# Impact Strategy

2025





## **About CRAF**

Climate Resilient Africa Fund (CRAF) is an impact-driven venture capital fund that backs pan-African tech opportunities at the intersection of agriculture, climate and gender impact. We back tech interventions that boost African agricultural productivity, mitigate climate risks, and drive gender-inclusive economic growth. Through strategic investments and partnerships, we are building a resilient, and inclusive future for Africa's agri-food systems.

Our Managing Partners, Sherief Kesseba and Hossam Allam, bring over 40 years of combined experience in agritech investment and venture growth. Sherief founded, scaled, and exited a global African produce export venture and has mentored 40+ startups as an angel investor. Hossam, founder of Cairo Angels and a 500 Global venture finance instructor, has backed hundreds of startups and previously built and exited a 4,000-person business.

At CRAF, we envision an Africa where farming is profitable, climate-smart, and resilient, ensuring equal access to tools and technology for all farmers. In turn, African agrifood becomes less fragile and its people more food secure.



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# **Executive Summary**

Africa, despite its size and population, contributes minimally to climate change but is among the world's most vulnerable regions, with significant impacts on GDP and human capital. CRAF emphasizes Africa's need for climate adaptation over mitigation.

Food systems are at especially high risk, with productivity at risk of dropping by 2050 due to land degradation, crop failure, and water shortages. We note that enhancing food system resilience improves productivity and farmer livelihoods, contributing to climate adaptation.

CRAF's theory of change focuses on advancing resilience in four key areas:

Arm Farmers: Provide digital tools to farmers, forming viable clusters for better access to markets, credit, inputs, machinery, and data.

Brace Food Systems: Protect crops and soil against extreme weather and diversify food sources to reduce supply chain vulnerabilities.

Curb Losses: Minimize waste from farm to fork, boosting food supply and value.

Defend Biosphere: Encourage sustainable farming practices through digital monitoring and verification of nature-positive actions.

The aforementioned change is delivered by investing in five sectors:

Digital Platforms & Marketplaces: Tools that group farmers into economically viable clusters.

Biotech and New Foods: Weather-resistant crops and sustainable inputs.

Farm Technologies: Innovations that improve food production efficiency and sustainability.

Supply Chain Innovations: Open new markets and reduce food waste.

Nature and Carbon Intelligence: Monitor and verify environmental impact digitally.

The strategy also holds potential for gender co-benefits, as women play a dominant role in farming and food processing in Africa. CRAF seeks to promote positive gender outcomes for women as farmers, business owners, employees, and consumers.

Impact is measured through seven criteria, including water saved, food produced, waste reduced, and improvements in farmer livelihoods. Targets are calculated taking a data-driven, bottom-up approach.

CRAF drives impact through the investing process, its formal and informal relationships with investees, and taking a thought leadership role in the community. We align with global benchmarks, including the IFC Performance Standards, 2X, and the Sustainable Finance Disclosure Regulation.

Africa: an Adaptation & Resilience Story

# 1.1 AFRICA & CLIMATE CHANGE

Africa itself is disproportionately affected by climate change, despite contributing minimally to global greenhouse gas emissions. While the continent is responsible for only about 4% of global emissions (IPCC, 2022), equivalent to that of the global shipping industry, it faces severe social, environmental, and economic risks due to its vulnerability to the impacts of climate change.

Socially, Africa is expected to see a dramatic rise in poverty levels due to climate change. The World Bank (2020) projects that by 2030, climate change could push an additional 100 million people into extreme poverty, exacerbating social and gender inequality and undermining development progress. This will affect the poorest populations, especially in rural areas, who are dependent on agriculture for their livelihoods.

Rising temperatures, water scarcity, and extreme weather events are driving internal and cross-border migration. The African Development Bank (2021) estimates that climate change could force over 86 million people to migrate within their countries by 2050 due to environmental stresses, primarily affecting East and West Africa. This displacement creates further social challenges, including increased competition for resources and potential conflicts.

Africa's primary focus must be on adaptation strategies rather than mitigation —strengthening resilience in agriculture, improving water management, increasing farmer income, reducing waste and investing in sustainable infrastructure to protect vulnerable populations from the worst impacts of climate change. Environmentally, Africa faces significant threats to its ecosystems and biodiversity. Changes in rainfall patterns, desertification, and rising temperatures are already impacting the continent's natural systems. The Sahel region, in particular, is experiencing increased desertification, which has already reduced the productive capacity of the land, impacting agriculture and livestock. By 2050, it is estimated that 250 million people in Sub-Saharan Africa could be affected by desertification (UNCCD, 2021).

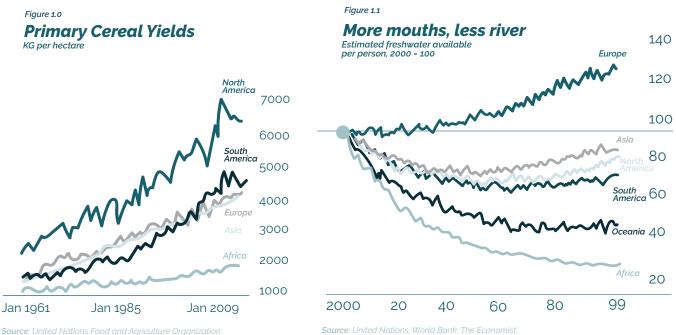
While Africa's greenhouse gas emissions remain low compared to other regions, the continent is suffering the consequences of climate change more acutely than many larger emitters. The United States, China, and the European Union, which together contribute around 60% of global emissions (IPCC, 2022), are less vulnerable to the localized impacts Africa faces.



