



GLOBAL
ALLIANCE
FOR THE
**FUTURE
OF FOOD**

TRUE VALUE

Revealing the Positive Impacts
of Food Systems Transformation

GLOBAL ALLIANCE FOR THE FUTURE OF FOOD

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INTRODUCTION

Our food systems are significant contributors to global crises: They are some of the largest sources of greenhouse gas (GHG) emissions; a driver of biodiversity loss and zoonotic diseases; and negatively impact our health, diet, and well-being.

These hidden costs of global food and land-use systems are estimated to add up to USD 19.8 trillion per year.¹ Despite that astounding number, there are many reasons for optimism. Today's food systems, from farm to fork, are also rich with incredible human and cultural capital, and inspiring initiatives to protect nature. Every day, they provide immense value to consumers, society, and the environment.

To catalyze the full value and potential of food systems to society – upholding ecosystem integrity; protecting biodiversity; delivering food and nutrition security; and building sustainable livelihoods, social networks, governance, and more – we must break away from metrics like yield per hectare productivity measures or market profits as sole indicators of value. These narrow understandings of value do not capture the many externalized impacts of food systems on planetary health and human well-being, often hiding or obscuring these from view, and in doing so undermining decision-making.

True Cost Accounting (TCA) is an innovative tool that provides a holistic understanding of the relationships between agriculture, food, the environment, and human well-being. Already in use by a plethora of countries, organizations, and businesses, TCA provides a systemic approach to assess, measure, and value all externalities – the positive and negative impacts – of food systems.

TCA initiatives such as the United Nations Development Programme's TEEBAgriFood Evaluation Framework² present this information in an integrated way in order to shift policy and practice toward transformational change. TEEBAgriFood is in use in more than 80 countries across the world. To date, using TCA to reveal the positive impacts of food systems managed for health, equity, and sustainability has been underexplored. With TCA, we can account for the total net impact of food systems by considering all the benefits they bring to consumers, society, and the environment in addition to the negative externalities.

In the assessments that follow, an inclusive and true cost evaluation approach is applied to six initiatives drawn from the Global Alliance's [Beacons of Hope](#) (BoH) initiative, which showcases the groundswell of people and organizations around the world who are addressing food systems challenges in creative and systemic ways. Providing first-hand evidence that food systems transformation is both possible and already happening, the BoH selected for this study are indicative of thousands of initiatives that are producing

most of the world's food, acting as stewards of nature by preserving biodiversity, sharing traditional knowledge, contributing to the resilience of people and nature, and more.

Applying the TCA methodology reveals the many ways in which food systems transformations have positive impacts by identifying and analyzing impact pathways (the hidden impacts caused by a chain of effects) across environmental, human, social, and economic domains. These include, for example, reduced health costs due to lower disease burdens as a consequence of reduced pesticide use; improved crop yields as a result of reintroducing traditional knowledge and agroecological farming practices; and increased local food security thanks to the sharing of indigenous seed varieties through seed banks, and helping farmers to adapt to changing climates and gain financial independence by transitioning away from synthetic fertilizers.

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A full understanding of the connections between humans, the environment, and food systems, as well as the multiplier effect these connections have, can be harnessed for ever-more positive impacts across food systems and sustainability as a whole. The diverse insights, indicators, and data captured can be used to build the case that healthy environments, healthy people, and well-functioning food systems are not only good economics but that they also concurrently make significant contributions to social, cultural, and ecological well-being.

This report calls upon diverse food system actors, from policymakers and business leaders to scientists and farmers, to unlock and accelerate the positive impacts and benefits of food systems by embracing holistic approaches to measuring, understanding, and accounting for their true value. It is time to retire metrics that don't measure what matters and that are allowing, enabling, and encouraging food systems practices to go beyond planetary limits.

While there is no one-size-fits-all strategy for food systems transformation, true cost frameworks can help turn this vision into reality. Understanding the pathways and conditions under which positive benefits can be enhanced is critical to building a resilient, sustainable, and equitable future of food for all.

Methodology

The Global Alliance for the Future of Food and TMG Think Tank for Sustainability used the TCA methodology described in this [Overarching Implementation Guidance](#) to develop a framework that demonstrates how TCA can be used not only to reveal negative externalities but also to comprehensively recognize and increase awareness about food systems' positive impacts.

We need to do things differently. Food systems are a significant factor in the creation of these daunting challenges and – importantly – they can provide brilliant pathways to the solutions.

Through an integrated process of research and interviews, data gathering, collection, and assessment, the TMG team and representatives from each BoH initiative worked together to compile the information and evidence needed to understand the breadth and depth of their positive impacts. The analysis was conducted using a multiple capitals-based approach to systems-thinking, accounting for impacts on the environment (natural capital), people (human capital), society (social capital), and the economy (produced capital). This integrated approach allowed the researchers to identify and explore the full range of visible and invisible connections between humans, the environment, and food system actors such as the BoH.

Where possible, the environmental, social, human, and economic benefits generated by the BoH's activities were measured and expressed in dollar values. Economic valuation provides a method to compare the diverse costs and benefits associated with various activities by attempting to express them in monetary terms. Valuation of natural capital was conducted by assigning monetary values to ecosystem services. These include, for example, the value of carbon stored in soil under sustainable land management, the price of natural fertilizer usage compared to conventional fertilizer, or the value of forest conservation. The economic valuation of social and human capitals was achieved through calculating the value of volunteers' work time, the value of food waste, and the economic expenses associated with the support of community cooperatives. Produced capital was valued by analyzing, for example, farmers' net incomes, crop market prices, or labour efficiency.

Monetization of this kind makes impacts clearly visible, allowing them to be expressed concretely in a way that is widely comparable, communicable, and comprehensible. It should be noted, however, that monetary units reflect a current societal norm but are not always appropriate. More holistic and inclusive measurements of value were also considered. Measuring costs and benefits demand that we respect and incorporate diverse ways of assigning value.

Assessing the true value of an initiative's impacts on society, people, and environment requires a rethink of the data and metrics that are typically collected. Each BoH that participated in these assessments had varying degrees of data and information to fully understand the broad impacts of their work. Importantly, the process undertaken during these asset-based assessments has revealed how TCA and a capitals-based approach can shift mindsets, enable systems-thinking, and prompt new approaches to data collection, analysis, and communication.

We need to do things differently. Food systems are a significant factor in the creation of these daunting challenges and – importantly – they can provide brilliant pathways to the solutions.

KEY MESSAGES

1) These TCA assessments revealed the true value of the BoH in monetary and non-monetary ways, demonstrating how sustainable food systems have positive multiplier impacts across diverse issues. Positive impacts were documented across public health, biodiversity conservation, climate change, farm workers' rights, cultural diversity, community well-being, and gender empowerment.

Public health, biodiversity conservation, climate change, farm workers' rights, cultural diversity, community well-being, and gender empowerment.

2) Along with providing powerful evidence that food systems transformation is possible and that it is happening, the assessment insights illustrate the power and potential of holistic and inclusive measurement like TCA to catalyze new thinking and better inform decision-making. Without a comprehensive picture of the interrelated economic, ecological, and social drivers of today's food systems, we are flying blind in decision-making about the future of food. We need practical and actionable tools and frameworks, like TCA, to help us understand, analyze, and shift systems.

3) Assessing the true value of a food systems initiative's impacts on society, people, and environment requires a rethink of the narrow data and metrics that are typically collected today. TCA assessments help us measure what matters beyond yield and income, and can directly inform interventions and solutions that set out to reduce the negative impacts of food systems while enhancing positive impacts. They help highlight what's wrong with the current system and point to changes needed to bring about a more desirable future.

4) TCA has proven to be applicable for all kinds of organizations, including businesses, farmer cooperatives, food banks, research facilities, and more. This unique flexibility means that TCA can be used as an evaluation tool for diverse projects and programs to assess the impact of their interventions. Understanding the complex and interconnected food chains of the world requires systems-thinking and tools built on a systems perspective.

5) The BoH selected for this study are indicative of a groundswell of initiatives worldwide that are working to transform food systems in creative and inspiring ways. Drawn from diverse countries, cultural contexts, and sectors, the BoH were an ideal place to apply TCA, build understanding of the dynamics that shape food systems, and draw unseen connections between natural, social, human, and produced capitals.

6) Through these initial and qualitative assessments, the utility of TCA as a universal tool was demonstrated. While quantitative and monetary data on the true value of benefits is useful, qualitative information, such as a description of the interlinkages between capitals and impacts, is equally important to understand the underlying systems and the connections between systems elements.

7) Describing the links between activities and outcomes is the first step in bringing to light the many unseen connections between natural, social, human, and produced capitals. These impact pathways, revealed by utilizing TCA, show how BoH

activities can initiate a chain of effects that result in additional and multiple unrecognized benefits. Once identified, these can be further prioritized, catalyzed, and enhanced.

8) The direct and indirect impacts of BoH activities deliver *co-benefits* to the environment, human health, equity, livelihoods, culture, and the economy. This underlines a key message in TCA that natural, human, social, and produced capital are inherently linked. It bears emphasizing that within the context of TCA, governance and the multistakeholder approach are critical.

9) The TCA assessment process triggered BoH to think differently about systemic food systems evaluation and understand their direct and indirect impacts. The TCA assessment process was challenging but generative, pushing participating BoH beyond their usual evaluative approaches and decision-making.

10) For funders and researchers, there's a clear and urgent need for finance to be redirected toward enabling holistic, transdisciplinary, and inclusive ways of understanding food systems. More must be done to build policies and processes that involve diverse voices, ensure meaningful dialogue, and promote transparency. Without this, we risk seeing more top-down and siloed interventions that all too often result in unintended consequences and inadequate solutions.

COMMUNITY MARKETS FOR CONSERVATION

ZAMBIA



Community Markets for Conservation (COMACO) is a social enterprise that supports the local community in the Luangwa Valley of Zambia to adopt agroforestry, thereby putting an end to wildlife poaching, deforestation, and food insecurity. By developing a business model to make these agricultural techniques and nature conservation profitable, COMACO incentivizes long-term ecological and financial sustainability. Sustainable land management is practiced by 225,929 COMACO-trained small-scale farmers across 168,800 hectares (ha) in Zambia. You can read more about COMACO's work [here](#).

IMPACTS & PATHWAYS

COMACO directly improves livelihoods and ecosystem conservation through its programs, but the indirect impacts of its approach are even more far-reaching and diverse than what is immediately apparent. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- In the 1980s, poor farming practices that had depleted soils and caused erosion led to low crop yields, poverty, and food shortages in villages. The origin of the organization began with a baseline community survey in 2001 that revealed subsistence living in Zambia's Luangwa Valley was failing to meet family food and income needs.
- Lacking livelihood opportunities, community members turned to poaching wildlife as a way to make money and feed their families, grew non-food crops for cash that further depleted soils, and often burned trees to create charcoal to sell for fuel.
- Damage to the ecosystem resulted in a vicious cycle, further impairing soil and increasing food insecurity. Forests and wildlife habitats were being cleared in the search for fertile soil to supply adequate food and nutrition.
- COMACO's programs bridged people into stable employment and reliable income through farming training and supports. The introduction of sustainable agroforestry methods improved soil quality, resulting in higher yields and improved diets.
- Regional land and ecosystem ownership structures require participation and collaboration across stakeholder groups. Fostering local social, cultural, and economic structures set the stage for community sustainability partnerships.
- Using a business model that links local production to value-added It's Wild! food products, as well as introducing a carbon credit program, allowed COMACO to fund its programming and reinforce the local economy and supply chains.

Looking through the lens of natural, human, social, and produced capital, an assessment of COMACO's data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Conserved ecosystems and wildlife

COMACO protects ecosystems, mitigates climate, and builds resilience of natural systems.



1,731 POACHERS TURNED FARMERS
PROTECTING ECOSYSTEMS

COMACO's work focuses on turning poachers who have been threatening the wildlife of the Luangwa Valley of Zambia into farmers. It is estimated that between the early 1970s to the early 1990s, elephant populations in this region dropped by about 60%, from 35,000 to 12,000.³ Since 2003, COMACO enabled 1,731 poachers to surrender their weapons and abandon hunting by providing them with stable employment and income as farmers. Through these actions, COMACO has prevented hundreds of would-be poachers from arrest or imprisonment, indirectly protecting their families from loss of the primary income earner, and increasing the wildlife in the region.

COMACO then further protects ecosystems by training both ex-poachers and existing local farmers in agroforestry, building knowledge on sustainable agricultural and land management practices. To date, over 225,929 small-scale farmers have signed a Conservation Pledge to adopt these practices and abandon those destructive to wildlife, forests, and soils. Rather than relying on chemical fertilizers and crops such as cotton and tobacco that damage soils, COMACO teaches integrated soil management practices that rely on maize crop rotation with legumes, crop residue management, agroforestry to enhance mineral recycling, natural pest management, and minimal soil disruption. These techniques restore the soil microbiome and underpin the development of an overall healthier ecosystem, leading to healthier crops, enhanced food security, climate-change mitigation, and resilience to environmental extremes, such as intense rains and droughts.

Facilitated sustainable production methods

COMACO fosters sustainability outcomes through multiple conservation methods from agroforestry to compost use to crop rotation and organic fertilizers.

COMACO promotes the use of *Gliricidia sepium* trees under an agroforestry scheme. *Gliricidia sepium* is a fast-growing and deep-rooted legume tree that controls erosion, fixes nitrogen, and provides fuel, fodder, green manure. It contributes to soil health by: 1) increasing important minerals for plant growth, and 2) increasing organic material in the soil that helps to improve water retention and feed soil microbes, ultimately sustaining increased crop yields at negligible costs to the farmer. COMACO reports that farmer net revenues per ha of maize produced with agroforestry is 50% higher (ZMW 4,683 vs. 7,135/ha or USD 277 vs 422/ha) compared to those employing fertilizer. The input cost of conventional fertilizer is ZMW 874.38 (USD 53.13) per ha, while the price of *Gliricidia sepium* seeds is ZMW 16.45 (USD 1) per ha.

At least 65% of COMACO-supported farmers have begun adopting agroforestry with an annual planting of about 44 million trees.

COMACO farmers save 874.38 Zambian Kwacha (ZMW) (USD 53.13) per hectare by utilizing Gliricidia sepium-based agroforestry instead of conventional fertilizers, a 98% reduction in production costs.

**AGROFORESTRY
REDUCES 98%
PRODUCTION COSTS**



Farmers who plant legume food crops such as soy and groundnuts as part of this agroforestry farming system not only enhance their soil quality but also ensure a more nutritious diet. Natural soil management additionally provides opportunities for organic certification. COMACO supplies its farmers with non-genetically modified seeds, allowing over 4,000 of them to produce marketable organic products. More than 1,300 of the farmers cultivate these organically certified seeds to build community seed banks, further reducing the costs of food production for local farmers.



