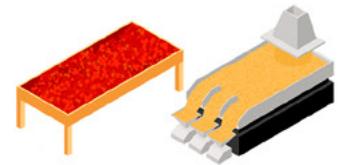
1. Grow a coffee plant (no synthetic fertilizer, all organic fertilizer = no 40% carbon emission), happy soil, happy plants



2. Harvesting



3. Use the coffee cherries (normally waste) for creating organic fertilizer = no rotting = 40% GHG



4. Wet mill & Dry mill



5. Roasting



6. Enjoy & drink coffee



7. Coffee waste/left over collect



8. Press ink out of (café INC)



13. And grow mushrooms



12. More left over coffee into organic compost



11. Coffee left overs into furniture blocks



10. Oil for cosmetic



9. Organic dye for textiles

1 Fighting malnourishment by reducing food waste in the value chain

Even though a substantial part of the Kenyan population still suffers from malnourishment, a sizable part of agricultural production is lost somewhere in the value chain (mainly between farm and market).

A higher yield per hectare (e.g. by introducing new varieties, the use of fertilizers, or better management) is the traditional way to increase food supply.

However, reducing losses is an approach that is trending in Kenya. In addition to the fresh crop market, we see more and more solutions to utilise all crops even when they don't reach the fresh markets.

'Left-over' produce can be stored in a way to extend the lifespan, processed into dried food, animal feed, soil fertilizer, or lastly, biomass fuel.

Examples of the opportunities within reducing food waste are **NatureLock**, by using harvest losses on farm level as ingredients for their healthy convenience meals. Leftover mangoes, pineapple, and other fruits are dried and served as great snacks by **Sweetunda** and [SweetnDried](#).

In Limuru, [Hannah Wanjiru](#), a potatoes farmer, is practicing value addition in the potatoe sector by processing crisps.

In Bomet, **Ndarawetta Producers and Business Farmers Cooperative Society** are facilitating support to farmers to increase value and to avoid losses.



2 Climate change mitigation by reforestation and moving to bio-solutions

Drought caused by global warming poses a serious threat to Kenyan agriculture. The rainy seasons have become more unpredictable, and farmers fear their crops will be lost due to a lack of water. Responsible companies act by reducing their greenhouse gas emissions, thus mitigating the risk of irreversible climate change. They use organic fertilizers as an alternative to synthetic ones or reserve a plot for reforestation.

Agriterra, Moyee Coffee, The Fairchain Foundation, Kipkelion District Cooperative Union, and Kenya Agriculture Livestock and Research Organization (KALRO) have formed a consortium to develop a low-carbon coffee value-chain in Kericho, Kenya. They produce their organic fertilizer from local waste streams.

Furthermore, Africa Wood Grow helps smallholder farmers to plant trees, both for carbon capture and timber production. [Tambuzi](#), a flower farm in Nanyuki, grows beautiful roses that are zero net.

Did you know that we can restore and influence weather patterns by allowing the soil to be receptive to moisture absorption?

The [Weathermakers](#) are showing us what the weather patterns have been, where rivers used to stream and how we can bring rain back where we need it. In Amboseli, the Maasai have collaborated in a digging project by [JustDiggIt](#). It is a system replicating the little holes and soil molding like those made by the hooves of wild animals. This allows the soil to restore its absorption ability. The [Kenya Forest Service](#) is steering the Forest Farm and Dry Land Forestry Program that should help to implement sustainable agriculture practices.





3 Carbon credits as a new value model

Closely linked to the trend mentioned above, is the 'discovery' of carbon credits as a new value model for farmers in Kenya and Africa. As the industrialized North is struggling to reduce carbon emissions by fossil fuel use, the market for voluntary carbon offsets is booming. Because forests absorb CO₂ from the atmosphere, they produce 'negative emissions' of greenhouse gases. The growing number of companies that pledged to become net-zero need these negative numbers to compensate for their carbon emissions, which has led to a true gold rush on these credits.

According to [ForestTrends](#) and [Ecosystemmarketplace](#), REDD credits are particularly in demand, showing a 280 percent increase in transactions in 2021, compared to 2020. REDD credits ("[Reducing Emissions from Deforestation and forest Degradation](#)") credits are used to fund the protection of existing tropical forests.

Other types of carbon credit trading also pose huge opportunities for Kenya and Africa, and this will be even more so in the years to come. The EU strives to have eliminated almost all carbon emissions in 2050, and until then offsetting by reforestation is one of the very few viable options to mitigate global warming. This will require vast areas of land, which are unavailable in the EU itself.

The carbon credit market is still in its infancy, but will already reach a size of 1 billion US\$ in 2021. [McKinsey estimates](#) that demand for carbon credits could increase by a factor of 15 or more by 2030 and by a factor of up to 100 by 2050. Overall, the market for carbon credits could be worth upward of \$50 billion in 2030. At the same time, the exploding market size and turnover attracts many new players, including ones focused on financial speculation only.

Kenya currently hosts around [25 active REDD projects](#) and programs, including the **Chyulu Hills REDD+ Project, the Kenya Agricultural Carbon Project and the Northern Kenya Grassland Carbon Project.**

As an example: Forest Again Kakamega [Forest is a reforestation project in the Kakamega Forest Reserve](#) in the Western Province of Kenya. The project intends to reforest approximately 473 hectares of cleared open forest and grassland to mimic the original indigenous forest.

The aim is to restore and conserve biodiversity, enhance local livelihoods, and sequester approximately 422,000 of CO₂ during the 40 year project period.

The project has been validated to a Gold Level Standard under the Climate, Community, and Biodiversity Standards by Rainforest Alliance. The project goals include sequestering carbon dioxide, increasing indigenous forest area and habitat, connecting forest islands through indigenous forest corridors and conserving the biodiversity of forest-dependent species, and improving the lives of local indigenous people.



4 Renewable energy as the only logical choice

Companies dedicated to circular agriculture tend to see renewable energy as the logical choice for their warehouses, production processes, and lighting.

Compared to the Netherlands, Kenya is already far less dependent on fossil fuels, and innovative companies in agriculture are supporting the development of not towards a low carbon economy. No wonder, because like vegetables, flowers, and dairy, solar, wind, and biomass-based energy are based on natural processes.

As a country on the equator with vast areas of unused land, Kenya is in a good position to increase the utility-scale production of PV electricity. In remote areas, off-grid power can be a reliable option too.

Biomass can be converted into biogas, and be used on the spot for processes that require heat, as the production of steam for cleaning and disinfection purposes.

Insectipro converts organic waste into the biogas they use in their production processes. **Florensis** uses solar to power the UV lights necessary to disinfect water from Lake Naivasha.

5 New crops and varieties to adapt to climate change

The effects of global warming are already visible in Kenya. Weather patterns are changing, and longer periods of drought combined with the erosion of fertile soils put pressure on agricultural production.

Farmers deal with this by choosing crops or varieties that are more resistant to changed circumstances.

To mitigate climate change challenges, **Agriterra** and partners are supporting farmers in coffee cooperations to choose crops and varieties that are resilient against climate change.

Africa Wood Grow smartly chose the Mukau Tree (*Melia Volkensii*) for their reforestation projects, because it is a resilient species that can withstand sustained periods of drought. **SNV's** craft program provides technical,

financial and organisational support to increase educated climate-smart farmers, increase the quality of seeds, yields and improve business practice.

6 Working in harmony with nature, not against it

Frontrunners in circular agriculture stress that our conventional food system works against natural processes. In the long term, this leads to depletion of soils, shortages of water, and decreasing availability of arable land, which can only be countered by using more chemical fertilizers and artificial irrigation.

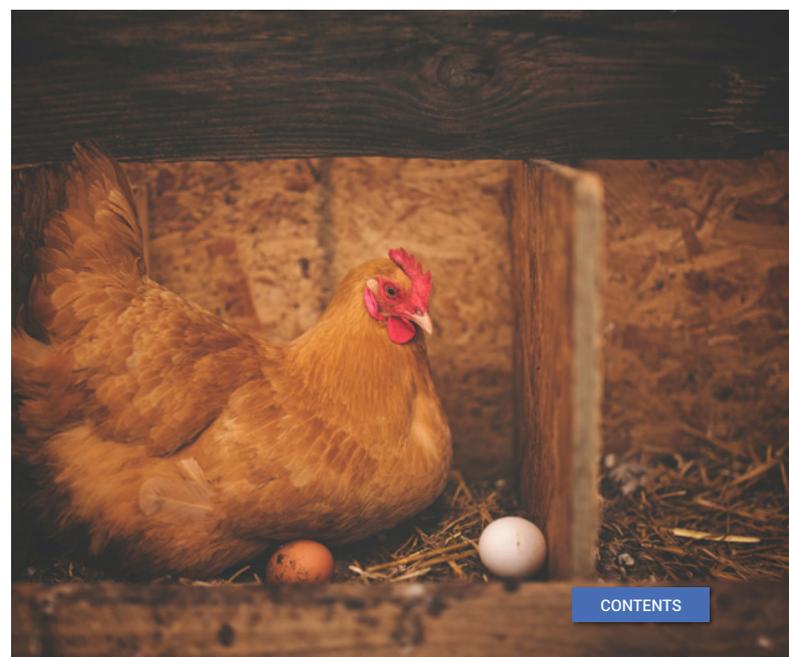
To reverse this negative spiral, circular farmers put the forces of nature to their advantage, by abolishing monocultures, enhancing soil life, and naturally storing water. Even though the revitalization of soils can take several years, results are very promising, including for the conservation of biodiversity.

[Tamalu Farm](#) has improved its not their farm soil by practicing agroforestry.

[Liquid Intelligent Technologies](#) provides realtime monitoring of moisture, and produce, to help users become completely agri-smart (implemented at Twiga foods).

Upande provides support on the same.

According to the **Ecoagriculture**; Kenya already has 15 Integrated landscape initiatives where farming in harmony is being practiced, taught, and implemented. If you like chicken, please have a chick from [Farmer Max](#), whose farms have free range organic happy chickens who create blooming soil and vegetation.



7 Food security is an economic issue

The fight against malnourishment is not only a matter of agricultural output, it is just as much an economic issue. That is why frontrunners in circular agriculture not only focus on agrotechnology but also have a keen eye for both the affordability of their products and the creation of new jobs.

Looking at improving the value chain through alternative distribution and access models, innovations that extend lifespan, and or create different food products are ways to create jobs.

Frontrunners are also very well aware that women and youth are the most vulnerable groups in economic terms, and strive to include these in their workforce. The biggest challenge is to not only include women and youth in the lowest-paid manual jobs but to also make space for them on all levels of the chain.

In Kenya, **Mama Mbogas** are crucial in accessing food for local communities. Mama Mboga means – Mama vegetables, and they help bring the fresh vegetables to their neighborhoods.

With their feet on the ground, they should be more included in the value chain as key distributors and guards of affordable food security.

Sustainable agri players start acknowledging this and **Twiga Foods** works with the mamas for a sustainable future.

Naturelock's production site in Nairobi employs primarily single mothers and provides on-site childcare. Their healthy convenience food products are in the same price range as less healthy alternatives.

Insectipro has a workforce of over 60 people and refuses to buy foreign-made products if Kenyan suppliers are available. By supporting food production for the local context, you are contributing to resilient and circular communities.

