CASE STUDIES: EXPLORING AN AGROECOLOGICAL APPROACH TO AGRI-FOOD SYSTEMS IN TANZANIA

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About this paper

The Southern African Faith Communities' Environment Institute (SAFCEI) commissioned a series of research papers focused on agroecology in South Africa, Tanzania, Zimbabwe and Zambia. This paper provides an overview of the state of the agri-food system in Tanzania and the potential provided by an agroecological framework as a response to current challenges of ecosystem degradation, climate change and malnutrition. SAFCEI aims to use this work to further deepen its understanding of the linkages between climate and food justice in Africa and to support the generation of advocacy material and practical recommendations it can offer to its members.

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CONTENTS

ACRONYMS

AFSA	Alliance for Food Sovereignty in Africa
FAO	Food and Agriculture Organization
HLPE	High Level Panel of Experts on Food Security and Nutrition
PGS	Participatory Guarantee Systems
SAFCEI	Southern African Faith Communities' Environment Institute
SAT	Sustainable Agriculture Tanzania
TARI	Tanzania Agriculture Research Institute
TOAM	Tanzania Organic Agriculture Movement
URoT	United Republic of Tanzania

EXECUTIVE SUMMARY

Tanzania is one of 12 mega-diverse countries in the world, home to an incredible array of plant and animal life. This richness is rapidly disappearing because of the damage done to ecosystems by the spread of industrial development and agriculture.

The industrial agri-food system, supported by the Tanzanian government, has not delivered on its claims that this model can feed the hungry and raise the incomes of the rural poor.

More than 50% of the population is either moderately or severely food insecure and malnutrition is widespread. The focus on modernisation of the agri-food sector has resulted in concentrated ownership of the formal seed and agri-inputs sectors – for the most part by multinational corporations. Even the Tanzanian government acknowledges that the promotion of 'modern' seeds within the industrial model has resulted in the steep decline in availability of farmer seed varieties. It is these varieties that will be able to adapt to climate change, the impacts of which are already being felt in Tanzania.

'Fixing' the industrial agri-food system is not possible through piecemeal efforts. There needs to be a holistic overhaul of the system that places producers and consumers at the heart of it. groecology provides such a system, in that is a holistic framework for farming and food systems that extends towards transform economic and social relations.

This paper uses two case studies (Sustainable Agriculture Tanzania (SAT) and Tanzania Organic Agriculture Movement (TOAM)) to illustrate how agroecology acts as a lever towards a transformed and sustainable food system. There is a focus on education and training as an enabler of success.

Key findings

- Food system training must go further than production practices to address education and information needs of a range of stakeholders. It must focus on farmers to build production ability and capacity to advocate for themselves. It also needs to focus on consumers to build awareness about the need for an agroecological food system – and thereby build the market. And it must focus on policymakers to enable them to understand how agroecology can contribute towards solving critical problems, like climate change, rural poverty and hunger.
- Food system training must include content on market and value chain linkages, providing either direct support to producers to enter these markets or support in setting up the mechanisms (such as PGS or cooperatives) that will build agency and collective bargaining power.
- Food system training must focus on bringing women (primary producers of nutrition in Africa) into a space in which they can create sustainable livelihoods and play an active role in transformation of the agri-food system.

1. INTRODUCTION

Tanzania in East Africa is home to about 63 million people, up to 80% live in rural areas and are dependent on agriculture for sustenance and livelihoods. It is one of the most biodiverse countries in the world, although ecosystems (forests, water bodies) are degrading fast.

There are more than 7 million smallholder farms in Tanzania (Food and Agriculture Organization [FAO], n.d.) producing mostly food crops on about 5.1 million hectares of land (Tanzania Invest, 2022). And millions more people survive on subsistence farming. In contrast, there are between 1 000 and 2 000 large-scale commercial farms in the country, each farming about 1 100 hectares or more (Tanzania Invest, 2022).

The government actively promotes the industrial agricultural model, with a focus on staple and cash crops (maize, rice and sugarcane) (International Trade Administration, 2021).

Food insecurity and malnutrition persist despite many policies, projects and plans focused on alleviating poverty, climate change and hunger.

The industrial agri-food system model, which is being supported by the Tanzanian government, is characterised by natural resource extraction, concentrated market power, high use of external inputs, and globalised supply and distribution chains.

Key outcomes at the global level have been climate change, growing rural poverty, soil degradation, poor health, loss of biodiversity (Wezel et al., 2020), deforestation at scale (reducing the Earth's ability to sequester carbon), water scarcities and high levels of greenhouse gas emissions (FAO, 2018).

There is an urgent need for transformation within the agri-food system to enable it to deliver nutritious and affordable food for all, while not harming the planet. SAFCEI calls for agricultural systems that work with and not against nature, that build resilience to climate change and that are socially just. It therefore supports the adoption of agroecology as a framework for agri-food systems in Africa.