225,929 COMACO farmers practice Sustainable Agricultural Land Management on 168,800 ha, yielding substantial benefits for soil carbon sequestration valued between ZMW 16.1 million (USD 979,040) and ZMW 88.7 million (USD 5,384,720) per year.⁴

COMACO assessments of sustainability practices reveal that the average farm uses multiple conservation methods: 48% use agroforestry, 59% use compost, 76% use minimum tillage, 86% use crop rotation with legumes, 85% use crop residues as organic fertilizers, 88% refrain from burning crop residues, and 92% establish fire breaks around their field. The resulting improvements in soil health lead to long-term crop and market sustainability. When all sustainability practices are accounted for, COMACO trained small-scale farmers save a total of over ZMW 7 trillion (USD 426,656,078)⁵ in avoided costs due to land degradation, annually.



**TOTAL VALUE
OF ALL SUSTAINABLE PRACTICES
\$426,656,078 USD/
YEAR**

Developed sustainable energy sources

COMACO realizes positive sustainable energy outcomes through the use of crop by-products, training, and infrastructure support.

Only 20% of the Zambia population has access to electricity, and 70% of national energy consumption is generated through the use of charcoal and firewood.⁶ These sources contribute to greenhouse gas emissions (GHG) and to deforestation, promoting a poverty trap as soils are further depleted and threaten food security. COMACO addresses this in two ways: 1) COMACO uses crop by-products, such as peanut shells and rice husks, to make combustible bricks as a form of renewable energy to use in its food-processing facilities, saving thousands of litres of fuel per year; and 2) COMACO teaches small-scale farmers to use wood from pruning the Gliricidia sepium trees as a sustainable household fuel source and supplies households with cookstoves, which are more energy efficient and cleaner burning than open fires. Every year approximately 10,000 households switch to

cookstoves (through a partnership with CQuest), for a total of 90,749 households currently using this technology. COMACO estimates that this saves 10 to 13 trees per year per household and 193 labour hours for female household members who would otherwise spend time collecting firewood.

Due to improved cookstoves, fuelled with organic by-products such as peanut shells and Gliricidia sepium tree cut-offs, a household can save 10 to 13 trees per year. This results in a savings of 907,000 to 1,180,000 trees annually at a value of ZMW 298,624 (USD 18,150)⁷ to ZMW 388,159 (USD 23,595).⁸

Prevented deforestation with carbon credits

COMACO incentivizes forest conservation and sustainable land management through the creation of a carbon credit program.

Zambia is one of the most forested countries in Africa but faces significant threats due to environmental degradation in the form of agricultural expansion, use of wood fuel and charcoal, timber extraction, and infrastructure development such as mining,⁹ human encroachment for settlement, uncontrolled late-season forest fires, and poaching. Between 2013 and 2017, farming communities supported by COMACO generated voluntary carbon credits at a value of ZMW 43.4 million (USD 2,636,640) from forest conservation, sustainable management of forests, and enhancement of carbon stocks across a total forest cover of 1,540,000 ha.

In 2015, COMACO established a voluntary carbon market to incentivize forest conservation and sustainable land management. COMACO's carbon market is based on carbon stocks from avoided deforestation as well as carbon sequestration from Sustainable Agricultural Land Management (SALM). The planting of *Gliricidia sepium* trees is contributing to Zambia's Reduced Deforestation and Forest Degradation (REDD+) program, which is aimed at protecting and expanding areas under natural forest and biodiversity conservation by helping farmers maintain existing plots rather than clearing more land. REDD+ helps to value the carbon and ecosystem services that forests provide and creates financial incentives to reduce deforestation. To self-finance COMACO as a company and provide its social and environmental services, COMACO retains 35% from gross carbon sales to help support its running costs and returns 55% to participating communities. The balance goes to Zambia's Forestry Department to oversee enforcement of its forest protection laws. COMACO's promotion of sustainable energy, forest conservation, and SALM contributes to Zambia's National Determined Contribution (NDC), reducing carbon emissions by 14,688 tons between July 1, 2012, to October 31, 2017.

1,540,000 ha FOREST PROTECTED
ANNUAL WORTH \$34,294,615 USD  **CARBON CREDITS SOLD \$2,636,640 USD**

Under COMACO's conservation scheme, 1,540,000 ha are set aside as community-protected forests. This forest area generates use values (industrial wood, fuel wood, and non-wood forest products) as well as non-use values (ecotourism, erosion control, and sediment retention) estimated at over ZMW 565 million (USD 34.2 million)¹⁰ per year.

Incentivized land conservation and stewardship

COMACO encourages communities and households to comply with various conservation practices by committing to buy their crops at premium market prices.

In Zambia, land is governed by a combination of local tribal and state laws. Tribes, or chiefdoms, own land through their customary traditional leaders, while the state owns the trees and wildlife on that land. COMACO's programs incentivize chiefdoms to create and adopt a community conservation plan that works effectively as a community business plan, tying agriculture and natural resources together under a sustainable-use approach governed by locally accepted regulations and enforced by local leaders. Resident households agree to this plan by signing a Conservation Pledge that specifies ways households are asked to comply with various conservation practices. In return, COMACO buys their crops at premium market prices, as well as rewards high-performing communities with a Conservation Dividend, a cash payment to support community development projects.

COMACO currently supports 66 community conservation areas, within which there are 1.54 million ha of forests protected by teams of COMACO-trained community forest guards.

Built up ecosystem services

COMACO provides training and support for beekeeping, which enhances crop pollination and produces an additional income source.

An agroforestry food system model can inherently lead to additional co-benefits. Beekeeping is one example. COMACO initiated beekeeping as part of forest conservation plans, which was reinforced by the indirect benefits of reducing pressures on local forests via agroforestry.

Farmers' beekeeping activity, a non-extractive use of the forest, results in pollination services across approximately 40,000 ha, which can be valued at ZMW 1.2 million (USD 75,897)¹¹ per year.



Beekeeping enhances pollination and species diversity in forested areas, and is also an additional source of income for small-scale farmers. Under COMACO, specially trained people from within the community oversee hive maintenance and the collection of honey to ensure only top-grade honey is harvested. COMACO currently supports over 5,000 farmers who own approximately 30,000 beehives. As forests become better protected with incentives from honey, other forest products such as edible wild mushrooms and caterpillars become more available and added sources of revenues and food.

SOCIAL CAPITAL / SOCIETY

Fostered community leadership

COMACO supports local farmers with extension services by creating local cooperatives.

COMACO has established multipurpose farmer cooperatives that support services such as crop marketing, seed replication and distribution, and training. COMACO recognizes and supports the community leadership structure, which relies largely on local traditional leaders but is augmented by other local leaders representing various community-based organizations.

COMACO supports 84 community-run cooperatives with over ZMW 28 million (USD 1.7 million) annually to provide extension services locally.¹²

Through its own staff of trained lead farmers, cooperatives maintain, on average, 6 to 12 lead farmers equipped with smartphones to track weather forecasts, monitor crop forecasts, warn about potential outbreak of crop pests, and facilitate crop marketing. Currently, 84 cooperatives participate in COMACO, supporting 225,929 farmer members and impacting nearly 1 million people across 3 provinces and representing 84 chiefdoms. Today, roughly half of all cooperative leaders are women.



Increased gender equity

COMACO increases women's participation via entrepreneurial programs and labour-saving initiatives.

182 FUNDING GROUPS SUPPORT ENTREPRENEURIAL WOMEN



COMACO supports a program that operates 182 savings and loans groups to support entrepreneurial ventures by women. COMACO also supports women

by directly purchasing from COMACO female farmers. Across COMACO's farms, roughly 50% of farmers are women. Women making use of the *Gliricidia sepium* tree from the agroforestry scheme as fuel wood, rather than searching for firewood, each save up to 193 labour hours per year. The minimum financial value of hours saved per year is over ZMW 132 million (USD 8.1 million)¹³ across all COMACO women farmers adopting agroforestry.

These initiatives enable crop revenues to recycle within the community, adding wealth opportunities that are derived from sustainable, eco-agricultural practices. Because women are saving labour hours by using *Gliricidia sepium* as fuel wood, rather than searching for firewood, business ventures can be an option.



**COOKSTOVES INSTEAD OF OPEN FIRES
193 FEWER HOURS OF COLLECTING FIREWOOD
10 TREES SAVED PER YEAR**

Empowered communities

COMACO works with the government to establish legally recognized community forest-management groups.

As part of Zambia's Forest Act, the community forest-management groups are empowered to own, utilize, and market forest resources within designated community-protected forests. Such opportunities become enhanced as destructive pressures on forests are minimized through soil-improving practices that allow farmers to settle and become more financially secure. Removing the need for financial coping strategies such as poaching have maximized the influence of forest-management groups.

Improved information access

COMACO uses local radio to share information about the benefits of sustainable farming.



**FARM TALK RADIO TEACHES
1.2 MILLION
PEOPLE THE BENEFITS OF
SUSTAINABLE FARMING**

Any farmer in the Luangwa Valley can tune into COMACO's radio show, Farm Talk, which is broadcast on 5 radio stations airing 3 times a week in the local language for the particular region. Farm Talk is central to informing farmers about the benefits COMACO brings through its organization of cooperatives and the markets and skills it supports. Through radio, COMACO reaches 1.2 million households. Topical programs include sharing knowledge about farmer production practices, nutrition, climate change, and farmer testimonials as well as weather warnings and ways to mitigate risks.

HUMAN CAPITAL / PEOPLE

Supported healthy development

COMACO agroforestry and school feeding programs support healthy physical and cognitive development.

An expanding use of COMACO's agroforestry program and other soil-improving practices has resulted in a significant increase in food available for household consumption. Food insecurity in Zambia means that families do not always have more than one meal a day and diets are micronutrient-poor. Now, 78% of families in the valley eat at least 2 meals per day. In addition, children under the age of 5 are half as likely to be underweight than non-COMACO households in the same area.

**110,000
SCHOOL CHILDREN
FED DAILY**



**100%
INCREASE IN
FOOD SECURITY**



From the time COMACO started, families in the Luangwa Valley of Zambia have experienced a nearly 100% increase in food security.

Through a partnership with the NGO Mary's Meals, COMACO directly feeds over 110,000 school children one daily serving of its soy-based and nutrient-fortified porridge, called Yummy Soy, every school day. A new childhood nutrition initiative by COMACO will build on its agroforestry farming practices by introducing a new snack product that targets children, made from 68% cow peas and rich in iron, vitamins, fibre, and protein. The goal is to increase consumption of nutrients essential for healthy physical and cognitive development. Anemia, or iron deficiency, is a condition that affects more than half of children under 5 years old in Zambia. Health and development costs related to mineral and vitamin deficiencies are estimated to be over ZMW 3.1 trillion (USD 186 million) per year, according to a 2017 report by the Zambia Ministry of Land and Natural Resources.¹⁴

PRODUCED CAPITAL / ECONOMY

Introduced added-value market goods

COMACO produces processed and/or packaged goods under the It's Wild! label, adding value to the farm outputs of small-scale farmers.

It's Wild! products are supplied in 4 major market channels: 1) modern chain grocery stores; 2) institutional buyers for programs such as school feeding; 3) COMACO's own chain stores, called Green Market Shops, that supply products on wholesale to other shops and retail to walk-in shoppers; and 4) export markets. Green Market Shops were developed by COMACO to increase food security for local families by eliminating packing costs and making products approximately 25% cheaper, creating a direct farmer-to-consumer opportunity.

EMPLOYS
290+ IN FOOD
PRODUCTION



The It's Wild! label includes 16 different natural, nutritious food products developed in 5 processing centres that employ over 290 Zambians.

COMACO buys raw farm crops and non-timber forest products from local farmers at premium prices, which is typically 4 to 12% above the top prevailing market price. It also purchases and transports crops from remote regions, where few other buyers will travel. COMACO enhances market knowledge among the small-scale farmers it supports and builds confidence for long-term commitment to the farming practices that it promotes. Previously, such farmers were at a disadvantage compared to other communities with closer access to and greater familiarity with markets.



COMACO's purchasing prices for crops grown under their sustainable land management and forest conservation scheme are typically 4 to 12% higher than conventional market prices. In 2020, COMACO purchased ZMW 37.2 million (USD 2.2 million)¹⁵ of crops from trained farmers.

Established long-term financial sustainability

COMACO's integrated programming and diverse revenue streams ensure sustainable sources of operating capital.



In 2020, the annual financing of COMACO was supported by three major streams: ZMW 64.5 million (USD 3.92 million) in working capital for the production of It's Wild! products, ZMW 72.4 million (USD 4.4 million) in donor support, and about ZMW 16.4 million (USD 1 million) in carbon funding. This has generated ZMW 39.5 million (USD 2.4 million) in revenue flows to local communities for the purchase of raw material. In 2020, COMACO bought 7,725,848 tons of groundnuts, soybeans, cowpeas, beans, maize, rice, honey, mangoes, wild mushrooms, and wild caterpillars from 43,148 farmers. Annual money paid by COMACO to farmers for farm crops has increased by 45% between 2012 and 2020.

On average, the annual income for a COMACO farmer is ZMW 6,691 (USD 406), a three-fold increase from pre-COMACO times.¹⁶ This totals more than ZMW 57.6 (USD 3.5 million) per year as additional income for the entire COMACO farmer community.

As a result, small-scale farming is now not only a viable livelihood, but also generates in-demand goods like organic peanut butter that supplies over ZMW 74 million (USD 4.5 million) annually to the Zambian economy. Farm revenue has increased enough to serve as the dominant household income for over 200,000 small-scale farmers.



COMACO

Social enterprise in Zambia that **supports the local community to adopt agroforestry, putting an end to wildlife poaching, deforestation, and food insecurity.**



PROMOTES SUSTAINABLE PRACTICES

Supporting transitions to sustainable agroforestry improve ecosystems and soil quality, resulting in higher yields and better diets.

STRENGTHENS LIVELIHOOD OPPORTUNITIES

Regenerative growing practices and multiple market opportunities help farmers realize higher economic returns.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT

1,731 POACHERS TURNED FARMERS PROTECTING ECOSYSTEMS

AGROFORESTRY REDUCES **98%** PRODUCTION COSTS

1,540,000 ha FOREST PROTECTED
ANNUAL WORTH \$34,294,615 USD CARBON CREDITS SOLD \$2,636,640 USD

SOIL CARBON SEQUESTRATION WORTH UP TO **\$5,000,000** USD/YEAR

BEEKEEPING POLLINATION SERVICES **\$75,897** USD/YEAR

TOTAL VALUE OF ALL SUSTAINABLE PRACTICES **\$426,656,078** USD/YEAR

SOCIETY

84 COMMUNITY-RUN FARMER CO-OPS

COOKSTOVES INSTEAD OF OPEN FIRES **193** FEWER HOURS OF COLLECTING FIREWOOD
10 trees saved per year

182 FUNDING GROUPS SUPPORT ENTREPRENEURIAL WOMEN

FARM TALK RADIO TEACHES **1.2 MILLION** PEOPLE THE BENEFITS OF SUSTAINABLE FARMING

ECONOMY

PAYS FARMERS **4-12%** MORE FOR CROPS

EMPLOYS **290+** IN FOOD PRODUCTION

3X FARMER INCOME SINCE 2003

PEOPLE

110,000 SCHOOL CHILDREN FED DAILY

100% INCREASE IN FOOD SECURITY

KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Promote food systems that foster food security: Food security is inherent to wildlife conservation. Environmental degradation leads to poverty traps that change food systems, which in turn reinforce behaviours that increase environmental degradation. Addressing the drivers of food insecurity will improve nutrition as well as agricultural and ecological resilience, and reduce the desperation that drives wildlife poaching.