8 Smart low tech and hands-on innovation

The shift from conventional to circular agriculture requires new insights, new approaches, and different technologies, and entrepreneurs in this field show a very high level of appreciation for innovation. At the same time, they manage to adapt their production processes to low-tech circumstances in Kenya. The independence of vulnerable technology is seen as an advantage. Skilled local craftsmen can carry out maintenance and repairs in machinery, testing new processes is easy, leading to hands-on innovation.

Smart hands-on innovation examples are aquaponic agriculture (both house and at farm level), agroforestry (responsible pastoral grazing), renewable energy farming to run greenhouses, halophytic agriculture (in salty soil circumstances).

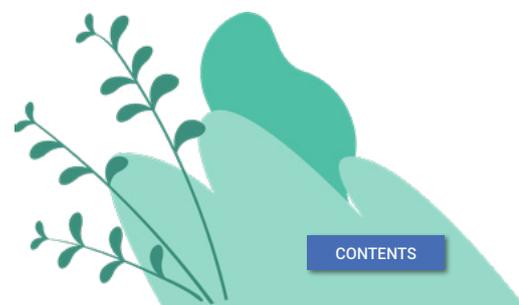
The circular economy for agriculture will benefit from new tech solutions for some aspects and requires going back to elders and past generations to connect with nature and natural solutions that are simple and locally available.

Mara beef is an example of integrating the value chain of beef into the full ecosystem; from grazing patterns that are healthy for everyone, the number of cattle producing better quality meat and volumes, to markets at fair prices.

Naturelock uses a proprietary technology developed in European labs and has converted this knowledge to a production process that can be controlled locally.

Insectipro is developing more efficient ways to grow insects and does this by a trial-and-error approach. Rapid adaptations on the ground and a short innovation cycle are key in this learning process.

Africa Wood Grow uses advanced geographical data to develop their view on regional reforestation, but at the same time are deeply rooted in local communities for progress on the ground.





10 Think big, produce locally

Companies focusing on circular agriculture tend to look at local production and consumption first. They know that a great deal of the food system is based on international trade, bringing Chinese feed to Kenyan markets at very low prices and supplying Dutch cattle with cheap soy from Brazil.

In a circular system, food is produced and sold locally, shortening the supply chain and reducing food losses during transport and warehousing. Sustainable, circular farming with fair pricing and local good decent jobs is not only possible, but it will also soon be a must and a requirement.

[Mara Farming](#) has proven that it is possible to work with smallholder farmers in a sustainable inclusive and nature-friendly way while serving export markets. *"With these results from the Service Delivery Model, we are excited to continue working with the smallholder farmers. We are also planning to include more smallholders in Kenya, and together with IDH we will replicate the model in Ethiopia to achieve further sustainability,"* says Christian Benard, CEO of Mara Farming.

Beyond the farm and the market, we have a caterer in Kenya that serves you only goodness working with all the mentioned good practices in the chain.

[Lime catering](#) uses only quality agricultural produce, organically produced out of the regenerative value chain. In this case, they work with most of the cases highlighted in this report, since they seek to only serve healthy and tasty food.

NatureLock uses local harvest losses to produce instant stew for local markets and aims to set up small-scale production sites across Kenya and Africa.

Farm to Feed ensures that local produce reaches local markets and local communities.

Insectipro uses local organic waste streams as an input for their production process and is starting up similar plants in other regions in Kenya and Uganda. The company also facilitates smallholder farmers to set up their small-scale production sites of black soldier flies.

9 Plant and insect based proteins as a substitute for meat

On a global scale, the consumption of meat is a huge source of greenhouse-gas emissions. Replacing the animal proteins with plant or insect based proteins contributes significantly to reducing carbon emissions in the food system.

Frontrunners in circular agriculture acknowledge this and strive to produce meat with fewer emissions, or develop substitute products. We notice many examples of meat replacements in Europe and America; from beef made in the lab to plant-based products.

Beyond beef is an example. In The Netherlands, the first **vegetarian butcheries** are opening their doors. Besides trying to make plant-based replicas of meat we can also choose to substitute meat protein with different forms of protein.

Have you tried crunchy crickets? **Insectipro** produces crickets for human consumption as well as Black Soldier Flies as feed for cattle and soil fertilizer. The carbon footprint of these protein-rich feed and food products is negligible compared to conventional cattle farming.

Plastic Waste

Today, plastics play a key role in any sector; including Agriculture. Whether it's the PET water bottles in the canteen, or plastic used to cover the greenhouses, package vegetables, fruits, and flowers; plastic is a fact.

The main problem is that a higher percentage of the plastics being used in the agricultural sector are not recycled after use. Therefore, single-use plastic should be eliminated either through innovation for recycling, replaced, or reused.

Rethinking whether it is necessary to use materials for specific purposes might lead to sustainable solutions that are urgently needed to solve the plastic menace. For greenhouse plastics and other agricultural plastics; collective recycling solutions are the first option.

The [Kenya Plastics Pact](#) has been developed to set clear and ambitious targets to Eliminate, Innovate and Circulate plastic Packaging.

[Timaflor](#) has started using 100% recycled flower sleeves as alternative to the non recyclable plastics packaging. the features of the foil have not changed.

Florensis is one of the Kenya Plastics Pact members driving the change and creating a circular economy for plastics from the Horti/ Flori sector angle.

Biofoods is member of the Kenya Plastics Pact. They have already reduced plastic packing by shifting to lighter and less material used, easier colour to recycle and increased the quality of recyclability of their packing.

Organic Waste

The low-hanging fruit in the agriculture sector is organic waste to value solutions. Leftovers of fruits, vegetables, stems, and leaves of flowers if not treated with chemicals, are perfect as food for soil, animals and can be converted to organic manure for soil improvement.

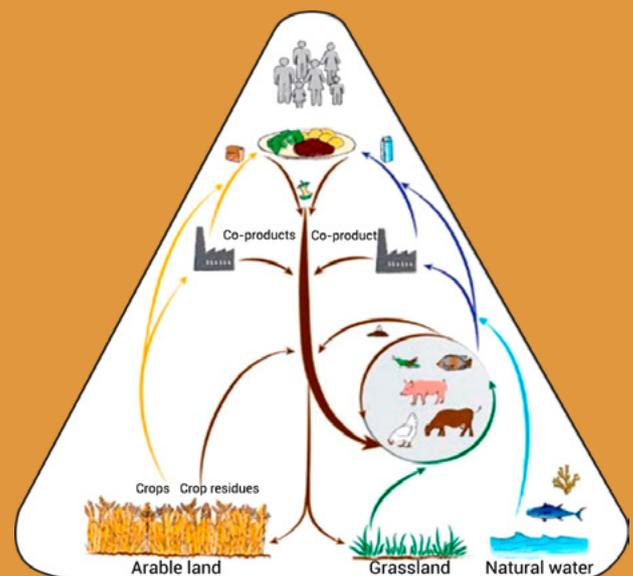
Several farms also have implemented waste to biomass converters to make alternative energy. Biomass turned into pellets for cooking is a much healthier way of cooking as it is clean, doesn't require tree cutting, has almost zero carbon emission, and is cheaper than charcoal.

[BrightGreen Energy](#) is a startup run by Chebet Lesan, a young woman in Kenya who was inspired to change the unhealthy cooking situation that she knew from her grandmother's place. As indicated on the BrightGreen website, *"there was little faith in biomass as a robust business model that could deliver widespread benefits when the company first launched. Since then, BrightGreen has become a trailblazer in this young sector and its impact shows that improved cooking fuels can deliver social, financial and environmental impact"*.



Three principles for circular food production

1. Plant biomass is the basic building block of food and should be used by humans first.
2. By-products from food production, processing and consumption should be recycled back into the food system.
3. Use animals for what they are good at: converting biomass and not suitable for human consumption into proteins.



Circularity in agricultural production

WORKING TOGETHER

Both in the Netherlands and Kenya, agriculture is of main importance for the economy, food security and the transition towards a sustainable economy. Cooperation between companies in both countries, the exchange of ideas and knowledge and mutual understanding of the specific political, geographic and social circumstances can be of advantage to both countries. This chapter describes a series of best practices in five subsectors that prove that Kenyan-Dutch relationships can result in fruitful and resilient agricultural innovations.



Move to more circular greenhouses

Both in the Netherlands and Kenya, greenhouses are getting more circular. Greenhouses are very important in the cold climate of the Netherlands to support the efficient production of other crops, vegetables, and flowers. In Kenya, heating a greenhouse may not be the problem, but irrigation also needs energy. Steps to make greenhouses more sustainable include the use of solar energy; light-saving measures (use of natural light and more efficient lamps); energy-efficient growth strategies; geothermal applications; use of biofuels (the use of biogas (green gas) and (residue) wood offer great potential); generation and use of (more) renewable energy.

Integrated pest management

Integrated Pest Management (IPM) is replacing chemical products. IPM consists of using biodiversity and biological crop protection agents to protect crops. For example, by introducing natural enemies of insects that harm crops in the greenhouses; or working with fungi or bacteria that naturally combat pests.

Standardization of certifications on sustainability – quality control

The Dutch Milieu Programma Sierteelt (MPS, Environmental Program Floriculture) and the Kenyan Flower Council both worked on the standardisation of sustainability certification. The MPS focuses on environment, good working conditions, safety, sustainability, traceability and hygiene. It also evaluates how a company scores on the components use of fertilizers, pesticides, energy and waste.

Sources

1. [Duurzaam ondernemen](#)
2. [Kenya Flower Council](#)
3. [MPS-A\(+\)](#)
4. [Circulaire Glastuinbouw](#)
5. [Bloemenkwekers in Kenia steeds duurzamer](#)



BEST PRACTICES IN HORTI/FLORICULTURE

Oserian

Oserian, a flower grower in Kenya, of not with Dutch origin, uses an installation that generates electricity from geothermal sources to heat the greenhouses at night. Furthermore, the about 7 million litres of water the system heats up every day is constantly reused to grow flowers.

Florensis

A collaboration between Florensis, a flower-growing company of Dutch origin and Philips led to impressive energy savings. Replacing the incandescence lamps with LED lamps, Florensis managed to reduce energy consumption by over 90%. [Have a look at the good practice 'case'](#).

KFC / MPS / Timaflo

Timaflo is a Kenya-based Dutch company that adheres to both the Kenya Flower Council (KFC) standard and the Dutch program Milieu Programma Sierteelt (MPS). They scored silver on the KFC scale and second-highest category of the MPS. Timaflo developed special systems that support their biological approach, which takes environmental effects explicitly into account.

Agriterra, Kipkelion, Moyee, Fairchain: low-carbon coffee value-chain

Moyee Coffee, The Fairchain Foundation, Agriterra, Kipkelion District Cooperative Union and Kenya Agriculture Livestock and Research Organization (KALRO) have formed a consortium to develop a low-carbon coffee value-chain in Kericho, Kenya. They are using local waste materials like coffee cherries, banana leaves, grained rock for essential minerals; to produce bio- alternatives that are then sold as an affordable alternative to synthetic fertilizer and pesticides. Over 7,000 smallholder coffee farmers in Kericho have already joined the project, dubbed the Sustainable Development Goals Partnership (SDGP). There is still room for the rest of the county's farmers to adopt the bio-alternatives and embrace organic farming.