# 1.2 **CLIMATE CHANGE** & AGRICULTURE

Employing over 60% of Africa's workforce, agriculture is possibly the continent's first and most climate-vulnerable sector. According to the FAO (2021), climate change could reduce agricultural productivity in Sub-Saharan Africa by up to 50% by 2050, due to factors such as droughts, soil degradation, and shifting growing seasons. This decline in agricultural output not only threatens food security but also risks destabilizing local economies dependent on agriculture.

Agricultural productivity in Africa already far under-performs every other livable geography on the planet, for reasons that will be discussed later in this paper (Figure 1.0). Additionally, agricultural **productivity growth** has reduced by 34% since 1961 due to climate change, more than any other region (IPCC AR6) and is expected to decline by a further 20% by 2050 due to climate change impacts (Niang et al., 2014). Whilst Africa's population is projected to double by 2050 (UN, 2019), potentially leading to an unsurmountable food import budget. The above should also be viewed through the lens of diminishing water supply (Figure 1.1).



Source: United Nations Food and Agriculture Organization

By 2050, climate change could reduce crop yields in Sub-Saharan Africa by up to 50% due to more frequent and intense droughts (World Bank, 2020). This significantly impacts food production, especially as about 60% of African farmers rely on rain-fed agriculture (FAO, 2021).

Climate change also threatens livestock production across Africa. Rangeland net primary productivity is projected to decline 42% for West Africa by 2050 at 2°C global warming. Vector-borne livestock diseases and the duration of severe heat stress are both projected to become more prevalent under warming. Fisheries provide the main source of protein for approximately 200 million people in Africa and support the livelihoods of 12.3 million people. At 1.5°C global warming, marine fish catch potential decreases 3–41%, and decreases by 12–69% at 4.3°C by 2081–2100 relative to 1986–2005 levels.

Studies such as the IPCC AR6 Climate Change Synthesis Report 2023 and IPCC WG 2 Climate Change 2022: Impacts, Adaptation, and Vulnerability highlight that climate change is intensifying in Africa, with severe impacts on agricultural productivity and sustainability.

And dwindling natural capital—such as fertile soils, freshwater resources, and biodiversity—further undermines agricultural resilience. As these resources deplete, farmers find it increasingly difficult to maintain productivity, deepening poverty and food insecurity. Agriculture presents itself as a pressing area in which to intervene and enhance resilience and adaptive capacity to brace our food systems and sustainbly feed Africa's growing population.

## 1.3 THE INTERSECTION OF CLIMATE, AGRICULTURE AND GENDER

Africa's agriculture sector inherently intersects with gender issues, given that women make up more than half of the continent's agricultural workforce: producing food, collecting water, and fueling households

But women have less opportunities and support to extract economic benefit from agriculture than men, and hence have a lower adaptive capacity to climate change. This is due to limited access to land ownership rights, agricultural inputs, financial services, education, and climate-resilient technologies and information.

Though they perform nearly 70% of the agricultural labour in Sub-Saharan Africa, they have less access than men to the resources that would drive adoption of new farming techniques, improve crop yields, secure livelihoods and respond to climate shocks (FAO, 2011). In many cases, extension services and climate-smart programs favour men over women, reducing women's ability to participate in and benefit from climate-resilient innovations. Women working in food processing and other value chain positions often experience additional challenges, such as lack of access to formal employment benefits, training, and financial services. The trend continues into investment and governance, where **women receive only 7% of total agricultural investments and just 5% of agricultural extension services in emerging markets** (Root Capital, 2023). Societal barriers restrict women's mobility and access to information, limiting their participation in decision-making processes at community, regional, and national levels. This exclusion is detrimental not only to women but to the broader community, as it impedes the development of comprehensive and inclusive climate resilience strategies that could mitigate risks more effectively.

Women are significantly underrepresented in economic decision-making roles across all levels of the agrifood economy. This underrepresentation extends further still, from the fields to the boardrooms of companies that drive the agrifood sector, affecting their ability to influence policies and practices that impact their lives and communities.

The intersection of climate change and gender issues in Africa's agrifood systems presents both challenges and opportunities. Addressing these interconnected issues requires a holistic approach that considers both climate adaptation and gender equity. Closing these gender gaps and providing women with equal access to resources, including climate-resilient technologies, skills development across the entire agrifood value chain and access to financial services, could increase productivity by 20-30%, resulting in significant gains in food security and economic stability (FAO, 2021)

### women recieve only 79/6 of total agriculture investments in emerging markets





# CRAF'S IMPACT THEMES

CRAF's theory of change centres on enhancing the resilience and adaptive capacity of farmers, consumers and productive land, integrating environmental and gender considerations at each layer.

Although we do take the view that any enhancement of resilience in agri-food systems equates also to climate resilience, we try as far as practical to identify specific climate adaptations or resilience themes. In the next section we pinpoint Africa's agri-food systems' primary vulnerabilities, dive down to their root causes, and then imagine a world where Africa's food systems are transformed. We distill our thinking down to four attack themes:



### **RM FARMERS**

imagines digitally enabled farmers, especially women, achieving global average yields and enjoying buyer and seller power, powered by technologies and digital platforms.



### **RACE FOOD SYSTEMS**

pictures locally produced food sustaining the continent, with climate-resilient crops and practices fortifying against climate risks, and women benefiting from better nutrition and jobs

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### **URB WASTE**

envisions a resource efficient Africa, with food losses optimised through pre and post-harvest improvements, providing women with income and cost savings.

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### **EFEND BIOSPHERE**

imagines adoption of tech that protects biodiversity and empowers land owners to monitor, report, verify and monetise nature-positive action, with women recognized as key environmental stewards.