This paper provides an overview of the current state of Tanzania's agri-food system and positions agroecology as a suitable framework for the country. It uses two case studies to highlight the potential of agroecology to act as a transformative lever for system change because it acts at multiple levels – production, social and economic – and is at its core an emancipatory approach focused on building the agency of food producers and consumers.

There is a particular focus on the role of training in the transition to a sustainable agri-food system. Both case study organisations provide training, among other offerings.

2. CHARACTERISTICS OF TANZANIA'S AGRI-FOOD SECTOR

2.1 Status of base of production

Healthy ecosystems are the basis of a healthy agri-food systems. Tanzania is home to a staggering amount of biodiversity – more than a third of the total plant species on the continent and about a fifth of its large mammals (United Republic of Tanzania [URoT], 2015). It is one of 12 mega-diverse countries in the world (URoT, 2015).

Agriculture – crop and livestock farming and fisheries – contributed 65% to the GDP in 2015, 60% of export earnings and provided livelihoods for more than 80% of the population (URoT, 2015). By 2015, Tanzania had lost a third of its key ecosystems: more than 50% of rivers, lakes and dams are degraded and the country is likely to completely lose its forests by 2080 if current rates of deforestation (about 400 000 hectares a year) continue (URoT, 2015). Primary drivers of degradation and biodiversity loss are agriculture and infrastructural development (URoT, 2015). Secondary drivers are overexploitation of natural resources, pollution, invasive alien species, mining of oil and gas and climate change, among others (URoT, 2015).

Agricultural development causes the degradation, fragmentation and destruction of habitats and ecological corridors and it negatively affects water availability and quality (URoT, 2015).

The herbicides and pesticides encouraged in the industrial agriculture model find their way into the soil and water bodies, harming wildlife and ecosystem functioning (URoT, 2015).

The promotion of hybrid, 'modern' seeds over the highly varied indigenous and farmer seeds has resulted in a steep decline in crop diversity (URoT, 2015) – with consequences for nutritional security in coming years.

2.2 Overview of market dynamics

Tanzania went through structural adjustment programmes because of loan conditionalities imposed by the World Bank and the International Monetary Fund in the 1980s (Eskola, 2005). Regulation of input and output prices was undone, public enterprises were restructured and government intervention in the agri-food sector limited to make way for private companies (Eskola, 2005).

Tanzania did not generate the expected benefits from this, and smallholder producers were marginalised (Eskola, 2005). A 1998 study noted that "farmers are growing more crops, risking more in marketing them, spending more in cultivating them, and earning less from their sale" (Eskola, 2005). The formal national markets and the export market are dominated by large-scale actors (Eskola, 2005).
The input supply market in Tanzania is predominantly privatised and controlled by a few actors. About 80% of the formal seed supply is from private companies, and 85% of that is imported (AECF, 2016).

Bayer-Monsanto, Pannar, Pioneer and Seed Co. are present in Tanzania – Seed Co. is the only regional company, the others are multinational corporations (AECF, 2016). These four each held about 25% of market share in 2016 (AECF, 2016). They focus on breeding seed for maize and other commercial crops – the seeds are mainly hybrids (AECF, 2016).

Regarding fertiliser, private companies were allowed to enter the market post-1994 and today it is almost entirely privately owned (AECF, 2016). Most of the fertiliser used in the country is imported and the sector is controlled by three large agribusinesses – Yara Tanzania (more than 50% of market share), Export Trading Group and Premium Agro (roughly 25% each) (AECF, 2016). Most agrichemicals used are imported by private companies (AECF, 2016). While most Tanzanians still buy most household goods, including food, from family-owned shops (dukas), supermarkets are gaining in popularity, particularly in the bigger urban areas (International Trade Administration, 2021).

2.3 Outcomes of the system

Hunger and malnutrition

In 2019, Tanzania was ranked 95th out of 117 countries by the Global Hunger Index at levels classified as serious (Borgen Project, n.d.). Just more than 56% of the population is either moderately or severely food insecure (SAFCEI, 2021). And almost 30% of infants up to 23 months do not consume any fruit or vegetables (SAFCEI, 2021).

About 31% of children under the age of five are stunted (SAFCEI, 2021) and malnutrition is responsible for a third of all deaths of children under five years of age (Borgen Project, n.d.). Malnutrition is also an outcome of poor water and sanitation infrastructure and an inadequate medical sector, in terms of sufficient medical supplies and properly trained healthcare workers (Borgen Project, n.d.). Rural families are affected more by undernourishment, particularly during the dry season (Borgen Project, n.d.).

Less resilience to climate change

The impacts of climate change are increasingly being felt in Tanzania, which puts further pressure on biodiversity and ecosystem functioning (URoT, 2015). These include more severe and recurrent droughts resulting in declining water levels in lakes and dams, and in lowered crop yields (URoT, 2015). Annual rainfall has decreased by 2.8 millimetres/month on average each decade since 1960 (SAFCEI, 2021). And average annual temperatures have grown by 1% in the same time period (SAFCEI, 2021). There are significant risks for food production and human health (SAFCEI, 2021).