Support ecosystem-based adaptation: Biodiversity and ecosystem services can be a part of an overall strategy to help local communities adapt to the adverse effects of climate change. Agroecology practices that use soil-replenishing trees can have multiple co-benefits, including soil health enhancement, carbon sequestration, fuelwood, and natural pest resilience.

Build carbon offset schemes to support community conservation: Conservation and climate-change mitigation are linked. Carbon markets are a critically important by-product of a sustained commitment to conservation farming practices if they result in decreased deforestation and increased sustainable land management.

Make sustainability and conservation a profitable business undertaking: A strong business model supported by the development of a unique brand and in combination with training and support can synergize economic and conservation efforts, achieve revenues, and carve a path toward sustainable financing.

MASIPAG

PHILIPPINES



MASIPAG, the “Farmer-Scientist Partnership for Development,” is a decentralized farmer-led network of 50,000 small growers in the Philippines who farm ecologically for subsistence and local market sale. Their aim is to “de-globalize and re-localize” their food system, with a focus on staple crops. The core of the model centres on local empowerment for the cultivation and production of local rice varieties and the promotion of sustainable practices and organic policies. MASIPAG includes 670 sub-national organizational nodes, 50,000 small growers, 20 NGOs, and a range of scientists spanning 3 regions of the Philippines: Luzon, Visayas, and Mindanao. You can read more about MASIPAG’s work [here](#).

IMPACTS & PATHWAYS

MASIPAG directly influences sustainable food production and rural agricultural development through its programs, but the indirect impacts of its approach are even more far-reaching and diverse than what is immediately apparent. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- Widespread rural poverty and hunger in the 1980s prompted community-motivated review of farming practices. MASIPAG’s agroecological farming methods supply food locally and improve diet quality.
- Addressing the root causes of hunger, such as landlessness and agricultural insecurity as roots of malnutrition, and promoting subsistence farming – which can yield co-benefits in the form of genetic diversity, crop diversity, ecosystem integrity, and climate-change resilience – are necessary for long-term solutions.
- The Philippine archipelago is highly vulnerable to the impacts of climate change, including sea level rise, increased frequency of extreme weather events and floods, rising temperatures, and extreme rainfall.
- Local rice varieties under organic farm management in the MASIPAG network better withstand local conditions, such as heavier rains and salinity. Resilience to climate change means more stable yields, less financial risk, and improved food security.
- Large agrifood companies disempower small farmers, resulting in insecure rural livelihoods. Conversely, MASIPAG’s model reinforces the local economy.
- The conventional food chain reflects social and economic imbalances. MASIPAG aggregates farmer voices and voting power, building their economic independence from monopolies and bringing political power and opportunities for political engagement to rural areas.

Looking through the lens of natural, human, social, and produced capital, an assessment of MASIPAG’s data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Protected ecosystems and valuable freshwater

MASIPAG assists farmers' shift from monocropping to diversified and integrated farming systems without chemicals.

MASIPAG supports sustainable agro-ecosystems that are part of an agroecology community rather than individual farms. In terms of inputs, MASIPAG encourages farmers to use alternatives to chemical fertilizers, such as animal manure, agroforestry, green manure, aquatic fern (azolla), rice straw recycling, and bioorganic fertilizers, to regulate pests and disease. This was qualitatively assessed in its 2013 organizational review,¹⁷ and observations indicated that soil fertility, pest disease tolerance, and biodiversity increased. Reduced chemical inputs such as pesticides and fertilizers decreased carbon emissions from

IMPROVED WATER AND SOIL QUALITY. REDUCED SOIL EROSION



BIODIVERSITY CONSERVATION

agriculture as well as prevented direct pollution of waterways and the ocean. This is particularly important for an island nation.

Adapted varieties to withstand environmental changes

MASIPAG farmers directly contribute to and benefit from the localized cultivation and management of heirloom varieties bred for regional environmental challenges and changes.

In 1986, MASIPAG began a trial with a 3-ha farm to model rice genetic conservation by breeding heirloom varieties for improved farming and environmentally friendly management practices. Today, 188 trial farms¹⁸ develop strains that withstand environmental changes. Farmers study and select adaptive varieties from the trial farms in order to design cultural management practices suited to their particular climatic conditions. In addition, MASIPAG has 2 national and 8 regional farms where seeds are conserved and improved, 10 seed banks, and supports 70 rice-breeder farmers and 12 corn-breeder farmers. An umbrella program¹⁹ manages the collection of varieties and farmer access to cultivars of rice and corn, indigenous vegetables, and poultry and livestock breeds.

Increased resilience and genetic diversity

MASIPAG's cultivar breeding process and farmer testing approach results in genotypes that are highly adapted to local conditions and challenges.

Over the last 35 years, MASIPAG has grown from 54 to over 2,000 cultivated rice varieties, including 747 heirloom rice varieties, 1,205 MASIPAG rice varieties bred from heirloom parent varieties, and 180 farmer varieties bred from MASIPAG rice and heirloom parent varieties, as well as 105 heirloom



**INCREASED CROP DIVERSITY
13+ FOOD CROPS PER FARM**

corn varieties. Transnational agrifood companies typically purify and homogenize the gene pool of their crops using pedigrees. Alternatively, MASIPAG invests in the bulk-breeding method, whereby after identifying and specifically cross-breeding heirloom parent genotypes, the offspring generation is then seeded over a period of years to allow evolution and natural selection to filter genotypes to the best environmental fit.



MASIPAG seed banks include 12 varieties tolerant to floods, 18 tolerant to droughts, 20 tolerant to saltwater, and 24 with greater resistance to pests and plant disease.

The resulting genotypes are the most adapted to local conditions, and are then reviewed and compared by farmers in a second round of selection to yield crops with the highest quality for consumption. Cultivars have higher resistance to adverse conditions such as drought, soil, water salinity, and pests and diseases.

Adapted to climate change

MASIPAG empowers local farmers to manage seed stocks and agricultural production to mitigate and adapt to climate impacts.

Climate change has greatly impacted natural patterns across the Philippine archipelago: intense rains – sometimes bringing an amount of precipitation in days that would normally come in as many months – are a significant agricultural problem, while El Niño, previously a 7-year cycle, now causes annual droughts. Coupled with the increasing frequency of typhoons, salinity resistance is essential for low-lying island farming. Climate-resilient crop varieties used on MASIPAG-farmed fields are more resistant to the saltwater flooding caused by typhoons that frequent the Philippines archipelago and result in an economic advantage over conventional farmers.

SOCIAL CAPITAL/SOCIETY

Empowered political advocates

MASIPAG supports farmers to become politically empowered actors that constitute a voting bloc in local elections and shape the way agriculture is practiced.

The MASIPAG advocacy infrastructure includes 20 provincial coordinating bodies, advocacy committees at 2 regional levels, and an overarching Information Communication Advocacy Unit that coordinates and reports on policy concerns.

20 PROVINCIAL COORDINATING BODIES ORGANIZE FARMERS TO VOTE AND ADVOCATE **COLLECTIVELY**



MASIPAG takes an active stand on national and global issues that affect the food security and sovereignty of resource-poor Filipino farmers. It advocates for farmers' control of seeds and technologies, and agrarian reform. Together, the MASIPAG network actively opposes the globalization of agriculture that has led to corporate control of seeds, biopiracy, and the patenting of life forms, genetic engineering, and introduction of genetically modified organisms to be profitable.

60% of the farming population have gained access to potential organic farming certification due to MASIPAG's political advocacy efforts generating pathways for small farmers.

The strength of MASIPAG's policy arm is impressive. In 2010, it influenced the establishment of the Organic Agriculture Act, which recognizes organic farming in the Philippines. However, the law only accepted third-party certification and not Participatory Guarantee Systems (PGS) more suited to small-scale farmers. This restricted small-scale farmers who could not afford third-party certification but were practicing organic farming. In 2020, MASIPAG played a strong role in advocating for the amendment of the Organic Agriculture Act to recognize the PGS.

PGS is an alternative and complementary tool to third-party certifications especially adapted to local markets and short supply chains. The quality assurance system certifies producers based on active participation of farmers in the process of verification, decision-making, and marketing. PGS essentially expands the eligibility criteria to include 60% of the farming population, while also bringing over 1 billion Philippine pesos (PHP) (USD 20 million) in rural investment, 35% of which will be distributed to communities. MASIPAG farmers all over the Philippines are involved in the development of PGS.



Strengthened traditional farming culture

MASIPAG builds traditional, Indigenous knowledge, culture, and economic capacity.

The origin of MASIPAG is deeply rooted in the Philippines' agroecological culture, where rice farming has a long history. Ancestors of the northern-most region established rice-terracing practices 2,000 years ago along the Philippine Cordilleras that are now considered a national treasure and are protected under the UN Educational, Scientific and Cultural Organization (UNESCO),²⁰ which describes these practices as a "master of engineering." A 2012 assessment of the Philippine population²¹ estimated roughly 10 to 15% of the national population is Indigenous (12 to 15 million), in 110 distinct groups.

Local food knowledge and ecological farming traditions are being promoted and protected through an emergence of ancestral movements across the Philippines.

MASIPAG operations inherently promote equity and diversity, and this is a co-benefit of its model. In a country of over 7,600 islands, the MASIPAG network crosses over a number of major cultural zones. Its farmer network incorporates food systems knowledge from 7 major ethnic groups, operating across 7 major languages (Tagalog, Cebuano, Ilonggo, Ilokano, Waray, Hiligaynon, Bikolano), in addition to a number of neighbouring dialects.

Developed participatory opportunities and pathways

MASIPAG ensures that decision-making, planning, and implementation arise from within its membership by fostering impactful partnerships.

As a grassroots agroecology network, MASIPAG plays a strong role in rural development. Scientists, coordinated with the support of NGOs, exchange and provide technical support to farmers, who, in turn, inform academia, building an environment of mutual, ongoing learning in the natural and social sciences.

University scientists and farmers exchange practical and theoretical knowledge through an arrangement set by MASIPAG, enriching graduate-level student education and ensuring that seed and technology access and control is maintained by farmers.

Between 5 to 10 university- or graduate-level students engage in studies with MASIPAG every year. These relationships ensure that access and control of resources – namely seeds, technology, and land – rest with the farmers. As a result, farmers have greater economic independence.

Reinforced women's participation and leadership

MASIPAG strengthens and reinforces female leadership roles in households, the community, and in its own organization.

Increasing women's leadership roles and participation in processing and marketing of agroecological goods is essential for reducing financial risks, increasing security of crop yields, and minimizing food insecurity by limiting dependence on external sources of food. Though the Philippines is a patriarchal society, in which farmer knowledge is passed down to male family members, women are the economic managers of the household. Women are responsible for procurement of agricultural loans, loan repayment, and provision of nutritious food.

Local healers are female community members who have a strong connection to the local ecosystem and medicinal herbs, practices that are reinforced by a farming model based on agroecology. MASIPAG strengthens and reinforces these female leadership roles. It also does this through its own organizational structure, where the majority of its board members, executive committee, and trustees are women.



HUMAN CAPITAL / PEOPLE

Enhanced farming knowledge

MASIPAG invests deeply in building the knowledge base of its network.

During orientation, farmers learn about organic practices as well as the history of the organization and its mission. Later, as committed members, they are trained in leadership, organization, and long-term planning. Specific workshops are conducted for those interested in breeding or processing rice to sell. This includes opportunities for peer exchanges at the local level as well as designated annual forums that convene farmers and university scientists in bidirectional learning.

Farmer knowledge is propagated and transferred in informal and formal exchanges facilitated by MASIPAG.

Farmers in the MASIPAG network also act as both the custodians and practitioners of traditional knowledge, passed down through heritage and cultural practice.

New knowledge is encouraged but incorporated

through a framework that ensures that the knowledge stays local and is not appropriated by external actors, such as transnational agrifood corporations. Field research is tested by peer farmers to ensure that agroecological knowledge is evidence-based and replicable.

Knowledge is then communicated via seed exchanges, cultural activities, and through farmer trainers, who have been educated on facilitation and are skilled in integrated farming. MASIPAG considers documenting and propagating this farmer-developed and -adapted technology as one of its key responsibilities. In doing so, adaptive farming, enriched gene pools, and organic methods lead to increased incomes, food security, and resilient crops, and demonstrates that traditional knowledge strengthens the food economy.

**TRADITIONAL
INDIGENOUS
PRACTICES
UPHELD**



Reduced incidences of illness

MASIPAG's advocacy arm works additionally to promote education on the harms of pollution, chemicals, and antibiotic inputs.

**REDUCED
PESTICIDE
ILLNESS**



According to the 2013 organizational assessment,²² organic practices led farmers to report illness less often, a finding in large part considered to be related to the reduction in biocide and other chemical inputs.

MASIPAG farmer households report fewer incidences of illness due to a reduction of chemical inputs and an increased use of plant-based remedies.

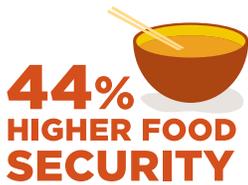


The MASIPAG team notes that a number of common ailments, such as skin infections typical to the tropical environment, are still commonly treated with plant-based remedies. Farmers and families reported a 60% greater use in herbal medicine use on MASIPAG farms compared to 22% on conventional farms, suspected to be related to greater ecosystem integrity on MASIPAG farms and the role of women in maintaining traditional medicinal knowledge.

Improved food security

MASIPAG training on traditional and organic practices improves diets and food security.

A focus on monoculture farming, demanding high levels of inputs, forces growers to take out loans to cover the cost of production. That leads to decreasing food security for many farmers since their income does not cover production costs. The food from the farm is mainly taken by debt collectors, forcing farmers' families to cut back on food or go without.



Over the past decade, 88% of MASIPAG farmers report that their food security has improved (better or much better), compared to just 44% for conventional farmers.²³

MASIPAG farmers using traditional and organic practices described their family diets as two to four times more balanced and diverse than conventional farmers' families.²⁴

MASIPAG farmers are twice as likely to be food secure compared to conventional farmers, and consume more vegetables, fruit, and protein.²⁵



NUTRITIOUS DIETS 68% more veg
56% more fruit
55% more protein

The organic farms also demonstrated greater crop diversity, growing on average more than 13 different crops per farm across the 3 regions and 50% more crop types compared to conventional farmers.

PRODUCED CAPITAL / ECONOMY

Increased incomes and market opportunities

MASIPAG demonstrates higher net incomes for small farmers.

According to the 2013 organizational assessment,²⁶ the net income per hectare (ha) for organic farmers is 50% more than that of conventional farmers, and MASIPAG farmers are less indebted, boasting a positive annual cash balance compared to conventional farmers who generally have deficits. As a practice, MASIPAG farmers secure rice for family consumption and then sell surplus products at the local market. By principle, MASIPAG wants farmers to sell directly to consumers, meaning taking on raw rice processing (milling) to eliminate an intermediary. Processing and quality control²⁷ to support small-scale farmer access to market is an area that MASIPAG would like to expand and strengthen. Currently, conventional rice sells at PHP 40 to 45/kg (USD .93), while MASIPAG organic rice sells at PHP 60 to 70/kg (USD 1.45). If external factors like weather are favourable, 4,800 kg of unmilled rice can be harvested from 1 ha of rice field.

