



AGROECOLOGY

The Bold Future
of Farming in Africa

AF SA

ALLIANCE FOR FOOD SOVEREIGNTY IN AFRICA



Tanzania Organic Agriculture Movement

"If anyone still entertained doubts as to the benefits of agroecology and as to whether it can meet the challenges of this century, this collection of essays provides a compelling answer."

Olivier De Schutter, Co-Chair of IPES-Food and Former UN Special Rapporteur on the Right to Food

"There could not have been a more opportune time to publish *Agroecology: The Bold Future of Farming in Africa*."

Hans R Herren, World Food Prize (1995) and Right Livelihood (2013) Laureate.

"It would be unscientific to ignore this evidence. The future of Africa's agriculture lies in the hands and minds of Africa's ecological farmers."

Dr Vandana Shiva, Founder of Navdanya, Author of *The Violence of the Green Revolution, Stolen Harvest, Who Really Feeds the World*.

"The evidence and case studies in this report point to one inevitable conclusion: African farmers hold the keys to unlocking the potential of agroecological farming systems for improved nutrition, livelihoods, and biodiversity."

Jennifer Astone, Executive Director, Swift Foundation

"Agroecology is the most important word no one knows: It represents a proven way of growing food that is best for people, the planet and the climate."

Anna Lappe, Small Planet Institute

*Cover Photo:
Drought resistant pearl millet for resilience.
Photo: Kerry Farrelly*

Photo: Mwanzo Millinga

AGROECOLOGY:

The Bold Future of Farming in Africa

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Ruzivo Trust, Zimbabwe
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Alliance for Food Sovereignty in Africa (AFSA) is a Pan African platform comprising networks and farmer organizations working in Africa. www.afsafrica.org

Tanzania Organic Agriculture Movement (TOAM) is the national umbrella organization for the organic sector in Tanzania. www.kilimohai.org

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“ There is an avalanche of evidence coming from almost everywhere in the world that agroecology works. ”

FOREWORD

A friend of mine said to me recently while we were talking about agroecology, “You people, you were talking about sustainable agriculture, then you started talking about organic agriculture, then ecological agriculture, then conservation agriculture and now agroecology. All talking about a farmer farming and producing food. What is the value of coming up with a new name?” Well, he is right; we have been coming up with a barrage of names. Even industry comes up with terms like agribusiness and climate-smart agriculture to confuse us all. So what is so different about agroecology and why is it that civil society organizations, governments, UN bodies, and even academicians and businesses are waving its flag?

To me, traditional agricultural practices looked mainly at producing diverse, nutritious and abundant food. They sought to take care of nature and culture while making sure that food was on everyone’s table. Agroecology also does this and more.

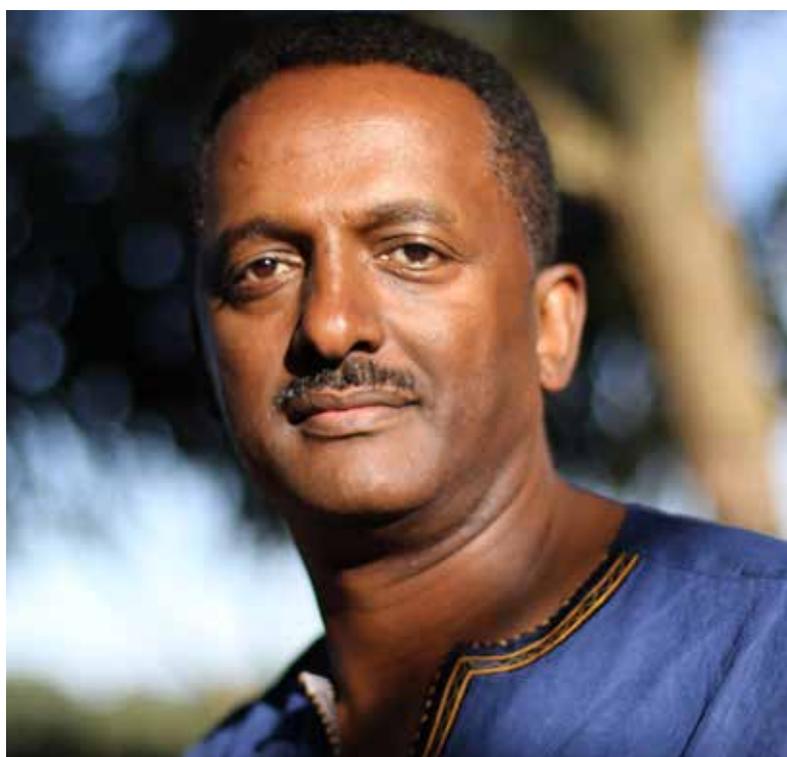
Grounded on the concept of food sovereignty, agroecology goes beyond the issue of just producing good food sustainably to confront the problems in our food system. It challenges the deliberate efforts by the food industry and its proponents to focus our thinking and actions on food production alone. It identifies the industrial food system as a key contributor of greenhouse gases and environmental degradation. The unholy trio of industry, academicians and government come up with an incredible amount of statistics to support its narrative that pumping chemicals into the soil and genetically modifying our seeds is the solution to feeding the hungry. Agroecology is a push by the people of the world back against these forces. It recognizes that correcting practices on farms is not enough; it is crucial to change the underlying political structure to bring about a better and more equitable food system for all.

There is an avalanche of evidence coming from almost everywhere in the world that agroecology works and this is Africa’s contribution to changing the narrative of industrial agriculture with evidence from the ground. We are Making the Case for Agroecology! This publication is a strong statement

by the Alliance for Food Sovereignty in Africa (AFSA) demonstrating that Africa can feed itself through caring for its environment, based on its rich cultural knowledge, supported by relevant science and technology. AFSA will continue to gather evidence for agroecology and mobilise African food producers, consumers, youth, women, faith-based organizations, and others to assert our right to food sovereignty and resist corporate control over our land, seed and food.

Million Belay PhD

Coordinator
Alliance for Food Sovereignty in Africa



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WHAT IS AGROECOLOGY?



Agroecology is deeply rooted in the ecological rationale of traditional small-scale agriculture, representing long established examples of successful agricultural systems characterized by a tremendous diversity of domesticated crop and animal species maintained and enhanced by ingenious soil, water and biodiversity management regimes, nourished by complex traditional knowledge systems.

Such complex farming systems, adapted to local conditions, have helped small farmers to sustainably manage harsh environments and meet their subsistence needs without depending on mechanization, chemical fertilizers and pesticides, or other modern agricultural technologies.

As an applied science, agroecology uses six principles (see table below) fundamental to the design and management of sustainable agroecosystems, taking advantage of natural processes and beneficial on-farm interactions in order to reduce off-farm input use and improve farm efficiency.

A key principle of agroecology is the diversification of the farming system through practices such as mixed cropping, intercropping, agroforestry, and livestock integration. These practices amplify the positive effects of biodiversity on productivity through better use of sunlight, water, and soil resources, and the enhanced regulation of pest populations. Crop diversification schemes are multi-functional as their adoption usually means favorable changes in various components of the farming systems at the same time, activating key processes such as recycling, biological control, antagonism, and allelopathy, which are essential for agroecosystem sustainability and productivity.

Agroecological systems are not intensive in the use of capital, labor, or chemical inputs, but rather in the efficiency of biological processes such as photosynthesis, nitrogen

fixation, and the solubilization of soil phosphorus; as well as the enhancement of biological activity above and below ground. The “inputs” of the system are the natural processes themselves; this is why agroecology is referred as an “agriculture of processes”.

“Agroecological systems offer promising models for healthy agriculture as they promote biodiversity, thrive without external inputs and sustain year-round yields in the midst of climatic variability.”

When designed and managed with agroecological principles, farming systems will exhibit attributes of diversity, productivity, resilience and efficiency. Agroecological initiatives aim at transforming industrial agriculture by transitioning existing food systems away from fossil fuel-based production largely for agro-export crops and biofuels towards an alternative agricultural paradigm that encourages local and national food production by small and family farmers based on local innovation, resources and solar energy. This implies ensuring the access of peasants to land, seeds, water, credit and local markets through the creation of supportive economic policies, financial incentives, and market opportunities; as well as the scaling up of agroecological technologies.

Miguel A Altieri
University of California, Berkeley

THE SIX AGROECOLOGICAL PRINCIPLES

1. Enhance the recycling of biomass with a view to optimizing organic matter decomposition and nutrient cycling over time.
2. Strengthen the “immune system” of agricultural systems through the enhancement of functional biodiversity, using natural enemies, antagonists, etc.
3. Provide the most favorable soil conditions for plant growth, particularly by managing organic matter and enhancing soil biological activity.
4. Minimize losses of energy, water, nutrients and genetic resources by enhancing conservation and regeneration of soil and water resources, and agrobiodiversity.
5. Diversify species and genetic resources in the agroecosystem over time and space at the field and landscape level.
6. Enhance beneficial biological interactions and synergies among the components of agrobiodiversity, thereby promoting key ecological processes and services.

Note: Agroecological principles take different technological forms depending on the biophysical and socio-economic circumstances of each farmer or region.



MAKING THE CASE FOR AGROECOLOGY



The need for systematic documentation of existing successful African stories of agroecology, in the context of food sovereignty, was a burning issue discussed at the inaugural meeting of the Alliance for Food Sovereignty in Africa (AFSA) in Nairobi in June 2011. Subsequently, in 2013, the network put together the Agroecology Working Group to lead the project on “Making the Case for Agroecology”.

Made up of AFSA member organizations, the Working Group was mandated to collect African case studies showcasing the economic, social, and environmental benefits of agroecology. It was also tasked to disseminate the information by putting the content into appropriate formats for various target audiences, including farming communities, policy-makers, funders, the media, consumers and schools; and setting up an online knowledge hub.

We received expressions of interest from all over Africa and appointed a panel of four international experts to assess and select the case studies. Authors submitted their case studies based on a template we provided. The case studies that were finally selected were then professionally edited and translated into French before being uploaded onto the AFSA website (www.afsafrica.org).

“ What is special about this project is that it brings together the experiences and voices of small-scale producers who actually feed Africa, for all the world to see, hear and learn from. ”

The objective of this project has been to put together a compelling, evidence-based case for agroecology as the sustainable long-term solution for farming in Africa. Over the two years since its inception, the project has collected 50 case studies from 22 African countries reflecting the positive aspects of agroecology, particularly, food sovereignty, nutrition, poverty reduction, climate change resilience, biodiversity conservation, cultural sensitivity, democracy, and justice.

In November 2015, 1,000 packs of ten case studies each were printed and launched at the FAO Regional Symposium on Agroecology in Dakar. A year later, we are proud to present this publication which showcases 15 fascinating success stories with commentaries by the world’s leading experts on agroecology.

What is special about this project is that it brings together the experiences and voices of small-scale producers who actually feed Africa, for all the world to see, hear and learn from. With a proper enabling environment including good policies and infrastructure, small-scale farmers can meet the food needs of the world in a sustainable manner, in harmony with nature. There is no room for industrial and chemical farming. Let’s continue making the case for agroecology together!

Mariann Bassey Orovwuje

Coordinator, Food Sovereignty Program
Friends of the Earth Africa

AGROECOLOGY CONTRIBUTES TO THE SUSTAINABLE DEVELOPMENT GOALS



While industrial farming claims to have raised yields, it has done so at great cost, with extensive soil damage, huge biodiversity loss, and negative impacts on food sovereignty. By contrast, agroecology offers a wide range of sustainable benefits far beyond yields. Where conventional agriculture seeks to simplify, agroecology embraces complexity. Where conventional agriculture aims to eliminate biodiversity, agroecology depends on diversity, and builds upon it. Where conventional agriculture pollutes and degrades, agroecology regenerates and restores, working with nature, not against her.

Counting the crop yield per unit area has been the basic indicator of conventional farming technology. However, it is not enough – we need to establish new ways of measuring the impact of our agricultural systems. One established benchmark against which we can gauge our progress is the United Nations Sustainable Development Goals (SDGs).

Making the Case for Agroecology

Starting from 2013, the Alliance for Food Sovereignty in Africa (AFSA) and partners have collected 50 case studies on agroecological practices from 22 African countries, with the aim of making the case for agroecology as the bold future of farming in Africa. The case studies document a diverse range of agroecological approaches, collectively involving several million farmers.¹

The Tanzania Organic Agriculture Movement, an AFSA member organisation, developed a simple checklist against which each case study could be cross-checked with the SDGs and their subsidiary targets. Agroecology was found to contribute positively to 10 of the 17 SDGs (Table 1). Notably, every case study showed a positive impact towards the goal, “End Hunger, Achieve Food Security and Improved Nutrition and Promote Sustainable Agriculture”. Positive impacts included: increased access to safe, nutritious and sufficient food; increased productivity and farmers’ incomes; sustainability of food production systems; and maintenance of genetic diversity.