Tanzania's National Adaptation Programme of Action has identified 72 priority projects, mostly focused on agriculture and water resource management (United Nation Development Programme, n.d.). What is needed is a holistic approach to the agri-food system that purposely works towards making the system inclusive, equitable and capable of delivering nutritious food for all.

3. AGROECOLOGY AS A TRANSFORMATIVE RESPONSE

There are varied understandings of agroecology but at its heart it is a holistic, contextual and sustainable approach to agricultural management that also aims to bring about social equity. There are 10 elements of the agroecological approach, decided on through a global multi-stakeholder consultation process undertaken by the FAO in 2014. These are diversity, co-creation of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy (Wezel et al., 2020). The 10 elements can be divided into contextual features (human and social values, culture and food traditions), characteristics of and practices within agroecological systems (diversity, synergies, efficiency, resilience, recycling, co-creation and sharing of knowledge), and enabling features (responsible governance, circular and solidarity economy) (FAO, 2018).

Because agroecology goes further than production practices to work at political and socioeconomic levels, it is considered a transformative approach. As a set of practices, agroecology uses natural processes to create beneficial biological interactions and synergies that enhance farming productivity while minimising damage to the environment (Wezel et al., 2020). As a social movement, agroecology provides a solution to malnutrition by delivering a greater diversity of foods with higher nutritional content and it works to make the agri-food system more equitable, inclusive and fair for both producers and consumers (Wezel et al., 2020). It also combats the effects of climate change by lowering greenhouse gas emissions (mitigation) and building more resilient farming systems (adaptation).

There an emphasis on putting the "aspirations and needs of those who produce, distribute and consume food at the heart of food systems" (FAO, n.d.:1). This means focusing on dignity, inclusion, equity and justice through building autonomy of farmers and communities, promoting the right to food and ensuring access to genetic resources (FAO, n.d.). There is a particular emphasis on creating opportunities for women and youth, ensuring that they are included in economic opportunities and in decision making (FAO, n.d.).

3.1 What would a sustainable agri-food system look like?

The elements of agroecology provide a contextual, flexible framework for the agri-food system. In particular, the system needs to (SAFCEI, 2021):

- **Encourage and support the use of local and improved crop varieties and livestock breeds** to enhance genetic diversity. This must be done in collaboration with farmers to meet their needs and to support resilience building.

- **Eliminate agrochemicals in production systems**, along with other technologies that pose a risk to human and environmental health, such as genetically modified crops and insects.
- **Focus on more efficient use of resources** to make the most of what we have and ensure that resources are available to future generations, as well as reducing farmers' dependence on corporate supply of inputs.
- **Embrace practices that conserve and enhance biodiversity**, **sequester carbon** and **ensure the availability of potable water**.
- **Acknowledge agricultural heritage systems** that foster social cohesion; this means recognising and actively applying Farmers' Rights and including farmers in co-production of knowledge.
- **Reduce the carbon footprint** of production, distribution and consumption, which will also reduce soil and water pollution.
- Actively **strengthen adaptive capacity** within communities to external shocks, including climate change.
- **Promote democratic governance** of natural resources to generate an equitable and inclusive system.

Elements of agroecology, practices and beneficial outcomes

Element	Associated practices	Beneficial outcomes
1. Diversification • Maintaining and enhancing genetic diversity of species and ecosystems • Supporting diversification of income streams	• Intercropping and crop rotation • Crop and livestock farming	• Builds adaptive capacity to external shocks, including climate, market and pests and diseases • Supports diversified income streams through sales of multiple products enabling greater financial independence • Generates greater volumes of micro- and macronutrients, contributing towards nutritional security • Farming livestock provides meat, an additional source of income and manure for composting • Supports ecosystem services such as pollination, air purification and soil health
2. Co-creation of knowledge • Enhancing co-creation and horizontal sharing of knowledge, especially through farmer-to-farmer exchange	• Promoting the inclusion of agroecology in educational curricula at all levels • Developing capacity for systems thinking to cope with an increasingly complex world • Participatory, farmer-led research • Needs-based academic research	• More holistic understanding of agri-food systems • Farmers and their needs elevated rather than marginalised
3. Synergies • Putting in place systems that enhance synergies (positive ecological interactions) • Enhancing complementarities in agro-ecosystems	• Using natural features (hedges, ponds, flowers, etc.) to perform functions such as windbreaks, pest deterrents, pollinator attractors.	• Reduces input and infrastructural costs
4. Efficiency	• Nutrient recycling by planting leguminous crops to fix nitrogen and other crops and flowers with nutrient-fixing or depositing characteristics. • Water recycling	• Saves costs • Saves on resource use, particularly external resources
5. Recycling • Using local, renewable resources • Making closed loop cycles	• Using animal manure with biomass and green manure to make compost instead of buying in fertilisers	• Cuts down on use of external resources, and thus costs • Helps to support closed loop systems
6. Resilience • Designing the farm to protect from extreme events	• Using permaculture design principles incorporating hedges, trees and natural windbreaks	• Helps to weather external shocks and enable continued production

