Game-changing solutions for transforming Africa's food systems: Successful cases

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ISBN: 978-1-77634-909-8

June 2024

About AUDA-NEPAD

The African Union (AU) Development Agency-NEPAD (AUDA-NEPAD) is Africa's first-ever continental technical and development agency. The foundation of AUDA-NEPAD is built on the New Partnership for Africa's Development (NEPAD) that was established as Africa's continental renewal and development programme by AU in 2001 and championed through the then NEPAD Secretariat, based in Midrand, South Africa. The NEPAD vision represented a common pledge by African leaders to eradicate poverty and foster Africa's sustainable economic growth and development through the promotion of regional and continental integration, through the inclusion of Africa in global processes and through the empowerment of socially disadvantaged groups, such as women and children.

This work was conducted with generous support from the Norwegian Agency for Development Cooperation (NORAD) under the Ministry of Foreign Affairs (MFA), Norway.

About AICCRA

The AICCRA project contributes to the construction of an African future that is climate-smart and driven by science and innovation in the agricultural field. It is led by Alliance of Bioversity International and CIAT and supported by a grant from the World Bank's International Development Association (IDA). AICCRA works to increase access to climate information services (CIS) and Climate Smart Agriculture (CSA) technologies for millions of smallholder farmers across Africa. AICCRA investments are concentrated in six main countries namely Ethiopia, Ghana, Kenya, Mali, Senegal and Zambia with the implementation of four components (i) Knowledge Generation and Sharing, (ii) Strengthening Partnerships for Delivery, (iii) Validating Climate-Smart Agriculture Innovations through Piloting and (iv) Project management. The sub-regional component of AICCRA in West Africa is implemented through the creation of multi-stakeholder partnerships of existing scientific and educational networks and centres in order to achieve results that cannot be achieved easily, or not at all, by engaging with individual partners at national level. Explore AICCRA's work at aiccra.cgiar.org.

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Acronyms and abbreviations

AFSH	African Fertilizer and Soil Health
AIF	Africa Improved Foods
ANACIM	Senegalese National Meteorological Agency
ANCAR	National Agency for Agricultural and Rural Council
AU	African Union
CCG	Morocco Credit Guarantee Corporation
CEMA	Centres for Mechanised Agriculture
CERAAS	Regional Centre for Improvement of Plant Adaptation to Drought
CIS	Climate Information Services
COP28	28th Conference of the Parties
CRGE	Climate Resilient Green Economy
CSA	Climate-Smart Agriculture
DRC	Democratic Republic of Congo
EFSTP	Ethiopian Food System Transformation Pathway
FAO	Food and Agriculture Organization of the United Nations
FBDG	Food-Based Dietary Guidelines
FWG	Fortified Whole Grain
GGWI	Great Green Wall Initiative
ICT	Information and Communications Technology
IPCC	Intergovernmental Panel on Climate Change
ISRA	Senegalese Institute of Agricultural Research
IVR	Interactive Voice Response
LTR	Land Tenure Regularisation
NDA	National Designated Authorities
PSNP	Productive Safety Net Programme
SDG	Sustainable Development Goal
SIA	Soil Initiative for Africa
SMEs	Small and Medium-sized Enterprises
UAE	United Arab Emirates
UNFSS	United Nations Food Systems Summit
WIAD	Women in Agricultural Development Directorate

Why we need to transform food systems in Africa:
The failing state of food security and nutrition

Prior to the COVID-19 pandemic, Africa's food security was already on a downward trend. Post-pandemic economic recovery observed in 2021 slowed in 2022. An increase in the prices of food, agricultural inputs and energy, compounded by the impact of the war in Ukraine, undermined the recovery of employment and incomes of the most vulnerable people, contributing to an increase in hunger. Food security in Sub-Saharan Africa has been particularly affected by the war as the region previously imported 37% of its cereals from Russia and Ukraine.[1]

A much larger proportion of the population in Africa faces hunger compared to the other regions of the world – nearly 20% compared with 8.5% in Asia, 6.5% in Latin America and the Caribbean, and 7.0% in Oceania. The number of people facing hunger in Africa has increased by 11 million people since 2021 and by more than 57 million people since the outbreak of the pandemic. Hunger increased throughout all subregions of Africa in 2022. The prevalence of undernourishment in Africa rose from 19.4% in 2021 to 19.7% in 2022, driven mostly by increases in Northern and Southern Africa (Table 1).[2]

Table 1. Prevalence of undernourishment in Africa and globally, 2005-2022[2]

Prevalence of undernourishment (%)										
	2005	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020***	**2021***	**2022***
WORLD	**12.1**	**8.6**	**7.9**	**7.8**	**7.5**	**7.6**	**7.9**	**8.9**	**9.3**	**9.2**
AFRICA	**19.2**	**15.1**	**15.8**	**16.6**	**16.5**	**16.6**	**17.0**	**18.7**	**19.4**	**19.7**
Nothern Africa	6.2	4.7	5.4	5.7	6.0	6.0	5.8	6.0	6.9	7.5
Sub-Saharan Africa	22.5	17.6	18.2	19.1	18.9	19.1	19.5	21.6	22.2	22.5
Eastern Africa	31.7	23.8	24.6	26.2	26.2	26.0	26.7	28.1	28.4	28.5
Middle Africa	31.9	22.5	23.3	24.7	23.7	24.4	24.8	27.6	28.5	29.1
Southern Africa	5.1	7.2	9.3	8.3	7.8	7.7	8.3	9.5	10.0	11.1
Western Africa	12.2	10.8	10.6	10.7	10.6	11.1	11.0	13.7	14.5	14.6

Food insecurity affects women more than men. Women residing in rural areas are more likely to be food insecure, as job and income losses are much higher for women than for men, particularly in agrifood systems. In 2022, the gender gap in food insecurity reduced in Asia and in Latin America and the Caribbean but widened in Africa.[2]

1. Nhlengethwa S, Thangata P, Muthini D, Djido A, Njiwa D, Nwafor A. 2022. Review of Agricultural Subsidy Programmes in Sub Saharan Africa: The Impact of the Russia – Ukraine War. Policy Brief. Hub for Agricultural Policy Action. Alliance for a Green Revolution in Africa (AGRA).
2. FAO, IFAD, UNICEF, WFP and WHO. 2023. The State of Food Security and Nutrition in the World 2023. Urbanization, agrifood systems transformation and healthy diets across the rural–urban continuum. Rome, FAO.

Africa's food systems face numerous challenges

Africa's present state of food security and nutrition can be attributed to many interconnected and complex challenges ranging from climate change, deficient infrastructure and conflict to inadequate policies and governance.

Climate change

Climate change is creating unpredictable weather patterns in Africa with variable impacts. Key climate related challenges such as droughts, floods, and pests damage agricultural productivity. For example, between October and December 2023, the El Niño Southern Oscillation led to a delayed rainfall season followed by insufficient rainfall and dry conditions in Angola, Botswana, Madagascar, Mozambique, Namibia, Zambia, and Zimbabwe.[3] Zambia, Malawi and Zimbabwe have since declared the drought a national disaster. In Zambia, an estimated 45% of planted areas were destroyed and the price of staple foods surged.[4] Drought is also impacting cereal production in the Maghreb countries. To the contrary, El Niño brought increased rainfall to East African countries leading to improved pasture and water availability, better livestock conditions, and delayed livestock migration in many agro-pastoral and pastoral areas. However, the increase in rainfall also caused flooding in countries such as Burundi, the Democratic Republic of the Congo, Kenya, Somalia, South Sudan, Uganda, and the United Republic of Tanzania.[3]

Conflict

African countries affected by conflict have higher rates of malnutrition as conflict disrupts food systems, impedes investment, limits access to food and healthcare, and increases displacement. In East and Southern Africa, countries with ongoing conflict as well as spillover areas are facing extremely high levels of food insecurity. For example, conflict is disrupting trade and agricultural activities in Sudan and threatening food availability nationally. The widening of hostilities in conjunction with population displacement (more than 7.4 million people) is worsening the already dire food security situation.

Post-harvest loss and market access

Much agricultural produce is lost post-harvest due to inadequate storage and processing facilities resulting in reduced food availability for consumption and sale, affecting food security and farmers' incomes. Further, inadequate transportation infrastructure makes it challenging for farmers to reach markets, limiting their sales and incomes and reducing the availability of fresh produce.

3. World Bank. 2024. Food security update. February 15, 2024.
4. Hill M. 2024. Record drought imperils food, copper output in Southern Africa. Bloomberg news. https://www.bloomberg.com/news/articles/2024-03-08/food-supplies-threatened-in-southern-africa-after-driest-february-on-record

Land tenure

Many farmers lack formal land titles or secure land tenure, leading to insecurity and hindering investment in land improvements. Women, who play a crucial role in agriculture, often have fewer land rights due to cultural and legal barriers, limiting their access to resources and impacting their productivity and food security. These challenges can discourage land investment and the adoption of sustainable farming practices which yield benefits in the long term.