# 2.1 ARM FARMERS

### **THE PROBLEM**

African smallholder farmers carry a number of handicaps compared to their peers' geographies. African farms have mostly failed to transition to being as tech-enabled as especially their global North counterparts and hence have significant opportunities to save cost, enhance yield, and better fight disease through precise optimisation of farm operations, and to capture additional export value by digitally monitoring and tracing their sustainability credentials.

In central and sub-Saharan Africa, 80% of food is produced on plots of land barely 1 hectare in size, that do not generate enough earnings to support investment in machinery, technology, infrastructure and quality inputs. Four out of five small holder farmers in Africa cannot access credit or insurance leaving a USD 100 billion /year credit gap to African farmers. The result is untenable yields and crop losses on the farm. The disaggregation of millions of small holder farmers, lacking collective bargaining power, results in overpaying for inputs and being underpaid for product, driving poverty and an exodus of talent from rural centres.

#### **THE VISION**

The "Arm Farmers" intervention imagines an Africa where large land holders farm in a highly scientific and precise manner, achieving quality and sustainability benchmarks that are competitive into a wide range of local and export markets. Climate smart tech is adopted allowing crops to withstand weather patterns, and domestic alternatives to imported, expensive and climate vulnerable inputs are plentiful.

Meanwhile smallholder farmers, especially women, are digitally pooled into economically powerful clusters with buyer and seller power, that better connects farmers to markets. They also have access to credit and insurance so they can afford high quality inputs and advice, expanding gateways to markets, finance, and income-earning opportunities, and levelling the playing field for women.

Though extreme weather events are inevitable, their effects are tempered through better prediction and response, and weather tolerant crops and supply chains mean that livelihoods are safeguarded

### **OUTCOMES INCLUDE**

- Adoption by farmers of resilience methods (disaggregated by gender)
- Access to finance for farmers (disaggregated by gender)
- Employment across value chain (disaggregated by gender)
- Improvement in livelihoods (disaggregated by gender)
- Improvement in landed food quantity

#### **SDG ALIGNMENT**



# 2.2 BRACE FOOD SYSTEMS

#### **THE PROBLEM**

Africa's agri-food economy is worth USD 550bn/year and employs around half the adult population. But climate change risks shaving 30% off that economic value by 2050, with extreme weather events significantly affecting crop yields (AfDB, 2021). Over 95% of African agriculture relies on rain-fed farming, making it particularly vulnerable to climate disruptions (FAO, 2020). The result is an anticipated climate-driven migration of more than 85 million Africans by 2050, in which women, for mobility and security reasons, will be especially vulnerable.

The continent's reliance on climate-vulnerable food and feed imports compounds the risk. In 2021, Africa imported some 83% of its wheat, making it highly susceptible to global supply disruptions, especially as global climate events impact other regions (FAO). This reliance exacerbates food insecurity during times of global instability. With soon USD 110 billion per year in food imports Africa is the single most food insecure geography on Earth, a fact that disproportionately affects the family members most responsible for making sure a family eats: women.

Access to affordable, high-quality seeds is another barrier. Over 40% of smallholder farmers in sub-Saharan Africa lack access to quality seeds, which are essential for improving crop resilience and productivity (FAO, 2021). And, underdeveloped agricultural infrastructure, including poor roads and limited irrigation systems, prevents effective responses to climate change and hinders market access, contributing to low productivity and increasing food insecurity (World Bank, 2020).

### **THE VISION**

Under "Brace Food Systems" we see domestic and climate-tolerant alternatives to food, feed, and inputs like fertilisers and pesticides, being developed and introduced. Associated derivative products and industries flourish creating jobs across the value chain including less labour-intensive ones that can favour women's employment.

#### **OUTCOMES INCLUDE**

- Quantity of food produced using climate-resilient methods
- Number of farmers adopting climate resilient inputs (disaggregated by gender)
- Number of jobs created by climate adaptation methods (disaggregated by gender)

#### **SDG ALIGNMENT**



# 2.3 CURB WASTE

### **THE PROBLEM**

Food losses in Africa are staggering. According to the World Bank, up to 40% of food produced in sub-Saharan Africa and 30% in North Africa, is lost before reaching markets due to poor farming practices, inadequate transportation and storage infrastructure, and an insufficiently integrated supply chain. Aside from the carbon footprint of decomposing food, the wasted labour, fuel, water, agricultural inputs, and companion ingredients associated with food that is farmed but never makes it to the plate represents billions of US Dollars lost value, that could feed entire countries and improve livelihoods.

But inefficient farming is also responsible for the waste. **The corollary of Africa underproducing its yield potential by up to threefold, is that it overuses farming resources to the same extent.** This represents billions of Dollars in wasted water, seed, fertilizer and unnecessarily deployed harmful pesticides.

#### **THE VISION**

Under "Curb Wastage" we envisage an African agri-food system in which technology allows precise use of water, fertilizer and pesticide, and optimises for energy use. Large data models accurately predict demand so that suppliers produce the right quantity, at the right time and deliver it to the best location for optimal value, driving down price discounts associated with anticipated food losses.

Post harvest supply chains are disintermediated reducing the number of times food changes hands, driving down switching losses, while in others, innovation opens up avenues to deliver more food to consumers, especially female consumers, in new markets that previously were underserved.

#### **OUTCOMES INCLUDE**

- Quantity of water and fertilizer saved
- Weight of waste reused
- Number of farmers using resilient methods (disaggregated by gender)
- Women employed in adaptive industries

#### **SDG ALIGNMENT**



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# 2.4 DEFEND BIOSPHERE

### **THE PROBLEM**

Africa's natural ecosystems, which are essential for the resilience of its agrifood systems, face severe degradation, threatening both biodiversity and agricultural productivity. Between 1970 and 2016, the stock of natural capital in African countries fell by an average of 65%, primarily due to land-use changes such as deforestation and overexploitation of resources. This overexploitation has led to a 65% decline in the populations of mammals, fish, amphibians, and reptiles, while freshwater biodiversity alone has dropped by 84%.