“ We need to establish new ways of measuring the impact of our agricultural systems. ”

Celestino Ndungu, a farmer from Kenya explains: “Our family was very poor. We used to gather crop residues and burn them, but now we make compost which we use as fertilizer. For three years now, we have never used any chemical fertilizer or sprays. Secondly, we used to buy vegetables for our family, but today we sell vegetables, fruits and other crops for income.”

The Sustainable Development Goals



On 25th September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development, along with a set of 17 SDGs and 126 associated targets. The SDGs are a new, universal set of goals, targets and indicators that UN member states are expected to use to frame their agendas and policies over the next 15 years.

¹The full collection of case studies is freely available online at <http://afsafrika.org/case-studies/>.

Table 1. The contribution of the 50 African case studies to the SDGs

Goal No.	Sustainable Development Goals	Positive impacts recorded	
		No. of cases	% of cases
1	No Poverty	27	54 %
2	Zero Hunger	50	100 %
3	Good Health & Well Being	11	22 %
4	Quality Education	31	62 %
5	Gender Equality	17	34 %
6	Clean Water & Sanitation	14	28 %
8	Decent Work & Economic Growth	27	54 %
12	Responsible Consumption & Production	33	66 %
13	Climate Action	21	42 %
15	Life on Land	33	66 %

Two-thirds of the case studies reported positive impacts towards the goal, “Responsible Production and Consumption” through sustainable management of natural resources, reduced post-harvest losses, and reduced release of chemicals to water and soil. This is well articulated by Jones Thomson, farmer from Choma, Zambia: “As organic farmers, we have always used local plants for pest control in our family. We encourage many wild plant species to grow on our fallow land and field margins that we can use as pesticides. Many of the plants have other uses too, such as increasing soil fertility or their flowers helping to support pollinators that maximize our crop yield.”

A similar proportion of the case studies showed positive contributions towards the goal of “Quality Education”. These included: families using their increased incomes to send their children to school, farmers learning vocational skills through agroecology schools, and communities gaining knowledge and skills to bring about their own sustainable development.

Conclusions

The case studies are real-life testimonies of farmers, pastoralists, and other small-scale producers across Africa. Mapping them against the SDGs provides a useful summary showing the wide-ranging social, environmental and economic benefits of agroecology to African farming communities. Highlighting the contribution of agroecology to such an important policy framework makes a clear case for instituting cross-cutting policies that support agroecology. It is now up to policy-makers and the agricultural research community to recognise its potential to meet Africa’s sustainable development challenges.

Michael Farrelly

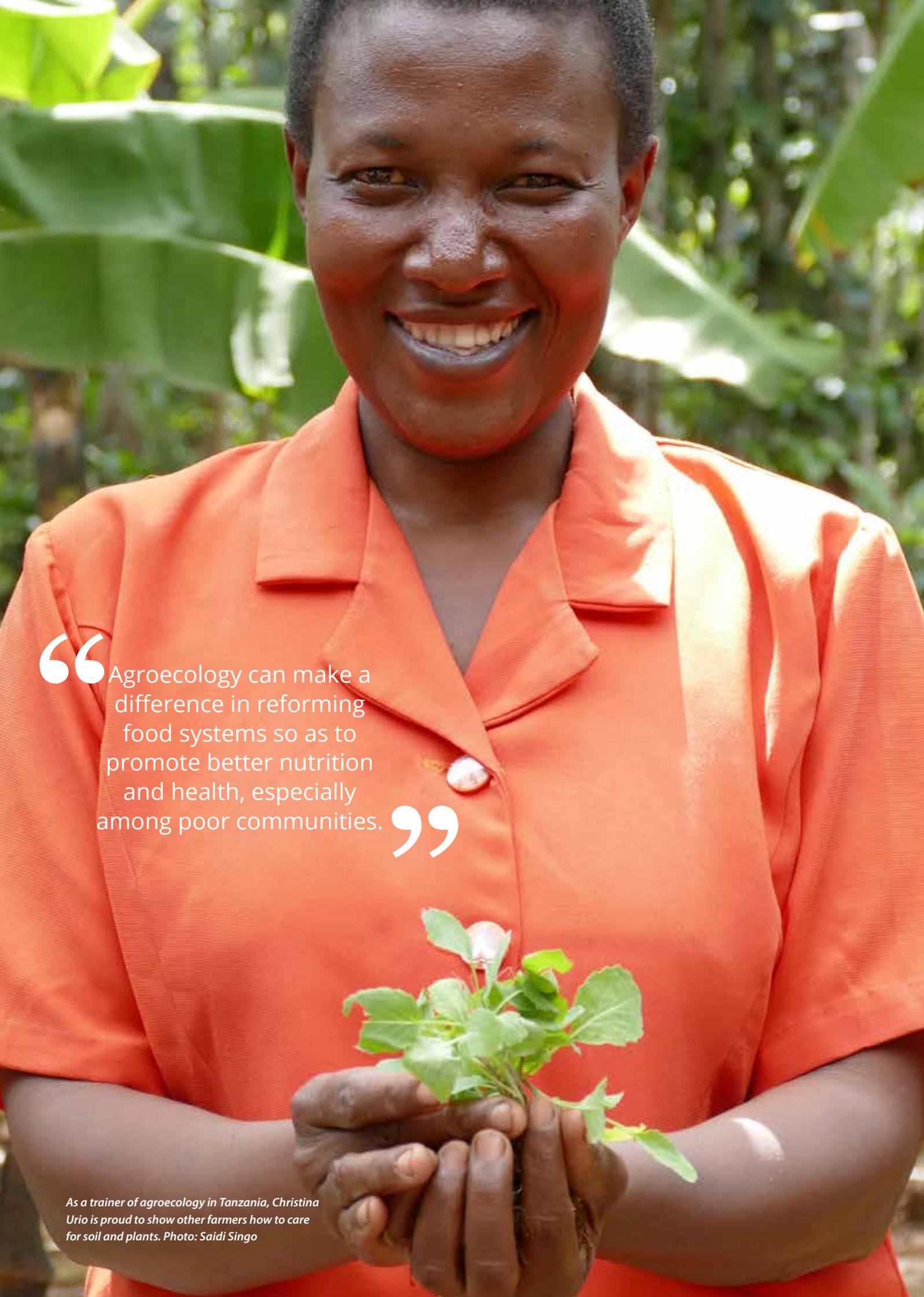
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N.B. The original version of this article was published in Farming Matters, September 2016.



“ Agroecology contributes positively to 10 of the 17 SDGs. ”

Children grow lady finger in a primary school in Dar es Salaam, Tanzania. Photo: Stephen Boustred

A close-up photograph of a woman with a warm smile, wearing a bright orange short-sleeved button-down shirt. She is holding a small, vibrant green plant with several leaves and a single white flower. The background is a soft-focus outdoor setting with large green leaves, likely banana leaves. The lighting is natural and bright, highlighting the woman's features and the colors of her shirt and the plant.

“ Agroecology can make a difference in reforming food systems so as to promote better nutrition and health, especially among poor communities. ”

As a trainer of agroecology in Tanzania, Christina Urio is proud to show other farmers how to care for soil and plants. Photo: Saidi Singo

FOOD FOR NUTRITION AND HEALTH



Introduction by: Olivia Yambi

Africa carries a large share of the global burden of malnutrition with consequences such as poor learning outcomes, poverty, reduced productivity, illness, and death. More than one-third of its children under the age of five years are stunted as a result of repeated episodes of disease interacting with prolonged inadequate food intake.¹ The rate of reduction in stunting has been slow compared to other regions and the absolute number of children affected is increasing.² Vitamin A deficiency affects 48% of children aged 6 to 59 months³, and anaemia affects between 28% and 50% of women of child-bearing age across the different sub-regions.⁴

Several countries in the region are developing and implementing multi-sectoral action plans on nutrition informed by evidence of what works, complemented by nutrition-sensitive interventions in education, water, sanitation and hygiene, and agriculture that address the underlying causes of malnutrition. Agroecology can play an important role in such multi-sectoral health and nutrition programmes.

The three case studies in this section illustrate how agroecology can make a difference in reforming food systems so as to promote better nutrition and health, especially among poor communities. These studies focus on enhancing food security at the household level, promoting dietary diversity and nutrient sufficiency, and improving livelihoods. Enhanced availability and consumption of nutritious food would not only help avert the incidence of undernourishment, but also of diet-related diseases, overweight and obesity that have started to manifest in the region.

Agroecological interventions could focus on the most vulnerable groups on whom malnutrition and ill health exert the greatest toll, for example, the provision of suitable nutrient-rich food for feeding infants following the first six months of exclusive breastfeeding.

Olivia Yambi PhD

Co-Chair, International Panel of Experts on Sustainable Food Systems (IPES-Food)

¹ *Levels and Trends in Child Malnutrition: WHO, UNICEF, World Bank Group Joint Child Malnutrition Estimates. 2016.* http://www.who.int/nutgrowthdb/jme_brochure2016.pdf?ua=1

² *Ibid.*

³ UNICEF Data: *Monitoring the situation of children and Women, update June 2016*

⁴ Steven G A et. al. *Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data: Lancet Glob Health.* 2013 Jul; 1(1): e16–e25



CASE STUDY

Orange-fleshed sweet potato brings health and livelihood to Pelungu, Ghana

Introduction

Pelungu is a dryland farming area in the Upper East Region of northern Ghana (see Figure 1), the second poorest region in the country with a mean annual household income of 616 cedis (GH¢)¹. Most of the people in Pelungu rely on the sale of crops like millet as their primary source of income, but some also sell firewood, cooked food, and animals. According to a needs assessment conducted by TRAX Program Support (called TRAX hereinafter) in July 2012, poor soil, water shortages and lack of alternative incomes are the biggest problems faced by the community.

The Project

To address the situation, a value chain development pilot project was initiated by TRAX, based in Northern Ghana, with financial support from Self Help Africa, United Kingdom. The project focused on promoting the cultivation of the orange-fleshed sweet potato by smallholder farmers in Pelungu. The project site is shown in Figure 1. The selection of the orange-fleshed sweet potato was based on qualities it possessed which could address several challenges faced by the local community.

Firstly, the project area suffers from low soil fertility. The orange-fleshed sweet potato is a crop that can grow well even on marginal soils.

Secondly, farmers have to cope with erratic rainfall and shorter rainy seasons. Traditional crops such as millet have not adapted well to these climatic changes, but the orange-fleshed sweet potato is drought-resistant and can therefore produce good yields despite poor rainfall.

Thirdly, there is widespread Vitamin A deficiency in Ghana, which is exacerbated by food insecurity mainly due to failed harvests. According to the FAO² and WHO³, three out of four children under the age of five in Ghana suffer from Vitamin A deficiency with 35% having severe deficiency. Vitamin A deficiency is the leading cause of blindness and disease in children of this age. In pregnant women, Vitamin A deficiency can cause premature death. The orange-fleshed sweet potato is a good source of Vitamin A.

Lastly, the local people of Pelungu, especially the women, have to constantly look for ways to earn income to offset the impact of poor crop yields. The orange-fleshed sweet potato can be processed into many secondary products such as bread, juice and pastry; this provides opportunities to earn income from the sale of such processed goods.

Fifty smallholder farmers (32 men and 18 women) cultivating less than two hectares of land each participated in the project. With an average household size of seven, this means the project outreached to around 350 people. The project duration was from January to November 2013.

¹ Ghana Statistical Service (2008). Ghana Living Standards Survey.

² Food and Agriculture Organization (FAO) (2009). Ghana nutrition profile—Nutrition and Consumer Protection Division. Retrieved from <ftp://ftp.fao.org/ag/agn/nutrition/ncp/gha.pdf>

³ World Health Organization (2009). Global prevalence of vitamin A deficiency in populations at risk 1995 – 2005: WHO global database on vitamin A deficiency. Geneva, Switzerland: WHO Press.