Element	Associated practices	Beneficial outcomes
7. Human and social values	• Social values and diets: food systems based on the culture, identify, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets • Fairness – support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers – fair trade, fair employment and fair treatment of intellectual property rights	• Enables shorter supply chains built on trust and transparency
8. Culture and food traditions	• Growing local and indigenous crops • Celebrating the culture in agri-'culture'	• Enables food sovereignty and reclamation of autonomy
9. Responsible governance • Strengthen institutional arrangements to improve recognition and support of family farmers, smallholders and peasant producers as sustainable managers of natural and genetic resources	• Democratic decision-making processes • Membership of a PGS or other networks that elevate the voices of farmers	• Inclusive, democratic governance mechanisms • Support for local and regional food systems • Contextual and varied governance systems that are fit for purpose
10. Circular and solidarity economy	• Encourage social organisation and greater participation in decision-making by food producers and consumers to support decentralised governance and local adaptive management of agricultural and food systems • Enable proximity and confidence between producers and consumers through fair, short distribution networks and re-embedding food systems into local economies	• Shorter and cleaner value chains • Diversified markets • Higher incomes for producers

Source: FAO 2018; Wezel et al. 2020

The High Level Panel of Experts (HLPE) on Food and Nutrition advise that there are cross-cutting elements necessary for large-scale transformation of the food system. These are inclusive and participatory forms of innovation governance, information and knowledge co-production and sharing among communities and networks, and responsible innovation that steers innovation towards social issues (HLPE, 2019).

3.2 Agroecology in Tanzania

Agroecology is an appropriate framework for the agri-food system in Tanzania because it speaks to poverty alleviation, nutritional and food security and climate change – some of the country's biggest challenges. There are many agroecology-specific programmes and projects being undertaken in Tanzania, some even involving or being driven by the government.

In Makete district, to the south-west in Tanzania in the highlands, the Department of Agriculture works with six villages to support the adoption of agroecological practices to rehabilitate farmland (Alliance for Food Security in Africa [AFSA], 2021).

The region experiences intense rainfall that damages crops and causes soil erosion and degradation (AFSA, 2021). The project focuses on working with nature – farmers were supported in building Fanya Chini terraces – ditches that curve along the top of ridges and that catch the rain before run-off down the hills can reach crops (AFSA, 2021). The water soaks instead into the soil, raising the moisture content. Grasses are planted along the ridges. This slows down the water, reducing soil erosion and it provides fodder for livestock (AFSA, 2021).

The project taught farmers additional terracing techniques enabling them to create level beds on the hills (AFSA, 2021). Farmers note that yields have almost doubled, and they can now access land previously not suitable for cultivation (AFSA, 2021).

There is an Agroecology Hub in Tanzania project, led by Sokoine University, that undertakes multi-disciplinary, demand-led research that aims to help enhance livelihoods and environmental sustainability in rural communities using the principles of agro-ecological intensification (Sokoine University, n.d.). The project is funded by the McKnight Foundation.

The Tanzania Alliance for Biodiversity is an alliance of private sector and civil society organisations that work on issues of biodiversity conservation, farmer seed systems and agroecology (FAO, n.d.). The alliance is a member of AFSA and participates in various campaigns that promote farmer autonomy and food and seed sovereignty (FAO, n.d.).

The demand for agroecologically produced products is growing in Tanzania. This market is supported by the government, which has adopted the East African organic label Kilimohai to provide assurance of sustainable production (SwissAid, 2020).

4. A FOCUS ON TRAINING AS ENABLERS OF A TRANSITION

The co-creation and sharing of knowledge play a key role in the agroecological movement. Multiple paradigms of knowledge are acknowledged in agroecology – lived experience, indigenous knowledge and needs-based scientific/academic knowledge. There is an emphasis on co-creation of knowledge with the farmer playing a central role and a range of approaches are endorsed. These range from farmer-led participatory research to farmer field schools and farmer-to-farmer exchange, among others.

Agroecological training extends beyond production to also encompass political and social movement building. La Via Campesina (n.d.:1) notes the importance of technical and political training because the "strength of change lies in the peoples' level of awareness and degree of organisation". The organisation notes that agroecology must 'permeate' the agri-food system's value chain to enable outcomes of "solidary, autonomy, popular agrarian reform, work, income and thus food sovereignty" (La Via Campesina, n.d.:1).

La Via Campesina (n.d.:1) notes that people must be able to "critically interpret reality to transform it". Transformational responses to current challenges are framed as seed, nutritional and food sovereignty – the right for a person/community to determine what they eat, and how it is produced, marketed and exchanged.

This notion of building the ability to critically interpret reality – to aid transformation – is applicable to all stakeholders in the agri-food system.