Women, who are often responsible for household food and water management, are disproportionately impacted by these environmental challenges. As farmers they are the first to feel diminishing productivity from soil stripped of its biodiversity, and as home makers they are first to feel the dwindling of forest resources, requiring them to travel longer distances for firewood and water, limiting both their ability to care for their families and their economic opportunities.

The expansion of food systems is the leading cause of global biodiversity loss, threatening over 85% of species. Agriculture contributes to environmental degradation, through abuse of soil by using synthetic inputs, and land-use changes, responsible for 75% of Africa's deforestation.

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#### **THE VISION**

Under "Defend Biosphere" we present a vision for Africa in which business values the role of nature in agriculture and captures emerging trends in compliance around nature reporting to digitally monitor, verify and report on nature's health, using data products that trace positive performance back to its source so it can be monetised on alternative currency platforms.

New, science-backed farming inputs, that are less harmful to biodiversity, emerge presenting STEM employment opportunities for women and men, and healthier food options for families and the women that primarily care for them.

The market for nature credits evolves globally, and technology that monitors conservation or restoration of biodiversity allows stewards of land, coastlines and waterways to monetise their crucial efforts.

#### **OUTCOMES INCLUDE**

- Area of land under sustainable management practices
- Reduction in use of synthetic agricultural inputs
- Number of farmers using nature-tech
- (disaggregated by gender)
- Number of farmers valorising nature action (disaggregated by gender)

#### **SDG ALIGNMENT**



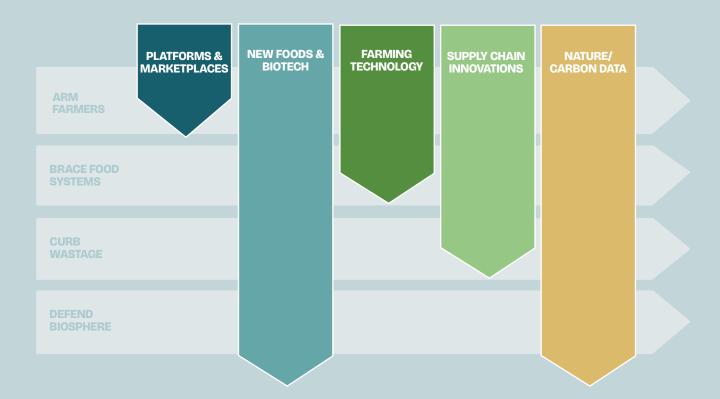
Investing for Impact

# INVESTING FOR IMPACT

CRAF's investment strategy seeks to leverage opportunities in the agrifood sector where we can drive climate resilience, build adaptive capacity especially among women, and deliver commercial returns to investors.

Our approach is informed by a detailed process of data analysis and market research, through which we have assessed key investment verticals, mapped and created typologies for primary business models in each, and identified opportunities for impact based on the roles of various stakeholders in key agri-food value chains.

CRAF is not a patient or concessional fund; it is a fully commercial venture fund. The above investment verticals overlap to a greater or lesser extent with our climate resilience and gender equity ambitions – as shown in the graphic above– while also generating market adjusted financial returns. Each vertical addresses specific challenges and opportunities within the African agrifood sector, offering potential for transformative impact and sustainable financial performance. There are five investment verticals:



# 3.1 PLATFORMS AND MARKETPLACES

At the centre of this intervention are the struggles of small holder farmers, described earlier in this document, to access credit resources and markets. Digital tools, communicated and adopted effectively can pool these farmers into larger, more economically potent clusters, to collectively access essential farm inputs such as seeds, fertilizers, and equipment at reduced costs due to bulk buying, or enhance negotiating leverage when selling produce, ensuring better market prices.

This aggregation not only increases the bargaining power of smallholder farmers but also helps mitigate the revenue and profitability losses associated with climate-related challenges (World Bank, 2020).

Once clustered around a service (eg weather advice, equipment rental, inputs sales or market access) there is a golden opportunity to upsell additional services. Access to credit and insurance in particular are a significant opportunity that can be unlocked once a critical mass of farmers is on a platform. Because commercial banks generally deem farming to be too high risk to lend, platforms that derisk farming present interesting conduits to cross sell credit.

### POSITIVE OUTCOMES ON **WOMEN AS...**

FARMERS Better access to info and credit improves livelihood

EMPLOYEES Low labour-intensive industries creates attractive jobs

CONSUMERS

Optimised supply and demand lowers household food prices



### SPECIFIC AREAS OF INVESTMENT INCLUDE...

Furthermore, digital marketplaces serve as critical platforms for knowledge sharing, particularly in the realm of sustainable and climate-resilient farming practices. These platforms facilitate the dissemination of information on advanced agricultural techniques, weather forecasting, and pest management strategies. By connecting farmers with experts and peers, digital marketplaces foster an environment of continuous learning and adaptation, which is crucial for navigating the uncertainties posed by climate change (FAO, 2021). Such knowledge exchange is vital for building resilient agricultural systems that can withstand the impacts of a changing climate and ensure long-term sustainability for smallholder farmers in Africa.

Because it is often the woman of the household who also manages the farmland, and possesses the greatest understanding of the risks and realities of how the land performs, platforms stand to disproportionately serve and empower women with access, knowledge and capital and indeed advance the climate agenda further.



# 3.2 NEW FOODS & BIOTECHNOLOGY

Biotechnology provides innovative solutions for enhancing agricultural sustainability, not only to derive new food strains, more resilient inputs but also to better utilise food waste. Technologies that convert agricultural waste into valuable resources—such as biofertilizers, animal feed, or even new food products—can help address the inefficiencies in food systems and reduce waste-related environmental impacts. For instance, biotechnological processes that extract nutrients from food waste can contribute to soil health and reduce the need for chemical fertilizers, thus promoting more sustainable farming practices (UNEP, 2023). Such advancements not only support environmental sustainability but also improve the overall efficiency and productivity of the agricultural sector.