NatureLock

Startup NatureLock reduces harvest losses on smallholder farms while offering a cheap and healthy meal to consumers looking for convenience food. An aggressive growth strategy on the consumer market will fund their ambition to reduce malnourishment among refugees and school children.

Ketchup Project

The Ketchup Project is a dutch initiative in collaboration with Kenyan farmers, designed to tackle food waste from harvesting and strengthen the financial sustainability of Kenyan farmers. They collect the 40% of tomato crop going to waste and dry them, allowing their conservation for up to 1.5 years. This method is also used with Mango crops, allowing the company to produce sustainable, healthy, and tasty ketchup.



Resilient potato varieties

Due to deterioration of soils by salt in The Netherlands, or drought and floodings in Kenya, research is done to develop potato varieties that are resilient to harsh growing conditions. As a result, in the Netherlands, two varieties of potatoes have been developed that are salt-tolerant. Kenya could make use of varieties that have a higher success rate on eroded soils.

Reduces losses in potato chain

In both countries, efforts are made to avoid food loss in the supply chain.

Better storage

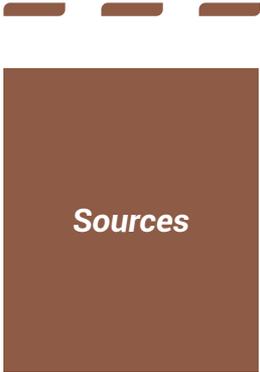
In Kenya, a substantial part of the harvest gets lost somewhere between harvesting and retail. The focus, therefore, is on increasing the quantity and quality of storage facilities.

Extraction of sugar and starch from wastewater

is a solution to the loss of these valuable by-products in the Netherlands. The water that is lost in the production process of potato products tends to contain a large amount of sugar and starch. Research is done on how those products can effectively be extracted so that the water can be used again.

Peels as a resource for other products

Potato peels are used to produce bread-crumbl-like food, and can even be an ingredient for beer.



1. [5 Innovative Opportunities In Sweet Potato Production In Kenya](#)
2. [2 kilo aardappels in 1 kilo frites: waar blijft de rest?](#)
3. [Savfood maakt circular alternatief voor paneermeel](#)
4. [Van \(aardappel\)reststromen naar geldstromen?](#)

BEST PRACTICES IN HORTI/FLORICULTURE

Gaea Foods

Gaea foods is a Kenyan limited company working on fresh cuts of potato production. In addition to sourcing locally, they also engage farmers from far and wide to ensure that the products they sell are of the best possible specification.

"These values made us innovate and seek solutions to the challenges that presented themselves in progressive ways that would bring a benefit to those involved, while maximising the resources, be they human, material and capital" (Rosanne Mwangi).

Agrico East Africa

Agrico East Africa supports improved potato farming in Kenya. Increasing yield, quality and profits for the potato sector in Kenya is needed for sustainability of the way of production as well as the farmers profitability.

With high quality certified seed potatoes and intensive training Agrico has managed to scale up a sustainable potato value chain in Kenya. This contributes to food security and food safety at the same time. With 5 new varieties of potatoes approved by Kephis boosting the Kenya Potato sub sector, new opportunities are on arise. The better the taste, the resilience, the shelf value and nutrition value all contribute to a better chance of sustainable potato value chain in Kenya.



The dairy industry is one of the biggest Agri subsectors in Kenya. It is a local industry that creates jobs, and contributes to food security and food safety.

Quality and safety (and nutrition) are very key in a healthy and sustainable dairy value chain. After increase in dairy products in a harmful and unhealthy way, Kenya is now on a track where education to farmers, healthy stock feed, quality controls on toxic substance in dairy are becoming the norm more and more.

Sustainable Dairy Chain

The Sustainable Dairy Chain (SDC) is an initiative of the Dutch Dairy Organisation (NZO) and the Dutch Federation for Agriculture and Horticulture (LTO Nederland) in which the dairy industry and dairy farmers strive to make the Dutch dairy sector the world leader in sustainability.

The parties involved have dedicated themselves to generating future support from both the market and society (www.duurzamezuivelketen.nl/eng/home).

They have formulated goals to realize a more sustainable dairy sector under these four themes: climate and energy, animal welfare and health, maintenance of grazing and environment, and biodiversity.

In the EU, agriculture accounts for **10.3%** of the GHG emissions, of which around **70%** is produced by livestock farming. As **68%** of all agricultural land is used for animal production, what happens on this land has an **enormous impact on the climate and the environment**.

The nutrients and pesticides used in the sector pollute land and water. Ammonia emissions from livestock waste are a **significant source of air pollution**.

Agriculture also contributes to **growing water scarcity**: it uses more than **40%** of freshwater in the EU, with a significant share used for **livestock production**. Animal farming is a major driver for biodiversity loss.

To dramatically reduce green gas emission and negative impact on climate and biodiversity it is crucial to reduce the pressure on land, reduce water and energy use, eliminate toxic fertilisers and pesticides.

These issues are both being addressed in Kenya and The Netherlands, EU in various ways. While sustainable practices require intensive and systematic changes, good practices are showing us its possible and happening.

Quality improvement

In Kenya, innovations in the dairy chain especially pay attention to improving the quality of the base product: milk. By stricter protocols, improving hygiene and better cooperation amongst smallholder farmers, the use of antibiotics and chemical pest control has shown a lot of improvement.

Product development, niche products

Both in Kenya and the Netherlands, milk tends to be processed to higher-value products to reach specific niche markets. The Netherlands has an enormous track record in this, but in Kenya too, milk is converted into specialty products for baristas, yogurt for hotels like the Sankara hotel, and attractive desserts for children, featuring the TingaTinga cartoon (**Biofoods**) as a marketing tool.

Biodiversity awareness

In both countries, biodiversity is climbing up on the agenda of dairy farmers. The Dutch Biodiversity Monitor is a tool that provides a comprehensive overview of the impact of a dairy farm on biodiversity. In Kenya, we did not find a similar tool, but biodiversity awareness is growing among farmers.

Sources

1. [Slow Food report](#);
2. [NZO report](#);

Carrying capacity of the land

Albeit in very different ways, both Kenya and The Netherlands are struggling with their version of the classic story of the 'tragedy of the commons'.

In the Netherlands, the massive consumption of soy by cattle is one of the major impacts on climate and deforestation worldwide. One solution that is suggested, is the so-called land-related dairy farming. In this case, the fodder needed for cattle comes from the farm's land or a farm nearby, making every dairy farm locally self-sufficient. To realise this, the number of cows (and pigs) will have to be reduced drastically.

In Kenya, the Maasai culture and pastoral grazing have traditionally been good for nature. If the cattle groups are the right size, cows use their hooves to dig up space for rain and prepare the soil for absorption. Over time, the number of cattle became a matter of prestige and pastoralists overstepped their grazing areas by encroaching on wildlife sanctuaries. Now, we face continuous human-wildlife conflict. The [Mara training center](#) tries to reverse this.

Sources

1. [Towards a sustainable dairy chain in the Netherlands - The opinion of dairy farmers and their advisors](#)
2. [Welke stallen zijn er in Nederland?](#)
3. [Why does the Dutch dairy cow need soy?](#)
4. [Sustainable dairy in Europe 2020](#)
5. [Protecting biodiversity and the environment](#)
6. [Letse melkveereus streeft naar circulariteit](#)
7. [Een verkenning van de circulaire economie in de zuivelsector](#)

BEST PRACTICES IN DAIRY FARMING

De Hoeve, circular dairy farming

De Hoeve is a circular dairy farm that wants to make optimal use of its manure and aims to close the production cycle. They combine agriculture and dairy farming and use cow manure on the arable land.

Biofoods, from grass to your glass

Biofoods helps farmers to produce more and better quality milk, by optimizing feeding hay, silage and feeds, to ensure the cow eats an optimal diet and produces more and better-tasting milk.

Happy Cow

Happy Cow consistently provides a diverse dairy-based product offering (including cheese) that is of high quality, healthy, innovative and widely accessible.



There is observed appreciation and adoption of climate-smart practices in aquaculture in both The Netherlands and Kenya. Notably, in the Netherlands, unlike Kenya, climate-smart aquaculture practices are intensively and widely adopted.

According to the [State of Aquaculture Report in Kenya 2021](#) , climate-smart agriculture in the aquaculture sector has been promoted through the blue economy concept which portends huge opportunities and potential to achieve economic growth, generate jobs and achieve food security embodied in practices such as; cage culture (in oceans, lakes, dams and rivers), integrated Re-circulatory aquaculture systems (RAS), aquaponics/greenhouse, pens, breeding and restocking of commercially indigenous species and live fish markets.




Sources

1. [Fisheries and Aquaculture](#)
2. [Fisheries and Aquaculture in Netherlands](#)
3. [Towards circular aquaculture](#)
4. [Mobile laboratory for coral rehabilitation](#)
5. [Norwegian technology for sustainable aquaculture](#)
6. [A 20-year retrospective review of global aquaculture](#)
7. [Circulaire viskweek](#)
8. [Aquaculture guidelines](#)
9. [Fisheries and aquaculture production](#)



BEST PRACTICES IN AQUACULTURE

Mwea Fish and Omega Farms

Insufficient quality fingerlings for restocking remains a key constraint to the advancement of the Kenyan aquaculture sector. As such, companies such as Mwea Fish and Omega Farms have come in to produce quality fingerlings to meet this gap.

Mwea Fish and Kamuthanga Farm

Resource efficiency is regarded as among the key principles of a circular economy. As such, companies such as Mwea Fish and Kamuthanga Farm have adopted the Recirculatory Aquaculture System (RAS), a technology in which water is recycled and reused after mechanical and biological filtration and removal of suspended matter and metabolites.

Victory Farms

Cage aquaculture continues to gain traction in Kenya as a preferred fish rearing technique that boosts production and enhances resource efficiency with companies such as Victory Farms leading the way in sub-Saharan Africa with more than 100 deep-water cages at the offshore of Lake Victoria.

Kikamboni Commercial Aquaponics Farm

To boost aquaculture production and enhance general agriculture production, an integrated fish culture approach has been widely adopted which involves the connection of agricultural systems to fish farming in a design that allows waste from one system to be used as input in another system, conserving resources and boosting returns as adopted by Kikaboni Commercial aquaponics farm.

Upande and Osiligi Fam

While appreciating the role of technology in spurring circularity in the aquaculture sector, Upande, a Kenyan IT company of Dutch origin, supplies software and hardware to track farming operations on the Osiligi Farm which combines water-based agriculture with aquaculture. The sensors are used to monitor growth conditions and the quality of the environment.

Blue Linked and Van Oord

Whereas the Netherlands has adopted all the above climate smart agriculture practices, they remain a trailblazer leading advancement in the way fish is fed and bred. Inspired by nature, Blue Linked creates 100% closed marine ecosystems on land, in which all kinds of marine life can grow under natural conditions. On the other hand, to enhance breeding ground for fish, the Dutch company Van Oord launched the mobile lab for coral culture under the name 'ReefGuard', for the rehabilitation of wild reefs in which fertilisation techniques can be carried out in transportable containers, using eggs and sperm obtained from corals off the reef.