Unsustainable and inefficient farming practices

Unsustainable and inefficient farming practices and the slow adoption of new agricultural technologies are negatively affecting the productivity of Africa's agricultural sector.[5] Issues surrounding monoculture, the absence of crop rotation, and inadequate soil management practices are evident throughout the continent.

Lack of access to financial resources and credit facilities

While agriculture remains the primary activity in African economies, the agricultural sector receives less than 4% of total commercial bank lending.[6] As such, many African farmers and businesses involved in food production lack access to the financial resources and credit facilities needed to invest in improved agricultural practices and technologies.

Land and soil degradation

Extensive land and soil degradation have severely constrained Africa's agricultural productivity. It is estimated that roughly 75% to 80% of the continent's cultivated land is degraded, resulting in an annual loss of nutrients ranging from 30kg to 60kg per hectare.[7] Disturbingly, projections suggest that by 2050, more than half of Africa's currently arable land could become unusable. Several factors contribute to soil degradation across the continent, including the loss of organic matter, erosion caused by water and wind, acidification, biodiversity loss, and salinity. The compromised health and fertility of Africa's soil also hinders its ability to respond effectively to yield-enhancing inputs such as fertilizers and improved crop varieties. Consequently, smallholder farmers and rural communities become increasingly vulnerable to the impacts of climatic shocks.

Inadequate policy and investment

Policies that do not support smallholder farmers, a lack of investment in agricultural research and development, and weak institutions are further restricting the transformation of African food systems. Despite the crucial role that agriculture plays in many African economies, it typically receives a low share of public expenditure, and private investment is often limited.

Reliance on food imports

Africa is heavily reliant on food imports and needs to identify opportunities to reduce its dependence by improving the resilience of its own food systems. The COVID-19 pandemic and the Russia-Ukraine war have highlighted such weaknesses.

5. AGRA. 2022. Empowering Africa's Food Systems for the Future (Issue 11). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA).
6. Langyintuo, A. (2020). Smallholder Farmers' Access to Inputs and Finance in Africa. In: Gomez y Paloma, S., Riesgo, L., Louhichi, K. (eds) The Role of Smallholder Farms in Food and Nutrition Security. Springer, Cham.
7. AGNES. 2020. Land degradation and climate change in Africa. Africa Group of Negotiators Experts Support.

Rapid urbanisation

Since 1990, Africa has undergone rapid urbanisation, witnessing a doubling in the number of cities from 3,300 to 7,600, accompanied by an increase of 500 million people in their cumulative population.[8] These cities are not only the fastest growing in the world but also the youngest. Moreover, real per capita incomes are on the rise across most parts of the continent.[5] This combination of factors has led to an explosive growth in food demand. To meet the increase in food demand Africa needs to boost yields without converting a significant portion of its remaining forests and natural grasslands into farmland, which would incur substantial costs to the continent's environment, biodiversity, and ecosystem services.

Despite these challenges, Africa's food systems are projected to be worth USD 1 trillion by 2030 and offer considerable opportunities for smallholder farmers and domestic markets.9 To seize these opportunities, Africa's food systems require transformation which will involve significant changes in policies, practices, institutions, structures, innovations, and processes.

Game-changing solutions for transforming Africa's food systems

Efforts to transform Africa's food systems are ongoing and critical if we are to reach SDG 2. The 2021 United Nations Food Systems Summit (UNFSS) presented an opportunity to apply a food systems approach to Africa's current agricultural and food security efforts. The Dialogues provided platforms for governments, businesses, communities and civil society to identify pathways towards resilient and inclusive food systems and to reflect on the benefits of the approach and propose strategies for its mainstreaming.

Box 1. Key terms

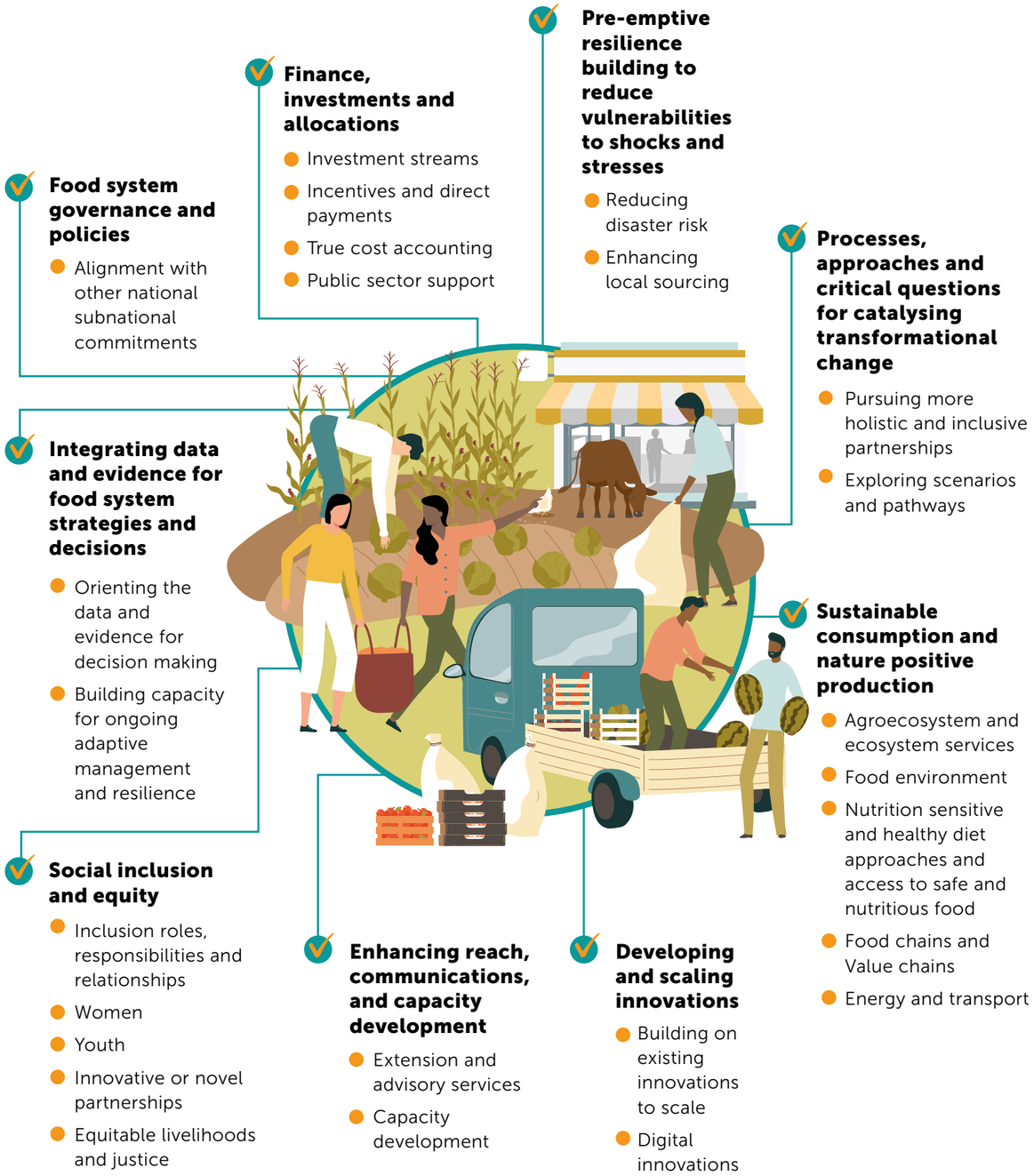
Game-changing solution – an innovative idea, disruptive technology or pioneering business model that dramatically alters the status quo and addresses one or more challenges.

Food systems – a complex web of actions to produce, process, transport and consume our food - from farm to fork to landfill. Food systems comprise any activity that produces, aggregates, processes, distributes, consumes or disposes of food.[10]

Food system transformation – is 'multi-faceted, multi-dimensional, multi-sectoral, multi-scale change resulting in new systems and processes incorporating a range of transitional, diverse innovations and interventions that intersect to create momentum and critical mass."[11] It is radical in nature and requires a complete rethink of the properties of food systems, including their objectives, rules, and power structures.[12]

8. OECD/UN ECA/AfDB. 2022. Africa's Urbanisation Dynamics 2022: The Economic Power of Africa's Cities. West African Studies, OECD Publishing, Paris.
9. Campbell BM, Sene A, Attah A, Ajay O, Fatunbi W, Halloran A, Jacobs-Mata I, Kidane R, Matsika R, Nyambura M, Nyirongo J, Prager S, Solomon D, Sunga I, Totin E, Williams PA, Winters P, Zougmore R. 2023. Advancing climate change adaptation in African food systems: Seven key priorities for action on adaptation. Discussion Starter: 5. Wageningen, the Netherlands: Clim-Eat.Clim-Eat.
10. World Bank. 2024. Food Systems 2030. Food Systems Transformation.
11. Biovision Foundation for Ecological Development and Global Alliance for the Future of Food. 2019. Beacons of Hope: Accelerating Transformations to Sustainable Food Systems. n.p.: Global Alliance for the Future of Food.
12. Dengerink J, de Steenhuijsen Piters B, Brouwer H, Guijt J, 2022. Food Systems Transformation: An introduction. Wageningen, Wageningen University & Research.