New foods present opportunities to enhance the resilience of the African farmers against the impacts of climate change. Science backed innovations such as drought-resistant crop strains and heat-tolerant varieties can stabilize food production despite climatic shifts, enhancing national food systems and reducing vulnerability to global market fluctuations (FAO, 2022). CRAF seeks to invest in the IP behind these strains rather than the farming activity itself.

### POSITIVE OUTCOMES ON **WOMEN AS...**

FARMERS Income potential with fewer climate shocks to livelihood

EMPLOYEES Low labour-intensive industries creates attractive jobs

CONSUMERS More nutritious food and stabilised

### **SPECIFIC AREAS OF INVESTMENT INCLUDE**... Ð ·C05 Lower Emission Fertilizers Methane-Reducing Livestock Feed 淡 r0 Plant-based Plastics Heat-Resistant Crops -ELE Enhanced Nutrient Improved Soil Health Content ٥ ()Water-Use Efficiency Biotech Crops Microbial Precision Enhancements Agriculture



3.2

Food innovation holds particular potential to disproportionately benefit women farmers and consumers in Africa. Women play a pivotal role in agriculture across the continent, often managing smallholder farms and being central to food production and distribution.

Technological innovations that improve crop resilience, enhance nutrition, and create value from food waste can directly impact women by increasing their productivity and income potential, and create industries that are less labour intensive which better suits women. Furthermore, innovations in domestic food products can improve nutritional outcomes and deliver price stability for consumers, particularly in underserved communities where women are often primary caregivers. By addressing these needs through tech innovation, both women farmers and consumers stand to gain (World Bank, 2021).

# 3.3 FARMING TECHNOLOGY

Farming technology, encompassing both cutting-edge hardware innovations and advanced digital solutions, offers African farmers a critical advantage in enhancing their resilience to climate change. Precision agriculture technologies such as GPS-guided machinery, drones, and satellite field probing imagery enable farmers to optimize their farming practices with unprecedented accuracy. These tools provide real-time data on soil health, crop conditions, and weather patterns, allowing farmers to make informed decisions that improve yield and reduce losses from adverse weather. According to a study published in \*Agricultural Systems\* (Smith et al., 2022), these technologies can significantly increase farm profitability by minimizing crop failure and maximizing resource efficiency, thereby helping farmers offset the financial impacts of climate-related disruptions.

Novel farm systems such as vertical farms or controlled-condition farming, present opportunities to insulate crop risks from extreme weather events, reducing risks to livelihoods and presenting consumers with reliable supply of interesting and nutritious new food groups.

### POSITIVE OUTCOMES ON **WOMEN AS...**

FARMERS Reduced food losses and greater share of market prices

EMPLOYEES Low-labour intensive industries create attractive jobs

**CONSUMERS** Availibility of more/new food at stable prices





In addition to improving profitability, these technologies also support more sustainable farming practices by reducing the reliance on harmful inputs. Digital solutions such as soil moisture sensors and automated irrigation systems facilitate the precise application of water and fertilizers, mitigating the risk of overuse and environmental degradation. Research highlighted in \*Journal of Cleaner Production\* (FAO, 2023) demonstrates that precision farming technologies can decrease the environmental footprint of agriculture by optimizing input use, thus promoting soil health and reducing water and nutrient runoff. This shift towards more efficient and environmentally friendly practices is crucial for maintaining long-term agricultural sustainability.

The benefits of these technological advancements are particularly significant for women farmers, who represent the majority of smallholder producers in Africa. Women are integral to managing farms and ensuring household food security, often balancing multiple roles including primary caregivers responsible for nutrition (World Bank, 2021). Technologies that enhance farm profitability and reduce input costs not only improve economic stability but also support women's critical role in maintaining household nutrition. Enhanced efficiency in farming translates to better food quality and availability, directly benefiting women and their families by improving overall nutritional outcomes.

### SPECIFIC AREAS OF INVESTMENT INCLUDE...



# 3.4 SUPPLY CHAIN INNOVATION

The staggering food losses between farm and fork, described earlier mean that innovation and entrepreneurship in logistics and the midstream of the supply chain are pivotal in enhancing the climate resilience of African food systems.

Innovations such as cold and live chain technologies, smart packaging, and real-time monitoring systems can significantly extend the shelf life of perishable goods and improve the efficiency of transportation and storage (Journal of Agricultural and Food Chemistry, 2023). For example,

temperature-controlled storage solutions and GPS-enabled tracking systems ensure that food remains within optimal conditions throughout the supply chain, thereby minimizing spoilage and waste. By implementing these technologies, Africa can increase the amount of food that reaches consumers, reduce the environmental footprint associated with food waste, and enhance overall food system resilience.

### POSITIVE OUTCOMES ON **WOMEN AS...**

#### FARMERS

Reduced food losses and greater share of market prices

EMPLOYEES Low-labour intensive industries create attractive jobs

**CONSUMERS** Availibility of more/new food at stable prices





Women's dominant role in both agricultural production and household food management, makes them critical stakeholders in the fight against food loss and waste (World Bank, 2021).

By reducing inefficiencies and ensuring that more food reaches the market, technological innovations can improve the economic stability of women farmers by enhancing their market access and reducing post-harvest losses. Additionally, women consumers benefit from improved food availability and reduced prices, which contributes to better household nutrition and food security.