**50%
HIGHER
INCOMES**



**LOWER
PRODUCTION
COSTS**



MASIPAG farmers make up to PHP 312,000 (USD 6,960) per harvest acre, 50% more than their conventional farming counterparts.



**HIGHER CROP
PRODUCTIVITY
AND RESILIENCE**

MASIPAG farmers have a marketing advantage, allowing them to expand their offer on the local market, which positively impacts their income. Since MASIPAG provides seeds and training for additional varieties of crops and offers workshops on crop processing, MASIPAG farmers produce more diversified farm products such as fruit wine, herbs, tea, unrefined sugar (muscovado), sugar products and desserts, honey, and brooms.

Built up financial independence

MASIPAG dismantles corporate control of the rice industry.

MASIPAG decouples production from local and multinational fertilizer, pesticide, and seed companies, multilateral rice research institutes, and distribution cartels. This results in less expenditures for synthetic fertilizer and industrial seeds, reducing the need to take out financial loans and the financial risks involved with debt. Financial sustainability is an important goal and a reason why MASIPAG chose a network structure that layers support systems at multiple levels so as to prevent dissolution in the case of crisis or funding loss.

Currently, only MASIPAG's secretariat is dependent on outside funds, and the MASIPAG network expands by approximately 300 farmers each year.



**STRENGTHENED
LOCAL
ECONOMY**





MASIPAG

50,000 small growers in the Philippines promoting **sustainability** and **biodiversity** by **de-globalizing** and **re-localizing** their food system.

PROMOTES
COOPERATION

Strong farmer networks increase cultural, agricultural, economic, and political leadership.

STRENGTHENS
GENETIC DIVERSITY

Enhancing and maintaining genetic resources and knowledge drives food security, climate-change adaptation, and economic opportunity.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT

74 CLIMATE RESILIENT RICE VARIETIES Tolerant to flood drought pest disease

13+ INCREASED CROP DIVERSITY FOOD CROPS PER FARM

IMPROVED WATER AND SOIL QUALITY. REDUCED SOIL EROSION **BIODIVERSITY CONSERVATION**

SOCIETY

INCREASED LOCAL OWNERSHIP **MAJORITY OF LEADERSHIP ROLES HELD BY WOMEN**

60% GREATER USE OF TRADITIONAL HERBAL MEDICINES

20 PROVINCIAL COORDINATING BODIES ORGANIZE FARMERS TO VOTE AND ADVOCATE COLLECTIVELY

PEOPLE

REDUCED PESTICIDE ILLNESS **44% HIGHER FOOD SECURITY**

NUTRITIOUS DIETS 68% more veg 56% more fruit 55% more protein

TRADITIONAL INDIGENOUS PRACTICES UPHELD

ECONOMY

50% HIGHER INCOMES **LOWER PRODUCTION COSTS**

HIGHER CROP PRODUCTIVITY AND RESILIENCE

STRENGTHENED LOCAL ECONOMY

KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Support cooperation: Small farmer networks create resilience across culture, agriculture, ecosystems, and the economy. Local and regional networks are essential to building and maintaining knowledge, buttressing local economies, the ability to address food security, and channelling voices in national decision-making.

Conserve and market genetic diversity: Crop genetic diversity, provided through farmer-based seed banks, strongly contributes to food and nutritional security, climate-change adaptation, reduced environmental degradation, poverty reduction, and long-term agricultural sustainability.

Promote organic agriculture and agroecology: Organic farming promotes agricultural practices that support food systems based on ecological processes, while agroecology links food production at farm level to the broader social-ecological systems. Organic agriculture and agroecology are innovative approaches to climate-change adaptation, food security, and improvement of rural livelihoods, including health and nutrition.

THE COMMON MARKET

USA



The Common Market (TCM) is a distributor of regionally sourced food products in the United States that connects vulnerable urban communities with family farms.

TCM aggregates wholesale fruits, vegetables, animal products, and artisanal goods from nearby small farms and then packages and delivers them to regional vendors, mostly public and private institutions. TCM focuses on engaging vendors on sustainable procurement and strengthening partnerships to and among regional farmers. The Common Market model operates in three areas in the United States: the Southeast, Mid-Atlantic, and Texas. You can read more about TCM's work [here](#).

IMPACTS & PATHWAYS

TCM directly influences regional food procurement through its programs, but the indirect impacts of its approach are even more far-reaching and diverse. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- The industrial food system is governed by national and international actors and corporations, which overlooks local producers and consumers.
- Global environmental change and natural disasters devastate the agriculture industry. The flexibility of the TCM model creates an adaptable safety net to support farmers through crises, such as extreme weather or the COVID-19 pandemic, by rearranging market access so that farmers can cover production costs, including wages for farm workers, and avoid bankruptcy.
- TCM provides real pathways to build an equitable and just food system by partnering with small growers marginalized by industrialized agriculture, including providing opportunities for new farmers. As a regional distributor, it reaches consumers where fresh and local food is not traditionally prioritized or available.
- During crises, TCM enables those in need, especially underserved communities, to have access to local food products, improving food security and maintaining the dietary health of vulnerable people.
- TCM's short value chain, focused on partnerships and procurement using crop-planning and menu-planning, addresses issues that result in food loss and waste, avoiding greenhouse gas emissions and water pollution.

Looking through the lens of natural, human, social, and produced capital, an assessment of TCM's data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Raised environmental standards

TCM's purchasing policy focuses on farmers and food artisans who show commitment to sustainability, raising the environmental standards for regional food networks.

The TCM baseline for responsible farm practices includes: safe growing, harvesting, and processing practices; minimal use of harsh chemicals at lowest possible toxicity; elimination of genetically modified organisms in food crops and, wherever possible, avoidance of GMOs in animal husbandry; elimination of hormones and sub-therapeutic antibiotics in livestock animals; and humane treatment of livestock via cage-free or pastured environment.



**SUSTAINABLE FARMING PRACTICES ON
13,370 HECTARES**

The downstream dividend is a regional food supply of fresh, local, non-enhanced crops and farm products for consumption. TCM's focus on family farms results in crop diversity, with 4 to 20 crops per farm, meaning less monocropping and a more diversified crop rotation. The model encourages the use and value of heirloom seeds, when financially viable for scalable items (such as apples and tomatoes), where these products are well-received through the wholesale regional market.

TCM's Farmer Impact Assessment tool drives efforts and impacts toward the long-term food system needs of their network for environmental sustainability.

New TCM farm partners are evaluated during onboarding using a farmer impact assessment tool, an exercise to be gradually expanded to the full network. The tool collects information on environmental factors such as biodiversity, soil health, pest management, and water and energy consumption. It also considers other factors, including the social conditions of workers and nutritional information of artisanal goods. Its objective is to establish baseline environmental data and promote best and regenerative practices that foster a transition to more sustainable farming, helping identify and stratify farmers for practice improvements. TCM aims to fund capital and upfront costs in part, mindful of the return on investment from demonstrating market viability for sustainable regional agriculture. TCM is not an agricultural institute but, via a dynamic and expert board and strong regional partnerships, is able to tap into a comprehensive web of specialists from soil scientists to animal welfare experts to engage in this project.

Eliminated food loss and waste

TCM partnerships allow for collaborative planning and creative adaptations throughout the growing season to reduce food loss and waste across the value chain.

Collaborative
crop- and menu-planning
**REDUCED
FOOD WASTE**



TCM's model involves working closely with their network of farmers and partner institutions to minimize food waste; for example, via crop- and menu-planning/adaptation. TCM also works

creatively to find viable markets (through its network of vendors or community organizations) willing to buy items at discount or making menu adaptations. By working dynamically, TCM leaves room for innovation that reduces food waste; for example, by marketing damaged but still nutritious crops that are no longer fit for whole-good sale (such as apples afflicted with pockmarks by hail storms) as ingredients (to be broken down and used in an alternate form) or using imperfect but still nutritious produce (such as peaches, nectarines, and apples) in emergency food boxes. In the warehouse, purchased and unsold food is donated to community organizations, such as the SHARE Food Program, The People's Kitchen, and Sharing Excess, who find ways to donate food surplus.

Cut food miles and carbon emissions

TCM production, distribution, and consumption networks drastically reduce the distance food travels.

Reduced food miles, meaning decreased air pollution and carbon emissions, is another co-benefit related to TCM's regional food model. The WorldWatch Institute estimates that the average domestically grown food item consumed in the United States travels between 1,500 and 2,500 miles from the farm to its ultimate market.²⁸ Food from TCM farms in the mid-Atlantic travels 50 to 150 miles, in the southeast travels 100 to 250 miles, and in Texas travels 250 miles.²⁹



90% FEWER
FOOD
MILES
REDUCED AIR POLLUTION
AND CARBON EMISSIONS

TCM's regional food model results in food travelling 90% fewer miles than average domestically grown food items consumed in the United States.

Energy sustainability will continue to be an area of growth at TCM. Blueprints for renewable power are on the table to address their facilities' carbon footprint, starting with backup generators. The Philadelphia site has a power purchase agreement for wind with a vision of dedicated solar power at all three locations.

SOCIAL CAPITAL / SOCIETY

Reinforced strategic partnerships

TCM aggregates products from a pool of local small and family farms, creating a volume of supply that is attractive to institutional buyers.

TCM has formed and reinforced long-term relationship structures among partner vendors in the regional food system. It connects a range of institutions, including municipalities, school districts, hospitals, community-based organizations, and government entities, such as the department of corrections, to regional farms, especially smaller growers.³⁰

TCM aggregates products from a pool of local small and family farms, creating a volume of supply that is attractive to institutional buyers. In 2020, over 24 million pounds of fruit and vegetables, bread, cheese, beans, and dairy were distributed



24 MILLION+
POUNDS OF FOOD
DISTRIBUTED TO 924 PARTNER
ORGANIZATIONS IN 2020

between 924 partner organizations: 1.2 million pounds distributed among 251 universities, colleges, public, private schools, and early childhood education facilities; 211,000 pounds distributed among 68 healthcare facilities; 5.5 million pounds distributed among 15 government organizations; 2.9 million pounds distributed among 396 community-based organizations; and 14.3 million pounds distributed among 194 other organizations, largely the private sector. It should be noted that 2020 was a unique year, when TCM pivoted to assist in emergency food distribution due to the COVID-19 crisis.

TCM increases food system efficiency and adaptability by dynamically engaging producers in crop-planning and vendors in menu-planning, building short- and long-term synergies. This liaison role is essential to bridging local farms to regional buyers. When it comes to crop-planning, TCM facilitates conversations to help guide crop production, in both quantity and variety, to reflect buyer's interests and according to the seasonal demand of institutional consumers. TCM also supports emergency crop-planning when unexpected changes affect farm output, such as when weather patterns impact supply. TCM works with farmers to adapt and adjust their production or processed outputs to maintain their business and access to the market. TCM also negotiates with buyers on how to steer consumption toward available local products. If supply is impacted by weather events or other factors, TCM liaises with buyers to shift menus to alternative crops.

Served marginalized communities

Through improved food access and economic opportunities across all operating areas, TCM reaches people and communities who are typically systematically marginalized or excluded.

TCM supplies customers who are ethnically, racially, and socioeconomically diverse and food insecure, including 89 schools that are 70 to 80% free-lunch-qualifying, 48 Head Start preschool programs, people of colour (BIPOC), and community-based organizations. Another way TCM reaches food-insecure people is via its Food Access Fund, which provides a 25% cost reduction on TCM food purchases that serve community organizations working directly with vulnerable populations. TCM Food Access Fund provides USD 800,000 per year in local food support.

Across TCM's farming network, 39% of farm owners, managers, staff are BIPOC, 46% are women, and 23% are new farmers. Comparatively, the US Department of Agriculture (USDA) 2017 agriculture census shows that less than 2% of farmers in the United States are Black.³¹



TCM FARM OWNERS, MANAGERS, STAFF ARE

**39% BIPOC
46% WOMEN
23% NEW**

Responded to diverse and compounded crises

TCM's regional scale and partnership-focused structure provides flexibility and clear insight on acute food needs during crises.

While its typical institutional customers closed, TCM nimbly adjusted its operations in order to keep farmers and local food businesses, such as bakeries, afloat, and to respond to government emergency food contracts with high-quality foods.

During the height of COVID, TCM supplied 63,000 emergency food boxes per week containing fresh seasonal produce, and often bread, cheese, beans, and dairy.³²

Rapid modification of its model included shifting the farm share box, typically a “boutique” item for higher-end consumers, into what TCM calls their “Farm-Fresh Box Program” for a wide range of food-insecure people. TCM found innovative ways to use what was immediately available from their farmer network. For example, Pequea Valley Farm (Delta, PA) milk was turned into cheese and yogurt, tasty additions to the box. Under an emergency contract with the city of New York, TCM supplied 13,000 boxes per week, each of which contained fresh-baked bread, cheese, dried black beans, and fresh seasonal produce. Recipients included municipal low-income housing communities and senior living communities. For the USDA Farmers to Families program, which focused on local/regional suppliers in the early days of the pandemic, TCM contracts provided up to 40,000 boxes of produce and 10,000 boxes of dairy per week across 80 community partners, including the New Jersey East Orange municipality, school districts, faith-based organizations, university pantries (for stranded students), neighbourhood alliances, and immigrant communities.³³



TCM also played an emergency response role after the 2021 natural disaster Winter Storm Uri, an ice storm and cold wave that caused power outages and tornadoes, significantly impacting Texas. TCM cooperated with World Central Kitchen, an emergency food provider, to deliver more than 17,000 boxes of fresh produce to underserved metropolitan communities around Houston, Austin, and San Antonio.³⁴ Approximately 60 to 90% of crops were lost in the area during the storm. To support affected farmers, TCM offered them employment packing emergency produce boxes to help offset the economic impact of the storm.

HUMAN CAPITAL / PEOPLE

Improved access to nutritious food

TCM indirectly addresses the NCD risk of its regional consumers by increasing access to fresh fruits and vegetables.

Diet-related non-communicable diseases (NCDs), such as diabetes, heart disease, and obesity, are major global health issues, particularly in urban areas. By linking regional farmers with urban communities, TCM minimizes barriers to healthy food access, encouraging local communities to increase their fresh fruits and vegetable consumption and use of whole-food ingredients. Providing farm-fresh produce increases the number of families who are able to prepare home-cooked, whole-food meals and snacks rather than rely on commonly available processed foods.

TCM currently has contracts with a number of public school districts, creating space for promising initiatives related to youth nutrition improvement. The vision is to encourage schools to purchase local and fresh food. Integrating fresh produce into the public school system is challenging because most school food infrastructure depends on microwave operations (“heat and serve”) as opposed to full kitchens (“scratch”). However, one element of school food that TCM can directly supply are snacks. TCM supplies schools with fresh fruits, such as apples, pears, oranges, and strawberries, instead of the processed food snacks typically offered.