Figure 1. Elements of food systems transformations[13]



13. Neely C, Chesterman S, Getz Escudero A, Thornton P, Chevallier R, Mutamba M. 2022. Framing food systems transformation: A diagnostic framework and checklist for integrating transformative actions into African food systems. AICCRA Report. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

The Africa Common Position on Food Systems was presented to the UNFSS in 2021. It synthesises the views, priorities and ambitions of the African Union (AU) member states on the main challenges affecting both African and global food systems. The Position was informed by existing continental and regional policy frameworks and outcomes from the UNFSS national dialogues. Through the consultations, game-changing solutions emerged as critical to transforming the continent's food systems. The solutions aim to achieve the desired short-term results as well as longer-term transformative and systemic change in accordance with the targets of Agenda 2063 and the Sustainable Development Goals (SDGs). The game-changing solutions encompass:[14]

Ensuring access to safe and nutritious food for all. Measures include promoting the biofortification of staple foods and industrial fortification and expanding school feeding programmes.

Shifting to sustainable consumption patterns. For example, promoting and supporting sustainable production and consumption of traditional and indigenous food crops.

Boosting nature-positive production at sufficient scale. This includes investing in productivity-enhancing technologies such as improved seeds, feeds and animal breeds adapted to the changing climate.

Advancing equitable livelihoods and value distribution. Done through strategies such empowering women and youth with greater access, and the security of tenure over land, water, and productive resources.

Building resilience to vulnerabilities, shocks, and stress. Including promoting the production of aquatic food products as alternative and supplementary protein sources and as options for improved diversity for nutrition, accessibility, and environmental sustainability.

Access to means of production. Specifically, enhancing access to production and productivity- enhancing technologies and resources that include land, finance, data, and information; as well as technologies. It also includes access to water and energy – both availability and affordable access.

14. Trautman, S., Chevallier, R., Cramer, L., Gosling, A., and Mutamba, M. 2023. Briefing Paper: Africa Common Position on Food Systems. African Union Development Agency - NEPAD. 2021.

Cross-cutting, game-changing solutions involve:

- Strengthening integrated policy-making and private sector engagement as a cornerstone for food systems transformation.
- Enhancing continental accountability for food systems transformation.
- Expanding social protection programmes.
- Developing and implementing tenure reform policies.
- Engaging the youth meaningfully in food system transformation.
- Supporting regional coordination.
- Building resilient and sustainable food and agricultural systems.

The UNFSS Dialogues also shaped national pathways to food systems transformation. They allowed diverse stakeholders who work in food systems - across the public sector, private sector and civil society – to identify priorities, opportunities and solutions. Forty-one African countries have since developed national food systems transformation pathways.

Figure 2. African countries that have developed national food systems transformation pathways.

Since the UNFSS in 2021, several overarching and cross-cutting continental strategies and action plans have been developed enhancing the enabling environment for Africa's food systems transformation, some of which are described below.

African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032)

In 2022, the AU adopted its Climate Change and Resilient Development Strategy and Action Plan (2022-2032) which includes key sectors where systemic transitions are required. Agriculture, land use and food systems are all highlighted within this strategy as critical areas to address. The Strategy's Strategic Intervention Axis 2: Adopting Pathways Towards Transformative Climate Resilience Development includes a section dedicated to 'food systems under a changing climate' with the following key intervention areas:

- Promote the equitable sharing of climate risk and reward amongst all food system actors, especially small-scale, rural farmers.
- Enhance resilience of food systems against climate effects, while emphasising nutrition outcomes and integrated planning.
- Emphasise production toward agro-ecological transition, to reduce greenhouse gas intensity (including methane and other gases), and dependencies on external inputs.
- Strengthen food system governance interventions across Africa's regions.
- Strengthen finance, investment and resource allocation interventions.

Farmers and farming organisations are clearly mentioned as key players in this continental climate response.

African Union Biodiversity Strategy and Action Plan (2023-2030)

The AU Biodiversity Strategy and Action Plan (2023-2030) supports the implementation of the Kunming-Montreal Global Biodiversity Framework in reducing the expanding demand for land and sea use with increased pressures for natural resources, ensuring their sustainable use and securing a fair share of benefits generated with consideration of an inclusive society and gender responsive approach. The strategy recognises the potential of Africa's wealth in nature to stimulate economic growth and thus gives focused attention to nature-dependent sectors recognised as key transitions in the pathway of Africa's development trajectory. As such, mainstreaming for the effective uptake of biodiversity and climate change priorities in the agriculture, forestry, and fisheries and aquaculture sectors constitutes a key approach to inform both development and investment trade-offs and provide guarantees for healthy and resilient ecosystems that secure food-nutrition-water-energy production systems and their value addition chains. Strategic Pillar C – 'Sectoral Mainstreaming and Integration of Ecosystem-Based Approaches' contains targets relevant to food systems and agricultural production including:

- **Target 10** - Sustainable management of areas under agriculture, aquaculture, fisheries and forestry. This target focuses on the production sectors that maximise material production from biodiversity and thus drive land and sea use change.
- **Target 14** - Integration of biodiversity into policies, regulations and development across all sectors. This target focuses on the values of biodiversity and integrating these values across sectors, and all relevant governance mechanisms, specifically those with significant impacts on biodiversity.
- **Target 15** - Transform businesses to progressively reduce negative impacts on biodiversity. This target focuses on production sectors that impact on biodiversity through their value chains.

- **Target 16** - Encourage sustainable consumption by reducing food waste, post-harvest loss, overconsumption and waste generation. This target complements Target 15 with a focus on transforming consumption and consumer demand.

- **Target 17** - Regulation of biotechnology and harnessing benefits. This target aims at stronger biosafety measures in the biotechnology industries.

African Union Soil Initiative for Africa Framework and African Fertilizer and Soil Health Action Plan (2024-2034)[15]

The AU Soil Initiative for Africa (SIA) Framework and African Fertilizer and Soil Health (AFSH) Action Plan (2024-2034) were developed to address Africa's soil health and associated food security crisis. The SIA Framework is to improve and maintain the health and productivity of Africa's soils across all agricultural sub-sectors (e.g. arable, fisheries (inland), forestry and livestock). To ensure the SIA is effectively implemented, the African Fertilizer and Soil Health (AFSH) Action Plan (2024-2034) was developed. The 10-year plan details the actions to be implemented within the first decade of the SIA Framework with an emphasis on addressing the outcomes of the Africa Fertilizer and Soil Health Summit in May 2024. The AFSH Action Plan includes specific actions to launch and implement the SIA Framework and support improved agricultural productivity through improved soil health and balanced and efficient fertilizer (organic and inorganic) use. The SIA Framework will continue through the implementation of subsequent 10-year Action Plans, following a review of progress and lessons learnt during the first 10 years of implementation. The AFSH Action Plan has four outcome areas:

- Improved policies, investment, finance and markets for sustainable soil health and fertilizer management.

- Improved access and affordability of organic and mineral fertilizers.

- Greater efficiency, resilience and sustainable use of mineral and organic fertilizer inputs and enhancement of soil health interventions.

- Institutional and human capacity enhanced for sustainable soil health and fertilizer management.

15. AUDA-NEPAD. 2023. Addressing Africa's soil health challenges through the ten-year African Fertilizer and Soil Health Action Plan (2024-2034) and the longer-term Soil Initiative for Africa Framework. African Union Development Agency.

African Union Great Green Wall Initiative Strategy and Ten-Year Implementation Framework (2024-2034)

The AU Great Green Wall Initiative (GGWI) Strategy and Ten-Year Implementation Framework: Enhancing Ecosystems Restoration and Livelihoods Resilience (2024-2034) aims to restore agricultural, pastoral, dryland and forest lands in support of healthy ecosystem functions and services, while strengthening people's livelihoods, well-being, and resilience against the myriad of stresses and shocks to which the region is prone. In 2023, over 25 new member states from North, West, East and Southern Africa, joined the initial member states from the Sahara and Sahel, including the eleven member States of the Pan African Agency of the Great Green Wall, achieving true Pan African status. While the primary focus of the GGWI is environmental conservation and resilience-building, its contributions to food systems in Africa are profound. By restoring degraded land and improving ecosystem functions the initiative helps to enhance soil fertility, conserve water resources, and create productive agricultural landscapes. This, in turn, provides opportunities for communities to diversify their livelihoods, improve food security, and adapt to the impacts of climate change.