Step-By-Step Process

The project consisted of six main steps, with a strong focus on capacity-building because TRAX believed that the beneficiaries would reap most benefit if they fully understood the advantages of the orange-fleshed sweet potato and took ownership of the process. The implementation steps were as follows:

- i. The project started with a one-day sensitization workshop for farmers, opinion-leaders and members of the public in the area. During this workshop, the economic and nutritional benefits of the orange-fleshed sweet potato were discussed.
- ii. An extension visit to the vine multipliers of the orange-fleshed sweet potato was organized for the farmers. This was done in order to make sure that the farmers knew where to obtain new vines for future growing seasons.
- iii. The farmers were asked to select from among them 50 farmers with the capacity to implement the project.
- iv. Before the next planting season, the selected farmers participated in another training course on the technical aspects of orange-fleshed sweet potato farming. They acquired new skills and knowledge on the agronomic practices that had to be adopted.
- v. The 50 farmers were then given vouchers to obtain 300 cuttings each from vine multipliers for cultivation.
- vi. A project review workshop was organized where the beneficiaries, vine multipliers, farmer groups and other stakeholders (research institutes, etc.) were brought together to discuss the strengths and weaknesses of the project and to develop strategies on the way forward.

All throughout the project period, the TRAX fieldworker in charge of the Pelungu project zone made weekly visits to the farmers to provide the necessary technical assistance. He facilitated additional trainings on various Low External



Figure 1. Map showing the project site (Pelungu)

Input Sustainable Agriculture (LEISA) techniques. The farmers used to invert the soil completely when they ploughed, thereby exposing a large area to erosion. In order to stabilize the top soil, the TRAX field worker trained the farmers in minimal and zero tillage. Another common practice among the Pelungu farmers was the burning of large portions of cultivated and uncultivated lands, in order to get rid of the crop residues and to create new fields. TRAX's fieldworker advised the farmers to adopt non-burning, as residues decompose, add nutrients and retain vital microorganisms in the soil. Lastly, he taught the farmers how to use compost and farmyard manure as an alternative to the costly and harmful agrochemicals that some of them use. The farmers were taught how to construct compost pits and improved animal pens, from which droppings could be collected. They were then spread on the fields so as to add nutrients to the soil.

In addition, the farmer groups, especially the women, were trained in financial resource mobilization using the Village Savings and Loan Association (VSLA) model to establish a culture of saving and to develop competence in setting up, expanding and diversifying commercial enterprises.

Outcomes

The most important feature of the orange-fleshed sweet potato for the farmers is its drought-resistance, which renders it a reliable and steady source of food. Very late onset of rains and an inconsistent rainfall pattern throughout the rainy season was experienced in Pelungu in 2012. The early millet crop, which had hitherto served to shorten the "hunger period" (up to 6 months before harvest time, during which many families have to cut down the number of meals they eat per day) failed due to these climatic changes, but orange-fleshed sweet potato cultivation flourished. The duration of the hunger period was thereby shortened significantly.

The project families also reported that the yield of the orange-fleshed sweet potato was double that of the ordinary sweet potato. They had excess produce to sell after consumption, so their incomes increased.



A happy farmer and her freshly harvested Orange Fleshed Sweet Potato



Harvesting the orange fleshed sweet potato

Upscaling

What is necessary for successful upscaling of this project are enough farmers willing to venture into orange-fleshed sweet potato cultivation. From the feedback obtained at the final workshop, a great willingness among community members in Pelungu who had not been part of the pilot project was observed.

One challenge is increasing public acceptance of the orange-fleshed sweet potato. Because it is not a traditional food in Northern Ghana, its merits for farmers and consumers alike need to be publicized in ways that will win farmer and public acceptance. This needs to be done in a consistent manner at all levels including through community-to-community exchanges. Further training that could be beneficial would be cooking classes for women, in which they are taught ways on how to incorporate the orange-fleshed sweet potato into their traditional diet as well as how to process the orange-fleshed sweet potato into products for the market such as bread, juice and pastry.

Another potential challenge is ensuring the steady supply of vines. Since the orange-fleshed sweet potato is relatively new to the area, the vines cannot be as easily obtained as those of other local crops. They have to be acquired from the CIP Potato Centre in Tamale or Kumasi, a few hours' drive away. With growing demand, however, TRAX is hopeful that vine supply will increase.

Food Sovereignty

The humble orange-fleshed sweet potato has improved the food sovereignty of the project communities in Pelungu mainly through satisfying their right to adequate and culturally appropriate food, right to health, and right to livelihood. In particular, the issue of Vitamin A deficiency in women and children has received considerable attention from the media and the health authorities in Ghana. However, food supplements are often seen as the answer. With this project, TRAX has produced evidence that a food-based approach towards Vitamin A deficiency is a more sustainable and cost-effective solution. The relevant government bodies should mount a campaign to increase the acceptability of the orange-fleshed sweet potato in Ghanaian dishes by educating the public about its nutritional advantages.

Resources

The project was jointly designed by the TRAX Ghana office and farmers' groups at Pelungu. It was overseen by the TRAX Sustainable Livelihoods Project Coordinator and on-the-ground implementation was the responsibility of the field worker in charge of the Pelungu project zone. This pilot project with 50 farmers did not demand the full-time commitment of the staff.

The project activities as described cost GH¢ 2,750 while the cost per acre was GH¢ 18 and the cost per person was GH¢ 12 (covering training, visit to the vine multipliers and refreshments served during activities).

“ The orange-fleshed sweet potato's production was double the old sweet potato variety. ”



Increasing vitamin A intake of mother and child

CONTACT

This case study is dated May 2014. The information was provided by TRAX. Questions may be sent to the author: Dorien Venhoeven, TRAX Program Support, Ghana at dorienvenhoeven@hotmail.com.

African leafy vegetable enterprise boosts livelihood of rural communities in Kenya

Pumpkin leaves growing in school vegetable patch

Introduction

In Africa and in particular, Sub-Saharan Africa, it is estimated that there are more than 45,000 species of plants, of which about 1,000 can be eaten as green leafy vegetables. Most of the latter fall within the category of African Leafy Vegetables (ALVs). ALVs are also known to be rich in vitamins, proteins, minerals and micronutrients such as selenium, zinc, potassium, beta-carotene, iron, folate, copper and iodine. They have also been found to have medicinal value in addressing illnesses such as diarrhoea, eye and renal ailments, hypertension and even HIV/AIDS.

A two-year project focusing on setting up community enterprises producing and marketing ALVs was initiated by the Participatory Ecological Land Use Management (PELUM) Network in January 2009. Entitled "Scaling-Up Sustainable Agriculture and Livelihood Improvement (SUSALI), the project focused on enhancing the production, consumption, value addition and marketing of ALVs within the four cultural groups in Kenya. This was part of PELUM's initiative to promote culturally favoured ecological farming systems in a bid to address rampant poverty, food insecurity and malnutrition among resource poor local farming communities.

Thanks to projects like these, ALVs, traditionally eaten by mainly rural communities, are fast becoming popular

among the middle and upper sectors of African society while improving farmers' livelihoods substantially.

Project Stakeholders, Objectives & Strategies

Stakeholders

PELUM invited member organizations from the four cultural groups in Kenya and Busia Environmental Management Program (BERMA) was selected to represent the Abaluhya cultural group in Western Kenya. BERMA was also designated to be the lead implementing and coordinating organization for the initiative. It is a registered local non-governmental organization which is in effect a network of 20 self-help groups with a direct membership of 100 small-scale farmers and over 1,000 indirect members drawn from the extended family networks. Over 80% of the members are women.

Twenty active farmer members of BERMA were chosen, along with over 200 immediate and other community members. Thirteen villages in Elugulu, Elukhari and Marachi in Butula Sub-County, Busia County in Western Kenya were involved: Bulwani, Bwaliro, Imanga, Esikarira, Busirangombe, Bulemia, Namusala, Enakaywa, Siololo, Budunga, Esiguli, Tingolo and Elukhari.

Objectives

Smallholder farmers cultivating and marketing ALVs were facing several challenges such as the high levels of perishability of ALVs; the lack of water during the dry seasons; and not being able to afford to package and transport their produce to distant and lucrative urban markets. There was no government support for the cultivation of ALVs and very little research done on how to improve their productivity. The objectives of the project were thus as follows:

- To revive and promote production, consumption, value-addition and marketing of the natural heritage i.e., ALVs, in the project communities.
- To initiate advocacy dialogue with the government, agricultural institutions of higher learning and training colleges to incorporate ALVs cultivation in their training programs.
- To raise awareness about the positive nutritional and health benefits arising from the regular consumption of ALVs.
- To encourage youth to consume and plant ALVs.
- To establish reliable sources of quality seeds in adequate quantities through seed bulking and maintenance of a seed bank within the community.
- To establish and promote indigenous seed saving and multiplication as an income-generating activity.

Strategies

- Institutional capacity-building and training.
 - » A three-day project launch workshop was organised to create awareness and train participants on the objectives, content and expected results from the project activities.
 - » Fortnightly institutional capacity-building seminars and workshops were held. These were both formal and informal forums which included field sessions.
- Support for 20 selected farmers in the form of farm inputs, implements and other services.
- Campaigns and advocacy through partnerships, collaboration and networking with different groups and agencies. This included farmer-to-farmer exchange visits.
- Product development and marketing initiatives.
- Support through micro-financing using a revolving fund mechanism.
- Monitoring, evaluation and impact assessment.
- Project management and coordination.

“ We now do not have to make frequent visits to the local health centre for minor infections. ”

Farmers' Responsibilities

The focal group of the 20 selected farmers were given seeds of seven types of ALVs to cultivate: black nightshade, spider plant, croton, pumpkin, amaranth, pigeon peas and jute. These were well known to the local communities.

Some of the farmers were specially designated to undertake seed bulking while one was assigned to maintain a seed store. The specific responsibilities of the farmers are described below.

Production

This involved the following activities:

- Seed collection and treatment.
- Preparation of organic manure by composting and making organic pesticides using local materials like dried and powdered leaves of the Mexican marigold and tithonium mixed with slurry and pepper.
- Making of raised seed beds measuring 3x1 metres, and 'mandela' and 'mountain' structures.
- Each farmer had to make at least ten raised beds. Each of the raised beds and mandela and mountain structures holds a variety of vegetable varieties.
- Planting of the vegetables at the onset of the long and short rainy season in mid-March and mid-September, respectively.
- Harvesting of the vegetables after 2–3 months between May to June and November to December, respectively. The vegetables were for household consumption in the farmers' own communities as well as for sale locally.
- Selling the harvested seeds as well as saving some for the next planting season. Some farmers were assigned to do seed bulking. BERMA also established a seed storage facility for its members.

Consumption

Consumption of the vegetables was promoted amongst the member households as well as the local community at large. The cultivated ALVs have become very popular with consumers and food outlets in urban areas. Many small and large restaurants order them on a regular basis.

Value addition

The farmers were taught a new and innovative technique of boiling the green vegetable leaves in salt water, then drying them under the shade, and packaging them in sealed small plastic packets. These packets have a long shelf life. They have proven very popular with small and single-person households in both rural and urban areas.

Marketing

This focused on the sale of the green vegetables, seeds, and packed dried vegetables within the farmers' communities and external market outlets. Local eateries have proved to be captive markets for the cultivated ALVs. With better marketing strategies, the local farming communities should be able to access more lucrative markets in urban areas.



The participants of a farmer training session



A manual thresher can be used to add value to vegetables, cassava, napier grass and any other farm produce

Outcomes / Impacts

The most significant change has been the uptake of ALVs as an income-generating activity among smallholder farmers and as a preferred food by the middle and upper strata of African society. Being highly nutritious, ALVs have also improved the state of health of the farmers as well as the consumers. Traditionally just subsistence crops, growing ALVs has turned into a major driver for poverty and hunger alleviation for small marginalized farming communities at the project site. The change in the attitude of the farmers is considered the lynchpin in that they now see that farming can be a viable business.

The major impacts of the project are:

- i) The uptake of planting, production, consumption and marketing of ALVs among local farming communities as a commercial enterprise.
- ii) Increased crop acreage under ALVs within the project farming communities.
- iii) Increased output of ALVs within Butula Sub-County.
- iv) Reduced food insecurity and malnutrition at the household level through consumption of ALVs.
- v) Realization of higher incomes from the sale of ALVs at premium prices.
- vi) Enactment of government policies supporting the cultivation and marketing of ALVs and the inclusion of ALVs in the curricula of local agricultural training and research institutions.

Resources

The project was implemented over 24 months between January 2009 and December 2010 at a total cost of Kshs 300,000 (US\$3,489). PELUM had provided a grant of Kshs 200,000 (US\$2,326) and the remaining Kshs 100,000 (US\$1,163) was generated from members' contributions in the form of cash, materials and labor.

It is estimated that for the continued implementation and upscaling of the project to involve at least 1,000 farmers

from Butula Sub-County, Kshs 1.0 million (US\$ 11,627) will be needed with the community contributing Kshs 500,000 (US\$ 5,814) in the form of cash, materials and labour.

Opportunities for Upscaling

The success of the project has been notable, namely, the uptake of modern and sustainable agronomic technologies, handling and marketing technologies in establishing ALV-cultivation as a vibrant income-generating activity by traditionally conservative subsistence farming communities.