School districts partnerships

**REPLACE PROCESSED
SNACKS WITH
LOCAL FRESH FRUIT**



Through hospital systems initiatives, TCM provides access to fresh produce for the hospital's patients, staff, and visitors, while also supporting local farmers through new sales channels. TCM does this by increasing the availability of healthy, fresh food in hospital systems through the installation of farm stands and small in-house farmer's markets that offer healthy food to hospital staff, patients, and visitors. The farm stands increase awareness and knowledge about the availability of fresh foods as well as reinforce the idea that health is intrinsically linked to food and the food system.

Prioritized health in emergency food

TCM's emergency food boxes meet diabetic diet requirements, emphasizing the importance of nutritious food access.



At a macro level, TCM's achievements during the pandemic point to a broader opportunity to revisit emergency food provision. Emergency food boxes that contain fresh fruits and vegetables, as opposed to the processed items typically offered through emergency food distribution channels, can mean life and death for some people. "Someone wanted me to live," said one grateful box recipient, noting that the fresh emergency food met her diabetic diet requirements.³⁵

A second phase of the pandemic grant from the USDA switched bidding from local/regional suppliers to least-cost suppliers – competition that resulted in the halving of prices offered to farmers (\$1 to 0.50 cents per bag of potatoes, for example), which for some farmers was no longer a viable income. Coupling the viability of local farms with emergency food relief has co-benefits that enhance the resilience of the regional food system.

Created local jobs

TCM both directly and indirectly contributes to employment and job creation across the value chain.

TCM intentionally locates its facilities in underserved urban areas, increasing employment opportunities for local residents through roles in food safety, inventory, warehouse and supply chain management, institution partnerships and procurement, data management and impact evaluation, marketing, operations, and advocacy.

On TMC network farms, 3,687 workers are employed on 110 farms: 1378 in the Mid-Atlantic, 1743 in the Southeast, and 566 in Texas.³⁶



Expanded visibility of small farmers

TCM enhances awareness of the regional food system.

In its 6th Global Environment Outlook (2019), the United Nations Environment Programme called for sustainability concerns to be included in food and nutrition labels. TCM defines the growers by name, city, and state, and clarifies growing practices. By providing specific grower information on its orders, TCM not only expands visibility of small farmers but links sustainable farming to consumption and steers regional nutrition.

PRODUCED CAPITAL / ECONOMY

Developed financially sustainable food systems

TCM connects communities with good food from sustainable family farms to create robust regional farming economies.

These connections improve food security, farm viability, and community and ecological health, thereby building vibrant regional food systems – where interdependent urban and rural communities thrive through relationships that build the health and wealth of all people. Grounded in this ethos, TCM has become a successful, financially sustainable enterprise.

\$30.3M USD TO TCM FARMERS OVER THE LAST 5 YEARS



In the last 5 years, TCM has mobilized 38.8 million pounds of food from rural to urban communities, generating USD 30.3 million in income for local farms from regional and institutional vendors.

Empowered small growers

TCM's "farmer comes first" motto demonstrates their commitment to building relationships that keep small growers viable.

TCM commits extra time and technical support to help novice farmers grow, serve their customers well, and develop their businesses. Though its core strategy centred on upstream engagement with large institutional purchasers, TCM supports a diversity of small farmers and food artisans by purchasing goods from farms sized less than 1 ha to over 400 ha. A notable difference from the traditional food system model is TCM's priority to financially empower small growers.



DIVERSE FARMS
1-400 HECTARES, 4-20 CROPS PER FARM

TCM farmers are better positioned because they set prices, striking a reasonable fair price equilibrium through an open dialogue with TCM.

TCM shoulders the burden through lines of credit, paying farmers within 15 days rather than the normal 30- to 90-day standard, a difficult wait for small farmers. In TCM's view, "farmers shouldn't shoulder the risks of the food system independently." This also applies to weathering environmental and economic change, which farmers are able to do with more flexibility and support, because TCM fosters fluid exchanges on crop-planning throughout the crop cycle. A waitlist of growers to join TCM network gives additional evidence that TCM discovered an overlooked producer demand.

FAIR CROP PRICES
DETERMINED THROUGH
OPEN DIALOGUES

An illustration of a blue speech bubble containing a white dollar sign (\$), symbolizing open dialogue about pricing.



COMMON MARKET

Connects vulnerable **urban communities** and **institutions** in the Southeast, Texas, and Mid-Atlantic U.S. with **healthy food** from local family farms.



PROMOTES

LOCAL PARTNERSHIPS

Regional networks that meaningfully adapt to local needs ensure maximum food security and inclusive economic value chains.

STRENGTHENS

PUBLIC PROCUREMENT

Local institutional procurement empowers small farmers, improves nutritious food access, and reduces environmental impacts.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT



SUSTAINABLE FARMING PRACTICES ON 13,370 HECTARES



90% FEWER FOOD MILES
REDUCED AIR POLLUTION AND CARBON EMISSIONS

Collaborative crop- and menu-planning

REDUCED FOOD WASTE



SOCIETY



24 MILLION+ POUNDS OF FOOD
DISTRIBUTED TO 924 PARTNER ORGANIZATIONS IN 2020

DURING THE HEIGHT OF COVID
63K EMERGENCY FOOD BOXES
DISTRIBUTED PER WEEK
of fresh seasonal produce, often with bread, cheese, beans, and dairy



TCM FARM OWNERS, MANAGERS, STAFF ARE

39% BIPOC
46% WOMEN
23% NEW



PEOPLE

3,687 WORKERS
EMPLOYED ON
110 FARMS



EMERGENCY FOOD BOXES THAT MEET DIABETIC NEEDS

School districts partnerships

REPLACE PROCESSED SNACKS WITH LOCAL FRESH FRUIT



ECONOMY

\$30.3M USD TO TCM FARMERS
OVER THE LAST 5 YEARS



DIVERSE FARMS
1-400 HECTARES, 4-20 CROPS PER FARM

FAIR CROP PRICES
DETERMINED THROUGH
OPEN DIALOGUES



KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Build and strengthen local food infrastructure: Regional networks built through community networks and partnerships are able to read and respond to local agricultural needs and provide meaningful adaptation to ensure maximum food security and inclusive economic sustainability across the food value chain.

Promote local and sustainable public procurement: Sustainable procurement and shorter supply chains supported by regional food distributors strengthen the livelihoods of small farmers, build local and rural job opportunities, and improve nutritious food access for consumers.

Enhance human and planetary health through agriculture: There is intrinsic value in food systems that support sustainable and nutrition-sensitive agricultural approaches, strengthening climate-change resilience, food security, well-being, and livelihoods.

LAGOS FOOD BANK INITIATIVE

NIGERIA



Lagos Food Bank Initiative (LFBI) is a hunger-relief organization based in Nigeria.

LFBI uses an integrated food-banking system to support meaningful community nutrition while also building long-term health and sustainability through urban farming, maternal and child health, and improved school outcomes. LFBI serves as a frontline agency on malnutrition and hunger, serving both immediate and long-term food needs for 136 communities, and benefitting 1.6 million people in the city of Lagos and its neighbouring states. You can read more about LFBI's work [here](#).

IMPACTS & PATHWAYS

LFBI directly improves food security and food system resilience, and directly influences urban and peri-urban agricultural development through its programs, but the indirect impacts of its approach are even more far-reaching and diverse than what is immediately apparent. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- Urban challenges include dense populations at increased risk for disease, water insecurity, and, in some areas, risk for food insecurity and global environmental changes such as heat waves and floods. Improved nutrition in urban environments can ensure populations are best situated to face these challenges.
- Urban farming can support nutritional needs, environmental sustainability, and livelihood improvements, while also serving as an outlet for cultural expression. LFBI seeks to promote urban food production and build resilience in Lagos through adoption of small-scale urban gardens and livestock farming.
- Food-insecure and hungry people lack essential macro- and micronutrients, as well as suffer from chronic metabolic diseases such as diabetes and obesity. LFBI focuses on meaningful nutrition that not only provides calories, but also, via collaboration with dietitians and adherence to a procurement nutrition policy, focuses on a food supply tailored to the specific nutritional needs and risks of the Lagos community.
- LFBI ensures that hunger relief is not just a short-term solution but addresses long-term health and well-being, and, in the case of children, maximizes physical and cognitive development.
- The conventional food system yields 30% waste in terms of food loss. Laws are not yet oriented to building efficiency across the value chain, meaning food that is approaching or has passed the “sell by” dates ends up in landfills. LFBI addresses this gap and creates a network among different food actors to reduce food waste, improve environmental sustainability, and supply food to people in need.

Looking through the lens of natural, human, social, and produced capital, an assessment of LFBI's data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Reduced food waste

LFBI gathers surplus food from farms, stores, and food-processing facilities to prevent waste and distribute it to its beneficiaries.

LFBI sources 3.3% of its food from rescue projects, collecting food that is beyond the “best before” date but is still safe to eat. In 2020, this totalled 14,054 kg of recovered food.³⁷ This food largely consists of frozen vegetables, fish, cereals, meats, fruit drinks, and ice cream. LFBI notes that since there are no current laws to encourage companies to effectively manage their waste, they seek to create partnerships to redirect food waste to bridge that gap.



The value of food reduced and not wasted by LFBI in 2020 was 11.6 million Nigerian naira (NGN) (USD 28,108).³⁸

Increased urban farming opportunities

LFBI enhances environmental sustainability by reducing food miles and promoting natural fertilizers.

The objectives of the Family Farming program run by LFBI are focused on improving food security but have indirect positive impacts on environmental sustainability, including hyper-local food supplies with zero food miles, and production methods that focus on minimal to zero chemical inputs and regenerative cycles (such as using vegetable waste to feed the snails and chicken manure as fertilizer).



BACKYARD FARMING
ZERO FOOD MILES AND
ZERO CHEMICAL INPUTS

SOCIAL CAPITAL / SOCIETY

Fostered a volunteer community

LFBI builds opportunities for individuals to advance professionally.

Nigeria has a high rate of unemployment. LFBI promotes the resumé of its community members to its partner organizations, creating opportunities for simple service labour, such as driving and housekeeping. LFBI also operates via a significant volunteer network.

Over 12,000 volunteers provided 140,000 hours of work in 2020, at an economic value of NGN 58.3 million (USD 141,655).³⁹

In exchange for receiving skills training, certificates of community service, or job or school recommendations, volunteers contribute to food distribution, community outreach, registering and monitoring beneficiaries, and organizing deliveries in the school system. An additional 20 to 25 individuals are selected as formal interns per year, working 9-to-5 jobs where they take on administrative tasks and various problem-solving roles as on-the-ground agents in food distribution and delivery. The volunteer network is described as a community within itself, building networks, friendships, and a sense of purpose for social change, and is a highly sought-after opportunity.



LFBI receives 500 applications per month for new volunteers, 250 to 300 of which are successful each month.

LFBI builds the community of Lagos in multiple dimensions. In its operations it offers monthly conferences, workshops, webinars, and training for its volunteers on vocational and communication skills. With employees, it holds knowledge-sharing sessions twice per month. These activities build community awareness and commitment to the mission for meaningful nutrition.

Addressed food and nutrition insecurity

LFBI reduces the prevalence and impacts of hunger and food insecurity by providing emergency food support.

Food insecurity has risen steadily in Lagos for the past half a century, reaching 80% in 2018, as a result of poverty, disease, inadequate supply, and low investment in the social sector.⁴⁰ Malnutrition in the form of non-communicable disease, nutrient deficiency, and macro- and micronutrient undernutrition, is prevalent. In 2020, LFBI distributed 153,000 kilograms of food, providing 9.6 million meals to hungry people, reaching 420,000 families.⁴¹

In 2020, LFBI supported 420,000 families in need, providing food and other items at a value of NGN 2.1 trillion (USD 5,040,000).⁴²



LFBI's Temporary Food Assistance Program (TEFAP) provides immediate food and nutrition relief assistance by organized community distribution and walk-in food warehouse access. Provisions of the program can sustain a family of 5 for 2 to 4 weeks. Moreover, this program uncovers hidden poverty by providing a resource to vulnerable people, orphans, and widows through direct outreach and community visits. In 2020, LFBI reached 126,000 vulnerable families in 55 communities.⁴³

HUMAN CAPITAL / PEOPLE

Built skills for farming at home

LFBI enhances food security and sustainable livelihoods of households in need of long-term nutrition and livelihood support by teaching them how to farm vegetables, snails, and poultry.

Individuals, particularly women and graduates from its maternal and child health program, are screened for inclusion into the Family Farming program. The household is given seeds for edible crops (Celosia amaranth and Corchorus) and, if their urban dwelling can accommodate livestock, LFBI also provides them with chickens and snails, both common to the local diet. Families are given training, soil, containers, and feed in their starter kit.

294 FAMILY FARMERS TRAINED
94% WOMEN



Lagos is densely populated and only produces a small fraction of the food it needs. Currently, 84 beneficiaries have their own well-established farms and 210 more are enrolled in the program; 94% of them are women. The program is aimed at supporting women and building women's empowerment in agriculture. This reinforces the interconnection of local and traditional knowledge with modern agriculture techniques in urban conditions. Through the Family Farming program, women from food-insecure families are introduced to subsistence farming and traditional methods of farming in their backyard.

\$↑ 12% HIGHER INCOMES FOR FAMILY FARMERS

The Family Farming program improves household food security directly and, as many find, indirectly by creating a surplus of food that can be sold at market, increasing household income. The increase in income for families from the program was estimated to be 12% in 2020. LFBI trains program participants to keep input costs low by using methods that focus on minimal to zero chemical inputs. In addition, in its procurement, LFBI purchases some local goods from local farmers, vendors, and food-processing companies.

Ensured nutritious diets

LFBI operates multiple programs that ensure patients in need can receive affordable, nutritious food.

1,891 previously malnourished beneficiaries have achieved optimal nutritional status, costing just NGN 34,969 (USD 84.98) per child.⁴⁴



Using global food bank guidelines, LFBI aims to provide foods that “nourish, replenish, and satisfy” and to reinforce a healthy relationship with food. Guided by an in-house team of dietitians, LFBI focuses on nutritious food sourcing, breastfeeding support, and nutritional supplements for mothers and young children, and therapeutic food for diabetics. In its nutrition policy, LFBI emphasizes procurement of:

- Whole grains;
- Low- and no-sugar cereal;
- Low-fat dairy and non-dairy substitutes, such as almond and soy milk;
- Low-fat milk, yogurt, and cheese;
- Proteins such as eggs, beans, fish, and meat;
- Healthy fats such as vegetable oils and nut butters; and
- Water.

LFBI operates a Nutritious Meal Plan Intervention for Mothers and Children (NUMEPLAN) project that targets pregnant and lactating women, focusing on children under 5 years of age who are affected by malnutrition (undernutrition). Currently, 2,278 participants are enrolled and 1,891 have already successfully graduated based on improved nutrition metrics.⁴⁵ The NUMEPLAN program links with various community nutrition trackers as well as 11 primary healthcare centres run by nurses, who provide referrals to LFBI’s programs so patients in need can receive affordable food and nutrition education. Many of these centres are located in slums. Following the program, LFBI works to bridge those who graduate from this maternal and child nutrition intervention into the Family Farming program for sustained, long-term food security and health.

LFBI also operates a Nutrition Intervention for Diabetes Self-Management (NIDS) program that provides free diabetic meals and foodstuffs to support glycemic control for 102 participants. Between 2018 to 2021, 7,104 kg of diabetic food was distributed to these participants.⁴⁶

Increased school enrolment

LFBI's school food program reduces the net cost of attending school, thereby increasing enrolment rates.