To achieve the GGWI objective to "enhance the resilience of communities, ecosystems, and economies in the African drylands by improving the living conditions of populations, improving the state and health of ecosystems, advocating and mobilising resources, strengthening institutional collaboration and promoting policy coherence," the strategy proposes four intervention axes including:

- Enhancing leadership, governance and political commitment.

- Co-designing and delivering pathways toward transformative restoration, resilience and development.

- Enhancing the means of implementation for resilient landscape restoration.

- Leveraging existing initiatives.

African Union Continental Circular Economy Action Plan for Africa (2024-2034)

The AU Continental Circular Economy Action Plan for Africa (2024-2034) guides the continent, its regions and countries on their individual and collective journeys towards a circular economy. A circular economy provides an alternative model to the current linear economy, transforming it towards sustainable development. The desired system ultimately reduces both waste and pollution by circulating materials and products at their highest quality within the production system and, where possible, feeding materials back into the biosphere to restore natural capital (biodiversity and ecosystems) at their end of life. As such, the action plan specifies three horizontal sectors to address including water, waste and energy, with agri-food and fisheries given as a key vertical sector.

Applying a circular economy approach to the agri-food and fishery sectors enables the circulation of nutrients and contributes to food security whilst reducing environmental impacts and food losses along the value chain. Making the agri-food and fishery sectors more circular requires developing aligned policy frameworks for a circular bioeconomy on different geographic levels, improving capacity and infrastructure in the sectors and promoting regenerative practices that valorise organic waste. The three goals given for the agri-food sector include:

- Develop a policy and regulatory framework toward a circular bioeconomy.
- Improve infrastructure and capacity in the agri-food sector.
- Promote innovations and indigenous solutions that are regenerative and valorise organic waste from farms, fisheries and cities.

Solutions for adapting African food systems to climate change

Climate related impacts on Africa's agricultural production are severe and projected to increase. As such, climate change adaptation must form a core area of African countries' food system transformation strategies. Current adaptation efforts are insufficient as demonstrated by a lack of progress in National Adaptation Planning processes and the probability of not achieving SDG2 on zero hunger. Climate change adaptation is affected by a lack of finance and funding. International climate funding has not materialised despite the agreed targets, and private sector finance is limited. Further, policies and governance enabling adaptation are lacking.

To realise the opportunities of food systems growth, Africa will need to build long-term resilience to climate change through appropriate adaptation actions. Priority actions for adapting African food systems to climate change include:[6,16]

Innovative finance mechanisms for public and private sector investments. Access to finance has been disrupted by market failures and a lack of bankable projects, aggregation mechanisms and matchmaking facilities. Innovative mechanisms, incentives and investment models are needed to overcome market failures such as by blending public and private finance to reduce risk and mobilise capital. Further, private investment in climate-resilient agrifood industries that source from smallholder farmers should be incentivised by governments, for example, by providing good ease of doing business and promoting blended financing models.

Using national budgets to enhance resilience building. For example, investing in rural infrastructure and services; developing of 'special processing zones' to stimulate agrifood industries; incentivising agricultural finance and insurance; developing mechanisms for more predictable markets; expanding climate-informed advisory systems; skills development for women, youth and producer organisations; technical assistance for market development activities; and improving land tenure.

Empowering farmer and consumer organisations, women and youth. The voices of local organisations and stakeholders need to be heard. Civil society and grassroots organisations have proven to be vital to transitions related to sustainability. Adaptation and development pathways need to be tailored to the type of farmer and food system actor.

Digital climate-informed advisories and services. Digitalisation is a key enabler for food systems transformation but the scaling of digital tools has been affected by a lack of capacity among farmers and investment gaps.

Reworking supply chains. There is a need to focus on all stages of the value chain, not just production. It is important to understand trends in retail, marketing and procurement, diets, food loss and waste, as well as consumer choices, which are all key components of food systems change. Changing consumption by encouraging the adoption of healthy and environmentally sustainable diets presents a valuable opportunity but requires significant change in areas such as costing, policy, culture, equity and governance.

Climate-resilient and low-emission practices and technologies. These refer to technologies relevant to the entire value chain. For example, some new and emerging technologies and practices with transformative potential include artificial meats, nano-drones, and robotics, but their application and appropriateness to African contexts needs to be explored. Further, farmer-led sustainable irrigation will be critical for Africa to reduce its reliance on rainfed production. Technology has transformative potential but needs to consider trade-offs and ethics.

16. Dinesh D, Hegger DLT, Klerk L, Vervoort J, Campbell BM, Driessen PPJ. Enacting theories of change for food systems transformation under climate change. Global Food Security. Vol 31.

Advancing enabling policies and institutions. Policies and institutions can contribute to food systems transformation through innovative approaches to policy design, implementation, land governance and reform, and trade, etc. Policy development must be informed by robust science.

Knowledge production and transfer. Achieving climate resilience in food systems requires transdisciplinary knowledge production and transfer. Systems thinking is critical for sustainability transitions. Knowledge production needs to be credible and legitimate to increase its impact. Knowledge fragmentation can be addressed through transdisciplinary approaches and streamlined funding.

Creative social protection to enable households to escape poverty and climate vulnerability. Looking to the future, agriculture will not be a sustainable livelihood for many smallholder farmers if systems do not change. However, by building agricultural assets and capabilities, social protection could assist households in moving toward more resilient livelihood-sustaining agricultural production or otherwise build new skills to assist households in moving out of agriculture. Social protection examples include weather-index insurance; school feeding programmes; cash- or asset-based safety net programmes; public works programmes; labour market programmes; and capacity strengthening. Social protection activities need to be proactive and so should be combined with early warning systems and climate-informed advisories.

Improving countries' direct access to international climate funds. Direct access to funds can enhance ground level adaptation action. African countries should build the capacity of National Designated Authorities (NDAs) as the focal points for accessing multi-lateral climate funds through direct access modalities. The NDAs need to facilitate the formation of Direct Access Entities within the country and ensure that relevant stakeholders at all levels are notified on the availability of international adaptation funds.

Reconfiguring knowledge and innovation organisations. Knowledge and innovation systems that address different areas of food systems need to be integrated and reconfigured for transformation. An interdisciplinary approach should be adopted from production through to consumption. International organisations for food and agriculture have outdated structures which are ineffective in addressing interrelated challenges such as climate change, malnutrition, conflict and food insecurity. Addressing these challenges requires broader, more inclusive thinking. As such, the following actions are recommended:[17]

- Establish a comprehensive, science-based, funding framework for food systems transformation. The framework should contribute to achieving the SDGs and the Paris Agreement and Montreal targets. Relevant institutions should be funded based on the framework.
- Ensure accountability. Where funding is allocated, organisations need to report on their performance through the transparent monitoring of progress towards targets.
- Phase out redundant components. The international system for food and agriculture should be reviewed and streamlined to ensure a clearer focus and efficient use of funds. Funding partners need to push for the phasing out of system components that have become obsolete.
- Establish an organisation or platform similar to the Intergovernmental Panel on Climate Change (IPCC). A platform for sustainable food systems could be established to promote consensus around the science, highlight priority information gaps, stimulate new research and modelling, and promote evidence-based best practices focused on achieving effective food system transformation.[18]

17. Dinesh D. 2023. If food systems transformation is to succeed, we need to address the elephants in the summit. Clim-Eat blog.

18. Global Panel on Agriculture and Food Systems for Nutrition. 2021. Game changing solutions for food system transformation.

Box 2. Food systems were at the forefront of the 28th Conference of the Parties

Food systems transformation is recognised as a solution to the climate crisis and biodiversity loss. The latest IPCC Report (AR6) indicates that adaptation and mitigation actions associated with 'land, water and food' have the greatest potential for combatting the climate crisis. At the 28th Conference of the Parties (COP28) in the United Arab Emirates (UAE), the Food Systems and Agriculture Agenda was prioritised. Heads of State and Government committed to a Leaders' Declaration on Food Systems, Agriculture and Climate Action. More than 130 countries signed the Declaration, covering over 5.7 billion people, around 500 million farmers and 76% of total emissions from the global food system. In addition, over USD 2.5 billion was mobilised to support the food-climate agenda, including a USD 200 million partnership between the UAE and the Bill and Melinda Gates Foundation.[19]

Accelerating food systems transformation at the national level

The failure of Africa's food systems to provide food security and decent livelihoods is largely attributed to poor governance. As such, governance inefficiencies must be addressed to allow for the necessary production, distribution and consumption changes needed to transform food systems. Food system transformation accelerators which focus on the policy, regulatory and collaboration aspects of food systems include:[20]

- Build trust among food systems actors.
- Foster learning mindsets among food systems actors.
- Enable stakeholder dialogue.
- Review and update policies and regulations.
- Design and implement market incentive schemes.
- Safeguard against indirect, adverse effects.
- Ensure financial stability.
- Develop pathways to plan for food systems transformation.