The enterprise has exposed the local farming communities to the rigours of markets and helped them meet the standards of high quality, consistency and reliability in supply that the market demands.

The gains of the initiative continue to manifest and have been reported in public forums as well as scientific publications such as the African Journal of Food, Agriculture, Nutrition and Development.

The opportunities for upscaling this easily replicable model are real indeed. The simple and appropriate technological packages recommended in the cultivation of the ALVs use readily available local materials, rendering them appropriate tools for resource-poor smallholder farmers. Expanding domestic as well as international markets for organic ALVs sold at premium prices is also another opportunity at hand. Upscaling will need governmental support through policy such as the proposed National Policy on Organic Agriculture, reinforced by the incorporation of ALV-cultivation in the government's agricultural programmes.

Challenges

No endeavour is without challenge however. Some of the challenges are:

- i) Forming and maintaining an effective, efficient marketing organization to manage group activities.

- ii) Having to establish and maintain close collaboration among the producers/farmers, traders/brokers, handlers/transporters and consumers.
- iii) Ensuring good quality control, reliability in supply and optimal pricing.
- iv) Ensuring the constant availability of quality farm inputs, in particular seeds, organic manure and pesticides, and other organic environmentally friendly soil additives.
- v) Getting the ALVs to market fast as they are perishable goods.
- vi) Advocating for stronger support from the government and research and training institutions.
- vii) Protecting the smallholder farmers from the threat of larger commercial players entering and monopolising this potentially lucrative market.

“ Now we are able to generate respectable revenues from the sale of our vegetables directly in the Nairobi markets. ”

Advancing Food Sovereignty in Africa

Food sovereignty is defined as the right of people, communities and countries to define their own agricultural, labour, food and land policies to be ecologically and culturally appropriate to their unique circumstances so as to reconnect food, nature and community.

A project like SUSALI advances the food sovereignty of African farmers as it puts smallholder farmers in control of productive resources and agricultural production, strengthens their food security, enhances local food systems, builds on local knowledge and skills, protects a local natural heritage (ALVs), and works in harmony with nature.

ALVs are emerging as a new, significant and marketable farm commodity in the food scene in Kenya. The ALV enterprise has the potential to emerge as a key revenue earner bringing in substantial earnings for small farming communities. It should therefore be strongly supported by public policy and research.

More advocacy initiatives will be undertaken by the project stakeholders from county to national level to promote ALV cultivation and consumption and the interests of smallholder producers through the integration of the issue into policy and public research as well as by raising public awareness.



Women farmers and traders display and sell their produce in the local market

CONTACT

This case study is dated March 2014. The information was provided by BERMA. Questions may be sent to the author: Francis Khadudu, Executive Director, Busia Environmental Management Program (BERMA), Kenya, at fkwere@yahoo.com



CASE STUDY

Never ending food in Malawi

'Never Ending Food' Demonstration Site

In 1997, Kristof and Stacia Nordin were invited by the Government of Malawi to work with the Ministry of Health on issues of HIV prevention, care and support. The Nordins quickly found that it was difficult to address such health issues without an improvement in nutrition. This led to an analysis of Malawian agricultural and dietary practices, which revealed an over-emphasis on the production and consumption of maize—one high-carbohydrate, low-nutrient food introduced from Central America—to meet the dietary needs of the country.

In an effort to reduce malnutrition, food insecurity, and poverty, the Nordins began to utilize a sustainable design system known as 'permaculture'. What transpired was 'Never Ending Food' (www.neverendingfood.org), a community-based demonstration site in Chitedze, Malawi, which outreaches to thousands of people in the surrounding villages, hosts regular visitors, supports an internship programme, maintains a 'model village' with the participation of several local families, and showcases many low-input, high impact ecological agricultural technologies.

Permaculture-Based Solutions

During their initial assessments, the Nordins were informed by many of the communities in the area that their concerns were primarily about food insecurity, stemming from namely, lack of financial means to obtain agricultural inputs (i.e., seeds and fertilizer). They also expressed problems related to scarcity of water resources, a chronic 'hungry season'

which lasted from about December to April when the nation's maize reserves run short and people had to wait for the newly planted maize crop to mature, and a staggering national rate of malnutrition of 47% of children under the age of five.

Ironically, many local sources of food existed which could provide a year-round, highly nutritious diet. Many of these were open-pollinated (replantable) plants and trees and their seeds could be sourced and saved at no financial cost. In addition, there was untapped animal diversity (like fish, bees, insects, and livestock). These local resources could eliminate the 'hungry season' which ironically coincided with Malawi's most agriculturally productive time of the year; the rainy season.

In 2001, the Malawi government switched from teaching a three-food group model (body building, body energy, and body protection) to a six-food group model (staples, vegetables, fruits, legumes & nuts, animal products, and fats). This switch was designed to encourage people to incorporate greater diversity in their dietary and nutritional choices. Unfortunately, many of the government's agricultural policies remained fixated on the production of maize.

A large amount of information on Malawi's traditional food crops has been amassed by Never Ending Food as the result of local knowledge transfer. Community members (especially older women who are the cultural custodians of knowledge on the identification, harvesting, preparation, and utilization of local resources) have been the main source of this information. Reviving and respecting this traditional knowledge has helped restore a sense of cultural pride in the use of local resources and provided the communities with alternative solutions. Never Ending Food has



been able to assemble and categorize a list of almost 600 different foods which can be used to improve nutrition, increase resilience, eliminate the 'hungry season', and provide diverse opportunities for income generation. Over the years, Never Ending Food has been able to propagate over 200 of these foods, which now grow year-round and provide the communities with daily access to Malawi's six food groups.

All of Never Ending Food's production systems have been designed using permaculture principles and uphold permaculture's three ethics: (1) care for the earth, (2) care for people, and (3) fair share of resources. This has allowed for the intensification of food production using low-input, high-yielding and organic methods. The site showcases a large range of natural medicines, fodder crops, open-pollinated seed stock, fuel, building supplies, timber, and appropriate technologies (solar driers, a hand-powered water pump, composting toilets, water harvesting tanks, fuel-efficient stoves, etc.)



Outcomes

At the community level, there have been transformations in local households and farms through the use of permaculture designs and diversified agriculture. These have been in terms of positive changes in their dietary choices, reduced costs, increased incomes, the use of local resources, the conservation of ecosystems, and the good management of soil and water systems.

After 17 years of hands-on experimentation and practice, Never Ending Food is more convinced than ever that there is absolutely no reason for Malawi to continue facing chronic hungry seasons or high levels of malnutrition. Solutions to these problems have repeatedly been demonstrated in practice at Never Ending Food as well as at a growing number of permaculture sites throughout the country. Entire communities are now beginning to benefit from a com-

Resources

Kristof and Stacia Nordin, the co-founders of the project, along with their daughter, Khalidwe, aged 11, and two to three interns (hosted for two years at a time), facilitate the project. Because they focus on low-to-no cost implementation strategies, very little was and is required in terms of start-up costs.

In Malawi, everybody owns a hoe and that is really the only tool that one needs to get started. The seeds, cuttings, or root-stock of many varieties of highly nutritious and open-pollinated local food plants can often be sourced from roadsides, windrows, fields, forests, or local markets.

Permaculture allows people to save money and reduce inputs while simultaneously increasing opportunities for diversified income generation, so the indicator of assessment which should be used is not 'cost per person' but rather 'benefits per person'. In terms of the latter, permaculture teaches that the yield of a system is theoretically unlimited.

All tours at Never Ending Food, however, are provided free of charge. A two-year internship, inclusive of a modest monthly stipend, a 12-day Permaculture Design Course, and other miscellaneous training activities, however, costs about 2,000 USD per intern. Hosting a Permaculture Design Course (PDC) in a workshop-setting costs about 1,000 USD per person, inclusive of room, board, and the facilitator's fees.

Land ownership does play a role in the establishment of permanent and sustainable agricultural systems; if a person does not own her/his land, it is less likely that she/he will make long-term investments in it. Never Ending Food has tried to help facilitate land ownership for various people through the years. Land prices vary greatly from less than 100 USD per acre to over 2,500 USD per acre. Implementation costs per acre are completely determined by locally available resources.

pletely new way of thinking about food production, agriculture, and nutrition. The three acres of Never Ending Food's land have been transformed from bare, degraded, barren and chemically dependent landscapes into lush, fertile, organic, and seasonally productive systems.

Several research projects have been conducted in connection with the work of Never Ending Food. The results of these are available on the project website:

- 'The Potential of Permaculture: Addressing Subsistence Farming and Food Security in Malawi' (<http://www.neverendingfood.org/wp-content/uploads/2010/02/Conrad-Potential-of-Permaculture-SfAA-Presentation-2010.pdf>)
- 'Permaculture Adoption Among Malawian Farmers: A Positive Deviance Inquiry' (<http://neverendingfood.org/wp-content/uploads/2008/10/Permaculture-Final-Capstone-Paper-5-26-Hope.pdf>)

“ Permaculture is good because we are able to get our day-to-day food in a simple way. We now harvest more food on a small amount of land and save energy, money, and time. We also get medicinal plants on our land, which is something good for our health. I have about ten people who have joined me in using lemon grass tea.

**Mrs. Njoka, local farmer,
housewife, and mother ”**

Upscaling the Successes

Opportunities for upscaling the project have been attained at many levels. In Malawi, permaculture practices are being carried out in almost all of the country's 28 districts and there is a fully-operational permaculture training centre (Kusamala Institute of Agriculture and Ecology, www.kusamala.org). In 2009, Malawi hosted the International Permaculture Convergence.

At the national level, Never Ending Food has been influential in introducing permaculture into government level programmes through various development partners. These programmes include the Ministry of Education's School Health and Nutrition Programme, which has piloted permaculture implementation in eight districts in 40 primary schools, 10 teacher development centres, and one teacher training college. Through working with primary school curriculum writers at the Malawi Institute of Education (MIE), Malawi's national school curriculum now contains units on permaculture and composting toilets.

Never Ending Food has also maintained a successful internship programme which provides hands-on practical training. Two to three interns are generally hosted at a time for a two-year period. Promising candidates go through the 72-hour permaculture course and are awarded certificates in Permaculture Design on successful completion. Interns are assisted in applying for paid permaculture positions throughout the country.

In 2005, the United Nations' World Food Programme (WFP) in Malawi hired Never Ending Food to author the "Low Input Food & Nutrition Manual" (<http://www.neverendingfood.org/sustainable-nutrition-manual/>). This manual is used by individuals and organizations to help rebuild the bridge between good nutrition and the agricultural and environmental systems that provide that nutrition.

There are, however, challenges that persist. As diets and agricultural systems have moved further away from the use of traditional foods over the years, many of these local resources are generally seen as 'bush food', 'poor people's food' or as a 'last resort' to turn to only in hard times despite

often having superior nutritional qualities. These messages are often reinforced by governmental policies that focus almost exclusively on the production of maize as well as school agricultural programmes which tend to concentrate on the production of maize and cash crops while overlooking local food. Many development approaches also contribute to this stigmatisation by focusing solely on external supplementation, fortification, and even genetic engineering rather than on the integrated use of highly nutritious local traditional food sources.

Advancing Food Sovereignty

Instead of working to devise naturally diverse, seasonal, perennial, inherently organic, and nutritious food supply systems, many African leaders are embracing an agribusiness expansion of industrialized agriculture which incorporates an increased use of monocropping, synthetic fertilizers, chemical pesticides, and genetically engineered seeds.



Africa already has hundreds of drought-resistant, pest-resistant, high-yielding, open-pollinated, seasonal, and naturally nutritious crops waiting to be integrated into agricultural systems without the need for newly engineered species. The only obstacle is the appreciation, respect and utilisation of these natural resources.

Never Ending Food's advocacy work at the national level takes a cross-sectorial approach. It has worked with several ministries. Efforts have been made to get governmental extension officers to work together as a team to communicate with communities on issues of agriculture, public health, nutrition, environmental conservation, water and sanitation in an assimilated and integrated manner rather than through isolated campaigns.

As a result of its advocacy work, Never Ending Food has been influential in getting permaculture activities established throughout Malawi, southern Africa, and even internationally. This has helped to strengthen the food security and perhaps even more importantly, the nutrition security of many communities.



The Difference that 7 months can make!

Village Headman Katongomala
Mr. James Chirwa, Nkhala Bay, Malawi

- 1. Before: Wife sweeping 1 hour+ each day
- 2. Month 1: Reduced sweeping and beds
- 3. Month 7: Area flourishing with foods



“ This is a way that can make people self-reliant while at the same time caring for the environment. Through permaculture, people are able to have direct access to their daily needs such as herbs, vegetables, and firewood just to mention a few. This helps us to use less money for buying some of these things.
Mrs. E. Kaniye, local farmer, housewife, and mother ”

The parking lot of a local church transformed in a single growing season!