According to national statistics, 70 to 80% of Nigerian school children are hungry when they arrive at school. Traditional approaches focus on “empty vessel” concepts, with the goal to “fill a child’s belly” with calories rather than address specific nutrient needs. LFBI operates an Education Enhancement Intervention for food-insecure students (EDUFOOD) in low-cost private schools with tuition fees less than NGN 411 (USD 1) per day in low-income communities. The EDUFOOD program provides 400-gram meals in primary and secondary schools to approximately 2,000 children in a dozen schools 3 times per week.



The school feeding program allows families to use their limited financial resources to pay tuition fees instead of the child’s food. The result of the program is increased school enrolment of 15% overall and girl child enrolment of 17%, contributing to a school attendance rate of 83.8% (compared to a national attendance rate of 65%).⁴⁷ The meals contribute to cognitive development and concentration in school, reduce the family cost burden of providing food to school children (elevating the opportunity for girls to attend school), and also creates a local market for farmers.

PRODUCED CAPITAL / ECONOMY

Built up the local food supply

LFBI increases food availability and access.

In 2020, LFBI brought 95,903 kg of donated and 57,427 kg of purchased food into the Lagos food supply,⁴⁸ with a total value of NGN 196,114,216 (USD 476,580).

153,330 kg
ADDED TO THE

LOCAL FOOD
SUPPLY IN 2020



Provided livelihood opportunities

LFBI supports job training and placement.

LFBI has assisted 200 individuals⁴⁹ to obtain simple service jobs with its partner organizations, including 37 in 2020.⁵⁰



200 PEOPLE
HIRED
VIA JOB-TRAINING PROGRAMS



LAGOS FOOD BANK

Addresses immediate and long-term **nutrition and hunger needs** for **136 communities** and **1.6 million people** in Nigeria.

PROMOTES

SKILL-BUILDING

Training and support for household vegetable and livestock farming builds long-term food security and sustainable supply chains.

STRENGTHENS

DIVERSE PARTNERSHIPS

Engaging food companies, primary healthcare clinics, and local schools addresses multiple challenges.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT

14,054 kg
FOOD WASTE
PREVENTED IN 2020
WORTH \$28,108 USD



SOCIETY

VOLUNTEER
COMMUNITY GROWS BY
250 PEOPLE
PER MONTH

\$5,040,000 USD
OF FOOD AND GOODS
PROVIDED IN 2020



BACKYARD FARMING
ZERO FOOD MILES AND
ZERO CHEMICAL INPUTS

PEOPLE

294 FAMILY FARMERS TRAINED
94% WOMEN
\$12% HIGHER INCOMES
FOR FAMILY FARMERS



NUTRITIOUS SCHOOL FOOD
INCREASED SCHOOL ENROLMENT **15%**

1891 CHILDREN
RECOVERED OR AVOIDED
MALNUTRITION



ECONOMY

153,330 kg
ADDED TO THE

LOCAL FOOD SUPPLY
IN 2020



200 PEOPLE HIRED
VIA JOB-TRAINING PROGRAMS

KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Build partnerships for food security: Food system partnerships for hunger relief can have synergistic effects, such as harnessing food waste of processing companies, forging connections with primary healthcare clinics to improve patient resources and care, and working in line with the school system to improve performance and attendance.

Build long-term self-sufficiency: Programs that create opportunities for families to move beyond hunger into a paradigm of long-term self-sufficiency help solve health and economic problems simultaneously. Training and support for subsistence livestock and household food gardening builds food security, livelihoods, and sustainable practices.

Address malnutrition in all its forms: Marginalized populations and hungry people deserve meaningful and adequate nutrition. Comprehensive nutrition policies can build long-term nutrition knowledge in the community through: guiding food provision and supplying wholesome calories; addressing nutrient and metabolic deficiencies; and providing nutrition education to participants.

SOILS, FOOD AND HEALTHY COMMUNITIES

MALAWI



Soils, Food and Healthy Communities (SFHC) is a non-profit agricultural organization building capacity of small-scale farmers in Ekwendeni, Malawi, while also leading research to advance food security, gender equity, nutrition, and integration of traditional knowledge. SFHC uses seed distribution, integration of indigenous crops, agroecology training and knowledge exchanges, and hands-on nutrition classes to fortify soils, crop yields, sustainable practices, and health and nutrition. Starting with 7 villages in 2000, SFHC has since worked in over 450 villages, with over 10,000 farmers, in Northern and Central Malawi. You can read more about SFHC's work [here](#).

IMPACTS & PATHWAYS

SFHC directly influences sustainable food production and rural agricultural development through its programs, but the indirect impacts of its approach are even more far-reaching and diverse than what is immediately apparent. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- Women in Malawi play a crucial role in farming, food processing, and childcare, but have limited decision-making and control over agricultural resources. Addressing gender inequality is a key mechanism by which agriculture can improve nutrition.
- Community-based participatory education on farming, nutrition, health, and gender demonstrates multidimensional improvements in social welfare and well-being. Participatory agriculture and nutrition education that explicitly addresses traditional male views linked to child nutrition, such as ideas about female-only spaces and women's roles in childcare, serve to change gender norms.
- Agroecology, founded on Indigenous knowledge exchanges, as well as a focus on soil health has led to greater nutrition and crop yields while also building resilience to climate change.
- Partnerships among farmers, between villages, and between Indigenous knowledge-holders, scientists, and students create dynamic knowledge exchanges that supplement ancestral wisdom with experimentation, such as solution-seeking on climate adaptation technologies and practices.
- Sustainable agricultural practices, such as planting legumes to increase soil health, carbon sequestration, and water conservation, protect ecosystems while also improving the quality and yield of crops, thereby increasing the nutrition of daily meals and the income of farming households.

Looking through the lens of natural, human, social, and produced capital, an assessment of SFHC's data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Enhanced knowledge on sustainable and agroecological practices

SFHC promotes sustainable agroecological practices through a farmer-to-farmer knowledge-sharing approach.

Approximately 10,000 farming households currently participate with SFHC. Of those, 94 to 99%⁵¹ of them are applying agroecological practices.

Specific practices applied by the households vary depending on local social and environmental conditions, knowledge, and preferences. According to a qualitative survey of 609 SFHC farmers,⁵² 90% of them use compost manure amendment, 82% are practicing burying crop residue, 81% are practicing intercropping, and 69% are practicing crop rotation. Farmers are applying agroecology practices on an estimated 10,000 hectare (ha) of agricultural land.

**AGROECOLOGY ON
10,000 ha OF LAND**



SFHC uses agroecological practices to promote healthy soils for its farmers. Building soil health with agroecological practices reduces farmers' dependency on synthetic

**REDUCED
FERTILIZER
COSTS**



fertilizer, reducing input costs. Moreover, these practices improve yields and resource use efficiency, including the intercropping of 6 different legumes (peanuts, pigeon peas, soyabeans, velvet beans, Tephrosia, common beans, and

cow peas) to enrich soil, as well as using crop rotation methods, compost, crop diversity, and home-produced botanical sprays to reduce soil mineral depletion and avoid chemical inputs. Sweet potatoes, cassava, and alternative grains such as local open-pollinated varieties of yellow-orange maize, sorghum, and finger millet are used to add diversity to the farm and enhance soil quality.

Farmers report that agroecological practices contribute to better crop productivity and increase crop diversity from an average of 2 crops to more than 4 crops per farm.⁵³

**↑ INCREASED
CROP
PRODUCTIVITY 2X CROP
DIVERSITY**

Adapted on-farm practices improve climate resilience

SFHC uses participatory knowledge exchanges to enhance farmers' capacity to adapt to climate change.

Current climate-change assessments indicate increased peak and seasonal mean temperatures, more erratic rainfall patterns, higher frequency and intensity of droughts, and reduced crop yields in Africa.⁵⁴ In the African semi-humid tropics, agroecological practices, including crop diversification and intercropping, serve as an effective climate-change adaptation and mitigation strategy. Recent experiments in southern Africa suggest that diversified farming systems, particularly with increased legume integration, can provide substantial ecosystem services such as nitrogen fixation, soil enhancement, and carbon sequestration.⁵⁵ SFHC holds workshops with government, international organizations, and academia to discuss local agriculture challenges and solutions. Farmers working with SFHC are supported and encouraged to participate in agricultural practice experiments to determine effective adaptation solutions and approaches to improve climate-change resilience.

Enhanced engagement on ecosystems and biodiversity

SFHC brings together sectors and intergovernmental departments in dialogues on land use and farming.



SFHC's FARMS4Biodiversity project is an interdisciplinary, multiscale project designed to address biodiversity conservation, support ecosystem services, and improve food security under scenarios of land-use change in the Global South. Connecting actors at different scales is a key element to this work, and SFHC supports the science-policy interface by engaging scientists with local researchers and local decision-makers.



SOCIAL CAPITAL / SOCIETY

Improved food security and healthy diets

SFHC supports farming households to adopt agroecological practices as a way to improve yields and dietary diversity.

Maize is a dominant staple crop and comprises nearly 50% of dietary caloric energy in Malawi. Singular focus on maize has led to nutritional deficiency as well as environmental unsustainability from fertilizer inputs, both of which have increased food insecurity. Almost one-third of Malawian households experience severe food insecurity and calorie deficiencies, and half of children under age 5 are stunted. In addition, 60% of preschool-age children are deficient in vitamin A, and nearly three-quarters are anemic.



INCREASED DIET VARIETY
 MORE VEGETABLES, GRAINS, TUBERS, AND FRUITS

 **5-6 MORE WEEKS OF MAIZE FOR THE DRY SEASON**

SFHC found that households that adopted agroecology were more likely to report good health status, due to more diverse diets and increased availability of food in the dry season.

SFHC households utilizing agroecological practices reported that maize yields provided food for 5 to 6 weeks longer than average households who didn't.⁵⁶

Agroecology has a positive impact on both production and dietary diversity. It is a viable strategy to tackle hunger and malnutrition. Agroecology increases the range of crops and livestock produced by smallholder farming households through its focus on ensuring agrobiodiversity and mixed cropping. Due to more diverse production, farmers' diets have improved, with a greater variety of vegetables, grains, tubers, and fruits consumed.

TRIPLED FOOD SECURITY RATES  **10-33%**

SFHC recorded improvements in food access by utilizing the Household Food Insecurity Access Scale (HFIAS), which categorizes households into 4 levels of household food insecurity (access): food secure, and mild, moderately, and severely food insecure.

At the baseline, nearly 80% of intervention households fell into the category of severely food insecure. The application of agroecological practices increased the percentage of food-secure households from 10 to 33%.⁵⁷

Elevated and integrated Indigenous knowledge

SFHC interventions are participatory and contribute to traditional knowledge transfer by integrating Indigenous knowledge of agroecology, nutrition, and other topics into its training.

SFHC emphasizes participatory research that recognizes traditional knowledge while acknowledging it can be difficult to sustain. Several agroecological practices promoted by SFHC are based on traditional knowledge. Many sustainable farming practices utilized by the farmers are indigenous; for example, mixed-/inter-cropping, crop rotations, polyculture, or water harvesting.

SFHC reports the potential to build on local knowledge of indigenous grains, such as millet and sorghum, which are more drought-resistant; pest management; and agroforestry (intercropping and crop rotation) as well as on crop storage methods. SFHC organization sees synergies between agroecology, climate-change adaptation, and traditional knowledge. Its FARMS4Biodiversity project is integrating traditional knowledge on agroforestry methods to improve both ecosystems and food security.

Established partnerships

SFHC organizes farmer–scientist and farmer–student networks, elevates Indigenous farmer knowledge, and provides a space for information exchange and collaboration.

Farmers experiment with agroecological methods, including the use of legume intercrops, crop diversification, compost manure, as well as mulching and other soil and water conservation methods to improve soil fertility and productivity, and are then encouraged to share this knowledge through farmer-to-farmer teaching.

To build sustainable farming practices, local ownership, and networks, SFHC provides leadership training to support farmers' empowerment. For example, a General Assembly of farmers guides SFHC programming decisions, and the Board of Directors is elected. SFHC also encourages and supports farmers to exchange knowledge between villages.

The SFHC governance model reflects its mission as a grassroots enterprise. A key component of its model is the election of community representatives, a man and a woman, by each community and who serve as a Farm Research Team. Farm

Research Teams are relied on as channels from SFHC to the community for training as well as bottom-up, top-down knowledge-sharing. Currently, there are more than 400 voluntary Farmer Research Team members in 209 villages, and over half of them are women.

SFHC also has academic partnerships with Lilongwe University of Agriculture and Natural Resources (Malawi), Cornell University (United States), Western University (Canada), and the University of Würzburg (Germany). Students in these universities conduct research on aspects of SFHC projects, building the research and evidence base for its work.



400 FARMER RESEARCHERS
MORE THAN HALF ARE WOMEN

Supported communities in crises

SFHC responds to the evolving health and well-being needs of its communities.

The well-being of a community is determined by many factors, including disease prevalence. Infectious disease continues to impact the region surrounding Malawi, compounding nutrition and labour productivity issues. According to UNAIDS,⁵⁸ in 2020 about 1 million people in Malawi had HIV, of which women bear twice (10%) the prevalence as men (5%). HIV-related deaths have led to orphans and youth-headed households, many of whom struggle with food security. Apart from HIV/AIDS, other major health problems include malaria and diabetes.⁵⁹ There is a bidirectional challenge between communities with a high prevalence of HIV and livelihoods based in farming: HIV can limit or diminish labour productivity; at the same time, poor agricultural yield and insufficient diet leads to malnourishment and hastens immunological decline. SFHC supports approximately 1,000 farmers with HIV.

COVID-19 added new challenges to the health and sustainability impact pathways of this region. SFHC responded to these challenges by providing hygiene and agricultural supplies, such as 225 kg of orange maize seed, 660 packets of seeds for mustard, onion, green leafy vegetables, tomatoes, cabbage (including Chinese cabbage), and 92,000 kg of maize cobs (1840 x 50 kg).⁶⁰

Improved equity and gender relations

SFHC addresses inequality in livelihood and farming gender roles as a critical component of food sovereignty.



SFHC projects integrate equity concerns into programming and research activities. Through innovative curriculum, SFHC has worked to shift gender norms through one-on-one house visit education sessions, small group sessions, as well as theatre and traditional dance and songs. Participatory education supports new gender norms through public performances that encourage men to take on new roles; for instance, encouraging men to be more involved in child feeding and cooking. Training and mentorship programs that include hands-on activities, theatre, and music foster cooperation between villages and between countries like Malawi and Tanzania.

According to SFHC research, implementation of agroecological practices result in enhanced interaction among local farmers, improved farmer-to-farmer agricultural resources and knowledge-sharing, reduced gender inequalities in household work, improved gender relations in decision-making in farming households, reduced incidence of illness in HIV-positive children and adults, and improved child growth.

Farmers report that agroecological practices are also labour-saving, in particular, mulching to suppress weeds and intercropping.

HUMAN CAPITAL / PEOPLE

Enhanced food and nutrition skills

SFHC hosts unique recipe days utilizing experiential learning to build health literacy and nutrition knowledge of locally grown crops.