African governments need to focus on transforming food systems in ways that improve nutritional outcomes, better livelihoods and protect or restore the environment. This requires the development of science-based policies and interventions targeting areas such as trade, infrastructure development, finance, science and technology, and capacity development.[21] Further, improved coordination of monitoring and accountability across the food systems, and amongst all stakeholders, is critical, including knowledge sharing, capacity development, improved means of measurement, foresight planning, and the sharing of successful cases.

Successful cases serve as invaluable learning tools for strategic leadership by offering real-world examples and evidence of effective (and ineffective) strategies across diverse contexts. They have the potential to inspire strategic leaders in pursuing their visions and objectives while offering insights into making well-informed decisions that resonate with their values and principles. In this light, the following section of the report draws upon literature to provide a selection of African cases where game-changing interventions have successfully contributed (or have considerable potential to contribute) to food systems transformation.

19. Cooper N. 2023. COP28 Presidency puts food systems transformation on Global Climate Agenda.

20. Herrero M, Thornton PK, Mason-D'Croz C, Palmer J, et al. 2020. Innovation can accelerate the transition towards a sustainable food system. Nat. Food, 1 (2020), pp. 266-272.

21. Badiane O. et al. 2023. Policy Options for Food System Transformation in Africa and the Role of Science, Technology and Innovation. In: von Braun, J., Afsana, K., Fresco, L.O., Hassan, M.H.A. (eds) Science and Innovations for Food Systems Transformation. Springer, Cham.

Successful African cases: Game-changing interventions for food systems transformation

Ensuring access to safe and nutritious food for all

Food-based dietary guidelines in Ethiopia[22]

In 2022, Ethiopia marked a significant milestone on its journey towards food systems transformation with the introduction of its inaugural Food-Based Dietary Guidelines (FBDGs). These guidelines are hailed as a game-changing solution to advancing the nation's ambitious Food and Nutrition Strategy 2030 and broader agenda for food systems transformation. The FBDGs advocate for comprehensive food systems initiatives that promote healthy diets whilst taking sustainability and affordability into account.

Ethiopia is striving to combat undernutrition while simultaneously tackling the burgeoning challenges posed by overweight/obesity and noncommunicable diseases. Ensuring access to nutritious diets remains a pervasive challenge for many households. As Ethiopia's food systems undergo profound changes driven by population growth, urbanisation, economic shifts, agro-processing advancements, and climate variability, policymakers are working to steer the transition towards enhancing food availability, choice, equitable income distribution, and the promotion of healthy eating habits. The formulation of the country's food system vision was a product of an extensive, multisectoral, and multistakeholder consultation process.

The Government's Ethiopian Food System Transformation Pathway (EFSTP) process, which outlines the nation's vision for national food systems transformation in response to the 2021 UNFSS, underscores the pivotal role of the FBDGs. The EFSTP recognises the guidelines as a transformative tool for driving both the short-term and long-term objectives of the country's food systems transformation agenda and its Food and Nutrition Strategy 2030.

22. CGIAR. 2023. The Ethiopian food-based dietary guidelines: Gamechanger for food system transformation? New project note from SHiFT. CGIAR Initiative on Sustainable Healthy Diets. CGIAR News.

Fortified whole grain flour for improved student nutrition in Rwanda[5]

Amongst the potential strategies for enhancing school feeding programmes in Rwanda, the substitution of refined grain flour with fortified whole grain (FWG) flour stands out as one of the most impactful and economically viable options. A pilot project spanning 18 months in Rwanda illustrated the feasibility of producing high-quality FWG maize flour at comparable costs to refined flours, while also successfully shifting consumer preferences towards FWG. This transition has the potential to positively affect 3.5 million students, constituting over a quarter of Rwanda's total population, who benefit from the country's universal school feeding programme. Furthermore, it could extend its benefits to the families of students, consumer markets, and future generations.

Transitioning to FWG offers two key advantages:

- FWGs are five times more nutrient-dense than unfortified refined grains.
- With a 20%-30% higher extraction rate, the same quantity of food can be produced using fewer resources, thereby reducing environmental and biodiversity impacts.

These changes can enhance overall food systems resilience and create local economic opportunities.

The broader social and economic advantages of transitioning to FWG in school meals in Rwanda were calculated at around USD 50 million, with health and environmental benefits comprising over 90% of the total. Despite the acknowledged benefits of FWG, there are several challenges faced in its implementation including investment in new equipment, social marketing, and technical support for millers.

The transition is expected to be a gradual process. Initially emphasis will be placed on establishing the foundational elements for sustainable change, building upon the progress already made in Rwanda and scaling it up. Such implementation will demand collaboration and backing from various stakeholders at both the global and national levels, including key ministries in Rwanda such as education, health, agriculture, industry, and local government. Adding impetus to this endeavour is the global School Meals Coalition, initiated by the Governments of France and Finland at the 2021 UNFSS, which now boasts 67 member countries. The Coalition has generated political momentum expected to accelerate policy adoption and transformation in this domain.

Advancing equitable livelihoods and value distribution

Gender mainstreaming by the Ministry of Food and Agriculture in Ghana[23]

Gender mainstreaming has been integral to the activities of the Ministry of Food and Agriculture since the 1970s. Initially conducted by the Women in Food and Agriculture Directorate, now renamed to the Women in Agricultural Development Directorate (WIAD), focus is placed on enhancing the livelihoods of women in agricultural value chains. WIAD ensures gender-inclusive policies that promote improved technologies and sustainable agricultural practices that directly benefit women. It implements the 2015 Gender and Agriculture Development Strategy, contributing to nutrition education, value addition, food safety, and gender mainstreaming across policies, programmes, and projects. WIAD coordinates with regional and district offices to ensure appropriate extension technologies and information reach women farmers and other value chain actors. Collaboration with research and extension services helps identify and address challenges specific to women's integration into food value chains. WIAD also provides training on food processing, preservation, and safe vegetable production and handling to overcome these challenges.

23. Malabo Montpellier Panel. 2021. Case study GHANA. In Connecting the dots: Policy Innovations for Food Systems Transformation in Africa Report. Dakar, Senegal: AKADEMIYA2063.

Supporting youth-led innovative agri-businesses[24]

The rise of a burgeoning middle class in African urban areas, which still holds a strong appreciation for traditional foods, has fuelled the emergence of youth-led enterprises that add value to indigenous crops. This transformative trend is reshaping local food supply chains, fostering the integration of local production and consumption, and generating employment opportunities for young people.

In Ouagadougou, Burkina Faso, young entrepreneurs enrolled in Rikolto's Generation Food programme are embracing the opportunity by processing local food staples such as tomatoes, tamarind, baobab, bissap, grains, and seasonal fruits (e.g. mangos and oranges) into minimally processed, ready-to-eat products. The youths are proving instrumental in mitigating post-harvest loss, stabilising food prices, facilitating market access for farmers, securing respectable incomes, and ultimately accelerating recovery from the recent global disruptions. Efforts to bolster youth-led enterprises extend beyond Ouagadougou, with Rikolto establishing business incubators in Arusha (Tanzania), Mbale and Gulu (Uganda), and five regions of Tanzania's Southern Highlands.

The youth of Africa face numerous challenges in establishing successful agri-enterprises such as a lack of policy coordination and coherence at the local government level, as well as difficulties in accessing innovative, affordable, and appropriate financing options. Addressing these obstacles in a comprehensive manner through inclusive stakeholder engagement will be crucial for the recovery of African cities in the wake of the global disruptions.

Leveraging digital tools

Digital platforms are attracting youth to Malawi's agricultural sectors[25]

Digital platforms are empowering a new group of elite farmers in Malawi, known as the 'achikumbe elite.' The achikumbe elite, characterised by their digital literacy and entrepreneurial spirit, are reshaping agriculture and challenging the narrative of rural youths' disinterest in farming. The achikumbe elite leverage digital technologies to access information, market opportunities, and social networks, contributing to the commercialisation of agriculture and shortening of traditional food supply chains.

These youth participate in agriculture as an entrepreneurial undertaking, with the perspective of it being a potential lucrative business venture.

Digital platforms play an integral role in filling knowledge and information gaps that inform their business decisions. Besides the role of digital platforms in accessing production, market information and learning needs, they also enable the building of social networks and social capital. As a result, the achikumbe elite are diversifying production, entering new value chains, and farming closer to urban markets to meet the demand for horticultural and animal products. Their motivation for product diversification is driven by market information which they can access in real time through the digital platforms. The achikumbe elite are shortening the traditional food supply chains and improving food availability. In addition, although not consciously driven by environmental sustainability, the proximity of the achikumbe elites' farming ventures to urban food markets and the marketing of produce locally contributes to positive environmental outcomes and more resilient food systems.

Despite the benefits, it should be noted that the accessibility of digital platforms may widen existing inequalities, as they are primarily used by well-educated and higher income status individuals. As such, policy needs to support equal access to education, skills development, and technology to avoid further marginalisation of poor rural communities. There are also risks surrounding corporate capture and misinformation agendas in digital spaces and so effective governance aligned with equity and responsible innovation will be key.