The difference that 3 years can make!

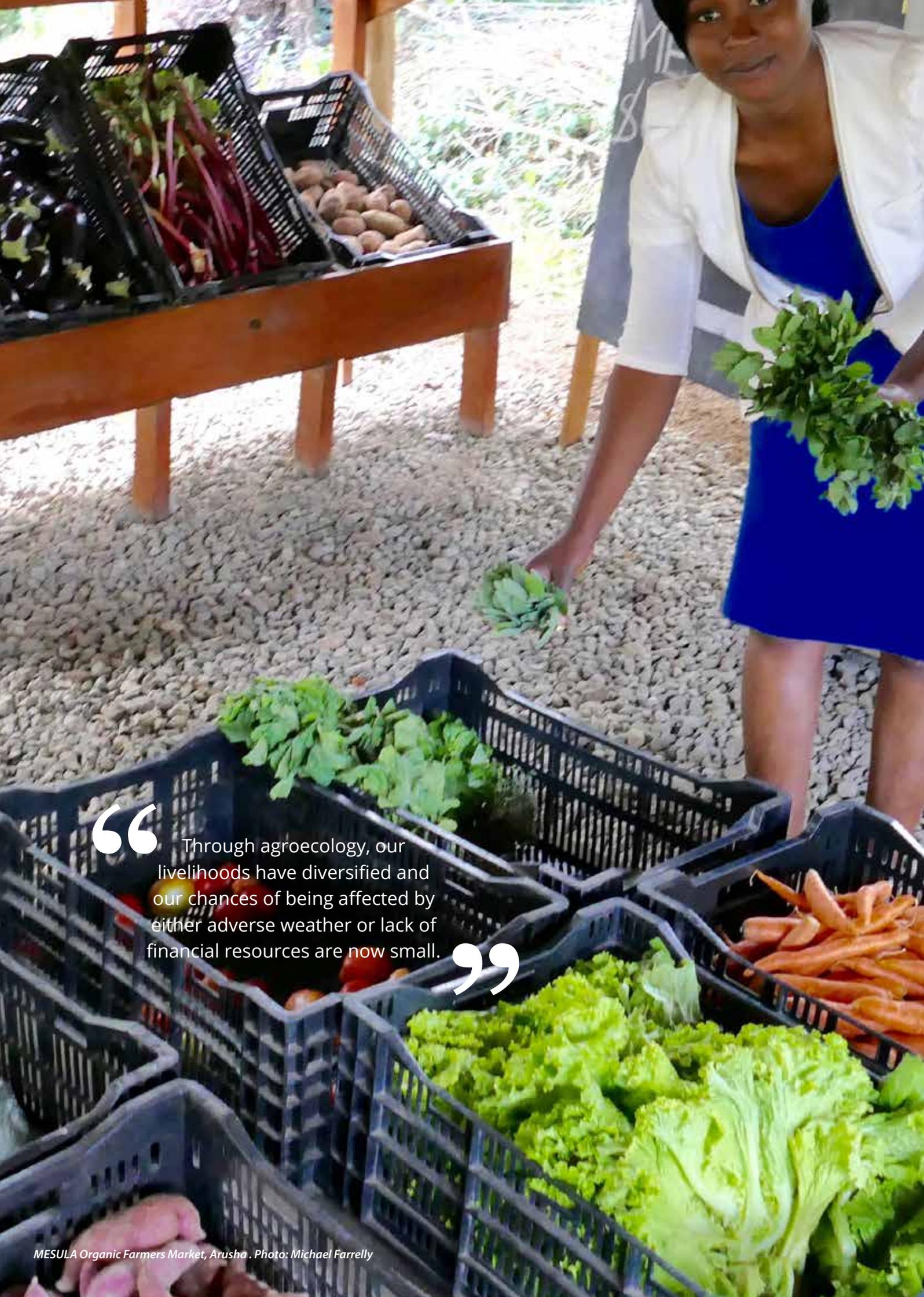
Before

After



CONTACT

For more information, contact Kristof and Stacia Nordin
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“ Through agroecology, our livelihoods have diversified and our chances of being affected by either adverse weather or lack of financial resources are now small. ”

INCREASING INCOMES, IMPROVING LIVELIHOODS

DEFENDING FARMERS' DIGNITY

Introduction by: Elizabeth Mpofu

Agroecology has enabled many African smallholders, most of whom are women, to lead dignified lives at a time when conventional agricultural inputs are failing to meet the challenges of worsening climate impacts like droughts and floods. The use of agroecological practices has enabled us, farmers, to withstand such changes through growing a variety of adapted traditional saved seeds of small grains, a wide range of pulses, and leafy vegetables as well as tubers.

Before this, we used to rely on maize or cotton for our livelihood. These crops do not do well any more. In our struggle to attain sustainable livelihoods, we have shared our local knowledge and experiences through horizontal learning processes. Farming communities now grow a diversity of farmer-saved seed varieties, and have reduced their dependency on external inputs like fertilisers, thus saving money for other household needs.

Through agroecology, our livelihoods have diversified and our chances of being affected by either adverse weather or lack of financial resources are now small. One, two or three of the diverse crops and livestock that we farm are able to withstand these factors. We, therefore, have enough variety

of food to feed our families and also to sell at our local markets. Even though agroecology requires a lot of labour at the beginning, once it is established, such demands decrease, allowing us, women, to engage in other income-generating activities such as handicraft-making and food processing. Consequently, household incomes have been increasing.

In Zimbabwe, I have seen that agroecology has enabled some farmers to enter into new ventures such as fish farming through water harvesting, and bee-keeping as a result of new and diverse crops planted which provide food for bees. Innovations like these are shared during our continuous learning platforms on best practices.

Agroecology is the only way to defend our dignity. It is simply amazing how it has transformed farming households through improved diets and livelihoods and people-empowerment.

Elizabeth Mpofu
International General Coordinator
La Via Campesina



Community-led approach sustains livelihood improvement in Kotoba, Ethiopia

State of Farming Communities in Rural Ethiopia

In rural Ethiopia, most families are reliant on agriculture as their sole source of livelihood. Most face a steady decline in agricultural productivity due to the degradation of natural resources, fluctuating rainfall, reduced soil fertility, low quality livestock and poor livestock management. Most households do not produce sufficient food to sustain their families throughout the year. The Ethiopian Demographic and Health Survey (2011) stated that about 44% of children under five were stunted.

The high population density has resulted in a shortage of arable and grazing land so farmers have resorted to cultivating marginal swampland or very steep slopes in the forest, which has contributed to deforestation and soil erosion. The farmers lack knowledge about improved technologies, access to information and services, credit and markets. Cultural and religious customs put women and girls at a disadvantage in the home and community. Harmful traditional practices such as female genital mutilation and early marriage are common.

Kotoba Sustainable Livelihoods Project

TAM Consult, an Ethiopian agency, carried out a preliminary needs assessment in Kotoba in 2004. The Send a Cow Ethiopia staff team travelled to TAM's project site in 2007 to carry out a full needs assessment with the local communities. A project area in the Dendi District of Oromia Regional State, around 120 kilometres west of Addis Ababa was chosen. A

wealth-ranking exercise showed that 90% of the people living in the Kotoba region were poor and 60% were very poor.

A project plan was developed to promote a variety of agro-ecological practices including agroforestry; soil fertility enhancement through composting, intercropping and crop rotation; organic pest management; post-harvest management; and improved animal management. The five-year initiative involved 5,000 people in 1,000 households, members of 50 self-help groups in the project area. The organizations coordinating and supporting the project were Send a Cow, Big Lottery UK, and AKAM.

“

Before the project, I had no saving habit and would spend all I made, and was always quarrelling at home. I spent all I earned and even sold assets. I had only a small amount of degraded land and no seed and couldn't use it. Now I have changed my behaviour and attitude; I rent 2 hectares of land and have pasture for fodder. I am growing crops. Our food at home has improved, the children are in school and I am sharing my practices with others. Who am I? I am a man, fully human, who can sit with others.

Kabata Merga, a farmer from the project

”

Project Interventions

The project focused on increasing the capacity of farmers to improve their livelihoods through innovative training methodologies. AKAM moved from the conventional “training” to “participatory learning” approach, from “teaching” to “facilitation”, and from “knowledge transfer” to “knowledge sharing”, with project families passing on the gift of help received to other needy families.

Community Organizing

- AKAM facilitated the establishment of 50 self-help groups with 15-25 members each made up of the most vulnerable members of the communities, including very poor families, widows, women household heads, youth and disabled people.
- Project steering committees were formed to oversee project implementation, made up of elders, leaders, men, women and youth from the communities.

Integrated Crop and Livestock Farming Systems

- Training was provided for the 1,000 households in sustainable organic agriculture technologies including manure composting, kitchen gardens, double-dug beds, and natural pesticides, to increase crop and vegetable production.
- Vegetable seeds, tree seedlings, and fodder trees were given to the households. Highland fruit trees were introduced for fruit production for income-generating and nutritional purposes.
- Access to agricultural tools and equipment was facilitated through providing credit facilities.
- Soil conservation was promoted through manure, mulching and crop rotation.
- The planting of fodder grasses, legumes and fruit trees allowed for a diversification of farm income activities, improved animal management and soil fertility.
- Livestock (cows, sheep, poultry, bees or donkeys) was placed in resource-poor households, with priority given to households without livestock.



- The project households were trained in improved animal husbandry techniques so that their livestock would be healthier and more productive. This included the introduction of stall-feeding, under which livestock were housed in light airy sheds and fed grass and leguminous plants cultivated for fodder.
- Increasing the genetic quality of livestock for better productivity was a key aspect of the project. Improved livestock breeding was achieved through the introduction of a village bull scheme and the provision of artificial insemination equipment and training for para-vets and government staff.
- Training in improved dairy and poultry management was provided to increase production.
- The project also promoted the construction and use of fuel-efficient stoves to reduce fuel consumption and release manure to be composted into organic fertilizer.

Support Services

- 15 farmer-owned demonstration sites were established as training centres for the dissemination of knowledge on sustainable organic agriculture and seedlings.
- An animal health post was constructed and para-vets trained to provide veterinary support to group members.

Livelihood Improvement

- The self-help group members were trained in enterprise development, business skills, marketing and financial management, and helped to establish community-based savings and credit schemes.
- The groups initiated income-generating activities such as vegetable and fruit production, bamboo plantations, poultry and milk production and sheep rearing in order to diversify income sources.

- Community access to information on markets, services and appropriate technologies was facilitated through distribution points, access centres and radio.
- AKAM mobilised the communities to build a road link to the main Addis Ababa road.

Natural Resource Management and Protection

- Natural resource management was improved by land reclamation and the regeneration of gullies, steep land, backyards, marginal land and boundaries.
- Studies of water needs and sources led to the development of springs, hand-dug wells and ponds to increase access to water for household and agricultural use.
- Environmental clubs for unemployed youth to learn about conservation management were established.

Outcomes

The project organizers say that the success of the project has been largely due to the action learning attitude of AKAM, its willingness to change from being teacher to facilitator, the favourable responses from the donors, and the project being driven by the participants. The communities stressed that this project was unique because they owned it. This was the reason for the high level of implementation after the training programmes, leading to significant increases in income.

Increase in Income

The project's central achievement is the significant impact on farmers' incomes. The average annual household income reported in the baseline survey was 679 Birr (35 USD) in male-headed households and 642 Birr (33 USD) in female-headed households. The survey at the end of the project found that participating households were earning incomes of 9,352 Birr in male-headed households (481 USD) and 8,356 Birr (429 USD) in female-headed households, around a thirteen-fold increase for the families. There is a wide range of increases, but even the lowest reported income is four times that in the baseline survey. Credit for business has been used by 67% of the participants, coming mostly from the self-help groups or non-governmental organizations, suggesting that the farmers now feel able to use greater working capital productively.

Higher Crop Yields

Some of the increase in incomes has come from higher production per unit area. The Kotoba chairperson reported a doubling of barley yields, due to the better crop varieties brought in by both the project and the government. The farmers also attributed yield increases to using compost on their fields and vegetable plots.

Increased Crop Diversity

Increasing the diversity of crop varieties has been a significant and visual change in the project area. This lowers the farmers' exposure to risk of crop loss and is an essential component of a resilient food production system. Women farmers said that growing vegetables had brought about positive changes in family diets and incomes as well as more effective land use. Project members are proud to show off their gardens. They reported that household cash expenditure was now subject to discussion and decision by the whole family.