Focusing on the local food system, SFHC aligns recipe days in conjunction with seasons to build nutrition knowledge along the crop cycle. The addition of grains and legumes to the crop harvest has increased the carbohydrate, protein, and micronutrient content of local diets while maintaining affordability. SFHC also does additional nutritional outreach with the HIV community and other marginalized groups, including providing them seed.

**Addressed childhood malnutrition**

SFHC worked with health professionals and families to develop simple interventions to reduce the rates of malnutrition.

Rates of childhood malnutrition and stunting are high in Malawi (up to 50%).⁶¹ Interviews conducted with 55 families whose children were hospitalized due to malnutrition revealed that the families relied on maize as a food crop yet were unable to afford the fertilizer inputs that generated sufficient productivity. A focus on soil health was needed. It was also found that the father's spending authority and habits influenced household nutrition rather than the mother, who controls nutrition. In 7 villages, SFHC began testing alternatives to fertilizers and evaluating the results of different legume crops directly on soil health outcomes and indirectly on childhood nutrition. This led to joint projects where SFHC provides seeds and training for intercropping legumes with the maize grown. Research completed on this initiative demonstrated significant positive impacts on child growth, including improvements of up to 0.8 in weight-for-age Z score⁶² above initial conditions.⁶³



Provided skill-building opportunities to farmers

SFHC developed an integrated curriculum on agroecology, climate change, nutrition, and social equity.

SFHC values, respects, and caters to the rural farmer. Building resilience and sustainability of culture, livelihoods, ecological integrity, and ecosystem services, as well as climate change, all rests on the capacity and skills of rural farmers. When individuals join SFHC, they receive annual training in a 2-week hands-on course that utilizes diverse educational methods, including performance. An essential aspect of strengthening the uptake of SFHC programs, knowledge, and overall mission to practically achieve sustainable development among Malawi people is the development and implementation of educational tools. With partners in Tanzania, SFHC has translated the programming into 3 additional African languages (Swahili, Chichewa, and Chitumbuka) to enhance its dissemination in the region.

PRODUCED CAPITAL / ECONOMY

Shared seeds and genetic resources

SFHC seed-exchange program provides farmers with a reliable source of diverse seed varieties.

70% OF FARMERS SHARE SEEDS WITH **10+** OTHER FARMERS 

Seed exchange is common in agriculture practice in Malawi, and 70% of SFHC's farmers share with at least 10 other farmers, which is a way culture contributes to crop diversity. Maize (white and orange) is the most commonly shared seed. Apart from maize, soybeans, groundnuts, sweet potatoes, pigeon peas, and beans are also frequently shared among households. The volume of seed shared reflects the pattern of cultivation of the various types of crops in the area.

SFHC creates and maintains local seed banks for finger millet and sorghum to build genetic diversity. The seeds are then given to farmers who, in return, deposit double the quantity of seeds received back into the local seed bank. SFHC has also built a Farmer Research and Training Centre and is constructing another seed bank as part of this project. Currently, SFHC has an estimated 10 to 20 crop varieties that they collect from farmers and research institutes, and redistribute to participating farmers each growing season.



SEED BANKS PROVIDE
10-20 CROP VARIETIES

Improved financial security and stability

SFHC provides resources and training to support the cultivation of diverse crops with reduced inputs leading to improved yields and more sustainable incomes.

In Malawi, 70% of the population lives on less than 816 Malawian kwachas (MWK) (USD 1) per day, while 80% of the Malawian population relies on agricultural livelihoods. The main economic products of Malawi are cash crops (tobacco, tea, cotton, groundnuts, sugar, coffee). However, maize makes up about 75% of the total land area cultivated under smallholder farming.⁶⁴ National subsidy programs have supported input-intensive production, which negatively impacts crop diversity and, in association, food, livelihoods, and the rural ecology.

As farmers increase their crop diversity and expand agroecological practices, income diversity follows. SFHC farmers demonstrate increased maize yields, but because other crops like groundnuts can also be used for income, farmers have the financial stability to wait to sell maize at acceptable market prices. In this way, crop diversity also builds independence, meaning farmers do not have to supplement their income by working on other farms. Farmers found that multiple sources of income had positive impacts on food security, particularly by reducing the exigency of selling crops valued for subsistence, such as maize.⁶⁵



SFHC farmers who implement crop diversification and soil management practices had significantly higher incomes after 3 to 5 years of adoption.⁶⁶

Through increased income from surplus crop sales, some farmers are now able to purchase foods they could not previously afford. Some families use the gains to buy major food groups not produced in the community, such as fish and rice, while others buy small luxuries, such as tea and sugar.



SOILS, FOOD AND HEALTHY COMMUNITIES

Builds the capacity of small-scale farmers in Malawi while also leading research to **advance food security, gender equity, nutrition, and integration of traditional knowledge.**

PROMOTES

AGROECOLOGICAL PARTNERSHIPS

Dynamic knowledge exchanges integrate ancestral wisdom, farmer experience, and scientific research.

STRENGTHENS

LOCAL KNOWLEDGE

Community-based education on farming, nutrition, health, and gender provides training and resources.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT

AGROECOLOGY ON **10,000 ha** OF LAND

↑ INCREASED CROP PRODUCTIVITY **2X CROP DIVERSITY**

CONNECTED POLICYMAKERS AND SCIENTISTS **REDUCED FERTILIZER COSTS**

IMPROVED BIODIVERSITY **BUILT UP SOIL WITH COMPOST AND CROP ROTATION**

PEOPLE

HEALTHY SOIL AND INTERCROPPING LEGUMES WITH MAIZE **REDUCED MALNUTRITION AND PREVENTED STUNTING**

SEASONAL RECIPE TRAINING FOR BETTER YEAR-ROUND NUTRITION

SOCIETY

INCREASED DIET VARIETY MORE VEGETABLES, GRAINS, TUBERS, AND FRUITS

5-6 MORE WEEKS OF MAIZE FOR THE DRY SEASON

TRIPLED FOOD SECURITY RATES **10-33%**

400 FARMER RESEARCHERS MORE THAN HALF ARE WOMEN

ECONOMY

CROP DIVERSITY ALLOWS FOR MAIZE MARKET TIMING & INCREASED THE SELLING PRICE

SEED BANKS PROVIDE 10-20 CROP VARIETIES

70% OF FARMERS SHARE SEEDS WITH OTHER 10+ FARMERS

KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Promote Indigenous and farmer knowledge: Generation, conservation, and dissemination of Indigenous knowledge and cultural diversity builds biodiversity, a pillar of sustainability. Agroecology blends traditional and Indigenous knowledge, producers' and traders' practical knowledge, and global scientific knowledge. Empowering farmers by promoting their knowledge and mobilizing different forms of knowledge through peer-to-peer exchanges can create meaningful local change and adoption of practices across a region.

Use agroecology to address malnutrition: Sustainable land management practices such as thoughtful crop diversity and intercropping can lead to improvements in both environmental (soil) and human health (nutrition). Crop diversity, biodiversity, and dietary nutrient diversity are integrated.

Empower communities to develop good environmental governance: Community representatives build knowledge, partnerships, communication channels, and local ownership of land stewardship, food production, and community health and well-being. They also stimulate local ownership of environmental problems and solutions that enable participatory engagement that leads to action.

Support gender equality for improved food sovereignty: Shifting gender roles can improve the decision-making, financial authority, and leadership of women at the household level. As food and nutrition managers at the household and community level, women's empowerment will have a positive impact on health and food-security outcomes.

COMMUNITY MANAGED NATURAL FARMING

INDIA



GIST

Community Managed Natural Farming (CMNF) is a non-profit government initiative implemented by the Department of Agriculture to build and scale a farmer-led agroecological model in Andhra Pradesh, India. CMNF aims to broadly improve smallholder livelihood security, health, and ecosystem integrity by supporting farmers to implement practices that minimize input costs by avoiding chemicals and incorporating local knowledge. The program currently is working in 3,780 villages across the state, with 700,000 farmers enrolled across 13 districts. You can read more about CMNF's work [here](#).

IMPACTS & PATHWAYS

CMNF directly influences sustainable food production and rural agricultural development through its programs, but the indirect impacts of its approach are even more far-reaching and diverse than what is immediately apparent. To reveal these, it is necessary to understand the following conditions and forces that drive these impacts:

- Agriculture development programs in India have historically focused on productivity, but policies that support this model ignore climate-change risks, biodiversity loss, groundwater loss and water quality, soil degradation, farmers' health, the role of women in food security, and chronic malnutrition. The CMNF model, instead, focuses on the latter, ultimately building the long-term health of both ecosystems and people.
- CMNF methods promote soil health, minimize synthetic chemical contamination in runoff, reduce land degradation, boost ecosystem services, and restore biodiversity. In addition to providing chemical-free food, these methods reduce input costs for water, electricity for irrigation, and fertilizers and pesticides. Each method varies according to local biologic "ingredients" across the region, meaning agriculture is tailored to local knowledge and conditions.
- Farmers involved are able to produce similar or higher yields in a variety of crops with vastly reduced input costs, while contributing to long-term natural capital gains in the form of resilient soil, resilient crops, water quality and quantity, and intact ecosystems.
- In India, rural communities depend on agriculture and related activities for their livelihoods. The CMNF model reduces poverty and supports better health for nature and people by promoting affordable farming methods adapted to the regional conditions. The model encourages high biodiversity and improves the diet of local communities due to increased yields and crop diversity.
- CMNF popularizes natural farming approaches through established social structures and peer-to-peer activities, thereby empowering smallholder farmers and women, and increasing food security.

Looking through the lens of natural, human, social, and produced capital, an assessment of CMNF's data reveals the following positive impacts.

NATURAL CAPITAL / ENVIRONMENT

Improved soil quality and water conservation

CMNF teaches farmers methods to naturally improve soil quality in cost-effective and replicable ways to prevent water runoff and topsoil erosion.

The CMNF program follows the universal principles that a healthy soil microbiome is critical for optimal soil health and plant health, and thereby animal health and human health. Farm practices vary based on the ecosystem and farming traditions of local communities, as well as their knowledge of local and traditional practices. CMNF practices rely on crop diversity and rotation, cover cropping and integrated crop–livestock systems, soil bioremediation, and natural pest controls. Its 5-layer model, whereby fruits and vegetables are grown in mixed canopy layers, increases year-round vegetation cover, income diversity, and stability.⁶⁷ In soil bioremediation, farmers use inoculums of fermented cow dung and urine as well as local ecosystem “ingredients” such as jaggery (palm tree sap) and flour made from pulses to build healthier microbiomes. Natural pest control includes the use of plants that have inherent herbicidal characteristics, such as tropical neem leaves, or include concoctions of cow dung and urine, lilac, and green chiles. CMNF farmers avoid till farming and support crop diversity and intercropping to ensure that seeds are planted only after coated with a homemade bio-stimulating inoculum of fermented cow dung and urine.

Water conservation is of high importance, not only because irrigation is a significant input cost, but also because of declining water tables, and droughts resulting from climate changes. To address this, CMNF adheres to regular mulching regimes using crop residues coupled with sustainable soil aeration techniques to naturally retain soil moisture and prevent erosion of topsoil.⁶⁸ Natural farming also targets the revival of deep soil earthworms, a species upon which soil structure depends, to improve soil quality and lower input costs.⁶⁹



8,000,000 ha FARMED NATURALLY

Alongside this assessment of positive impacts, CMNF is currently undertaking a full True Cost Accounting (TCA) assessment examining all externalities, both positive and negative. Conducted by GIST⁷⁰ using the TEEBAgriFood evaluation framework,⁷¹ this study, forthcoming in 2022, will expand understanding of the cost and benefits of CMNF activities and how smallholder farmers are impacted by government support and policy shifts.

Restored land through biodiversity management

CMNF prevented land degradation and the associated negative impacts on livelihoods and food security by focusing on crop diversity, soil quality, and species conservation.

Significant agroecological changes affecting biodiversity have occurred in Andhra Pradesh since 1960 and



AVOIDED LAND DEGRADATION COSTS
\$164,442,399 USD/YEAR

the introduction of the Green Revolution.⁷² Prior to this, farmers maintained livestock such as sheep, goats, cows, and buffaloes; buffered crop fields with food and/or income-generating trees such as mango, tamarind, pongamia, and custard apple; and diversified livelihoods through timber and non-timber forest products, such as honey, beedi leaf, leaf plates, medicinal plants, and brooms. Farming also consisted of 15 to 20 intermixed crop varieties, such as millets, pulses, oilseeds, flowers, vegetables, and spices, with the primary objective of subsistence. In contrast, conventional farming in 2021 rarely incorporates livestock or tree cover, and produces only 4 to 5 crops (typically groundnut, red gram, castor, jowar, Bengal gram, or cotton), which are largely produced as a monocrop that is cultivated primarily for income. Nearly 75% of conventional farming families buy their food.

The Andhra Pradesh region is known to experience soil erosion, low vegetation cover, low tree diversity, and low earthworm presence.⁷³ CMNF increases species richness, including earthworms, as well as pollinators and pest antagonists, such as honeybees, lacewing bugs (an antagonist to aphids, leafhoppers, whiteflies, and mealybugs), and ladybugs.

Natural farming on 8,000,000 hectares (ha) of land avoids land degradation costs of up to 12.3 trillion rupees (INR) (USD 164,442,399)⁷⁴ annually.

Reduced costs, energy inputs, and emission outputs

CMNF practices require less water and energy inputs, significantly reducing emissions and also reducing input costs that results in higher net incomes.



In survey results of 120 farms published in 2020 comparing CMNF to conventional chemically intensive farming, CMNF found that its model requires an average of 55% less water and electricity for paddy, groundnut, chile, cotton, and maize. This includes 45 to 70% less energy input for irrigated crops, resulting in 55 to 85% fewer emissions, and 42 to 90% less energy input for rainfed crops, resulting in 85 to 99% fewer emissions. Farm costs were found to be INR 7484 to 5,5385 (USD 100 to 740) per ha lower using natural farming methods, and net revenue was INR 9055 to 37,270 (USD 121 to 498) higher.⁷⁵

CROPS NEED
55% LESS WATER
& ELECTRICITY
SAVES \$100-740 USD/ha



55-99% FEWER EMISSIONS

Increased resilience to the impacts of climate change

CMNF practices improved crop and field characteristics that protect harvests from the impacts of extreme weather events.

In 2017, farmers' stories and records showed that CMNF-managed paddy fields withstood winds and waterlogging better than adjacent non-CMNF paddy fields. This is likely due to the roots going deeper, stems being thicker, and soil being more porous under natural farming methods.⁷⁶ A survey of CMNF farmers in 2019 reported increased green cover (36%), more earthworms (43%), softened soil (52%), resistance to dry spells and wind (20%), stronger stems (33%), and increased grain weight (35%) for crops such as paddy, maize, groundnut, bengal gram, jowar, black gram, green gram, sesamum, banana, and sugarcane.⁷⁷

Pre-monsoon dry sowing (PMDS) combined with CMNF methods show significant improvements in root length, number of tillers per hill (size of plant cluster), grain weight, wet and dry yield per acre, and number of 75 kg bags yield per acre.⁷⁸ These are important characteristics given increased incidences of extreme weather events caused by the climate crisis.