The Trout Tree Restaurant

The restaurant serves fresh trout from the trout ponds below their dining space, char-grilled to perfection; thus the slogan "From Farm to Plate".



Growing demand for nutritious feed

Both in Kenya and the Netherlands, there is a growing demand for nutritious animal feed that is not imported from across the globe.

In the Netherlands, and other EU countries, the EU Farm to Fork strategy creates great incentives to make agri-food systems more circular.

Specifically, animal feed has great potential to become circular, given the grounds and dynamics observed locally, and the incentives created by.

Re-using animal feed by-products

In both countries, reusing by-products and waste streams in the food chain is one step in making the animal feed more circular. One way of doing this is by breeding insects on organic waste streams from agriculture, industry, and urban centers.

These insects can then serve as a resource for food and animal feed. This alternative to livestock farming consumption is also a way to reduce the number of antibiotics given to livestock farming production.

The re-use of by-products of livestock can also lead to the production of bio-energy. By favoring organic fertilizers and recycling non-edible biomass through animal food chains, livestock farming is contributing to closing nutrient cycles (see figure below).



The Impact Cluster Feed: FeedTechKenya

The livestock sector in Kenya is developing at a fast pace. The demand for protein-based food increases due to population growth and changing consumption patterns.

However, the development of the livestock sector is constrained by the slower development of the animal feed sector. Feed users and feed producers could increase their performance by using better feed and applying better feed practices.

This Impact Cluster project is a spin-off project of an earlier Public-Private Partnership project, [Food Tech Kenya](#), also funded by the Dutch government. This project aimed to improve the aquaculture sector in Kenya. Through this project, it became clear that fish feed is an important bottleneck in the development of the Kenyan aquaculture sector. The impact cluster project was designed to tackle this problem and improve availability, quality, affordability, and knowledge of animal feed.

Aim

Empowering and innovating the feed sector in Kenya and boost the production of high-quality feed and more effective feeding practices, and generate business for the cluster partners

Funding Duration

The Impact Cluster FeedTechKenya was approved by the Netherlands Enterprise Agency (RVO.nl) and the embassy of the Netherlands in Kenya in December 2019. The duration of funding is 3 years. The total amount of the project is a subsidy of 50% for the amount of € 449,497.

Cluster

The consortium consists of 6 partners active in the entire feed chain and is coordinated by Larive International (NL) and Lattice Consulting (KE):



Aeres Training Centre International



Ottevanger Milling Engineers



Insectipro



Almex Extrusion Techniques



Unga Farm Care Ltd



Nutreco Africa

Activities

The consortium conducts studies, performs feed trials, demonstrates best feed production and usage practices to feed millers and farmers. By working together, knowledge and expertise are shared.

- A [study](#) towards promising alternative protein sources for livestock and fish feed in Kenya. In total, 71 sources including Black Soldier Flies (BSF), have been assessed of which 21 have been further analysed at the Nutreco laboratory.
- Following this assessment, the consortium selected the most promising sources to be trialed at a Kenyan broiler and Tilapia farm.
- Established protocols and feed formulations for alternative protein source-feed trials.
- Prepared training programs for Kenyan broiler, layer, pig, cow, and Kienyeji farmers.
- Have been awarded additional funding from the Bill & Melinda Gates Foundation to widen the activity scope and increase impact.
- Worked out details on how to adjust feed production and formulations to use BSF as a protein source.
- Branded FeedTechKenya training materials, including educative books elaborating upon best farming and feeding practices.

Strengths

- Cooperation between Dutch and Kenyan businesses on an equal basis.
- Knowledge, and expertise in the entire chain with a focus on farmers and feed millers.
- Room for innovations; solving dependency on feed imports and creating new local markets and methods for feed millers and improved business models for farmers
- Experiences to be expanded in the East African region as well as creating activities outside the scope of the impact cluster funding
- Successful start despite COVID-19 restrictions because of the solid Kenyan base.
- Multiple synergies, spinoff activities, and collaborations as a payoff from working in a consortium



Business links

The consortium paves the way for a more successful business:

- By training feed millers and giving them local alternatives for high-quality feed.
- By developing better farming and feeding techniques and actual alternatives for feed.

Also, the cluster members create more business, both for the Dutch and the Kenyan companies, by joining forces:

- Nutreco entered into a joint venture with Unga (to invest in a feed factory in Kenya).
- Insectipro and Unga collaborated to work on feed for crickets (beyond the scope of the impact cluster project)
- Insectipro and Unga collaborated on incorporating BSF in feed production.
- Startup Insectipro is able to grow as Unga is a stable sales partner for Insectipro (this is a trade spin-off after the project).

Ottevanger Milling Engineers is using the experience gathered during the implementation of this project to adapt their technology to better fit the needs in these kinds of markets.

The importance of the cluster is endorsed by Ingrid Korving, Agricultural Counsellor of the Netherlands Embassy in Nairobi:

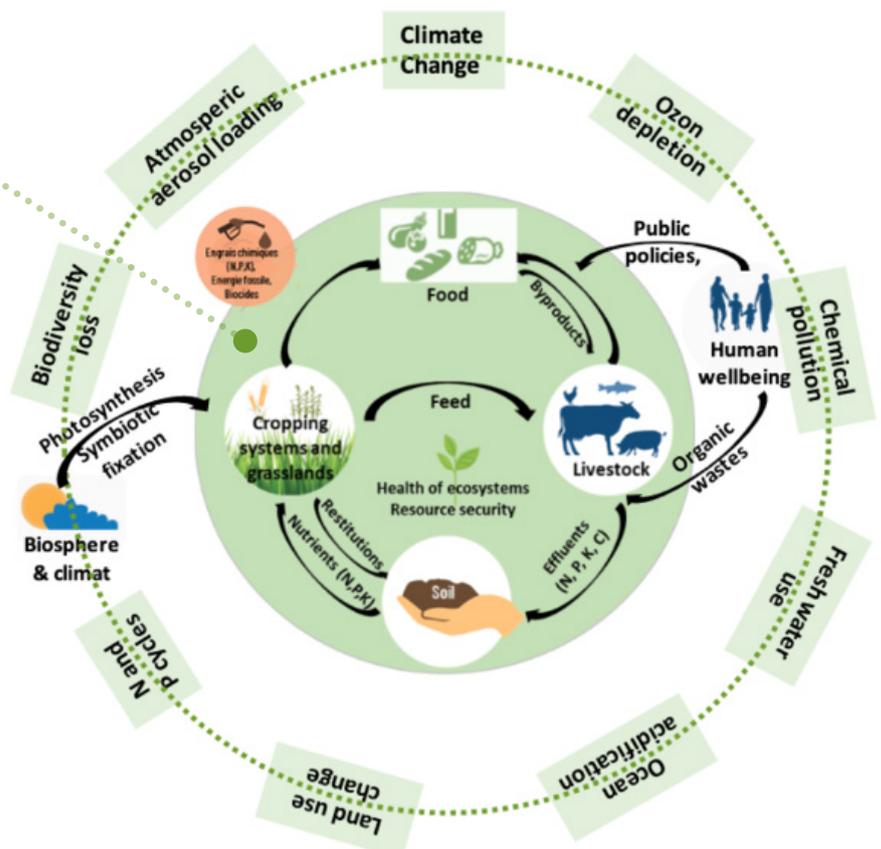
"We identified the need for a feed-sector based project, and are very happy with the arrival of this first impact cluster in Kenya. The livestock and aquaculture sector contribute over USD 3.1 billion to the Kenyan economy. It is important to facilitate the growth of such an important sector by tackling the issues in the feed sector".



Role and place of livestock in balanced circular food production within planetary boundaries
(Source: a study on future of EU livestock)

Sources

1. [Sustainable livestock production](#)
2. [Circular agriculture calls for practical steps](#)
3. [Circular agrofood system](#)
4. [Future of EU livestock](#)
5. [Circulair voer](#)





The fast-growing population and urbanization of Kenya are leading to several challenges such as excessive waste and the limited supply of protein-rich food.

To reduce the amount of waste, the Ministry of Environment and Forestry has written draft legislation.

The "National Sustainable Waste Management Policy Bill" will force businesses to handle their waste sustainably. This offers opportunities for innovative circular businesses.

The Circular Fly

The *Hermetia illucens* or Black Soldier Fly, an insect common in Kenya, has a spectacular ability to convert organic waste into protein and is renowned for easy handling. The larvae of the fly can consume as much as 70% of its body weight in waste every day.

Another challenge of a growing population is feeding this population with sustainable protein-rich food. Fish is a very efficient form of animal protein in terms of feed, water usage, and emission. Unfortunately, the production of local fish has been difficult partly due to the high prices of protein-rich fish food. Talash Huijbers realized she could tackle both problems simultaneously with a circular and sustainable solution; the production of the Black Soldier Fly (BSF).

For every kilogram of organic waste that it consumes, nearly 50 grams of protein are produced that can act as a feed supplement for commercial livestock such as poultry or fish. Moreover, the leftover product, which remains after the decomposition process, can be used as a high nitrogen organic fertilizer.



Background Insectipro

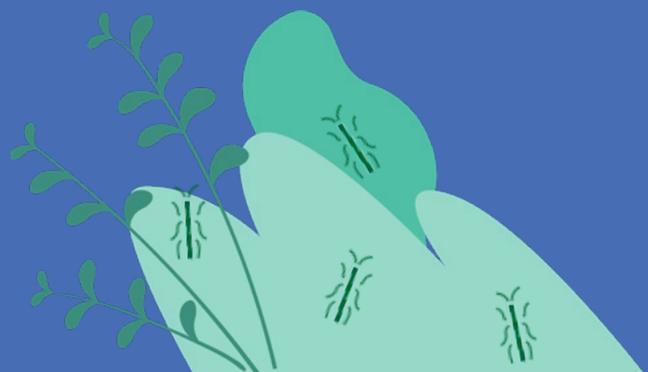
Talash grew up in Kenya on the farm of her Dutch dad and Kenyan mom. After finishing her bachelor's degree in International Food and Agribusiness at the HAS in's-Hertogenbosch, she moved back to Kenya. In November 2018, Talash started her circular business InsectiPro where she creates protein-rich animal feed from insects. A sector, which is very new, sustainable, and efficient. In her greenhouses, she makes feeds from the BSF larvae. The larvae feed on organic waste from local grocery stores; bakeries and even a local beer brewer. While the animal feeds are being made from the insects, the feces of the flies are great fertilizer and thus everything within the cycle of the fly is being used.

This business is of great value for Kenya because it will support the local economy in so many ways; as Talash says, *"My business will have a big impact on the Kenyan economy since it will reduce the prices of animal feed, give local farmers the ability to produce local fish, and chickens, which feed on good quality protein (BSF) produce higher quality meat and eggs and thus will create a higher nutritional value and help solve food security in Kenya"*.

This requires Talash to think outside the box and thus, by copying systems from the flower and rice sector and by being creative, she is expanding her company.

The future of this sector is bright; many opportunities are arising, not only for animal feed but also for human consumption. As Talash says, *"Before you know it we will be eating a cricket burger"*.

The demand for animal feed ingredients in Kenya is high; currently, 70% of animal feed ingredients are being imported. In 2018, legislation for the use of insects in the animal feed had been introduced in Kenya. The insect feed sector is rapidly growing and the industry is constantly changing. The number of animal feed mills has almost doubled since 2008.