# 3.5 CARBON -NATURE INTEL

The role of tech innovation in preserving the natural world sits primarily in creating markets and digital products to support an emerging trend in national and corporate biodiversity disclosures.

Entrepreneurship in diagnostics, big data, telemetry, blockchain, and related fields present opportunities to enhance the climate adaptation and resilience of Africa's farmers, landowners, and custodians of waterways. By leveraging these technologies, stakeholders can gain actionable intelligence for managing natural capital assets in a more sustainable manner. For example, big data analytics can provide insights into soil health, water usage, and crop performance, enabling farmers to make data-driven decisions that optimize resource use and minimize environmental impact (Journal of Environmental Management, 2022). Telemetry and IoT (Internet of Things) devices offer real-time monitoring of weather conditions and soil moisture levels, allowing for timely interventions that can mitigate the effects of extreme weather events.

Blockchain technology can further enhance transparency and accountability in the management of natural resources by providing immutable records of land use, conservation practices, and sustainability metrics. This can be particularly valuable for verifying and certifying climate-positive actions, such as reforestation or sustainable farming practices, which can then be monetized through carbon credits, nature credits, or biodiversity credits (Environmental Science & Policy, 2023). By creating a reliable and transparent system for tracking and trading these credits, blockchain technology offers a channel for land managers to generate additional income while contributing to climate resilience and sustainability.

### POSITIVE OUTCOMES ON **WOMEN AS...**

#### FARMERS

Reduced food losses and greater share of market prices

### EMPLOYEES

Low-labour intensive industries create attractive jobs

#### CONSUMERS

Availibility of more/new food at stable prices



The benefits of these technological advancements are particularly pronounced for women, who are often the primary stewards of agricultural land and natural resources in Africa, even though land ownership may legally reside with their men (FAO, 2021). By providing women with access to sophisticated tools for diagnostics and data analysis, these innovations can empower them to make informed decisions about land and resource management. Enhanced prediction of weather patterns through big data and telemetry also improves resilience by enabling farmers to anticipate and prepare for weather-related shocks, safeguarding livelihoods and improving food security.

Moreover, these technologies can support women by facilitating their participation in emerging markets for environmental credits. As women are frequently responsible for managing household and agricultural resources, the ability to monetize climate-positive and nature-positive actions provides a new avenue for economic empowerment. According to a study in \*Agricultural Economics\* (World Bank, 2022), access to such financial opportunities can enhance women's economic agency and contribute to greater gender equity in agriculture.

### SPECIFIC AREAS OF INVESTMENT INCLUDE...



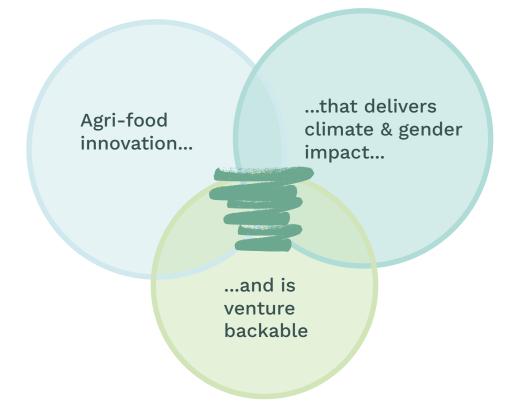
Managing our Impact

# 4.1 TAKING STOCK

In this paper CRAF has taken the position that Africa's climate change story is more one of adaptation and resilience than of mitigation. That agriculture-food systems present an opportunity to advance climate resilience while generating financial returns, and that there is a significant co-benefit in positively impacting women at the intersection of agri-food and climate adaptation

We have dived into the root causes of Africa's vulnerability to climate change and presented a vision for what a more adapted and resilient continent could look like, through targeted investment interventions. We have made a case for measuring resilience in terms of food produced, water saved, waste reused, and farmers experiencing improved livelihoods by adopting our tech. And shown that we can move the needle on gender impact by distinguishing between and benefitting women as land managers, employees and consumers.

In the next section we address the investment opportunities which we reject, the impact commitments we make, the targets we set with their underlying assumptions, the methods we will use to drive change, the risks to achieving it, and finally the questions which may sit in our blind spot.



# 4.2 SPECIFIC EXCLUSIONS

Although CRAF takes the view that most interventions that advance the livelihoods of farmers, or build more robust food supply chains, by definition also advance climate resilience and adaptation, we have some clear exclusions. Below is a list of potentially attractive investment opportunities, which CRAF will not invest in, on the basis that their impact is detrimental to the fight against climate change or gender equality. These include as examples:

- Genetically modified organisms (GMO)
- Animal Cattle farming (unless there is a clear climate adaptation or mitigation story)
- Conventional farming that advances use of harmful synthetic inputs
- Innovations that extend the exclusion of smallholder farmers from access to proprietary seeds
- Alternative meats
- Destruction of natural capital/deforestation
- Tobacco and bio ethanol production
- All categories in the Harmonized EDFI Exclusion List

# 4.3 COMMITMENTS

At CRAF, we commit to fostering inclusive and equitable investment strategies that address both gender and climate challenges within the agrifood sector. Recognizing the critical intersection of gender and climate resilience, we intend to achieve measurable impact on gender equality and climate while generating superior financial returns.

Our impact ambitions distil down into seven goals, including ones for the organisation, the companies we invest in and the people those companies reach.