Promoting and supporting the new achikumbe elite could help to generate the transformative change in agriculture that the Malawian government seeks as well as provide a solution to feeding Africa's growing cities.

24. Mvanda K, Ouattara B, Ecklu J. 2022. Game-changers for sustainable food systems – A reflection piece in support of #AfricanCITYFOODMonth. Rikolto.

25. Tauzie M, Hermans TDG, Whitfield S. 2023. The new achikumbe elite: food systems transformation in the context of digital platforms use in agriculture in Malawi. Agric Hum Values (2023).

Accelerating digital food systems in Rwanda[6]

Rwanda is advancing the digitalisation of its food systems in alignment with its ambitious goal of ascending to a higher middle-income status. The country boasts excellent digital connectivity, with over 90% of the population having access to 3G networks, complemented by affordable handset prices. Rwanda is renowned for being one of Africa's top destinations for tech investors as it has instituted effective and coherent information and communications technology (ICT) and innovation policies. It has established pivotal infrastructure including an 'open technology hub', a national data centre, a soil information system, and an agricultural land information system as well as a network of local meteorological stations to bolster climate-informed decision-making.

Digital platforms play a pivotal role in augmenting climate-informed advisories, offering information in local languages on market dynamics and pricing. To ensure inclusivity, farmers without access to mobile phones can utilise village phones facilitated by extension workers or use one of the 92 ICT centres dispersed across the country. Furthermore, the establishment of solar-powered charging stations has facilitated widespread access to digital resources.

Innovative digital solutions extend beyond advisory services, with mechanisms for accessing credit and blockchain technology used for tracing products through value chains, ensuring transparency and efficiency. Through these digital interventions, Rwanda showcases a holistic approach to modernising its food systems, propelling it towards economic prosperity and sustainability.

Digital climate-informed advisories and services

MUNDA MAKEOVER SHOW[26]

A lack of access to technologies, such as smartphones and the internet, is a barrier to sharing knowledge and awareness amongst smallholder farmers in Zambia. However, live television programmes offer the potential to bridge this gap by engaging a wide audience of farmers, market networks, and agribusinesses to enhance agricultural climate resilience for food security.

Munda Makeover, a show broadcast by the Zambia National Broadcast Corporation, aims to scale out climate information services (CIS) and promote CSA amongst smallholder farmers. It brings together the development, research, and commercial sectors to entertain and inform farmers on CIS and CSA solutions. The show communicates best farming practices for crop, tree, and livestock production; market information; and the benefits of consuming nutritious foods and adopting clean cooking practices to assist farmers in adapting to climate change.

The show highlights the role of women in farming and promotes agri-business small and medium-sized enterprises (SMEs) as essential actors in the agricultural ecosystem. The objective is to increase farm productivity, profits, and adaptation to climate change, ultimately aiming for a climate-smart African future driven by science and innovation.

Munda Makeover travels across Zambia, addressing diverse issues faced by farmers through expert advice and farmer interaction. Each episode features practical solutions demonstrated on family farms and explores a wide range of topics, solutions, and best practices in agriculture. The broadcast covers issues from soil testing and seed selection to pest management, crop management, harvesting, post-harvest losses, livestock management, financial inclusion, nutrition, and modern cooking solutions.

The show adopts a networking approach, engaging with cooperatives to improve farmer knowledge exchange and learning. Modelled after East Africa's 'Shamba Shape Up', Munda Makeover aims to replicate its success, drawing wide appeal from Zambian farmers, with a target of approximately 50% female audience members.

RICEADVICE – A GAME-CHANGING APP FOR MALI'S RICE SECTOR[27]

RiceAdvice, an innovative, freely available Android application, has emerged as a pivotal tool for transforming Mali's rice sector. RiceAdvice is a science-backed decision-support tool which provides farmers with farm-specific, locally relevant information to enhance yields, profitability, and nutrient-use efficiency. The app provides advice to smallholder farmers on optimal nutrient management, weed management and other good agricultural practices to enable them to cope with climatic risks. The app assists farmers in making informed decisions based on return-on-investment calculations, enabling them to select their own target yield level according to their budget. Data reveals that farmers utilising the app have achieved, on average, a 0.9 t/ha higher yield and USD 320/ha higher income.

The intervention is based on an inclusive business model which uses Centres for Mechanised Agriculture (CEMA) as entry points for scaling RiceAdvice and ensuring benefits are accessible to women, youth and other vulnerable groups. Through the CEMAs, young service providers (40% of whom are women) have access to loans and training to enable them to deliver recommendations and support to farmers who adopt RiceAdvice practices. Additionally, the intervention supports vulnerable groups, particularly women service providers, in acquiring mobile phones. Empowering women farmers to apply RiceAdvice guidelines has yielded notable outcomes, with women farmers experiencing a higher average yield increase (1.0 t/ha) compared to their male counterparts (0.8 t/ha).

Both public- and private-sector extension services, development agents, and non-governmental organisations have collaborated to expand the reach of RiceAdvice. The tool is now available in Benin, Burkina Faso, Ethiopia, Ghana, Guinea, Madagascar, Mali, Mauritania, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, and Tanzania.

26. AICCRA. 2023. Zambia's first farming reality TV show launched by national broadcaster. Blog. Accelerating Impacts of CGIAR Climate Research for Africa.

27. Dossou-Yovo E. 2022. Game-changing digital tool galvanizes smallholder rice farming in Mali. Blog. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

ISAT – A DIGITAL AGRO ADVISORY TOOL TO REDUCE CLIMATE RISK[28]

Scientists from the International Livestock Research Institute collaborated with Jokolante, a Senegalese Agritech company, the Senegalese National Meteorological Agency (ANACIM), and the Regional Centre for Improvement of Plant Adaptation to Drought (CERAAS) of the Senegalese Institute of Agricultural Research (ISRA) to develop a climate advisory service called iSAT. This service, designed for smallholder crop and livestock farmers, utilises a decision tree process to provide context-specific and real-time climate and agro-advisory information accessible through ICT. iSAT enables smallholder farmers to make informed decisions to improve their yields. The tool is commonly used to choose optimal crop types and varieties, guide the timing of planting and harvesting, and for in-season adjustments of inputs or target outputs.

The dissemination of weekly climate-informed agro-advisories in local languages was initiated in June 2022. The agro-advisories are delivered via interactive voice response (IVR) voice messages. By September 2022, voice messages had been disseminated to 2,720 users (registered via Jokolante), with 23.5% of the users representing women-led farms. The iSAT climate-informed agro-advisories have also been integrated into the SAIDA app, a tool administered by the National Agency for Agricultural and Rural Council (ANCAR) under the Food and Agriculture Organization of the United Nations (FAO), potentially reaching 84,000 producers nationwide.

ENHANCING AWARENESS ON THE IMPACTS AND TRADE-OFFS OF DECISION MAKING FOR GLOBAL FOOD SYSTEMS TRANSFORMATION[29]

A novel gaming platform, known as 'Change the Game, Change the Future', has been designed to educate youth and policymakers on the pivotal role of data in addressing intricate trade-offs and formulating effective policies. The online platform integrates real-time data from over 190 countries with engaging animations that showcase diverse local cultures worldwide. Through interactive gameplay, users gain insights into managing complex real-world trade-offs, striving for equilibrium amongst economic growth, social advancement, and environmental preservation.

Beneath the surface of this game lies advanced quantitative global modelling tools that analyse trade-offs and align with the SDGs. By integrating insights from cutting-edge modelling into an accessible app format, the game empowers players to experiment with various strategies and to understand the implications of their decisions across different regions. 'Change the Game, Change the Future' allows players to select from 17 diverse regions. Upon choosing a region, players are prompted to enact interventions across three policy domains: institutions, infrastructure, and behaviour.

To make informed decisions, players can seek counsel from government ministers and experts. Users quickly grasp the reality that decisions benefiting one region may yield adverse consequences elsewhere. At its essence, the game underscores the necessity for governments, companies, and the public to navigate multiple perspectives and balance trade-offs for strengthening global food systems.

28. Josehp EJ, Worou N, Diedhiou L, Dhulipala R, Houessionon P, Whitbread A. 2022. iSAT, the new generation digital agro advisory tool that empowers farmers to manage climate risks. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

29. World Food Forum. 2021. "Change the Game": New online game platform will teach youths balancing act of feeding people and saving planet.

Climate-resilient and low-emission practices and technologies

Climate-smart agriculture as a driver of food systems transformation[30]

The need for rapid transformation of food systems in the context of climate change pressure is well-known. A study on 24 concrete, ground-level, CSA projects from across Africa, demonstrated conditions for agriculture and food systems transformation. The CSA cases that were analysed included:

- Climate-smart village approach: This approach generates knowledge on CSA technologies and practices for scaling. It aims to redirect farming and rural livelihoods towards climate-resilient and low-emission trajectories.
- Climate information services: Leveraging CIS enables better management of climate variability and extremes for risk mitigation.
- Science-policy interface: Bridging science and policymaking facilitates the mainstreaming of CSA into agricultural development strategies, ensuring a more cohesive and impactful approach.