Improved Nutrition and Health

Improved nutrition and access to healthcare through a new government centre has lowered the number of school days lost by children due to sickness. A health worker reported a 70% decrease in childhood diarrhea cases recorded since the project began and attributed this to the use of toilets and hand-washing facilities introduced by the project. The local Elementary School Director commented that pupils now saw agriculture as a positive means of improving family life and incomes.



Improved animal management is a key feature of the KoSuLP training. Improving production through better management in tandem with genetic improvement creates a resilient system and also enables key on farm resources such as animal wastes to be collected efficiently.

Enhanced Social Skills

Social skills have been enhanced as project members have been trained on group formation and management, credit and savings organisation, conflict resolution, and managing family relationships. About 16% of the baseline survey respondents had believed that their efforts could bring about changes in their communities; by the end of the project, this had risen to 99%, with 90% believing women could make community decisions equally well as men.

Resources

The project cost USD 261,270, approximately 52 USD per person, or 261 USD per household. The highest cost was for staff salaries as the project success relied heavily on intensive training being delivered to the groups. Agricultural inputs and livestock took up another significant share of the project budget. Finally, another main expenditure of the project was facilitating the self-help groups which were paramount to the success of the project. It must be stressed that this model of community-led development was a defining feature of this project's success.

Upscaling

The project introduced the principle of "Passing on the Gift" whereby farmers who received livestock and other inputs were to pass on the equivalent as a gift to another needy family. In the same way, those who attended the training programmes were encouraged to share their new skills and knowledge with others in the community.

The self-help groups have been using their savings and credit schemes for group-based income generating activities. Some self-help groups have also evolved into larger federated organisations, enabling a greater outreach for the dissemination of agroecological techniques.

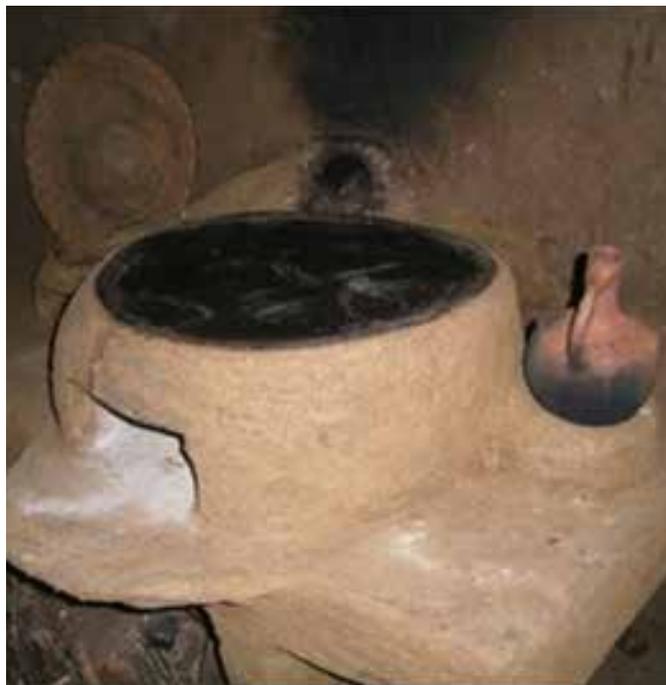
Success Factors

The project has advanced the central message of food sovereignty in that the main actors of change in food systems should be the smallholder farmers themselves. The most effective advocates for food sovereignty are farmers who are living proof that smallholders can indeed make a successful living off their land while conserving and enhancing ecosystem services.

Putting smallholders at the centre of agricultural programmes and policies and giving them culturally, technologically and environmentally appropriate support on a broad scale has the potential to radically transform the face of agriculture in Africa.

Supporting self-help groups to function effectively is a strong sustainability factor for any intervention. Organised communities not only create informal social security nets, they are also strong platforms for policy advocacy.

The project underscores the importance of appropriate government policies and extension services in poverty reduction. Government staff capacity building and strengthening their links with the communities proved to be a valuable resource for the project farmers, who now have improved access to better extension services and more capacity to advocate for favourable policies.



Improved traditional stove at the home of Kabata Merga.



Cabbages planted by a farmer in a copy group. Those on the lower left side were planted with fertiliser, on the right using compost.

CONTACT

This case study is dated May 2014. The information was provided by Send a Cow. Questions may be sent to the author: Martin Vieira, Policy Executive, Send a Cow at martin.vieira@sendacow.org



CASE STUDY

Bees bring a new buzz to family farming in Zimbabwe

*Family beekeepers benefiting from increased economic and environmental resilience.
Photo: Chipogono*

One way that family farmers improve their resilience to both climatic and economic shocks is to diversify what is produced. More and different crops and livestock, particularly local varieties and breeds are being promoted. Two other options also stand out – bees and trees. These have the added advantages of complementing the production of agricultural crops and enhancing the agroecosystem. In Zimbabwe, the Ruzivo Trust has been promoting beekeeping, and the results are showing the sweet taste of success. Bees can help farmers break out of poverty.

Agriculture in Zimbabwe is largely rainfed and therefore highly dependent on nature and its extremes. Many families barely manage to earn a living from the land they farm even in good years. In this context, beekeeping is one practice where families pride themselves on working with and for nature, while deriving food, nutrition and income.

At the Ruzivo Trust, we value the cultural activities of family farmers, and in our participatory approach, our resolve is not to displace but to co-create knowledge with them. Through an innovative programme we are giving family farmers the opportunity to earn a decent livelihood from their independent work in apiculture, while also providing a platform for social change.

Social Learning with Beekeeping

Most families now combine beekeeping with raising crops and cattle. In collaboration with district agricultural extension officers, the Ruzivo Trust identified a group of about 100 families in Goromonzi with an enthusiasm for beekeeping; women and men were equally represented.

In collaboration with Zonful Enterprises, we set up five 'Ru-ZoBee' demonstration sites where farmers get hands-on beekeeping experience. We used discovery-based learning approaches, or 'learning by doing'. The main objectives are to equip farmers with beekeeping basics, and ensure the engagement of community organisations to strengthen social interaction and mobilise financial resources.

A little effort, well placed, can make a large contribution to improving rural livelihoods. We will use the evidence we are generating to show decision makers in government, the private sector and development agencies the value of small climate-smart enterprises such as beekeeping and how these can transform lives. There is no doubt that honey production presents an enormous potential for achieving food security in Africa. Family farmers in Mazowe and Goromonzi have started towards this goal while ensuring that their footprint will not prejudice future generations.

Bees and Honey Everywhere for Everyone

There are more than 50,000 beekeepers in Zimbabwe. A field workshop arranged by the RuzivoTrust in February 2014 brought some of them together to share their knowledge on the practices and benefits of beekeeping.

Mr Moyo from Mhondoro amazed people when he explained how he harvests 15 kg from each of his 15 hives every six months, or 450 kg per year. Mrs Manyowa of Mazowe was also very happy to share her experiences since she started keeping bees only a year earlier. She has already harvested 340 kg of honey and now has 20 hives. "I strongly believe that my community must have access to honey, and the surrounding areas must have greenery where bees can thrive and people can access not just honey but also water and other resources provided by nature," said Mrs Manyowa.

In Mazowe, beekeeping has already helped to bind rural communities by becoming a social phenomenon where families work together to develop more sustainable farming practices.

Bees in the Service of the Environment

Deforestation and unregulated pesticide use are major threats to beekeeping in Zimbabwe as well as to long-

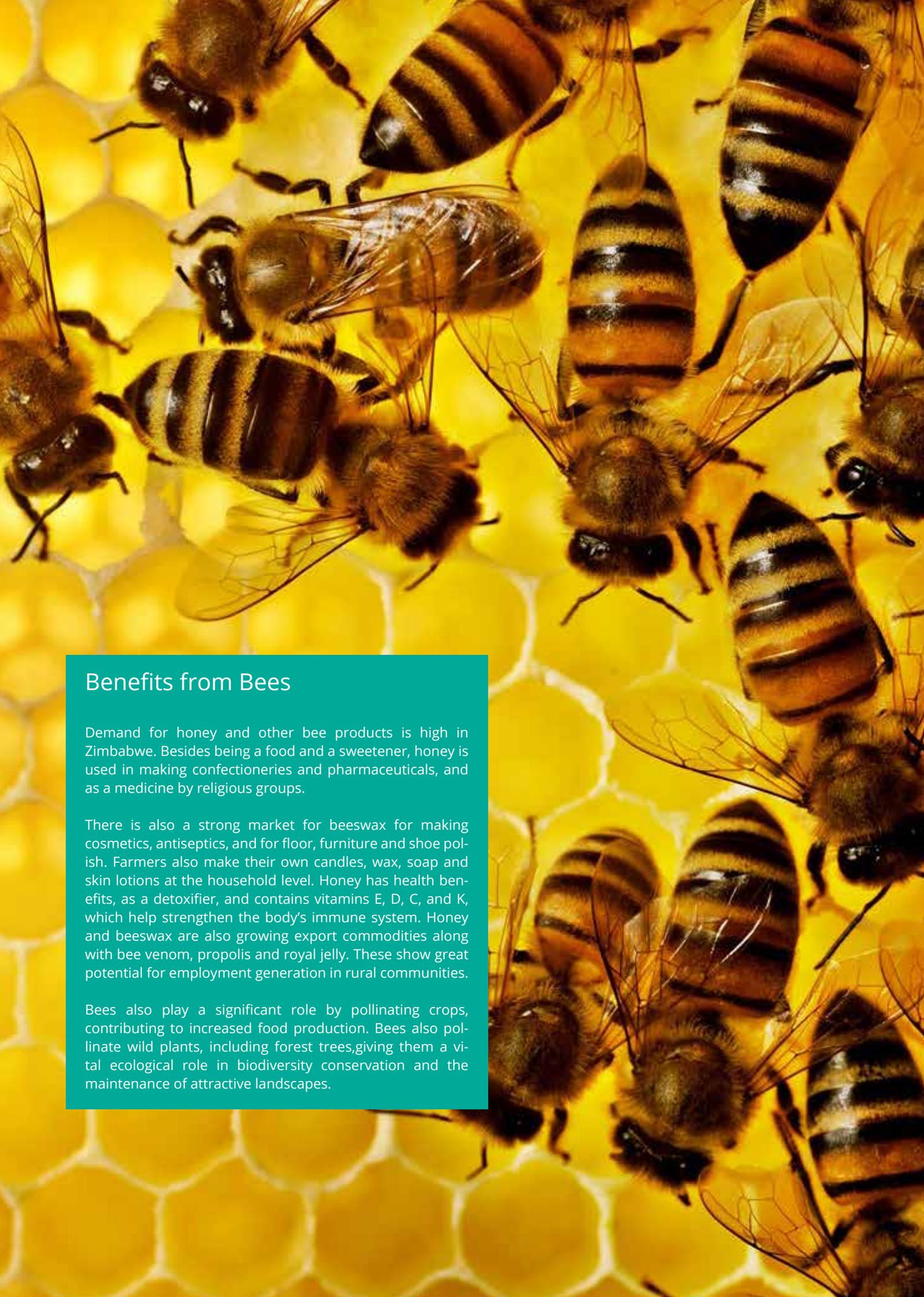
term environmental sustainability. Today, trees and woodlands are being cut at an ever-faster rate due to demands for fuel and more land for growing input-intensive cash crops such as tobacco. The Ruzivo Trust works with family farmers to promote beekeeping-centred agroforestry, maintaining tree cover by promoting the protection and planting of trees. This also helps to ensure a regular and ample supply of bee forage, and contributes to the design of interventions that help people and their environment.

An unexpected outcome is that beekeeping increases the participation of communities in conservation. When farmers learn about the value of trees as a source of bee forage, they are also less likely to continue with destructive activities such as charcoal burning and hunting. They can even begin to plant more trees. The farmers recognise that protected environments are good for bees, and that the growing of bee-friendly crops like sunflower and alfalfa can further increase honey production.

Climate change, floods, and unpredictable droughts are contributing to crop failures. Yet, beekeeping has proven to offer a valuable adaptation strategy. During droughts, bees can forage in the wild vegetation and still produce honey and beeswax. While farmers such as Mrs Manyowa invest in beekeeping, they are equally investing in a future environment in which their community and physical surroundings are more resilient to climate shocks. Her efforts are not lost, because in the process of conserving nature for her bees, cash is also coming into her pocket and helping her family and her community break out of poverty.



*Beekeeping in Zimbabwe
Mazowe, Mashonaland, Central Zimbabwe*



Benefits from Bees

Demand for honey and other bee products is high in Zimbabwe. Besides being a food and a sweetener, honey is used in making confectioneries and pharmaceuticals, and as a medicine by religious groups.