The FAO (n.d.) notes that agroecology education is critical for policymakers, consumers, researchers and farmers. Policymakers need agroecological knowledge packaged in a way that is accessible by and useful for them. The FAO (n.d.) notes that sharing of knowledge and experience among policymakers should be encouraged.

Research within the agroecological model must be needs-based and preferably led by farmers (FAO, n.d.). Consumers are key to the transition as their choices determine the 'value' placed on outputs from different production systems (FAO, n.d.).

Training of this nature – that spans production and political/economic/social factors – tends to happen outside of government and is instigated and managed by donor organisations or self-organised farmer groups. Some examples of the latter are African agroecology 'schools' associated with La Via Campesina, like the Mozambique Peasant School that has worked with more 1 200 lead farmers on production aspects, peasant seed systems and how to withstand land grabbing (Via Campesina, n.d.). In South Africa, the Landless Peoples Movement and Agrarian Reform for Food Sovereignty Campaign use self-developed publications focused on seed saving, land occupation and agroecological production (Via Campesina, n.d.).

The Zimbabwe Small Holder Organic Farmers Forum works with the Shashe Agroecology School to disseminate agroecological learning through horizontal learning (Via Campesina, n.d.). And Mtandao Wa Vikundi Vya Wakulima Tanzania trains farmers as leaders to "defend the economic, social, cultural and political interests of Tanzanian peasants" (Via Campesina, n.d.:1).

Neither agroecology nor organics is mentioned in the Tanzania Agriculture Research Institute's (TARI) (2019) strategic plan to 2024/25. Instead, the focus is aligned to the country's National Development Policy and the Ministry of Agriculture's strategic priorities of commercialisation, modernisation, productivity and food security (TARI, 2019).

The Tanzanian government noted in 2021 that limited access to extension services was a significant deterrent to the growth of the agricultural sector (Taylor, 2021). But even if full capacitated, it is the type of knowledge that extension officers would share with farmers that is important.

Against this backdrop, the case studies that follow are used to illustrate how agroecological training can act as a transformative lever of change. They were selected as case studies as both are institutions that intervene in the agri-food system at multiple levels focusing on multiple stakeholders in the agri-food sector.

5. CASE STUDY: SUSTAINABLE AGRICULTRURE TANZANIA(SAT)

5.1 About SAT

Tanzania, as with many African countries, is caught in a cycle of environmental destruction that causes food insecurity, poverty and malnutrition, which then drives further environmental destruction in efforts to support livelihoods. SAT (2020) notes that "Our interventions start exactly at the core of the vicious circle, by transforming farming methods. In our understanding, agriculture is the core pillars of society and life in Tanzania. Therefore, we work face-to-face with farmers, acknowledging their experiences, communities and local knowledge".

SAT works out of Morogoro, a city in the eastern part of Tanzania 196 kilometres west of Dar es Salaam. This non-profit organisation employs a multi-faceted approach to realise its vision that most farmers in Tanzania are "using agroecological methods to improve their livelihoods, conserve the environment and reduce pressure on natural resources" (SAT, 2022).

The organisation derives income from own activities as well as from funders for specific projects. Janet Maro, SAT's CEO of Programmes, notes that "with growing organic demand in the country, more farmers will join us in protecting Tanzania's soil, water and biodiversity" (Maro, 2021).

5.2 How SAT works

SAT works across four strategic pillars to realise its vision: knowledge dissemination, application and marketing, research and networking. It makes interventions through programmes and projects that attempt to holistically address farmer challenges and bring about an equitable, inclusive and sustainable agri-food system in Tanzania. It collaborates with farmers, research organisations, academia, NGOs, government and other relevant stakeholders to deliver a diverse range of projects.

5.3 The SAT model as a transformative lever of change

SAT's approach to its work embodies the 10 elements of agroecology determined through the FAO's global multi-stakeholder consultation process of 2014. These are diversity, co-creation of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy (Wezel et al., 2020).

Their approach is transformative in that the projects they initiate and support work across the three categories of the agroecological elements defined by the FAO (2018) as contextual features, characteristics of and practices within agroecological systems, and enabling features. Its work also supports the elements identified by the HLPE as necessary for large-scale transformation of the agri-food system.

These elements are inclusive and participatory forms of innovation governance, information and knowledge co-production and sharing among communities and networks, and responsible innovation that steers innovation towards social issues (HLPE, 2019).

In addition, the SAT model aligns with the FAO's (2018:2) understanding of why agroecology is a transformative approach in that it uses "bottom-up and territorial processes, helping to deliver contextualised solutions to local problems. It builds the autonomy of producers, drawing on their knowledge and on science to generate an agri-food system capable of delivering social and environmental benefits."

5.4 Overview of key intervention areas

This case study describes selected SAT programmes and projects that speak to agroecological transformative levers of change. The information used is drawn from a review of online sources. The description of programmes and projects is aligned with the four strategic pillars identified by the organisation as key to their success.