Analysis of the cases highlighted the potential for CSA to catalyse rapid change in African food systems by:

- Implementing relevant climate-smart technologies and practices to reroute agricultural activities and rural livelihoods toward climate resilient, low-emission trajectories, and sustainability.
- Developing and utilising weather and climate information services to de-risk livelihoods, farms and value chains in the face of erratic weather patterns and extreme events.
- Embracing climate-smart options that minimise the wastage of natural resources used across the entire food value chain, thereby reducing the carbon footprint as well as food loss and waste.
- Realigning policies and financial mechanisms to support action in these areas by exploring novel means for sustainable finance mobilisation and the development of innovative financial models and delivery channels.

Ultimately, the findings of the study emphasise the critical role of CSA in driving transformative change in African food systems by offering pathways towards resilience, sustainability, and adaptation in the face of climate change pressures.

30. Zougmoré RB, Läderach P, Campbell BM. 2021. Transforming Food Systems in Africa under Climate Change Pressure: Role of Climate-Smart Agriculture. Sustainability2021,13,4305.

Improving policy and fund allocation to enhance climate-smart agriculture in Zambia[6]

Like many African countries, Zambia faces significant climate-related challenges. In addition to this, issues such as limited financial resources, inadequate infrastructure, insufficient extension services, and various policy constraints have adversely affected the country's food systems and private sector investment. Farmers have encountered disincentives in the form of price controls, particularly through government interventions in markets and trade, including export bans. Fixed prices have hindered producers from capitalising on price increases later in the season and have prevented opportunities for investment in storage facilities. Furthermore, public expenditure has constrained efforts towards crop diversification.

In response to these challenges, the Government of Zambia is taking steps to realign its policies and programmes and is implementing the Climate-Smart Agriculture Programme, which promotes crop diversification and the adoption of climate-resilient crop varieties. Additionally, the government has approved the amendment of two pieces of legislation on sustainable agriculture, focusing on plant varieties, and the management of plant pests and diseases. Efforts are also underway to reallocate funds to expand irrigation infrastructure, aiming to enhance agricultural resilience in times of drought.

Innovative and inclusive finance and insurance mechanisms

A holistic approach to bolstering Morocco's food systems[31]

Morocco has demonstrated significant progress in its efforts to establish sustainable food systems. Spearheaded by the Ministry of Agriculture and Fisheries, various agencies, including the Regional Offices of Agricultural Development, the Agricultural Development Agency, the National Office for Health Security of Food Products, and the National Office of Agricultural Advisory Services, contribute to the transformation of food systems. A decentralisation process and territorial approach adopted in policies and programmes ensure inclusivity and efficacy in service delivery.

Additionally, Morocco has prioritised the financial inclusion of smallholders through initiatives like the innovative financing institution, Tamwil El Fellah, and support from the Morocco Credit Guarantee Corporation for private investments in the food system.

- **Tamwil El Fellah** - In 2010, the Groupe Credit Agricole du Maroc, formerly Morocco's Agricultural Development Bank, introduced an innovative financing institution called Tamwil El Fellah in partnership with the Government of Morocco. Tamwil El Fellah aimed to provide financial services to smallholder farmers lacking collateral. The institution set loan limits at 25% of the farmer's income or USD 10,000, with restrictions on spending for inputs and working capital. Tamwil El Fellah offered a partial guarantee programme underwritten by a 60% risk coverage from the government. Collateral was not required; instead, credit risk assessments relied on factors such as the client's credit history and repayment behaviour. Loan durations were adjusted to accommodate agricultural financing needs, and Tamwil El Fellah promoted productivity-enhancing investments like irrigation and mechanisation. Technical assistance, including extension services and investment planning advice, complemented financial services. By 2015, Tamwil El Fellah operations had reached break-even, with over 67,000 smallholders receiving loans and a 98% repayment rate. Most loans financed investments in dairy farming, irrigation, farm equipment, and tree planting. Popular reasons for borrowing included crop conversion to higher-value production, diversification to off-farm and processing activities, and intensification. By October 2015, over 1,800 irrigation projects utilising solar water pumping systems had been financed. The model's success led to its extension to SMEs.

- **Morocco Credit Guarantee Corporation** - The Morocco Credit Guarantee Corporation (CCG), established in 1949, is a public financial institution aimed at fostering private initiatives by supporting the establishment, growth, and modernisation of businesses, including agrifood SMEs. Through guaranteeing loans and financing/co-financing projects, CCG facilitates access to finance by lowering eligibility criteria for opening accounts and accessing credit, especially for rural youth. It provides guarantees for women and young entrepreneurs looking to start micro or small enterprises and shares risks with other financial institutions to facilitate finance access.

The Government of Morocco is also dedicated to enhancing employment opportunities for youth in the agriculture and food sector, alongside promoting women's participation in agribusinesses. Programmes implemented under the National Initiative for Human Development aim to sustainably improve living conditions for vulnerable populations, including smallholders. Furthermore, incentives for private sector investment, contract programmes, and aggregations have contributed to sustainable increases in agricultural production and the effective functioning of food value chains. Additionally, efforts in irrigation development, land restoration programmes, and the expansion of agricultural insurance have bolstered the resilience of Morocco's food systems.

Improving direct access to international climate funds

Climate Resilient Green Economy Facility in Ethiopia[6]

Since its inception in 2011, the Climate Resilient Green Economy (CRGE) Facility in Ethiopia has been entrusted with the task of mobilising and accessing international climate funds to support the implementation of the CRGE Strategy within the country. Operating under a direct access modality, the CRGE Facility has successfully managed over USD 190 million in international climate funds, sourced from entities such as the Adaptation Fund, The Green Climate Fund, and various bilateral development partners. Over the years, more than 13 projects have been effectively implemented through this facility.

Although the Government of Ethiopia encourages funders to utilise the direct access modality (referred to as 'channel one'), most funders still prefer the indirect access modality (known as 'channel two'). Channel two involves channelling funds through an international intermediary, such as the United Nations Development Programme.

31. Malabo Montpellier Panel Report. 2021. Case study MOROCCO, in Connecting the dots: Policy Innovations for Food Systems Transformation in Africa Report. Dakar, Senegal: AKADEMIYA2063.

Advancing enabling policies and institutions

Improved enabling environment for irrigation expansion in Uganda[6]

The expansion of sustainable irrigation is of paramount importance to Uganda's agricultural development agenda. The National Irrigation Policy (2017) ambitiously targets 1.5 million hectares of irrigated land by 2040 but currently only represents 100,000 hectares. Recognising the significance of transitioning to market-oriented production, approximately one-fifth of Ugandan farmers expressed an interest in this shift. However, water scarcity poses a significant constraint to this transition. Moreover, high transportation costs exacerbate the situation, with irrigation equipment prices 30% - 50% higher than those in neighbouring Kenya. This disparity also stems from factors including low sales volumes, importation tariffs, and logistical complexities. To address these challenges, the government has implemented measures to create a more favourable enabling environment such as by offering partial subsidies and facilitating improved access to knowledge resources. The establishment of a digital farmer registration and advisory system represents a significant step forward. The system includes intensive online training programmes tailored for approximately 1,000 government field personnel, enhancing their capacity to provide effective support and guidance to farmers. Through these initiatives, Uganda aims to overcome barriers and accelerate progress towards its irrigation expansion goal, enhancing the climate resilience of the country's smallholder farmers.

Food systems transformation in a post-conflict context[32]

Rwanda's food system transformation journey spanning over two decades offers valuable insights, particularly for post-conflict nations. Despite challenging beginnings, Rwanda's experience highlights the importance of setting ambitious goals even in adverse circumstances. Initially focused on stabilising political conditions and ensuring food security, the government gradually shifted towards enhancing agricultural productivity and environmental sustainability, subsequently addressing issues of food safety and nutrition.

- **Land tenure reform** - Land distribution was a crucial aspect of food systems transformation in Rwanda, impacting agricultural productivity and livelihood security. The Land Tenure Regularisation (LTR) programme aimed to provide legal titles to all landholders. Supported by the National Land Policy (2004) and Organic Land Law (2005), the LTR clarified and documented land rights across the country. The programme, implemented between 2009 and 2013, issued certificates validating titles for over 10 million land plots, enhancing land security and enabling land use as a transactional asset. The programme's main goal was to improve livelihoods, reduce poverty, and establish social security post-genocide. Rwanda's LTR programme is recognised internationally for its role in rural agricultural development, supporting commercialisation and easing agricultural investments. Notably, the Agriculture Land Information System stores certified land size data, aiding stakeholders in making informed investments and supporting initiative implementation, monitoring, and land management.