NEXT STEPS

Looking at the policy overview, the trends in Circular Agriculture, the sectoral developments in the Netherlands, and best practices in Kenya, the question remains how the transition to a sustainable food system could be hastened. A survey among 35 agricultural companies in Kenya suggests the following.

Over 50% picked these as top trends in sustainable agriculture:

- Reducing food waste in the value chain.
- Combatting climate change.

Runners up:

- Work on biodiversity.
- Food security, economic aspects.

Q: Which in your opinion are the top trends in sustainable/circular Agriculture?

ANSWER CHOICES	RESPONSES	
Reduce food waste In entire value chain including transport (see freight), 'farm to fork'	60.00%	21
Climate charge mitigation, mixed crops, agroforestry	57.14%	20
Climate charge adaptation, new varieties for drought, heat	31.43%	11
Biodiversity, work with nature, not against it (reduce chemicals)	45.71%	16
New varieties, plant breeding. GMOs under pressure	11.43%	4
Food security, economic issues, food as a commodity in international trade	45.71%	16
HI tech, big data, precision agriculture	17.14%	6
Meat, plant-based proteins	8.57%	3
Price of food, accessibility, food security for the poor, SDG2	28.57%	10
Total Respondents: 35		



Q: Top sustainability issues I address in my company

ANSWER CHOICES	RESPONSES	
Drought/water	45,71%	16
Biodiversity	25,71%	9
Soil health	60,00%	21
Biological pest control	25,71%	9
Sustainable energy	51,43%	18
Living wages for employees	37,14%	13
Product development, plant breeding	28,57%	10
Packaging	11,43%	4
Transport	17,14%	6
Others, please specify.	14,29%	5
Total Respondents: 35		

The private sector is especially working on these issues:

- Soil health.
- Sustainable energy.
- Drought and water.

The most important drivers to shift to sustainable / circular agriculture are:

- The long-term value of their companies.
- Market demand in Kenya.

Q: Select top-3 drivers for a transition to sustainable/circular Agriculture

ANSWER CHOICES	RESPONSES	
Market: demand by buyers in Kenya/Africa	51,43%	18
Market: demand by buyers in Europe/developed markets	40,00%	14
Market: demand by investors/shareholders	20,00%	7
Personal motives, ethics	34,29%	12
Long-term sustainability of a company	54,29%	19
Higher profits, better turnover	25,71%	9
Policies, laws and regulations	45,71%	16
Engagement of the local community	40,00%	14
Others, please specify	5,71%	2
Total Respondents: 35		

Q: Select top-3 barriers for a transition to sustainable/circular Agriculture

ANSWER CHOICES	RESPONSES	
Lack of finance, investments	77,14%	27
Policy gaps, laws, regulations (If selected: which ones?)	48,57%	17
Lack of knowledge about circular Agriculture	68,57%	24
Buyers unwilling to pay higher prices	42,86%	15
Lack of management readiness to implement	22,86%	8
Lack of qualified personnel	20,00%	7
Others, please specify	8,57%	3
Total Respondents: 35		

Policy focus to speed up the transition to a more sustainable food system:

- Facilitating access to investments.
- Increase knowledge about circular agriculture.

STAKEHOLDERS

Key stakeholder landscaping in the sector (demand and supply side; innovation and technology)

1 Agri & Livestock Research Org

- <https://www.kalro.org/>

2 Kenya Agri Research Institute:

- <https://kari.org/>
- <https://kenya.un.org/en/sdgs/2>
- <https://ellenmacarthurfoundation.org/topics/food/overview>

3 Regenerative academy

- <https://therockgroup.biz/nl/project/regeneration-academy-onderzoeksprogramma-landbouw/>
- <https://www.feedthefuture.gov/country/kenya/>

4 Netherlands Food Partnership:

- <https://www.nlfoodpartnership.com/>

TIPS AND TRICKS FOR FARMERS

Herewith we have included simple tips & tricks. We realise that these require a plan to implement (the how), it is however a good checklist in ticking that helps you on the way to sustainable regenerative smart agriculture.

Don't waste waste for example could become a subsector project to develop ways to eliminate, innovate and circulate the used plastic packaging. There is always a lot you already do and a lot that still can be done and improved on.

1 TIP

Create short and transparent supply chains, buy local, add value locally. Create a transparent value-chain through Fairchain's blockchain application.

- » Impose your sustainability criteria upon your suppliers and work with them to meet the new standards.
- » Feel responsible for the impact you have with the whole value chain; where can you improve, change, help?
- » Read about Agriterra: Roasting at Origin. With partners, they set up a local roasting facility in Kenya to create local job-opportunities and support the structural transformation of Kenya.

2 TIP

Conserve water, build terraces, plant trees

- » Harvest rainwater.
- » Understand the weather pattern from the past and create receptive soil to even absorb moisture when the rains are little.
- » Put a waste-water system in place and use waste-water for irrigation.
- » Consider water scarcity and treat it as a rare commodity.
- » Have water filters replacing bottled drinking water.
- » Practice irrigation
- » Learn from Africa Wood Grow, an organization that supports in the Kitui region to plant trees.

3 TIP

Focus on healthy soils, use chemicals only if you have no other options

- » Produce your biofertilizers with local waste streams.
- » Ban the use of fertilizers, limit the use of pesticides.
- » Agriterra: Set up local bio-solutions production facility to increase the use of bio-compost, bio-fertilizer and bio-pesticides to improve the soil health and increase productivity.
- » BlackSoldierFly: use 'fly-poop' to improve soil.

4 TIP

Visit other farmers, ask experts, customize your approach

- » Create partnerships to solve issues like plastic waste collectively.
- » Work with interns to expose youth to current business attitude and developments, while benefiting from a 'green, fresh' mind approach towards problems.
- » Climate change, loss of biodiversity and inequalities pose challenges globally, and solutions from elsewhere might inspire you to follow suit.
- » Support the implementation of a comprehensive intercropping strategy for farmers.

5 TIP

Use renewable energy

- » Produce your biogas with biological waste streams, like InsectiPro.
- » Invest in solar energy to become more energy independent.
- » Cooperate with neighbors to set up more energy-efficient cooling or heating facilities.

6 TIP Be mindful about sustainability

- » Reflect on all items, things you use and why. From printing paper to material used to make desks (could they be made from recycled material?).
- » Rethink transport – how do your employees move around? How is your produce transported?
- » Think long term. How would your grandchildren value the business decisions you take today? What will be your legacy?

7 TIP Communicate

- » Educate each and everyone in your organisation on sustainability and circularity.
- » Communicate about the circular aspect (s) of your organisation; it will inspire others and make them understand why it is important and that it is possible as well. For instance, tell your employees why single-use plastic packaging is no longer used and create a challenge to embrace the concept and become the champion of the month (nominated by other colleagues).
- » Create slogans for your value that are reflected in your action.
- » Have reward systems in place that acknowledge circular solutions, responsible resource use, renewable energy, avoiding waste and let the reward be linked to sustainability (such as giving a fruit tree, or taking their family to a national park).
- » Make people your reviewers, alert them and they will alert you.

8 TIP Ensure financial sustainability, fair wages and equality

- » Provide equal pay for both women and men.
- » Empower women in roles that are not the lowest in the chain (Women are mostly seen in cutting, and sorting), make them distributors, managers, etc.
- » Boost your equality, not by offering everyone the same, but offering packages that match everyone's need.

9 TIP Don't waste waste

- » In your organisation, you can start avoiding single-use products and plastic packaging; refill water bottles, coffee cups, etc.
- » Bring sorted waste to recycling centres.
- » Rethink packaging material use; are flower pots reusable? Recyclable? Compostable?
- » Can food and bio waste become food for animals, the soil, or fuel for the farm?
- » If materials are no longer in use; dispose of responsibly. E-Waste can be taken to the WEEE center.

10 TIP Learn about and restore biodiversity

- » Which animals, plants, insects are indigenous? Are they all still around? If not, can you bring them back by restoring areas with natural vegetation for other forms of life?
- » Use native species.
- » Do not cut trees, but try to plant more of them.
- » Grow flowers in between lanes of corn, wheat, etc. to bring back the bees.
- » Emulate Base Titanium in restoring mining areas and bringing back endangered species.

11 TIP Involve local communities

- » Extend the education and information beyond your organisation; clean ups & waste management education, waste to value workshops, nature walks to talk about biodiversity with the elders (who still hold all the knowledge regarding flora and fauna and their purpose and place in the cycle of life).
- » Be inclusive and provide on-site child care, which allows single mums to get a job in their production facility. Involve women and youth not only at the bottom of the value chain but integrate them throughout the value chain.



CLOSING NOTE. AN OPEN CONVERSATION

This report should inspire, and show areas of opportunities. The trends we notice today and development in progress will change over time.

We, therefore, aim to continuously update our reports and create active roadmaps from the input.

Would you please share your knowledge, needs, findings, innovations, technologies, challenges, and activities with us to speed up the transition to a circular, sustainable and regenerative Agriculture?

- Describe the opportunities you see within CE Agriculture and the future impact of those in Kenya.
- What would you need to boost your Circularity?
- Which company do you consider a best practice for circular agriculture? Why?
- What is the key to securing safe food in the future?





Kingdom of the
Netherlands



Netherlands Enterprise Agency



CIRCULAR AGRICULTURE REPORT

Case Studies



INSECTIPRO

Making Africa food secure
with the help of insects.

"Where we see annoying bugs, InsectiPro shows us that insects can be a sustainable solution to the increasing demand for animal proteins, both for feed and for food. InsectiPro reveals the beauty in the beast."

WHO:

InsectiPro is a startup based in Limuru, Kenya that dedicates itself to creating "sustainable, nutritious and profitable systems, that will positively change the current food and value chains". Their solution: insects. Founder Talash Huijbers: "People call them beasts, we call them beauties."

WHY:

With a fast-growing population, the demand for animal proteins is spiking. Traditional food systems fail to produce these without an alarming pressure on nature. Feeding cows, pigs, and chickens requires vast areas of land, which threatens biodiversity and climate. Additionally, animal feed is extremely expensive so much that local meat and fish are costlier than the imported equivalent. A cheaper and more sustainable source of animal feed is desperately needed.

WHAT/ HOW:

This is where the products of InsectiPro come in. Insects breed at high speed, require no medicine, do not smell nor bite, don't require large stables and have a negligible impact on the environment. Furthermore, they thrive on waste streams. InsectiPro is breeding two species that are especially suited to speed up biological agriculture: the black soldier fly (BSF) and the cricket.

At first sight, the black soldier fly may look like an annoying bug, but it provides a range of valuable products. As an ingredient for animal feed, it adds loads of protein to the diet. This is beneficial for cows, chickens and pigs, which have been shown to grow faster, healthier and in better shape after incorporating the BSF in their feeds.

Black soldier flies also convert the organic waste that they feed and live on into biological fertilizer that improves soil quality. As a result, farmers who have used organic fertilizer have reported improved crop productivity.

By converting organic waste into high-value protein, InsectiPro is making a circular production cycle that reduces the amount of organic waste that otherwise ends up in the environment or dumping sites throughout Nairobi.