In addition to these we seek to comply or align with following standards:

#### Compliance with ...

- Sustainable Finance Disclosure RegulationArticle 8
- IFC Performance Standards

### Alignment with ...

- 2X gender criteria
- BII Agriculture & Aquaculture toolkit

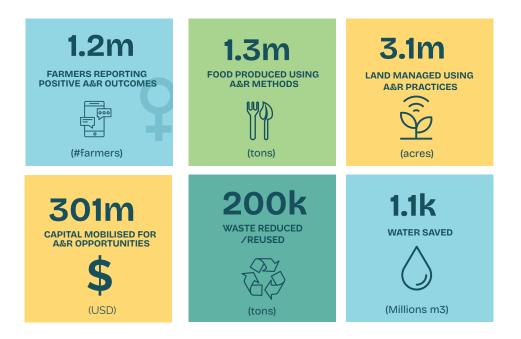
32

1\* CRAF's workplace supports the needs and advancement of women, including benefits such flexi-hours, a hybrid office environment, 6-month maternity and mandatory paternity leave and equal employment opportunity.

<sup>2\*</sup> Not less than 30% of CRAF's spend on vendors will go to women owned or led businesses. Vendors with whom we spend more than US\$10,000/ year must subscribe to our gender policies and also become part of our grievance mechanism.

# 4.4 TARGETS & ASSUMPTIONS

We have distilled our commitments above into six key performance indicators of impact. The indicators themselves are chosen on relevance to our mission, and on practicality of measuring. Each target is calculated based on assumptions taken from public literature and our own extrapolation. These assumptions and sources are presented in Appendix 1.





# 4.5 HOW WE DRIVE CHANGE

At CRAF we engage with our investees and ecosystems as actively to drive impact as we do to drive financial return. We have a multi-modal playbook of interventions through which we seek to steer founders, companies and markets in the same direction as we are moving.

**Impact strategy, 2025 –** The report you are reaing helps us articulate our "why"and commits us to our mission publicly. It acts as a guiding light for entrepreneurs to find us in a crowded field of investors.

**Screening for deals** – We screen for gender balanced or women-led teams, and offerings that are women- and climate-positive at scale. Conversely, we screen out offerings that are harmful to the gender-climate agenda.

**Impact officer** – Our dedicated Impact officer works with the investment officers, advancing our impact objectives with the investees, and with our risk officer, making sure that our ESG risk registers are current, our mitigation strategies are robust and complied with.

**Governance** – Our internal operational processes ensure that CRAF staff are fully aligned on investment and impact objectives, so that every touch point with the investee is consistent, when it comes to communicating our impact goals and expectations.

**Technical assistance** – We work with our fund Limited Partners and ecosystem donors to raise grant capital to extend technical assistance to our founding teams, across a broad set of areas including impact measurement and management.

Co-investors – We are intentional about our

**Co-investors** – We are intentional about who our co-investors are, striving to ally ourselves and our investees with investors that share our vision of impact. We seek broad alliances across cap tables to be able to influence co-investors on the value of prioritising impact.

**Reporting –** We invest in companies that can report on at least one of our impact metrics. We agree with management, at the outset, on the climate and gender metrics and reporting requirements, and integrate them into legal documents. This translates into our public and private disclosures to investors and the market. We gather impact data directly from investee reports, as well as by hiring consultants for more qualitative data from deep within the field operations of our portfolio companies.

**Own management** – We practice what we preach. At CRAF we believe in diversity of thought and actions, and hence commit ourselves to at least 30% representation by women in our workforce and within our committees and advisors. We also have internal climate goals, and a budget to offset our emissions from travel.

# 4.6 RISKS

We accept that there are risks to achieving the impact goals we have set. Partly these stem from ecosystem bottlenecks or resistance to change, and partly they will be from the reality that we set goals based on aspiration rather than precedent, given that we are the first fund of its kind in our geography. Below is a list of the risks that could compromise some of our impact outcomes and the mitigation strategies we seek to minimise those risks.

RISK CATEGORY	RISK DESCRIPTION	MITIGATING MEASURE
Data availability	Difficulty of gathering reliable data from the field to indicate impact	Simplify as far as possible the ask, making it easier to gather
Data Quality	Lack of reliable data and tools to drive reliable output	Sense check data annually for usefulness and change metric if needed.
Capital Market	Limited investor appetite for climate resilient agriculture, perceived as high-risk.	Communicate broadly in forums on the investment opportunity and showcase success
Regulatory	Contradictory policies and weak legal frameworks with limited enforcement hampers investees.	Assess exposure to regulatory risk at diligence stage and advise investees how to navigate.
Political	Unstable political environment hamstrings investee	Seek investments in offerings that would survive regime change, and in which there is no sign of government meddling
Receptiveness	Local communities hesitant to change farming habits reducing effectiveness of tech offering.investees.	Look for early proof of adoption at diligence stage.
Social Norms	Women fail to secure legal rights or family support essential for adopting A&R practices.	Train our ESG/Impact officer to understand these risks and raise them at diligence stage.
Climate Change	Changing weather patterns impact productivity, prices and quality.	Seek investment opportunities that deliver increasing gains with more extreme weather events.and raise them at diligence stage.

# 4.7 LEARNING

We realise that much of this paper is a shot in the dark. This has not been done before and we will overshoot some goals and underachieve others. We know that there are obstacles in our blind spot, and assumptions we have made that may be wrong. CRAF is committed to uncovering and challenging our assumptions, addressing our knowledge gaps, and exploring uncertainties or shifting contexts. As the fund advances through the investment period and beyond, we want to ask and learn what has worked, why it worked, for whom and in what circumstances.

We want to share the lessons we learn because a better-informed investment community can better assess and manage their own risks, and is more likely to lead to investment in our future funds, or co-investment on future deals. As a result, our communications team will generate learning products: blog posts, video logs, video teasers, jointly published papers and conference talks, summarising our most important takeaways.

At the outset the assumptions we initially seek to challenge are shown here. When we are midway through the investment process – around 2028 – we will take stock of answers to these questions, and see if our investment or impact strategy needs to be revisited. Are farmers really amenable to new ways of farming when you relieve their credit burden?