Knowledge dissemination

SAT engages with farmers groups in their villages using demonstration sites to showcase the benefits of agroecological production. Group leaders (lead farmers, multipliers) are encouraged to share the knowledge gained with the rest of their communities – youth and the elders.

Knowledge dissemination is not restricted to farming practices but goes further to include entrepreneurial skills and an introduction to a saving and lending culture. The latter supports the emergence of new solidarity economies, a key element in agroecology.

SAT also offers short courses on agroecological practices at a dedicated Farmer Training Centre located on an 80.9-hectare farm. And it co-produces a farmer magazine Mkulima Mbunifuin Swahili that offers practical information about agroecological farming methods that reaches about 45 000 farmers. The organisation hosts an Innovation Platform that shares co-created contextual agroecological knowledge. It does this by bringing farmers together to demonstrate and practice agroecological principles working through a core network of 70 groups drawn from 50 villages. The knowledge presented or generated is refined and made accessible to a broader community comprising over 50 000 farmers as well as public and private stakeholders.

Key elements are the emphasis on face-to-face training, use of lead farmers (or knowledge multipliers) for further dissemination, production of knowledge products (the magazine) in the local language, and active co-creation and sharing of knowledge – both indigenous, local and scientific. The category of characteristics and practices encompasses diversification, synergies, efficiency, resilience, recycling and co-creation and sharing of knowledge (FAO, 2018).

SAT's first strategic pillar of knowledge dissemination speaks to all of these as agroecological production practices (intercropping, multi-cropping, water harvesting, composting, etc.) are embedded in their training courses. And the Innovation Platform, local-language magazine and use of multipliers speaks to the element of co-creation and sharing of knowledge.

Application and marketing

SAT works through the value chain encompassing agroecological production, processing, packaging, marketing and awareness raising with consumers. In this way, it can demonstrate the benefits of the agroecological approach and put its philosophy into practice.

SAT supports its farmers in gaining organic certification working through PGS. PGS is an inclusive, transparent and accessible way for smallholders to 'certify' their produce as organic.

A PGS comprises farmers, consumers, retailers and other interested parties that collectively inspect the farm against agreed upon organic standards to provide assurance that standards have been met. It not only provides this assurance to market but is also a vehicle for empowering farmers, enabling shorter market linkages and capacitating farmers to engage with local governments. To date, 12 groups of 300 smallholder farmers have been certified through their PGSs against the East African Organic Product Standards.

This enables them to reach markets such as hotels and restaurants, as well as urban retail markets. To further support market access, SAT opened an organic food store in 2012 to help develop a local organic market in Tanzania. The shop provides a market for PGS-certified produce that is sold at an affordable price. It also acts as an awareness-raising site about organic cultivation. The intention was to also gain access to dedicated market space through the Morogoro Municipality from where farmers could sell organic produce direct to consumers.

SAT's approach therefore extends beyond production to focus on farmers' key challenge of market access and the need to grow incomes. It also encourages the building of circular and solidarity economies.

Research

Collaborative, multi-disciplinary research is undertaken with farmers and universities focused on real-world challenges and possible solutions. SAT facilitates access to agroecological farmers, and it conducts research on its demonstration farms to provide scientific evidence of the benefits of the agroecological approach. The results of all studies are taken back to the farmers.

The significant contribution made through this model is the focus on farmer-led and participatory research methods. This helps build the autonomy and agency of producers.

Networking
SAT shares the experiences of farmers at national and international workshops and conferences – sharing stories of both successes and challenges. SAT also brings together different stakeholders in the agri-food system – farmers, government, non-governmental organisations, and other relevant actors – helping to build strong knowledge exchange and support networks.

5.5 A focus on cross-cutting issues

The organisation also focuses on cross-cutting issues such as gender, climate change and conflict. The following programmes illustrate the potential of an agroecological approach to transform social relations and to build resilience to climate change in an equitable manner. They speak to the categories of contextual features, which encompasses agroecological elements of human and social values and culture and food traditions, as well as the category of enabling features, which includes responsible governance and circular and solidarity economies.

Dodoma's Women in Agriculture and Business Initiative
This initiative provides practical production training to women, along with entrepreneurial skills development. The project aims to improve nutritional and food security of women and grow their incomes. These women's access to capital is enabled through saving and lending groups. It is not just food that the project focuses on; women are also producing sweets made from baobab, soaps and batik cloths. Women are also supplied with mobile phones so that they can access market information.

Farmers & Pastoralists Collaboration
SAT works collaboratively with other organisations to support the Farmers & Pastoralists Collaboration. The goal is help farmers and pastoralists create thriving circular economies that benefit both groups and which reduce conflicts driven by competition over land – for crop production or livestock grazing. A circular economic model focused on recycling, efficiencies and synergies could "build on collaboration rather than segregation".

Benefits for both groups are strengthened climate resilience, enhanced access to better nutrition, increased incomes and reduced instances of conflict.