The crickets grown by InsectiPro cover a different market segment: that of human consumption. The product is either ground and added as an ingredient in porridges, soups, or pizzas, or is roasted and sold as a tasty snack. Both options are healthy and provide valuable nutrients such as protein zinc and iron that many humans lack. A handful of crickets contains as much protein as an entire chicken.

As Kenya's population continues to grow, the demand for food will continue to increase. Unfortunately, the COVID 19 pandemic has further negatively impacted child and maternal health and nutrition indicators. According to UNICEF, over 531,000 children aged 6 to 59 months need treatment for acute malnutrition in Kenya, including nearly 344,000 children in arid and semi-arid counties. Against such backdrops, InsectiPro aims to provide a cheaper and more practical solution to the food crisis by elevating nutrition through crickets.

NEXT:

Talash Huijbers's ambitions are sky-high.

"In the coming years, InsectiPro will expand rapidly by setting up local production units in Kenya, Rwanda and Uganda. We do not need hi-tech equipment, and everything you need to grow insects can be sourced locally. The market is booming, to an extent that we are sold out until 2025. We provide a real solution to the impacts of global warming on food and feed production; and we are looking to bring insect consumption to the mainstream population to change human protein consumption."

With a big smile, she summarizes her vision: "*Climate change, Bad! Insects, Good!*"



The logo for Agriterra, featuring the word "AGRI" above "TERRA" in white capital letters on a dark blue square background. Below the text are three curved, orange-to-yellow gradient lines.

AGRITERRA

Mitigating climate change with local organic products.

Agriterra and partners have developed a low-carbon coffee chain by using local waste streams to replace chemical inputs with locally produced bio-alternatives. Over 7,000 smallholder coffee farmers in Kericho County, Kenya have already joined the project, and there is room for many more.

WHO:

Moyee Coffee, The Fairchain Foundation, Agriterra, Kipkelion District Cooperative Union and Kenya Agriculture Livestock and Research Organization (KALRO) have formed a consortium to develop a low-carbon coffee value-chain in Kericho, Kenya. Of the 40,000 smallholder coffee farmers represented by the union, over 7,000 in this region have already joined the Sustainable Development Goals Partnership project, and are reaping the benefits of increased farm production.

WHY:

According to the Agriterra County Representative- in Kenya Wilfred Chepkwony, "Climate change reduces the production of crops and lowers the profits farmers make with coffee production. Of all greenhouse gas emissions in coffee production, 40 percent is caused by the production and use of synthetic fertilizers and pesticides. Another 40 percent comes from the rotting of the cherry once the coffee bean is removed. That is why we must move away from non-organic agriculture. Climate-clever coffee production is the way to sustainable farming."

WHAT/ HOW:

This project consists of three main pillars, including showcasing a model farm and developing with a coffee roasting facility in Nairobi. Apart from that, a low-tech production site of bio-compost, bio-fertilizer and bio-pesticides is in operation at the KDCU coffee mill in Kericho. Henry Sang is the SDGP Project Officer and says: "All ingredients of the bio-products are sourced locally, from waste materials like coffee cherries and banana leaves to grained rock for essential minerals. The bio-products are sold as an affordable alternative to synthetic fertilizers and pesticides."

NEXT:

Wilfred Chepkwony: "The Kenyan economy is driven by agriculture. There is a general awareness about the importance of mitigating climate change among farmers, and the need to reduce the use of chemicals. Scaling up organic farming quickly, as one of the best alternatives, is our biggest challenge because the transition takes time. Setting up a bio-compost fertilizer facility takes months, restoring soil fertility can take years. You cannot expect immediate results. The farmers know this, they only need a financial buffer to bridge the period between traditional and biological production. But I am optimistic because we cooperate with ambitious organizations."





NATURELOCK

Turning harvest losses into healthy convenience meals.

Startup NatureLock reduces harvest losses on smallholder farms while offering a cheap and healthy meal to consumers looking for convenience food. An aggressive growth strategy on the consumer market will fund their ambition to reduce malnourishment among refugees and school children.

WHO:

NatureLock is a Nairobi-based social enterprise that aims to reduce harvest losses on the farm level while offering a cheap and healthy meal to consumers looking for convenience food. The Kenyan/Dutch startup aims to grow aggressively in the next 5 years by introducing their consumer brand StewsDay, targeted at a mass market.

WHY:

Wilco Vermeer, co-founder of NatureLock explains: "Depending on the crop, harvest losses can amount up to 50 percent of agricultural production. Around 40 percent of these losses are caused by the fact that consumers are not willing to buy potatoes that are damaged during harvest, carrots with an unusual form or shape, or tomatoes that are too small. This means that smallholder farmers have to discard a large portion of the food they produce. At the same time, large parts of the Kenyan population suffer from a lack of food and malnourishment. We want to bridge this distribution gap."

HOW:

This is why Naturelock partnered with the NGO Farm to Feed. They started rescuing surplus harvests during the COVID 19 pandemic, to supply food to underprivileged families. Now, NatureLock buys vegetables and fruits that would otherwise have gone to waste from Farm to Feed. Farmers from different counties who work with Farm to Feed are then able to increase their income by around 20 percent, and reduce crop wastage previously experienced.

WHAT:

At their processing plant in Nairobi, Naturelock converts the fruits and vegetables into pre-prepared food, packaged into a dry product of 45 grams units. The process is based on proprietary technology that does not rely on chemical preservatives. All vitamins and nutrients from the carrots, onions, potatoes and ginger are conserved in the end product. The process is relatively low-tech, so it can be applied anywhere where food losses occur.

There are already over 3300 small shops in Nairobi that sell the processed ndengu stew, and NatureLock is piloting distribution via street vendor karts. But in the end, the company is focused on scaling up the process to turn more second-grade vegetables into healthy, cheap and instant meals.

Urban consumers prefer convenient food but are currently stuck with noodles and other products that fill them up but lack the fibers and vitamins needed for a balanced diet. StewsDay, NatureLock's initial product competes on this market. The reception has been incredible, and its not with their expansion strategy, the company aims to break even by the end of 2022.



NEXT:

Tei Mukunya Oundo, the Co-Founder and CEO of NatureLock notes, "We do need the income from a mass-market because our product is also extremely valuable to schools and refugee camps. StewsDay could be a key product in the fight against malnutrition. We aim to be a game-changer in this field. In five years, we want to have thousands of production locations across Kenya and Africa. Per location, there will be around 20 small-holder farmers that convert their discarded products into income for themselves and good food for consumers. Every facility will employ several people, primarily women in rural communities. They do not only need the job but they are already focused on food anyway."



FLORENSIS

Growing plants with less chemicals

Florensis aims to be the most sustainable breeder and propagator of plants. With an output of over 1 billion plants per year, reducing the use of chemicals is an important component of this ambition.

WHO:

Florensis is a family-owned business founded in the Netherlands in 1941. The Kenya branch is located in Naivasha and produces planting material for growers in Europe and across the globe. They consider their product as part of nature and go to great lengths to reduce their impact on the environment.

WHY:

For Florensis, the availability of freshwater from lake Naivasha is key to producing young plants. "A healthy environment is what makes our business thrive," explains Florence Obonya, CSR manager at Florensis. "That is why we have a wholesome view on sustainability. We rely on natural resources and will do anything that protects them. Apart from that, as a family business, we always consider long-term effects."

WHAT/ HOW:

Florensis has identified several sustainability issues in its production systems. The use of chemicals is one of those. Eddy Verbeek, general manager: "We use chemicals for two purposes. The first is for growth control. Whenever we can, we use biological alternatives. That is relatively easy, but we also use disinfectants, and these are far more difficult to replace. All our plants must be 100 percent free of viruses, bacteria, and fungi. We want our clients to receive healthy plants that do not spread diseases. And besides that: the phytosanitary rules in the EU are extremely. You cannot export any plants that are not safe. To prevent the use of disinfectants, we focus on prevention. We produce our plants in sterile compartments, maintaining sanitizing rules that are at least as strict as in healthcare."

"The soil we use to grow the plants is sterilized with steam that we generate with renewable energy. The water from Lake Naivasha undergoes treatment with UV radiation. This allows us to produce healthy plants with minimal use of chemicals."

NEXT:

Next: Florensis will continue their efforts to produce plants sustainably in different ways, e.g., by harvesting rainwater on greenhouses, and replacing single-use plastic pots and packaging with not by reusable products. To reduce carbon emissions during transport Florensis is looking into sea freight instead of transport to European markets by air. Verbeek: "Yes, it takes longer, but if COVID hat taught us anything, it is that just in time deliveries are vulnerable in times of crises."





AFRICA WOOD GROW

Facilitating reforestation on smallholder farms.

Africa Wood Grow envisions a green future for the barren land in the Yatta region. One by one, smallholder farmers in this region plant plots of trees that will preserve water, provide timber, and, ultimately, will change the climate for the better.

WHO:

Africa Wood Grow is a Dutch/Kenyan organization founded in 2010 to initiate economic activities in the Yatta region part of Kitui county. Their core competence is to facilitate farmers to plant trees and contribute to the reforestation in the area. Over 80 farmers planted on average one acre of trees, and the number of participants is growing year by year.

WHY:

Reforestation and agroforestry are potentially the most effective ways to abate global warming while conserving biodiversity, increasing the income of smallholder farmers, and restoring soil fertility. Africa Wood Grow has a strong belief in the capacity of local communities to take responsibility for the environment and focuses on training, the supply of planting material, and involving new participants.

WHAT/ HOW:

Seedlings are produced on one of the farms of Africa Wood Grow and then distributed to participating farmers for free. The species used are all native to the region and produce valuable hardwood that is suitable for construction purposes.

Over the years, AWG has gathered a solid practical knowledge of the do's and don'ts of tree planting in this dry part of Kenya, and this experience is shared with all participants. Every plot of land is fenced properly, to avoid young trees being eaten by goats.

The rate of success is high, as only around 10 percent of the trees planted do not survive. Farmers are selected on their skills and ambition to cultivate the trees. The construction of dams, gutters, and terraces is part of AWG's efforts to reduce erosion and prevent rainwater to wash away fertile soil.

NEXT:

Expanding the area that is reforested is the main element of AWG strategy. Apart from that, experiments with the production of biofertilizers are carried out. They envision a future in which all separate plots of the forest will be connected, thus changing barren land into a region that thrives on agroforestry.



The Ketchup Project.

KETCHUP PROJECT

Strengthening the financial sustainability of Kenyan farmers.

The Ketchup project is a Dutch initiative in collaboration with Kenyan farmers, designed to tackle food waste from harvesting and strengthen the financial sustainability of Kenyan farmers. They collect the 40% of tomato crop going to waste and dry them, allowing their conservation for up to 1.5 years. This method is also used with Mango crops, allowing the company to produce sustainable, healthy and, tasty ketchup.

"The food production in the world is gigantic, more than we need, but as long as a large part of it has no guaranteed market destination, it counts for large losses".

WHO:

The Ketchup project has been operating since 2016, processing agricultural food waste to implement sustainable year-round agriculture for tomatoes with a planting program that is innovative in the country. The Ketchup project is a frontrunner in sustainable agriculture, working with 104 farmers, implementing certified processes to add value to the food waste.