SOCIAL CAPITAL / SOCIETY

Facilitated knowledge transfer by empowering small farmers

CMNF built decentralized farmer networks to encourage peer-to-peer knowledge dissemination.

CMNF works with more than 12,500 village councils, organized into clusters of 2,000 households, each of which relies on a support system that includes 3 lead farmers who are all locally identified: a master farmer, a natural farming fellow (young graduates and postgraduates from agriculture and allied streams), and an outreach extensions specialist. In this way, CMNF develops local capacity-building, leadership, and an educational network, contributing to small farmer empowerment.

6,000 CMNF local lead farmers advise and guide their peers through farmer-to-farmer networks.



CMNF liaises with 38 civil society organizations that contribute to program innovation and community development. The program is further supported by community monitors, who are paid to evaluate crops, and thorough knowledge centre hubs. Farmer-producer organizations facilitate market communication and exchange to strengthen the local value chain.

Nearly 70% of crops produced locally are consumed locally.

Preserved local and indigenous seed varieties

CMNF supports farmers to select seeds based on local knowledge of conditions, and reliance on indigenous seeds is encouraged.

Seed banks for indigenous seeds are especially used in the dryland tribal areas, and CMNF is working with civil society organizations to support this genetic diversity. There has been some traction to switch back to farming millet grains from rice, a crop largely introduced



USE OF LOCAL INDIGENOUS SEEDS

with the Green Revolution in the 1960s. Millets are key ingredients to historic local dietary traditions and are also more drought and pest resistant in the region.

Reinforced the role of women and community

CMNF promotes the roles of women and women's networks to act as powerful agents of change.

A unique aspect of the CMNF model is its use of women's self-help groups to embed the natural farming initiative in local society and culture. Early on, CMNF realized that a barrier to scaling up the natural farming model was that knowledge disseminated from outside the community did not have the impact that knowledge disseminated from within the community could have. It also realized that women serve to mobilize community and social action, including men's behaviour, in organic ways. In part, this may be attributed to these groups being historically seen and used by the government as a means for poverty eradication through setting up credit platforms and providing microfinance services. Many women's community groups, comprising approximately 85% of rural women, have been around for 20 years. As groups matured, their role expanded, and they became platforms for community dialogue and resolution on health, nutrition, and livelihoods.

From the realization of the role and impact of these women's community groups, CMNF moved to incorporate them into its formal network, identifying a point person for

communication to liaise with core staff. In Andhra Pradesh, almost 7 million women form 652,440 self-help groups and are organized further into 26,753 village groups. Within CMNF, these groups distribute loans, organize storage and processing of crops, and serve as a forum for knowledge exchange and dissemination of natural farming practices. In times of need, they organize surplus yields to feed the families of the group, prior to approving market sales of surplus, ensuring local food security. The women's community groups generate trust in natural farming knowledge, and this is referred to by CMNF as "spiritual capital." CMNF also recognizes and supports movement of women into trainer and other leadership positions in the agricultural community.

**652,440 WOMEN'S
GROUPS**
MOBILIZE ON FOOD AND FARMING ISSUES



Influenced policy with evidence

CMNF has been providing the economic evidence needed to inform policy toward expanding sustainable agriculture practice throughout India and demonstrating how natural farming can improve well-being, livelihoods, and the economy.⁷⁹

One of the major reasons for the success and scale of CMNF is involvement of the state government. In 2016, the state of Andhra Pradesh established the Rythu Sadhikara Samstha (RySS), a state-owned, non-profit organization, to develop and spread CMNF through the state. Currently, the state government is drafting the state Organic Policy informed by the on-farm success of natural farming, and natural farming is being embedded in the Rythu Bharosa Kendra – an initiative of the state government to facilitate a one-stop agriculture solution in each village. There is also an official memorandum of understanding signed between the Society of Elimination of Rural Poor and the RySS program to integrate the women's self-help groups and their federations in natural farming. The entire state ecosystem is favourable toward promoting agroecological principles on a large scale.

Ongoing efforts aim to inform organic farming policies that would reciprocally add value to smallholder farmer sales; for example, by creating an opportunity for the government to procure high-quality produce from CMNF farmers. This would both catalyze the transition to sustainable agriculture and allow households who purchase government-procured produce through the public distribution system to have access to chemical-free food at subsidized rates.⁸⁰ CMNF's efforts are also influential beyond India; they regularly share information about their methods and transformation pathways with other countries and regions.

HUMAN CAPITAL / PEOPLE

Improved physical health and well-being

CMNF's recognition of the links between soil health, plant health, and animal health drives reductions in health costs by eliminating synthetic pesticide use and improving crop and consumption diversity.

CMNF's focus on agriculture that is good for health and well-being is driven by its understanding of several elements: pesticide residues not only alter soil pH and impair the soil microbiome, but can lead to human physiological problems such as reproductive and neurological disorders as well as congenital birth defects; malnutrition indirectly contributes to economic poverty traps, such as by inhibiting cognitive development, leading to a vicious poverty-malnutrition cycle; and diverse diets reduce dependence on carbohydrate nutrition and subsequent risks for diet-related disease such as heart disease and diabetes.⁸¹

In a qualitative survey of 570 households that adopted and consumed naturally farmed crops,⁸² CMNF found that: 95% of respondents reported improved food taste; 91% reported increased quantity of dietary food; and 89% noted increased dietary diversity



(to include millets, pulses, leafy vegetables, fruits), which 96% believed to be associated with reintroducing intercropping and border-cropping practices.



In the same survey, respondents described health improvements, including: 27% described an increase in overall health; 20% reported a decreased frequency of fever and illness; 17% noted improved overall nutrition; 7% described “stabilized” blood pressure and diabetes conditions; and 27% reported improved digestion. Of pregnant and lactating women, 58% described improvement in blood hemoglobin levels, indicating reductions in the incidence of iron-deficiency anemia. The survey showed that health expenditures declined by approximately 50% in CMNF households.

Improved mental health and occupational pride

CMNF approaches – from on-farm practices to community building – have dramatically reduced the hardship and suffering too often experienced by farmers in India.



Between 1996 and 2006, farmer suicide reached up to 18,000 per year in India.⁸³

Through its qualitative surveys, CMNF is finding that farmers adopting natural farming methods and joining the farmer networks CMNF offers have new occupational outlooks. One study of 2,600 farmers reported that, in addition to noting economic gains of natural farming, the model created positivity toward farm stewardship and enhanced the respectability of the profession.⁸⁴

Reduced chemical exposures and mitigated related health effects

CMNF farmers are trained to use natural plant concoctions and bio-inoculums that are not harmful to the body.

The chemical-free agricultural model promoted by CMNF reduces negative health effects associated with fertilizer and pesticide exposure, including headaches, dizziness, nausea, eye issues, skin rashes, acute neurotoxicity, respiratory disease, and cancers.

86% of CMNF farmers reported reductions in negative health effects associated with fertilizer and pesticide use.⁸⁵

CMNF anticipates that reducing exposures to polychlorinated biphenyl (PCB) (e.g., through PCB-containing equipment) and insecticides such as gamma-hexachlorocyclohexane



(lindane) and dichlorodiphenyltrichloroethane (DDT) will reduce risk for 50 million people in India of probable carcinogens and endocrine disruption, while also preventing land and water contamination.⁸⁶

PRODUCED CAPITAL / ECONOMY

Reduced costs and increased crop yields

CMNF farmers produce the same or higher yields of higher quality with fewer inputs and lower costs.

Analysis conducted in 2017 reported that 88% of 1,614 CMNF farmers surveyed had statistically significant increases in yields of 8 to 32% for paddy, groundnut, black gram, maize, and chile crops, as well as decreases in costs for both rainfed and irrigated crops.⁸⁷ A survey of 2,600 farmers in 2018 for the monsoon season found a 68% reduction in the cost of inputs for CMNF farmers for paddy at the same yield as non-CMNF farmers. A second survey of 385 farmers in the 2019 winter season found similar crop yields results between CMNF and non-CMNF farmers for banana, Bengal gram (chickpea), black gram, green gram (mung bean), and groundnut, and higher yields for CMNF farmers for maize, sesamum (sesame), and sugarcane.⁸⁸

88% FARMERS HAVE BETTER YIELDS

decreases in costs for both rainfed and irrigated crops.⁸⁷ A survey of 2,600

**Higher incomes and living standards**

CMNF farmers earn higher net incomes leading to improved living standards.

Under the CMNF model, net income per ha is higher because of declines in input costs coupled with similar or improved yields. Chemical-free food also earns a price premium on domestic and international markets. In a 2018 survey, a reduction in costs alone resulted in an 8% improvement in income. The net income for CMNF farmers was higher for groundnut (41%), cotton (45%), tomato (41%), Bengal gram (chickpea) (17%), and, due to significantly greater yields under CMNF, up to 111% higher for maize.⁸⁹ If chemical input costs subsidies for non-CMNF were included in the calculation, the net income of CMNF would be even higher.

CMNF methods increase crop-by-crop net incomes, ranging from 8% for paddy to 111% for maize.



Notably, this increased income has resulted in improvements to standards of living and habitation, with 86% of CMNF households switching from katcha (rough, thatched) housing to pukka (permanent, concrete or mortar) housing.



COMMUNITY MANAGED NATURAL FARMING

A non-profit government initiative implemented to **build and scale** a farmer-led agroecological model with **700,000 farmers** enrolled across Andhra Pradesh, India.

PROMOTES LOCAL NETWORKS

Women's groups and farmer-farmer exchanges form the communication and social networks essential to trust-building and knowledge-sharing.

STRENGTHENS FOOD SOVEREIGNTY

Local ecological and agricultural knowledge leads to improvements in health, well-being, and livelihoods of farmer households and communities.

LEADING TO POSITIVE IMPACTS ON

ENVIRONMENT



8,000,000 ha FARMED NATURALLY



AVOIDED LAND DEGRADATION COSTS
\$164,442,399 USD/YEAR

CROPS NEED **55% LESS WATER & ELECTRICITY**
SAVES **\$100-740 USD/ha**



55-99% FEWER EMISSIONS

SOCIETY



6,000 LEAD FARMERS GUIDE LOCAL FARMER NETWORKS



USE OF LOCAL INDIGENOUS SEEDS

652,440 WOMEN'S GROUPS MOBILIZE ON FOOD AND FARMING ISSUES



PEOPLE

91% INCREASED FOOD QUANTITY

89% INCREASED FOOD DIVERSITY

50% LOWER HEALTH COSTS

REDUCED PESTICIDE USE

86% LESS ILLNESS **IMPROVED MENTAL HEALTH**

ECONOMY

88% FARMERS HAVE BETTER YIELDS

68% LOWER INPUT COSTS

8-11% HIGHER INCOME PER CROP

86% FARMERS MOVE TO BETTER HOUSING

KEY MESSAGES FOR FOOD SYSTEMS TRANSFORMATION

Support agroecology: Comprehensive, locally tailored agroecology results in resilient crops with longer roots, stronger stems, greater weight, and higher yields, and is cost-effective. Moreover, it can be scaled-up across communities and regions when supported by local institutions and leadership structures.

Engage and empower women: Local women's community groups provide incomparable access to communication and social networks. They are essential to relationship and trust building, and serve to mobilize actors and actions to support smallholder agriculture.

Encourage local food production and consumption: Integrating local ecological and agricultural knowledge into community practice means local farmers are experts in their own agriculture. At the same time, smallholder subsistence farming contributes to dietary changes that improves the health and well-being of farmer households, reducing exposures, illness, and health expenditures. This means that farming contributes to food security and income savings.

Promote food sovereignty and local empowerment: Communities have a right to define their own food and agriculture systems. Natural farming allows communities to control the production and distribution of food. It also allows local people to have healthy and culturally appropriate products produced through sustainable methods. Use of local community structures and peer-to-peer knowledge transmission empowers the community.

CONCLUSION

Every Beacon of Hope (BoH) assessed through this study is acting to address pressing global challenges such as climate breakdown, migration, urbanization, and the need for more sustainable economies, lifestyles, and diets each and every day. Further, we now better understand the BoH's myriad and significant positive impacts across environmental, social, human, and economic domains.

The integrated approach at the heart of TCA and used throughout this process enabled us to uncover hidden systems interconnections and reveal the true value of the BoH in both monetary and non-monetary ways. This not only illustrates the power and potential of more holistic and inclusive measurements, but also shows how TCA can be applicable for all kinds of organizations – relevant to businesses, food banks, farmer cooperatives, research facilities, and others. This flexibility and scalability underline the value that TCA offers to organizations across the board.

By focusing on existing and diverse qualitative data for early-stage assessments of positive impacts, the TCA approach enabled us to work in collaborative partnership with the BoH. We know that the TCA assessment process was challenging but generative for all. Participating BoH were pushed beyond their usual evaluative approaches and data, and encouraged to think about their work in more holistic and systematic ways than before. For most, undertaking a full cost accounting exercise that factors in negative externalities alongside the positive for a holistic picture of how their initiatives operate requires more time and funding support to facilitate additional and scientific data collection.

The analysis as a whole revealed a variety of impact pathways that could be used in the future by others. Insights gleaned from the TCA assessments also demonstrate how established policies, regulations, and corporate models can be challenged. However, to further accelerate food systems transformation, we need national and global policy efforts to recognize the inextricable links between healthy people, healthy societies, and a healthy planet. For policymakers, the BoH serve as inspiring evidence that food systems transformation has already begun. The centrality of food systems transformation to building resilience and sustainability across multiple systems has never been more apparent.

To further catalyze transformation across food systems, policymakers must initiate deeper TCA assessments – ensuring that both the negative and positive externalities are made visible and factored into decision-making. With this full picture of information, they can enact policy that responds to a full picture of data – whether that's the need to ensure environmentally positive food chains, to enable sustainable practices, or to implement programs that guarantee access to sufficient, nutritious, sustainable, and affordable food.

For funders and researchers, there's a clear and urgent need for finance to be redirected toward enabling holistic, transdisciplinary, and inclusive ways of understanding food systems. More must be done to build policies and processes that involve diverse voices, ensure meaningful dialogue, and promote transparency.

More must be done to build policies and processes that involve diverse voices, ensure meaningful dialogue, and promote transparency.

Ultimately, all BoH participating in this project present powerful evidence that food systems transformation is possible. Through the lens of TCA, it's clear that solutions and tools grounded in systems-thinking must be applied to understand all the interrelated economic, ecological, and social drivers of today's food systems. Without this systemic approach, we can never expect to fully understand the dynamics that shape food systems, the broader environments in which they are formed, and the change that is possible – and within reach.

The pandemic has shown our collective capacity both to change and to take urgent action. Let's capture this momentum to apply holistic, integrated methodology to our understanding of food systems and drive real movement toward transformative change.

NOTES

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The Global Alliance is a strategic alliance of philanthropic foundations working together and with others to transform global food systems now and for future generations. We believe in the urgency of transforming global food systems, and in the power of partnership to effect positive change. Food systems reform requires new and better solutions at all scales through a systems-level approach and deep collaboration among philanthropy, researchers, grassroots movements, the private sector, farmers and food systems workers, Indigenous Peoples, government, and policymakers.

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