There is also a strong market for beeswax for making cosmetics, antiseptics, and for floor, furniture and shoe polish. Farmers also make their own candles, wax, soap and skin lotions at the household level. Honey has health benefits, as a detoxifier, and contains vitamins E, D, C, and K, which help strengthen the body's immune system. Honey and beeswax are also growing export commodities along with bee venom, propolis and royal jelly. These show great potential for employment generation in rural communities.

Bees also play a significant role by pollinating crops, contributing to increased food production. Bees also pollinate wild plants, including forest trees, giving them a vital ecological role in biodiversity conservation and the maintenance of attractive landscapes.

An Attractive Family Enterprise

Most rural development initiatives attempt to improve farmers' livelihoods. We have observed that when crop production alone cannot provide adequate food security, beekeeping provides a feasible diversification option. It is low cost, low risk and requires minimal land and labour, making it viable for young and old, and for disadvantaged groups. Bees are self-sufficient and do not need constant attention. Beekeeping does not compete for resources with other types of agriculture. Most of the necessary equipment, such as hives, smokers, protective clothing and veils, can be made by local carpenters, tinsmiths and tailors, adding to the rural economy.

In Mazowe District, most families now practice a mix of activities combining beekeeping with raising crops and cattle. Local farmer Clemence Machoto said, "I can now better cater for my growing family needs and improve my quality of life. Beekeeping supplies me with an additional non-perishable food and it is not time consuming." A neighbour, Mr Musiwo, explains, "I have upgraded from using reed baskets and log hives to using improved 'Kenyan top bar' hives which make it easier to harvest honey without impurities."

Beekeeping for Income, Pride and Independence

To family farmers in Mazowe, beekeeping is becoming much more than a renewed rural occupation. It is now an integral part of a new and much broader agriculture with diversified income sources. A survey of 26 farmers previously trained on beekeeping by Ruzivo showed that nine out of ten farmers improved their incomes as a result of keeping bees. They diversified their diets, invested in education for themselves and their children, and reinvested in their farm to make it a more productive enterprise. Input costs are relatively low, at less than 50% of the income generated, making beekeeping a thriving business that acts as a way out of poverty.

“

One beehive can produce honey with a value of almost US\$100 per year. Each hive produces up to 15 kg of raw honey, which is processed into 12 kg of pure honey, then decanted into 375g bottles and sold for US \$3 each.

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But is it all 'Honey' That Flows?

At the Ruzivo Trust, we have identified constraints to the further development of apiculture in Zimbabwe. Small scale farmers face uncertainties over access to finance, advice, information and reliable markets. Some beekeeping family farmers in Goromonzi District have not yet been able to make a decent living from selling their own produce. This is because they do not sell directly themselves and still rely on middlemen. Often, raw honey is sold to middlemen at low prices whereas pure honey and its by-products could fetch much more. Furthermore, we found that beekeepers would benefit from improved technical knowledge at all levels of the honey value chain: in processing and value addition, record keeping and provision of coordinated market information systems.

The importance of beekeeping and its links with trade and food security must form a critical area of attention for government and international agencies, policy makers, environmentalists and entrepreneurs. We believe that beekeeping farmers have the potential to transform Zimbabwe's agricultural sector. The challenge is a crisis of knowledge. More resources are needed to enable the necessary training and knowledge sharing, and we at Ruzivo Trust are confident of being able to help in covering the gap.

CONTACT

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CASE STUDY

Organic and soil fertility practices bring food and livelihood security to farmers in central Kenya

Introduction

In Kenya, communities in the Central Province and neighbouring counties suffer the impacts of land degradation due to increased population growth rates. The average land size is one acre while the average family size is about eight people. This exerts substantial pressure on available land for food production. Demographic, economic and environmental changes have upset the balance necessary for appropriate land use. Farm sizes are decreasing and conventional chemical fertilizers as well as soil restoration methods are becoming less affordable; this situation leads to land degradation.

Soils in the area have become very acidic and some have a pH as low as 4.0 and below; these kinds of soils cannot produce sufficient food. Some of the communities here have been beneficiaries of food aid, not because they have no land for cultivation, but because their soils are too poor for producing food. For this reason, there is a great need to build the capacity of the farming communities from these regions in agricultural practices that will restore soil fertility, improve the soil pH, and enhance livelihoods.

The Project

A project to increase soil fertility and promote chemical-free agriculture was started by Grow Biointensive Agriculture Center of Kenya (G-BIACK) in 2010 and is still ongoing. Over 8,000 farmers in Kiambu, Muranga and Machakos counties (the project areas) are involved in organic farming, focusing predominantly on soil fertility management, seed security, small livestock production and income generation.

The long-term objectives of this project are:

- To improve the food security, preservation and storage, and nutrition levels of households through diversification of food production and sustainable agriculture techniques
- To improve farmers' access to markets and diversify their sources of livelihoods through alternative income-generating activities
- To build the institutional and organizational capacity of farmers' groups in the targeted communities
- To establish a participatory monitoring and evaluation framework

Interventions and Resources

Interventions

The rate of land and environmental degradation is extremely high in the project areas. Poor agricultural practices such as excessive use of chemicals, burning of crop residue during land preparation and improper soil conservation practices have contributed greatly to nutrient depletion, and hence declining soil productivity. Low soil fertility is regarded as a major cause of low crop yields in smallholder farms resulting in food scarcity within households.

Moreover, deforestation has also occurred in the communities' search for new land for cultivation or settlement. This is likely to have contributed in part to reduced rainfall which in turn affects food production. Furthermore, the prices of farm inputs like inorganic fertilizers have been increasing and their acquisition has become burdensome to farmers, given their financial limitations.

This project attempts to improve this situation through five forms of intervention:

1. Training workshops
2. Follow-up with farmers including farm visits
3. Demonstration gardens
4. Experiments
5. Monitoring and evaluation

These interventions are implemented through the following measures:

1. Baseline surveys
2. Awareness-raising through the chiefs' camps, barazas, churches, advertisements and road shows
3. Training workshops
4. Follow-up with farmers including farm visits
5. Refresher courses through small groups
6. Evaluation exercises

The good practices applied and promoted through the project include:

1. Use of organic fertilizers including compost and farmyard manure
2. Use of soil and water conservation structures
3. Timely and early planting
4. Crop residue management
5. Use of open pollinated and indigenous seeds

Resources

The cost of the project is over KSH 4 million (USD 45,600) per year. In order to implement it, six technical staff members were hired. The available funding has also enabled training sessions and follow-up meetings to take place.



Outcomes

At least 30% of the farmer collaborators have reported an increase in food production due to improved soil fertility. Farmers are now using compost and/or farmyard manure as a means of soil fertility management. Farmers have also noticed improvements in food quality.

The key successes of the project so far are as follows:

- At least 30% of the farmers trained have adopted organic farming systems
- The use of compost and farmyard manure is high
- Local indigenous seeds are in high demand
- The use of chemical pesticides and fertilizers is fast declining

Several farmers are now able to rely completely on their farms as a source of livelihood.

“ Our farm was very poor. We used to gather the crop residues and burn them but now, we make compost with them which we are now using as a fertilizer. For 3 years now, we have never used any chemical fertilizer or chemical sprays. Secondly, we used to buy vegetables for our family but today we sell vegetables, fruits and other crops for income... and yet we have the same land.”

Mr. and Mrs Celestino Ndungu Kibechu

”





Challenges and Opportunities

The project has faced a number of challenges such as having to process the information collected by G-BIACK which conflicted with that from the Ministry of Agriculture and corporate suppliers of agrochemicals, the lack of indigenous seeds, and insufficient funding to scale up this initiative. Nevertheless, the successful outcomes of the project are grounds to justify its upscaling as smallholder farmers are constantly looking for cheaper and yet more sustainable ways of farming for better food and livelihood security.

Reflections on Food Sovereignty

The essence of this initiative has been to contribute to the ability of the selected vulnerable communities to regain self-reliance and assert their food sovereignty through community empowerment. The communities exercise their right to choose what to grow and how to grow it. This has led to food security, livelihood improvement, better nutrition and a better standard of living for them.

Africa has the potential to feed itself because it has all the resources required in order to produce sufficient food.

These include fertile soils, a climate that favours agriculture all year round and a wide range of indigenous seeds. Governments should embrace local and indigenous agriculture and promote indigenous agricultural knowledge. Civil society organizations that work in the areas of agriculture and environment should advocate for organic farming to be recognized and taught at all levels in the education system. This should be made legally mandatory.

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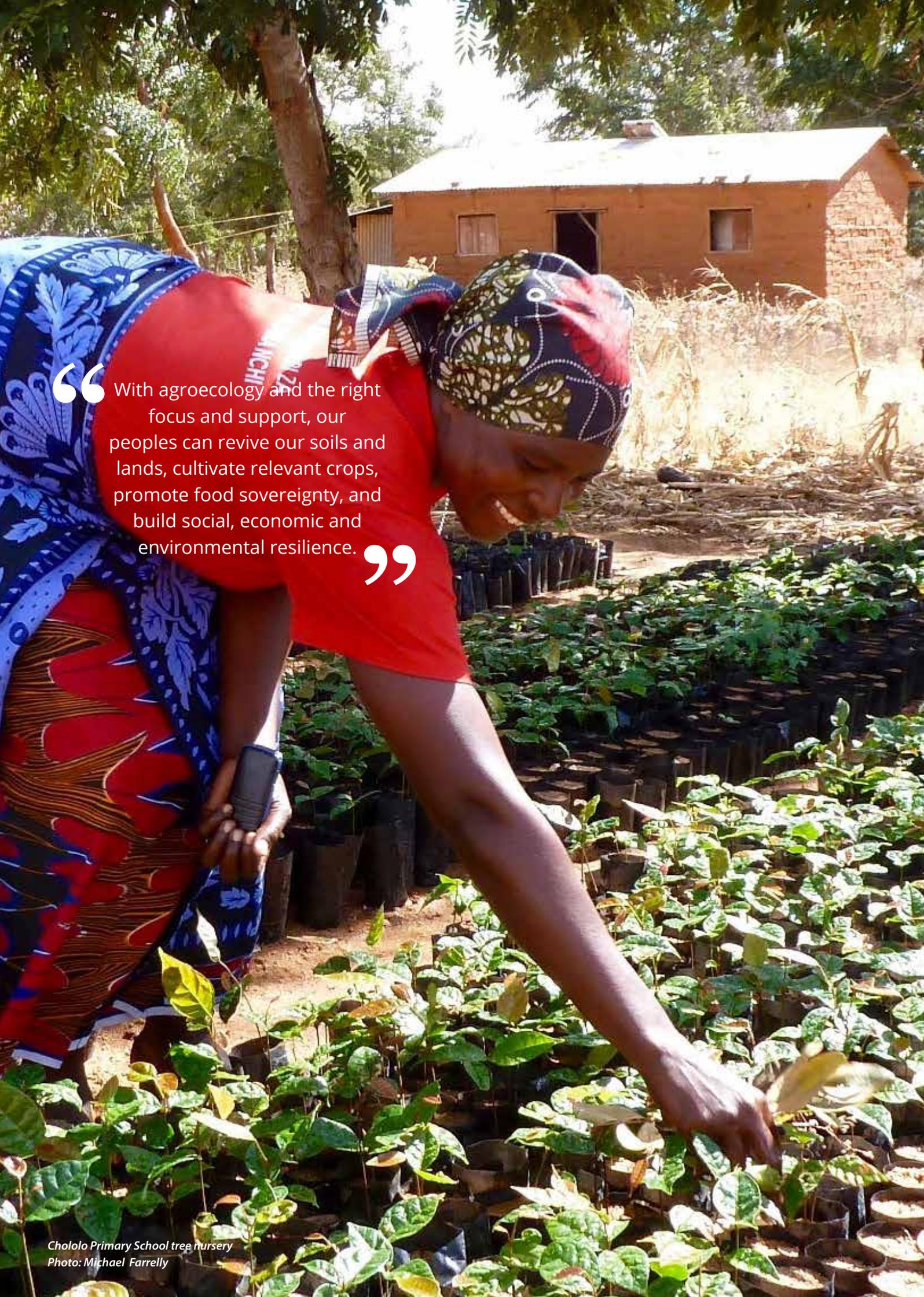
G-BIACK came to take us out of Egypt and we are now in Canaan. We have opened an organic hotel where we are selling what we are producing from our farm. This is complete employment and we have now employed six other people both in the farm and in the hotel.