WHY:

In collaboration with Kenyan farmers, the ketchup project collects dried fruits from harvest waste locally. This solution helps keep fruits in stock for 1.5 years and is perfectly suitable for ketchup production. None of the tomatoes (and mangoes!) is going to waste: using skin and seeds to enrich the flavor of the end product. This model in collaboration with local, smallholder farmers, is also a way to ensure a reliable regular financial income for the collaborators.

WHAT/ HOW:

To ensure minimal food waste and drive sustainable practices in food production, the n°1 top driver they identify is guaranteed market offset and a market-driven production. Sustainable practices should also be secured by international agreements and standards. A trend has been observed with increased and internationalized quality control.

Shifting the current food production trends can be a challenge: going from staple food to sustainable food markets can only happen through international norms of all kinds (correct pricing, taxes, minimum percentage of plant-based products, quality of agricultural input, and practices). Those will ensure a global sustainable transition, moving at the right pace: raising awareness, financially incentivizing transitioning farmers.





UPANDE - AQUAPONICS

Smart asset
management in a click

Upande, an IT company of Dutch origin, supplies software and hardware to track farming operations on the Osiligi farm where they combine water-based agriculture with aquaculture. They use sensors from Upande to monitor growth conditions and the quality of the environment. They use the nutrients the fish produce as an organic manure for the water-based crops, and the fish are in return fed with black soldier flies that naturally live in the area.

WHO:

Upande has established a partnership with the Osiligi Farm, dubbed the AgriLift farm (in Kenya's Rift Valley). The Agrilift farm is a "non-commercial farm that supports young Kenyan ex-convicts to redirect their lives" as explained by Mark de Blois, the founder of Upande. The farm trains these young men on the techniques of aquaponic farming, which combines water-based agriculture with aquaculture. The Agrilift farm uses sensors from Upande to monitor growth conditions and the quality of the environment.

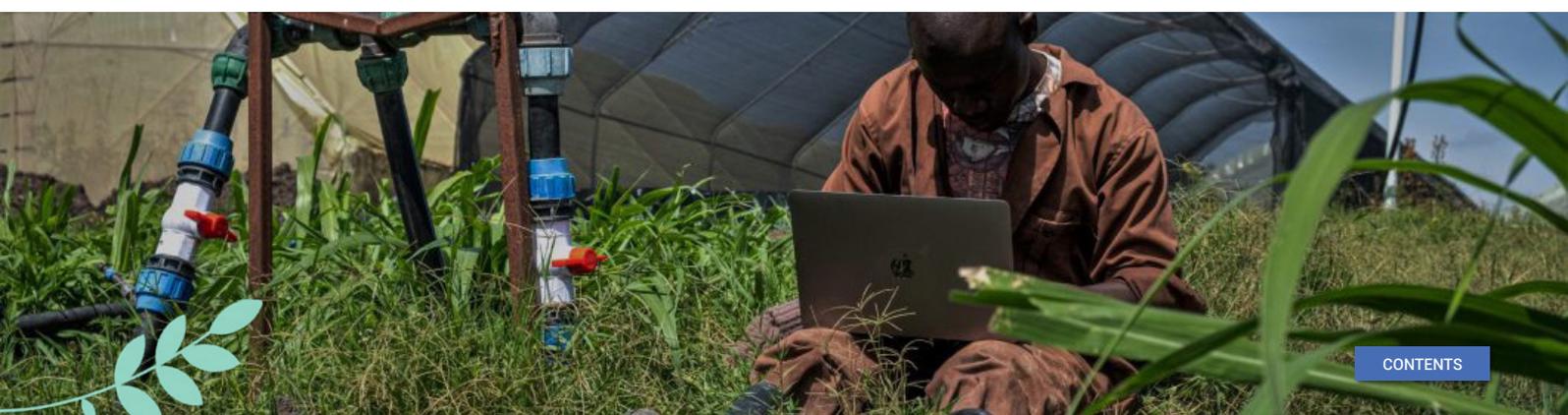
WHAT/ HOW:

The Agrilift farm has several inspiring sustainable activities. They breed crops in water instead of soil, using organic manure that dissolves in water. This allows crops to grow in places where the soil is not arable (anymore) and thus combats the challenges of soil degradation. De Blois explains that another benefit of this approach is that it allows crops to be grown close to the cities, which decreases the cities' dependence on transport and the emissions caused by transporting crops. Furthermore, the farm is involved in fish-breeding for consumption and nutrient generation, both used in organic manure production. Breeding fish for consumption provides an alternative to overfishing natural resources. Additionally, they use black soldier flies which are high in protein, as a source of feed for the fish to reduce the need for transported fish feed.

NEXT:

When asked about challenges the Agrilift farm encounters, De Blois identified making the farm 100% circular, mainly because organic manure allows for less precise dosing of the relevant nutrients. Another challenge is getting certification for water-based organic agriculture, as this certification in Kenya is only available for soil-based agriculture at the moment. Lastly, getting enough funding for upscaling and improving the initiative remains a challenge, just as getting support translating the circularity theory into practice from knowledge institutions.

Overall, De Blois sees many opportunities for combining smart farming (based on data collected with the software + hardware of Upande) with aquaponics in the future.





GAEA FOODS

Earthly and wholesome

Gaea foods is a Kenyan limited company working on fresh cuts of potato production. In addition to sourcing locally, they also engage farmers from far and wide to ensure that the products they sell are of the best possible specification.

"These values made us innovate and seek solutions to the challenges that presented themselves in progressive ways that would bring a benefit to those involved, while maximizing the resources, be they human, material and capital."

WHO:

Gaea foods has been active in the Kenyan market since 1998. It has since been a frontrunner in fresh-cut potato peeling in the local potato industry. The company has progressively grown, and with growth, integrated sustainability transition leads to its activity. Sustainability was always considered in a holistic view, considering the living conditions and opportunities for improvements of its workers; but also processing waste as a resource and exploring innovative ways to improve their sustainability processes.

HOW:

One top driver of sustainability for Gaea foods is the principle of maximization of resources. Gaea foods has an anchor farm serving as a nucleus of potato farming and undertaking production year-round, mitigating against climate change through irrigation and availing the farm. They work with seed producers to source and grow new varieties that are high yielding and best suited for the local growing conditions, and are intended for the processing market. Moreover, waste from the plants is processed by chickens, goats, pigs, and black soldier flies, but also turned into biogas units.

NEXT:

Gaea foods is also very much influenced and aware of the future of the market, oriented by consumers' rising level of awareness. The organization is pushing for a structural transition of the potato and agriculture system in Kenya: they take on advocacy actions and policy dialogues with local governments and engage with strategic partners in training sessions for their peers, sharing best practices including recommendations, demonstrations, and leads for product diversification. Sustainable diversification is considered the next challenge for Gaea. The company sees that circularity and agroecological practices are returning as climate-smart Agri-practice/mitigant and sustainability drivers. Thus, the diversification curve needs to be smart-lead and managed in this growing, global dynamic.





KAKUZI

Future proofing Agriculture

"Regenerative agriculture is ultimately about how agriculture can have a beneficial impact on climate change by taking atmospheric carbon and capturing it into the soils by rebuilding the soil organic matter content."

Kakuzi PLC is a listed Kenyan agricultural company trading on both the Nairobi and London Stock Exchange engaging in the cultivation, processing and marketing of avocados, blueberries, macadamia, tea, livestock and commercial forestry. They have successfully initiated a regenerative transition plan to structurally change the impact of the company, where we see direct link and enriching of social and environmental sustainability objectives, such as the ones set by the Dutch government since 2015.

WHO:

Kakuzi is a Kenya listed company established in 1927, that initially started with tea farming but has continuously grown over the years to include avocado (717 Ha), macadamia (1026 Ha), livestock and butchery (4387 Cattle), blueberries (10 Ha), tea (510 Ha), and Commercial forestry (1,544 Ha). Over the years the company has identified four material issues (water, biodiversity, energy and waste) to support environmental sustainability and continues to identify the environmental impacts of all our activities as well as minimize and mitigate these in a responsibly manner.

HOW:

Kakuzi had adopted the materiality concept to accelerate regenerative and sustainability practices within its farm to comply with environmental legislation by assessing the main environmental impacts of its operations and business activities, including establishing programmes to minimize environmental impacts, as well as provide appropriate training to employees.

Also, the company has robust corporate social responsibility investment to serve communities surrounding their farms that go beyond the convention by establishing health camps for menstrual campaigns, improved housing for employees as well, including advancing scholarships to accelerate education. This structural transition plan is designed in line with the objectives set by the Dutch government in the 2015-2030 transition plan on circular Agriculture: coupling farmers' welfare and sustainability along the production.

The company has also established water dams for rain harvesting that can support irrigation for up to three years in the event the rain water fails to meet demand. As part of regenerative agriculture, the company has established waste treatment centers (macadamia husks, liquid waste, avocado pruning's) via constructed wetlands management.

Also, the company runs an active tree planting programme with a target of over 200,000 indigenous seedlings per year to sequester carbon as part of their climate action campaign.

With the ever-evolving technology, the use of drones in agriculture is steadily growing and Kakuzi PLC is using it as an effective approach to sustainable agricultural management to help streamline operations and gain effective insight into crops.

For example, drones provide a fast and efficient way to scout crops, track

their growth and identify stress areas. They can also be used in mapping, pest monitoring, spraying and photography. Additionally, drones cut the cost and work hours that go into capturing data.

NEXT:

As part of the next steps, the company plans to diversify their portfolio by enhancing the acreage under blueberry since it's a very resilient crop with low water consumption. Also, the company plans to establish a computerized irrigation system that will see water consumption being cut by at least 10% in the next five years after implementation.

In collaboration with the International Centre of Insect Physiology and Ecology (ICIPE), Kakuzi PLC has been looking into stingless bees over the years. Stingless bees are indigenous to eastern parts of the country like Mwingi, and western region in Kakamega, and are now plans being on high gear to be part of Kakuzi operations at the blueberry farm. These stingless bees, which are harmless to people and friendly to use, are frequent visitors to blueberry flowers and because of their small bodies, they easily make contact with stigmas while foraging for food therefore making them efficient pollinators for blueberries.





L.E.A.F. AFRICA **(Linking environmental and agribusiness Forestry Afrika)**

Structuring tropical agriculture

LEAF Africa is the first African company to pioneer & integrate the successful agricultural development connections between Brazil and Africa. LEAF Africa is the only hybrid company in East Africa offering complete support services for all phases of agribusiness development with proven capacity to analyze, design, develop, deliver and manage progressive agro-enterprises across a diversity of tropical value chains. Through global expertise sharing and developing regenerative practices along their value chains, LEAF Africa is in line with the objectives set by the EU on resilient agriculture transition and offers great opportunities to boost the transition on both sides through transnational cooperation.

WHO:

LEAF Africa aims to stimulate Africa's transition towards positive impact agriculture at any scale of farming that encourages economic, environmental and social profitability at a landscape level, by:

- Providing structured support via a 7-step process for implementing, managing and delivering viable agricultural, forestry & livestock systems.
- Linking clients with a comprehensive network of international and local partners across the agribusiness & finance support space
- from input sourcing to quality equipment supply through to commodity trading and financial support services.
- Pioneering innovative models with the vision of transforming Africa's subsistence farming culture into one that offers progressive advancement.