The project aimed to benefit 2 850 farmers and pastoralists over two years – 2017 to 2019. Farmers are trained on organic cultivation of seasonal crops and pastoralists on sustainable livestock keeping. Farmers gain access to SAT-owned machinery and services, including tractors, maize shelling machines and trailers. They are also able to submit their harvests to the Farmer Training Centre where produce is processed and sold, with residues offered to the pastoralists for animal feed. In turn, pastoralists can offer manure for composting by the farmers. Better fertilised plots support higher yields, which, in turn, provides for more animal feed. This can boost milk production generating higher incomes.

SAT Holistic Group Ltd.
SAT established a new social enterprise – SAT Holistic Group Ltd. – in which the smallholder farmers they work with can also be shareholders. This enterprise connects 3 500 farmers to local land international organic markets by creating incentives along the value chain for sustainable production, processing and marketing.

FairCarbon4Us
SAT has piloted an innovative carbon credit programme that is localised, equitable and transparent.The programme provides training and direct payments for planting and caring for trees. The trees are suitable for the local context and chosen for their ability to improve the soil and enhance biodiversity. Since inception, the project has trained and made payments to more than 100 smallholder farmers in the Uluguru mountains. In 2020, 4 450 trees of 16 different species were planted; to date, 17 783 trees have been planted and cared for through this programme. Some of the downfalls of these types have projects – no direct benefits to the farmer and inappropriate tree selection – are avoided through the FairCarbon4Us approach.

Building capacity in the larger system
It is not enough to educate farmers directly about the benefits of agroecological production as the broader policy and educational environment play a key supportive role in the type of agriculture practiced in the country. SAT offers support for curriculum implementation for training institutes in collaboration with the Ministry of Agriculture through the Division of Training, Extension Services and Research. This division oversees curriculum implementation in agricultural training institutes.

5.6 Successes to date

SAT's multi-faceted approach to encouraging the adoption of agroecological approaches has been successful. In 2020, SAT reports that:

- Farmer incomes have grown by 38% because of increased production.
- 61% of farmers note that they spent less money on inputs.
- 76% of farmers report they have a more nutritionally balanced diet.
- 50% of farmers note they have access to new markets.

There are also clear benefits to the environment. In 2020, SAT reports:

- 91% of farmers report using erosion control measures, up 61% from prior to training.
- Farmers that have been practising these approaches for a while note a 59% reduction in water use.
- 95% reduction in slash and burn practices over the past decade.

SAT worked with about 18 000 farmers in 2020, 70% were women. About 1 300 people attended 41 different courses at the Farming Training Centre, 1 023 farmers were certified organic under PGS, SAT worked with 29 agricultural training institutes and constructed 16 demonstration gardens.

6. CASE STUDY: TANZANIA ORGANIC AGRICULTURE MOVEMENT (TOAM)

6.1 About TOAM

TOAM is a voluntary association that registered as a non-governmental organisation in 2005. It is the sector body for the organic movement in the country. TOAM aims to coordinate and support the development of the sector throughout the value chain. It promotes organics as a key determinant of sustainable livelihoods in Tanzania (Kilimohai, 2022).

6.2 How TOAM works

The 115 members span farmer associations and cooperatives to organic companies, institutions, researchers, faith-based organisations and trainers. The vision is to "establish a vibrant, sustainable, and mutually beneficial organic sector in Tanzania" through building capacity on organic practices, supporting participation in quality management systems (such as PGS), advocacy for appropriate policies, and collecting and sharing relevant knowledge (Kilimohai, 2022).

TOAM works through partnerships to implement on-the-ground projects with smallholders with the aim of promoting farming methods that improve livelihoods while building adaptive capacity to climate change and preserving the environment and biodiversity.

6.3 The TOAM model as a transformative lever of change

TOAM works at multiple levels (production, policy and consumption)

with a broad diversity of stakeholders to bring about the necessary change on the ground and within government. Its programmes and projects – delivered in partnership with relevant stakeholders – align with the FAO's (2018) clusters of agroecological principles – contextual, characteristics of and practices within agroecological systems, and enabling features. And its work aligns with the HLPE's (2019) indicators of levers of change for large-scale transformation of the agri-food system – inclusive, participatory forms of governance, information and knowledge co-production and sharing, and responsible innovation that also focuses on social issues.

6.3 The TOAM model as a transformative lever of change

SAT's approach to its work embodies the 10 elements of agroecology determined through the FAO's global multi-stakeholder consultation process of 2014. These are diversity, co-creation of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy (Wezel et al., 2020).

Their approach is transformative in that the projects they initiate and support work across the three categories of the agroecological elements defined by the FAO (2018) as contextual features, characteristics of and practices within agroecological systems, and enabling features. Its work also supports the elements identified by the HLPE on Food Security and Nutrition as necessary for large-scale transformation of the agri-food system.