Do women actually benefit economically just because we put tech in their hands? Do users actually adopt A&R practices just because they're clustered on a digital platform?

Does an increase in women's wealth lead to better quality of life?

Did women get a fair shot at the labour non-intensive jobs we created? report positive impact from supposedly female-friendly products?

Do female

consumers

Do A&R practices in agriculture actually improve soil health?

Does an average investee actually reach the expected user number?

Does technical assistance really enhance investees ability to better provide an A&R offering?

Are our assumptions around crowding in capital right?

Do digital tools that derisk farming also unlock credit to farmers?

How did we overcome these challenges? What are our major challenges to scale innovative and impact?

What are our future no-goes?

What competencies could we enhance?

What pathways have we found for generating change?

# **APPENDIX**

### **APPENDIX 1** IMPACT ASSUMPTIONS

#### **Consumers reached**

- ▶ Farming Tech: 1 acre affects 5 consumers.
- ▶ New Foods & Biotech: 1 ton of new food affects 10 consumers while 1 biotech-enhanced acre affects 5 consumers.
- Supply Chain Innovation: 1 ton of waste reduced affects 20 consumers while 1 ton of produce moved through a streamlined and traceable supply chain affects 50 consumers.

#### **Farmers reached**

- Farming Tech: 1 acre affects 0.4 farmers, considering that the average smallholder farm size in Subsaharan Africa is 1 hectare (2.5 acres approx.) Assume a 1:1 ratio of farmers affected per platform or marketplace user.
- Biotech: Each 1 biotech-enhanced acre affects 0.4 farmers, considering that average SHF land size in SSA is 1 hectare.
- Supply Chain Innovation: 1 ton of waste reduced affects 0.8 farmers (CRAF estimate) and 1 of 1 ton of produce moved through a streamlined and traceable supply chain affects 0.25 farmers.

#### Waste reduced

- Waste reduced through Supply Chain Innovation is assumed to affect 0.8 farmers per tonne. This estimate is based on:
- Average cereal yield in Africa being 1.65 tonnes per hectare (Source: AfDB, 2022).
- Post-harvest Loss in Africa from 15% to 19% per crop per year (Source: APHLIS). Assume the solution will bring down the loss by 7.5 percentage points. This gives an average waste reduction per farmer of 0.124 tonnes per year. Over the life of the fund (10 years), each farmer will have experienced a reduction in loss of 1.24 tonnes. So the target 100,000 tonne reduction will affect approximately 80,000 farmers
- Waste reduction is also assumed to come from some biotech solutions that process organic waste into biological agents for agriculture.

#### Water saved

- Irrigation Water Demand is assumed to be 5000 m3/ hectare per year. (Zaki et al, 2018) Average smallholder farm size is assumed to be 1 hectare.
- ▶ 60% water efficiency saving, from smart irrigation data. (Chu, 2017)
- Water-saving interventions could come from farming technologies, platforms, or biotechnology.

### **APPENDIX 2**

#	Vertical	Farmers	Consumers	Acres managed	Water Saved	Waste reused	Food produced	CRAF Investment	Third Party
-	Earmine Tech		250 000	SO DOD	Kn nnn nnn	(salilion)	33,000	300	Capital US\$ UUUS
2	Farming Tech	20,000	250,000	50,000	60,000,000		33,000	300	22,200
ę	Farming Tech	20,000	250,000	50,000	60,000,000		33,000	300	17,200
4	Farming Tech	20,000	250,000	50,000	60,000,000		33,000	300	15,200
Novel	Novel Farming Systems Sub-total	80,000	1,000,000	200,000	240,000,000	0	132,000	1,200	76,800
S	Platforms & Marketplaces	50,000	0	125,000	150,000,000		82,500	6,550	32,200
9	Platforms & Marketplaces	50,000	0	125,000			82,500	2,550	11,200
7	Platforms & Marketplaces	50,000	0	125,000			82,500	6,550	32,200
∞	Platforms & Marketplaces	50,000	0	125,000			82,500	550	3,200
6	Platforms & Marketplaces	50,000	0	125,000	150,000,000		82,500	2,550	11,200
Farme	Farmer Platforms Sub-total	250,000	0	625,000	300,000,000	0		18,750	90,000
10	Bio-tech and new foods	0	200,000	0			0	5,000	17,500
11	Bio-tech and new foods	0	200,000	0			0	2,000	20,500
12	Bio-tech and new foods	200,000	2,500,000	500,000			330,000	500	2,000
13	Bio-tech and new foods	200,000	2,500,000	500,000	600,000,000		330,000	2,000	20,500
<b>Bio-te</b>	<b>Bio-tech and New Foods Sub-total</b>	400,000	5,400,000	1,000,000	600,000,000	0	660,000	9,500	60,500
14	Supply Chain Innovation	80,000	2,000,000	200,000		100,000		500	7,000
15	Supply Chain Innovation	25,000	2,000,000	62,500				5,000	17,500
16	Supply Chain Innovation	80,000	2,000,000	200,000		100,000		2,000	20,500
17	Supply Chain Innovation	25,000	2,000,000	62,500				500	7,000
Supply	Supply Chain Innovation Sub-total	210,000	8,000,000	525,000	0	200,000	0	8,000	52,000
18	Nature/Carbon intelligence	100,000	с	250,000			165,000	250	9,750
19	Nature/Carbon intelligence	100,000	x	250,000			165,000	250	9,750
20	Nature/Carbon intelligence	100,000	1	250,000			165,000	250	2,250
Natur	Nature/Climate Intelligence Sub-total	300,000	0	750,000	0	0	495,000	750	21,750
Total		1,240,000	14,400,000	3,100,000	1,140,000,000	200,000	1,287,000	38,200	301,050

IMPACT CALCULATIONS

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