Key insights from Rwanda's food systems transformation strategy include the significance of context-specific approaches and responsible leadership, emphasising the need for inclusive participation and continuous review of roles and approaches. Balancing competing priorities and ensuring continuity in governance are essential for sustaining progress. Operationally, coordination and coherence in policy development and implementation are crucial, along with diversified approaches tailored to local realities. Rwanda's experience underscores the importance of adopting a holistic systems approach, establishing new institutions, and leveraging partnerships with development agencies to drive transformation.

Although Rwanda has made considerable progress in improved food systems outcomes, much remains to be addressed, such as further reducing malnutrition. Significant challenges faced include climate change, skills and education levels (capacity development), and persistent high stunting rates.

The journey towards food systems transformation involves inevitable challenges, requiring patience, adaptability, and resilience. While there may be setbacks and differing opinions on the chosen pathways, sustained government commitment to serving the needs of the citizens, embracing continuous learning, and maintaining momentum are crucial for success.

Expanding social protection programmes

Ethiopia's Productive Safety Net Programme[33]

Launched in 2005, the Productive Safety Net Programme (PSNP) in Ethiopia aims to empower rural communities facing chronic food insecurity by offering economic opportunities and fostering resilience to crises through cash transfers, public works projects, and nutritional feeding initiatives. The fourth phase of the PSNP commenced in mid-2015 with the objective of enhancing resilience to shocks, improving food and nutrition security, and promoting environmental stewardship.

The PSNP provides financial assistance to able-bodied individuals participating in labour-intensive public works and offers direct payment support (for six months of the year) to households lacking labour capacity due to age or disability. This support helps households stabilise their consumption, prevent asset depletion, and plan more effectively.

Public works activities concentrate on community-based watershed development, encompassing tasks such as soil and water conservation, management of rangelands (in pastoral regions), and the establishment of community assets like roads, water infrastructure, schools, and healthcare facilities.

The Ethiopian PSNP case highlights the significance of integrating environmental and climate change considerations in the design and execution of social protection initiatives. By incorporating these factors, Ethiopia's PSNP has bolstered resilience, enhanced food security, and mitigated deforestation through land rehabilitation and natural resource management, earning recognition as one of Africa's most extensive climate change adaptation programmes.

32. Guijt J, Wigboldus S, Brouwer H, Roosendaal L, Kelly S, Garcia-Campos P. 2021. National processes shaping food systems transformations – Lessons from Costa Rica, Ireland and Rwanda. Rome, FAO.

33. Capacity4Dev. 2014. Productive Safety Net Programme in Ethiopia. European Union.

Private sector investment

Private sector finance stimulates smallholder production in agri-food industries in Rwanda[6]

Africa Improved Foods (AIF), a public-private partnership between finance institutions, the Government of Rwanda, development organisations and smallholder farmers, has mobilised private sector finance for agricultural development. The partnership works to address malnutrition and stunting in the country and the wider region by manufacturing high-quality, nutritious foods. The products are made using maize and soybeans sourced locally from over 130,000 smallholder farmers across the country. To supplement production, maize, soy, and packaging materials are also imported from the neighbouring countries of Uganda and Kenya. Manufacturing operations are centralised in a factory in Kigali.

Smallholder farmers receive extensive technical support aimed at enhancing productivity and improving yield quality and are connected to secure markets. Recognising the importance of climate resilience within its supply chains, AIF works closely with the smallholder farmers to ensure their operations are resilient to climatic challenges. This strategic partnership serves the mutual interest of all parties, ensuring the sustainability and resilience of the supply chains.

Transdisciplinary knowledge production and transfer

Systemic solutions through multi-stakeholder platforms in the United Republic of Tanzania and Uganda[20]

Creating solutions that transcend sectors and encompass the entirety of food systems necessitates amplifying diverse voices within the food ecosystem and integrating them into decision-making processes concerning new initiatives and food policies.

In Arusha and Mbeya (United Republic of Tanzania), as well as Mbale (Uganda), multi-stakeholder platforms have been established, comprising a wide array of food system stakeholders. These platforms encompass local government officials, research institutions, private enterprises, non-governmental organisations, farmer organisations, and youth representatives, fostering collaborative discussions on challenges and opportunities within the cities' food systems.

These platforms have been instrumental in driving innovative initiatives, such as the participatory food safety guarantee system, which ensures adherence to localised food safety standards. Additionally, they have facilitated participatory improvements to market infrastructure in Arusha and Mbeya. The platforms have also spearheaded nutrition and food safety campaigns, promoting market hygiene and the consumption of balanced diets.

Such inclusive, collaborative approaches are critical for generating the transdisciplinary knowledge needed to address food systems challenges and contribute to enhanced food security and nutrition in Africa.

Regional science-policy dialogue[34]

Science-policy dialogues can be used to bridge the gap between research, knowledge production, and policy and management for evidence-informed decision making. In March 2022, the West and Central African Council for Agricultural Research and Development (CORAF) organised a regional consultation workshop aimed at inaugurating the 'Alliance for CSA in Central Africa.' This initiative also marked the revival of the West Africa Alliance for CSA. These platforms serve as regional science-policy dialogue platforms with the goal of enhancing capacity and awareness of CSA and integrating evidence-based CSA knowledge into agricultural development programmes and policies. During the workshop, CSA technologies were identified for scaling to address the specific needs of both Central and West Africa.

34. Segnon AC, Obossou E, Lamien N, Zougmore RB. 2022. Scaling Climate-Smart Agriculture technologies and innovations in West and Central Africa through regional spillover mechanisms: Experiences from CORAF and way forward. Info Note. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

Implementing a holistic, regional approach to food systems transformation

CGIAR Initiative on Transforming Agrifood Systems in West and Central Africa[35]

The CGIAR initiative on West and Central African Food Systems Transformation aims to improve nutrition, incomes, and food security within the context of climate change in West and Central Africa (Burundi, DRC, Ghana, Ivory Coast, Nigeria and Rwanda) through nutritious, climate-adapted, and market-driven food systems. This objective is to be achieved through a holistic approach involving the following activities:

- Sustainable intensification and diversification of food production: This involves promoting sustainable seed systems and improved management practices, stimulating demand for nutritious foods, co-designing cost-effective and diverse production systems, and promoting good agricultural practices.
- Climate risk management and access to services through digital agriculture: This entails enhancing digital services for small-scale farmers, value chain actors, and governments to facilitate informed decision-making and climate risk management.
- Scaling land and water innovations for resilient agrifood systems: Utilising participatory tools and citizen science to co-develop inclusive landscapes owned by communities, enabling sustainable scaling of land, water, aquaculture, and climate-smart agronomic and digital innovations.
- Enhancing youth and women's entrepreneurship in food value chains: Promoting and preparing youth and women to engage in agribusiness while addressing social barriers.
- Coherent management system: Establishing a coherent management system to catalyse the initiative's impact at scale, articulating demand for research and innovations and increasing impact investments.

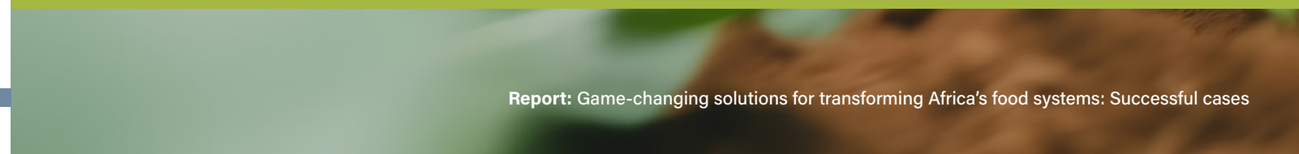
Through these activities the initiative aims to effect change in the following areas:

- **Nutrition, health, and food security:** Access to quality seeds and CSA practices, along with reduced post-harvest losses, will contribute to food and nutrition security in the region.
- **Poverty reduction, livelihoods, and jobs:** Providing opportunities and tools for women and youth to engage in the labour market, coupled with increased access to finance, will contribute to poverty reduction, livelihoods, and job creation.
- **Gender equality, youth, and social inclusion:** Empowering youth women through a gender-transformative approach and reducing risks in agricultural production will reduce existing gender gaps and increase business opportunities.
- **Climate adaptation and mitigation:** Matching digital supply-demand services will increase productivity and improve adaptation to climate change.
- **Environmental health and biodiversity:** Mitigating landlessness and disputes among resource users and addressing issues of poor environmental health and biodiversity loss through good governance of natural resources to restore degraded land.

36. CGIAR. 2022. West and Central African Food Systems Transformation. Research initiatives.

Reflection

Rich in resources, Africa has the potential to not only be food secure but also be a key player in global food systems. However, the continent is contending with multiple challenges ranging from climate change and deficient infrastructure to inadequate policies. The transformation of Africa's food systems is not only an urgent priority but also an extraordinary opportunity to elevate millions of people out of poverty, enhance nutritional standards, and drive inclusive and sustainable economic advancement. Such a transition will require inclusive game-changing solutions across policies, practices, institutions, structures, technologies, and processes, as well as a united effort and sustained commitment by African countries.

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