6.4 Overview of key areas

This case study provides an overview of selected TOAM programmes and projects that align with agroecological transformative levers of change. The information is used from their organisational website and online sources. This section describes programmes and projects under the four action pillars described by TOAM.

Building capacity on organic practices

TOAM provides a series of courses on organic agriculture. A beginners' course focuses on the broader picture of agriculture in Africa, its potential and challenges. There is a focus on food sovereignty and the use of local seed varieties, as well as training on establishing and managing an organic nursery. An intermediate course goes deeper into organic agriculture principles and practices, with a focus on soil fertility and pest and disease management, as well as organic technologies and post-harvest processes.

Quality management systems

Building collective systems is an important part of agroecological principles and TOAM does this through training on organic assurance models. This includes internal quality management systems that enable producers to self-inspect and monitor their production cycles and systems and how to enter organic value chains.

This is viewed as a step towards third-party certification, which would support entry into export markets. Training is also provided on PGS, a democratic and transparent model that also include other value chain actors – consumers and retailers, for example. PGS standards align to the East African Organic Products Standards. Participants in the training go on to set up a PGS or internal control system.

Advocacy for supportive policy
TOAM acts as a platform of organic stakeholders to elevate their voices in decision-making circles – such as government – and to boost the sector's influence in training, research and extension sectors. TOAM calls on government and the private sector for more investment into ecologically sound cropping systems, as well as associated research and extension.

Through the Organic Agriculture Climate Change Intervention for Empowering of Smallholder Farmers project, funded by Organic Denmark, TOAM strengthened the capacity of 200 smallholder farming families to advocate for themselves with government, while building community-level resilience to climate change.
Its Seeds of Freedom project, funded by the Rosa Luxemburg Foundation, advocated to government for recognition of and support for farmer-managed seed systems. Seed is a fundamental element of production, and the industrial farming model is proven to diminish the rich variety and diversity of farmer seeds. It is critical that support is provided to farmer-managed seed systems.

Collecting and sharing knowledge
TOAM generates multiple communication products, including a weekly and quarterly newsletter, a series of fact sheets on the benefits of biodiversity, agroforestry and how to make natural pesticides. These are available in English and Kiswahili. It also generates policy briefs on relevant issues for dissemination to policymakers and the broader public. It also participates in the AFSA-led Making the Case for Agroecology initiative that collects, prepares and publishes case studies of agroecological successes in Africa.

The One Stop Shop project with a national and two regional platform (Nairobi and Kampala) aims to be a comprehensive, go-to information resources on organics in East Africa and it provides a space for collective lobbying and advocacy for supportive policy. Besides providing online market and product information, the project also supports farmers' markets in each city. The project is funded by Trademark East Africa Challenge Fund.

6.5 Focus on cross-cutting issues

Gender and youth
TOAM embeds gender and youth empowerment in all programmes noting that "organic agriculture supports gender equality because it makes women's contribution more visible, offer economic opportunities, supports health, encourages biodiversity and traditional knowledge, and ensures equitable work standards" (TOAM, 2022:1).

Their approach extends beyond primary production to position women and youth as able to take advantage of the potential of processing opportunities (TOAM, 2022).

Research

TOAM supports research that provide the evidence of how organic farming can support livelihood strategies, identifying relevant value chains and how to enter the market.

Market access and value chain development

TOAM provides organic certification services – against the East African Organic Standards – to support the entry of smallholder farmers into formal markets. It helps to establish connections between producers and buyers and to support smallholders in collectively bringing produce to market to meet the demands of formal retail chains. It trains farmers on the "structures, systems and relationships that define the value chain".

TOAM works with the national organic agricultural movements (NOAMs) in Burundi, Kenya, Uganda and Rwanda to support the development of a regional market for organics.

Ecological Organic Agriculture Initiative (EOAI)

TOAM is also part of the Ecological Organic Agriculture Initiative for Africa (EOAI). Tanzania was selected as a pilot study country in 2012 and the project focuses on research, training and extension; creating awareness and knowledge of ecological organic agriculture and strengthening extension systems; and value chain and market development.

7. CONCLUSION

Both case studies illustrate how agroecology works at multiple levels to bring about change. They highlight the need to work with different stakeholders (consumers, policymakers, researchers) to help build a supportive ecosystem for production, and access to market. The need for collective forms of governance is also emphasised, along with the creating and sharing of knowledge and support for innovation that also focused on social issues.

SAT's holistic model is both scalable and replicable as it works within localised contexts, operates at multiple levels to combat on-the-ground challenges such as the need for access to markets and market information along with relevant production knowledge products, and it does so with the farmer in the centre, boosting farmer autonomy and agency over production.

TOAM's work illustrates the need to work holistically in the agri-food sector. Sustainable production practices are not enough to leverage large-scale systemic change. There also needs to be education and training at the consumer and policymaking levels to provide an enabling ecosystem for agroecological farmers. And education and training are on their own not enough either – there needs to be bottom-up collective organising of producers and consumers. PGS provides an excellent mechanism for this.

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