HOW:

LEAF Africa offers extensive agriculture and management service offers, via technical competence, local and international market knowledge and practical experience in the

area of progressive agri-business development, agro-industrial initiatives and small-holder based agri-cluster projects.

Through the emphasis on the integration of crops, forestry, fodder and livestock, the company caters from collective smallholder initiatives through to medium and large scale agri-ventures.

Through the combination of cutting-edge disciplines upheld by Regenerative and Conservation farming methodologies, the organization align both the economic and ecological utilization of resources through closed-loop farming practices, high tech soil and water conservation strategies; mechanized value chain development and others via a 7-step model.

NEXT:

The company aims to scale syntropic farming in Kenya which originated from Brazil, by Ernst Götsch, a Swiss farmer and researcher, to scale up forestry coverage. It seeks to cultivate resilient ecosystems by regenerating the soil without the need for not of long-term external inputs.

Also, as part of their long-term strategy, the company aims to set up learning and exchange centers on regenerative agriculture between Kenya and Brazil so as farmers can learn innovative practices of how they can augment food security in line with strengthening agriculture resilience.

LEAF Africa uses mutual uptake in global best practices to ensure food security, food quality and sustainable farming, in the EU Farm 2 Fork strategy together with such farming companies.

Also, the company plans to roll out Integrated Livestock Crops/Pasture & Forestry (ILC/PF) as one of the regenerative agro-practices to be cascaded from Dutch to ensure smallholder farmers are adequately equipped to generate sustainable revenue from agriculture during harvest (or rainy season) and livestock in the offseason (or dry season). In turn, when adopting the ILCF/PF, it is possible to generate short-term income from agriculture, medium-term income from livestock and long-term income from timber and other non-timber forest products (NTFP's).

7-step model

1 Pre Analysis Survey & Report

Scoping Assessment

Recommendation Report

2 Bankable Business plan

Full Business Plan Strategy

Detailed Budget

3 Project Implementation

Inception Activities Begin

4 Supply of Equipment

Delivery and Instalment

5 Execution

Full Project Realisation

6 Management Handover

Full Project Management

Capacity Building

7 Commodity Trading

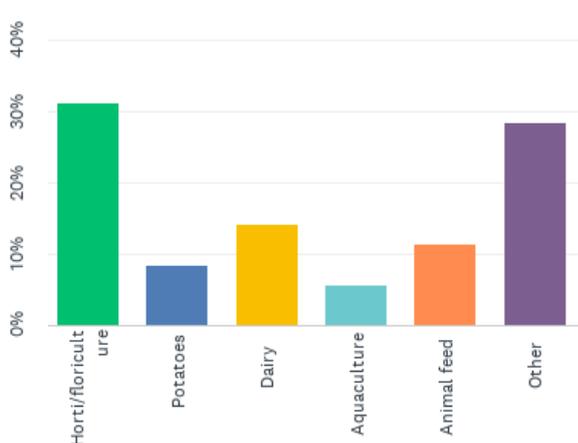
Market Connections and Trading

Value Addition

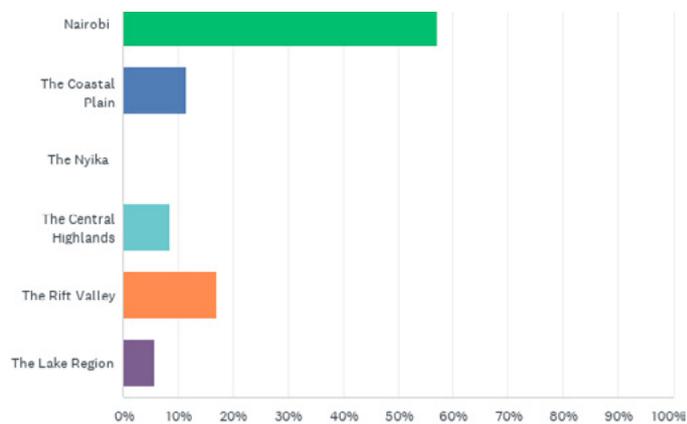
ANNEXES

ANNEX 1 : SURVEY RESULTS

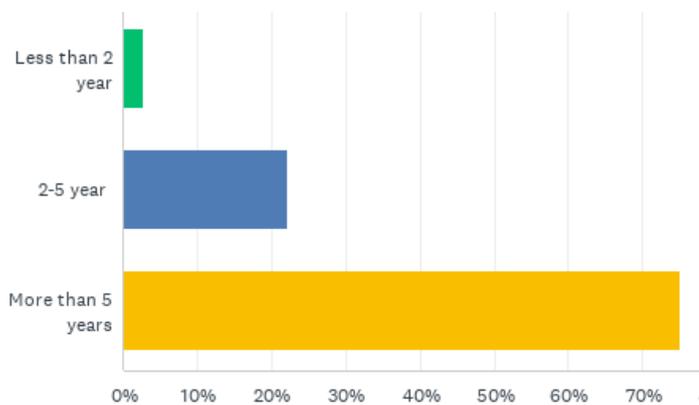
Q1: Which sector do you represent?



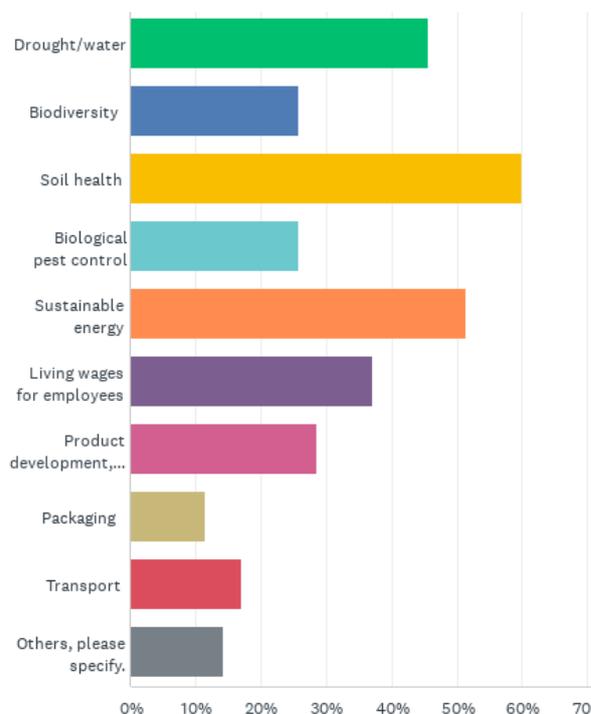
Q3: In what part of Kenya is your business located? Select 1



Q2: Operations in Kenya since



Q6: Top sustainability issues I address in my company



Q4: Which option describes best your sustainability strategy? (Sustainability includes climate, circular economy, biodiversity, livable wages)

ANSWER CHOICES	RESPONSES	
I have a well-developed business strategy that includes all sustainability issues relevant for my business and my value chain.	55,88%	19
I have a strategy on selected sustainability issues.	32,35%	11
I have no strategy but do separate sustainability projects.	5,88%	2
Sustainability is not a part of my business strategy.	5,88%	2
I don't care about it / I don't know	0,00%	0
Total respondents		34

Q5: Which in your opinion are the top trends in sustainable / circular Agriculture?

ANSWER CHOICES	RESPONSES	
Reduce food waste in entire value chain, including transport (see freight); 'farm to fork'	60,00%	21
Climate change mitigation, mixed crops, agroforestry	57,14%	20
Climate change adaptation, new varieties for drought, heat	31,43%	11
Biodiversity, work with nature, not against it (reduce chemicals)	45,71%	16
New varieties, plant breeding, GMO's under pressure	11,43%	4
Food security, economic issues, food as a commodity in international trade	45,71%	16
Hi tech, big data, precision agriculture	17,14%	6
Meat, plant-based proteins	8,57%	3
Price of food, accessibility, food security for the poor, SDG2	28,57%	10
Total respondents		35



Q7: Select top-3 drivers for a transition to sustainable / circular Agriculture.

ANSWER CHOICES	RESPONSES	
Market: demand by buyers in Kenya/Africa	51,43%	18
Market: demand by buyers in Europe/developed markets	40,00%	14
Market: demand by investors/shareholders	20,00%	7
Personal motives, ethics	34,29%	12
Long-term sustainability of a company	54,29%	19
Higher profits, better turnover	25,71%	9
Policies, laws and regulations	45,71%	16
Engagement of the local community	40,00%	14
Others,please specify	5,71%	2
Total respondents		35

Q8: Select top-3 barriers for a transition to sustainable / circular Agriculture

ANSWER CHOICES	RESPONSES	
Lack of finance, investments	77,14%	27
Policy gaps, laws, regulations (if selected:which ones?)	48,57%	17
Lack of knowledge about circular Agriculture	68,57%	24
Buyers unwilling to pay higher prices	42,86%	15
Lack of management readiness to implement	22,86%	8
Lack of qualified personnel	20,00%	7
Others,please specify	8,57%	3
Total respondents		35

ANNEX 2 : SOURCES / MORE INFORMATION

Ellen MacArthur:

<https://ellenmacarthurfoundation.org/circular-examples/agriprotein>

CSR risks in Kenya:

<https://www.mvorisicochecker.nl/en/worldmap>

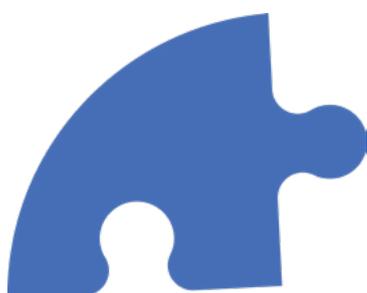
UNDP:

<https://www.ke.undp.org/content/kenya/en/home/blog.htm>



Inventory of Dutch Agri companies working on circular approaches and technologies in Kenya

Sector	Company	Approach/technology
Coffee	Moyee/Agriterra	Using unused part of coffee beans for fertilizer
Dairy/ Agrofood	Biofood	Recycling of water and plastic bottles
Animal Feed	InsectiPro	Black Solder Fly (BSF)
Floriculture	Bilashaka	Solar energy
Floriculture	Timafloor	Recycling of flower sleeves
Floriculture	Florensis	Reverse Osmosis water used for fish production biogas from farm waste
Horticulture	Koppert	Use Natural products for IPM hence reduce use of chemicals
Horticulture	Ketchup project	Drying technology to process tomatoes, mangoes
Horticulture/ Agrofood	NatureLock	Drying technology to process foods
Aquaculture	Kamuthanga Farm	Recirculation Aquaculture System (RAS)
Aquaculture	Upande	Supplies software and hardware to track aquaculture
Aquaculture	Mwea Fish	Recirculatory Aquaculture System (RAS) and producing quality fingerlings
Aquaculture	Victory Farms	Cage aquaculture
Aquaculture	Kikaboni Commercial aquaponics farm	Integrated fish culture approach
Aquaculture	Omega Farms	Producing quality fingerlings
Aquaculture	Blue Linked	Aquaculture feeding and breeding
Aquaculture	Van Oord	Aquaculture breeding
Potato	Gaea foods	Use of boiled potato and peels as pig feed, Use of peels for BSF farming
Soil	PowerCem	Technology for reclamation of contaminated soils(not in Kenya yet)
Agrofood	Verhoeven Group	Machinery that are sustainable, less energy and avoids waste
Reforestation	Africa Wood Grow	Supplying smallholders with seedlings and expertise



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