Mr. Charles Waweru and his wife, Njeri

”

CONTACT

This case study is dated June 2014. The information was provided by Grow Biointensive Agriculture Center of Kenya (G-BIACK). Questions may be sent to the author: Samuel Nderitu, Director, G-BIACK at growbiointensivecentrekenya@gmail.com



“ With agroecology and the right focus and support, our peoples can revive our soils and lands, cultivate relevant crops, promote food sovereignty, and build social, economic and environmental resilience. ”

REGENERATION, RESTORATION AND BIODIVERSITY

REVIVING OUR LANDS WITH AGROECOLOGY!

Introduction by: Nnimmo Bassey

The major problem in the world today is that while we yearn for solutions to massive environmental degradation, we are unwilling to accept that the answers are around us. The case studies in this section show that with agroecology and the right focus and support, our peoples can revive our soils and lands, cultivate relevant crops, promote food sovereignty, and build social, economic and environmental resilience. The studies present irrefutable evidence to counter the mechanical, monocultural and ecologically destructive and exploitative modes of industrial agriculture.

I learnt a valuable lesson on this score a couple of years ago when I visited some farmers in northern Burkina Faso. Some of the farmers stated that there had been a time when they thought that some lands were degraded beyond redemption and thus worthless for agriculture. Such lands were considered marginal and used merely for grazing. The farmers said that after learning and adopting the locally developed Zai technology, they could farm on any sort of soil. They proudly called on anyone to visit their farms to verify

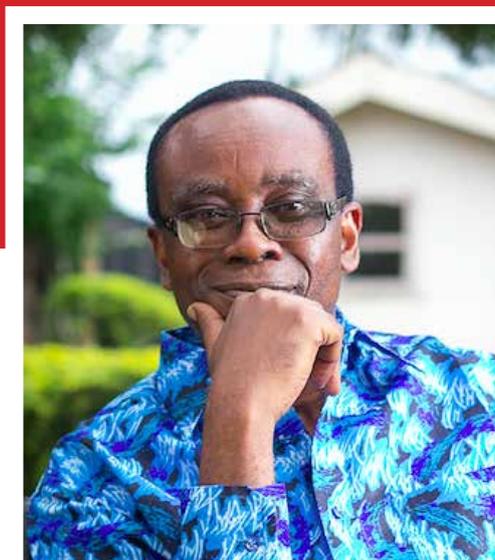
their claims. I did. And I saw that previously gravelly and semi-arid land had been turned into verdant farms of grains and trees. The Zai technique is a land rehabilitation technology which can convert degraded dry land to agricultural land by restoring soil fertility. Organic manure is placed in pits or along stone ridges to trap water and fertilize the soil.

Based on this and the case studies presented in this section, we can boldly challenge any move by individual or corporate land grabbers to label our lands as marginal in a bid to plunder our resources, harm Mother Earth, displace our farmers, and push our peoples into the pits of dependency and poverty.

Nnimmo Bassey

Environmental Justice Advocate

Health of Mother Earth Foundation (www.homef.org)



Mr. Masara of Nyahondo, a small-scale farming area in Mutoko, show-casing six different bambara nut landraces

CASE STUDY

Saving the bambara nut in Mutoko, Zimbabwe

Introduction

The local farmers in Mutoko, Zimbabwe, face constant food insecurity due to a number of factors which include the loss of biodiversity and traditional food crops. One of the traditional crops that has dwindled in production over the years is the bambara nut. In the resettlement sector in Mutoko, bambara nut production covered over 2,000 ha in 2011-2012, but this declined to only 26 ha in the following season. According to the Department of Agricultural, Technical and Extension Services (AGRITEX), the average yield has now dropped to below 0.5 tons/ha. Contributing factors for the decline include socio-economic, agronomic, and environmental issues. This loss is complicated by the loss from community memory of traditional names and characteristics of the local landraces.

In October 2013, a project was implemented to address the problem of food and nutrition insecurity due to the loss of biodiversity and cultural knowledge on traditional foods. It sought to characterise landraces and prevent the further loss of the bambara nut. The project focused on the bambara nut because of its traditional role in food and nutrition security in the area and the fact that the crop had been largely abandoned. Bambara is rich in nutrients. According to Heller et al. (1997)¹, the nut contains 63% carbohydrates, 19% protein and 6.5% oil on average.

The project was located in the Mutoko District in Mashonaland East Province, a semi-arid region of Zimbabwe where the production of traditional crops was common at one time. The project lasted from 15 October 2013 to 15 February 2014. The total budget was USD 5,000 which was provided by Practical Action Consulting U.K. A multi-disci-

plinary team of scientists participated in the project: one agronomist, three research officers from the Department of Research and Specialist Services (DR&SS) which houses the National Genetic Resource Bank and the Plant Protection Research Institute (PPRI), and one District extension officer and five field extension officers from AGRITEX. The extension workers each worked with 2-5 farmers from a total of 17 from the three farming sectors in Mutoko.



Ten different landraces of bambara nut packed in different forms for display at Nyahondo Small-Scale Commercial Farm in Mutoko, Zimbabwe

¹ Heller, J., F. Begemann and J. Mushonga (Editors). (1997). *Bambara groundnut (Vignasubterranea(L.) Verdc.). Promoting the conservation and use of underutilized and neglected crops. Proceedings of the Workshop on the Conservation and Improvement of Bambara Groundnut (Vignasubterranea(L.) Verdc.), 14-16 November 1995, Harare.*

Approach and Activities

The project was implemented based on the knowledge and skills gained from Evidence and Lessons from Latin America (ELLA)², which facilitated a study tour from February to May, 2013. It showcased how Peruvian smallholder farmers conserved indigenous Andean potatoes for food, nutrition and income security.

Based on this, it was decided to focus this project on creating awareness of the importance of conserving traditional food crops and improving nutritional and seed security for the farming communities in Mutoko. Bambara is considered a women's crop and is less preferred by male farmers compared to other leguminous crops such as beans and cowpeas. Tradition has it that planting on virgin land (land that is newly opened for cultivation) will produce high yields of bambara nut, but this is currently difficult to come by, resulting in a reduced production area.

The main activities of the project were the repatriation of seeds from the National Genetic Resource Bank to farmers, the characterisation of different varieties of the bambara nut, and the promotion of ex-situ and in-situ conservation. Demonstration plots/trials were set up.

Meetings were held with the district heads of three districts initially to sensitise them on the importance of biodiversity conservation. The Mukoto District was finally selected as the study site. In order to capture a broad range of biodiversity, communal, resettlement and small-scale commercial farming sectors were selected to participate.

Farmers who had a history of growing the bambara nut and who often displayed different landraces at agricultural shows were selected irrespective of gender. A total of 17 farmers were finally selected: 4 from the communal area, 4 from the resettlement area, and 9 from the small-scale commercial farming sector.

Two plots each measuring 4m x 3m were demarcated within each farmer's field for bambara nut cultivation. On one plot, six accessions from the gene bank (conserved ex-situ) were planted and on another plot, six or more landraces from the farmer's seed stock (conserved in-situ) were planted. Recommendations from AGRITEX and DR&SS were followed e.g. planting twenty seeds at the most in one line, spaced at 20cm apart within a row and 45cm between rows; and adding soil to cover the root area of the crops during the flowering stage for effective 'pegging' i.e., the production of more bambara nut pods in the ground. Weed control was done manually and the harvesting of dry bambara nuts was done at the maturity stage. A total of 102 accessions from the gene bank and 100 in-situ-conserved seeds (farmers' own seeds) were planted.

Characterisation was conducted in a participatory manner

involving both farmers and researchers. The farmers provided the qualitative characteristics of the bambara nut while the researchers provided the quantitative characteristics based on the recommendations of the International Plant Genetic Resources Institute (IPGRI). Data on the characterisation was collected through field visits at 14 days after germination, 10 weeks after germination, and at harvesting time.

Two farmer days³ were held in the communal and resettlement areas. Different stakeholders from the agricultural, education, and health sectors as well as NGOs and politicians participated. A total number of 10 representatives from stakeholder institutions and 195 farmers (43% men) attended these farmer days.

A total of 17 kg of bambara nuts was harvested from one cropping season and from a total area of 204 m². The yield of dry unshelled nuts was approximately 0.8 tons/ha. Farmers participated in the selection of mature seeds and retained half the harvest (both from their own seeds and the repatriated seeds) depending on the outputs from their plots. The retained seeds at farm level were multiplied by the farmers under the guidance of AGRITEX. The other half of the harvested seeds was collected by researchers for further laboratory characterisation and ex-situ conservation in the National Genetic Resource Bank.



“ I learnt a lot on the nutritional value of bambara nut which was equated to livestock protein sources ”
Mrs. Rudo Nyakudanga, host farmer from the communal area of Mutoko District

² ELLA is a platform which encourages exchange of information on small-scale farming.

³ A farmer day is an extension method whereby a day is set aside for farmers, researchers and extension agents to meet and exchange ideas and information on a particular topic.

Outcomes

There were several successful outcomes from the project such as the initiation of the documentation of the traditional names of the bambara nut. Another was the increased acceptance and interest among male farmers in bambara as a cash crop. The bambara nut is traditionally grown by women. In this project, however, 29% of the growers and 43% of those who attended the farmer days were men.

Furthermore, the initiative of alerting farmers on producer prices through their cell phones proved to be an effective motivation tool. A price of USD 80 per 20-litre bucket was hit during the project lifespan and this motivated the farmers greatly.

The repatriation of accessions from the National Genetic Resource Bank to the communities increased the farmers' diversity range of bambara landraces. There was a large increase in the number of landraces collected for ex-situ conservation in the genetic resource bank as well. A total of 193 samples was conserved compared to the 100 samples

before the start of project (Figs. 7A and 7B).

The improvement in stakeholder linkages was another successful outcome as the project addressed both agricultural and health issues. The organisation of farmer Dayson bambara nut conservation was the first of its kind in the history of the communities. A platform for sharing information was created. Multi-stakeholder interest in bambara nut conservation and characterisation was raised.



Drying of samples from farmers' fields before laboratory characterisation and conservation

Upscaling Opportunities

The increased interest in food and nutrition security amongst the stakeholders is expected to lead to more project proposals being developed to take the work further. The project is a good model for upscaling considering that it was initiated within AGRITEX in line with the current Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimASSET).

The extension and awareness-raising methods used in the project e.g. farmer days, videos, photos, posters, etc. proved appropriate, effective and very replicable. As the National Genetic Resource Bank has collected so many more varieties of the bambara, these are now available to other communities to take advantage of.

Initiatives such as this project are the way to go in view of the call for nutrition-sensitive agriculture. With more education on nutrition and dietary diversity, households and communities will be able to make informed decisions on the type of seeds to grow and conserve for future planting, consumption and sale.

Some challenges to upscaling need to be borne in mind however. For one thing, there are still many landraces of bambara without characterisation or documentation. There is also a lack of funding for mainstreaming biodiversity conservation as well as limited knowledge amongst the stakeholders on how to do this. The bambara nut is highly susceptible to fungal diseases such as *Fusarium* sp. which causes premature drying of leaves. Furthermore, misconceptions on soil types and recommended agronomic practices on bambara nut production still prevail along with negative attitudes towards the production and utilisation of traditional crops.

It can be concluded that the characterisation of landraces contributes to the cultural and biodiversity conservation of under utilised but valuable local crops such as the bambara nut. In turn, this improves food and nutrition security at the household and community level. A participatory multi-disciplinary approach in research and extension is needed for such initiatives to work.

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My wife did not sell Bambara as fresh nuts this year as she intends to multiply and increase production. I liked the research component of the project.

Mr. Chipunza, husband of host farmer from the small-scale commercial farming area of Mutoko District

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Poor soil fertility and low soil pH



Participants at a farmer day in the resettlement area, Mutoko



Mrs. Mukuna of Mutoko in a demonstration plot demarcated by a row of pigeon pea (after the harvest of bambara)

“ In the past years I did not give much attention to “nyimo” (bambara nut), but after the project I will increase the area under bambara nut. Also, had I known, I would have planted pigeon pea right round my homestead as a life fence and source of food”

**Mrs. Phillipa Nyamuzinga,
host farmer from the
resettlement area,
Mutoko District**

”

CONTACT

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CASE STUDY

Reclaiming life in marginal areas and fragile ecosystems through innovative solutions

Introduction

Human activities have helped to speed up the process of desertification in Burkina Faso.

In order to curb this scourge and its disastrous consequences, the NGO "TERRE VERTE" has, since 1989, carried out a rural development project referred to as bocage perimeter, ("Wegoubri" in the Mooré language).

This new concept has helped to develop and enhance degraded lands.

Over fifteen years, the NGO has developed a reliable system that should be shared widely.

The project began with the establishment of a pilot farm in Guié, central Burkina. It has then been relayed in the following locations:

- In the village of Filly, Yatenga Province, a bocage perimeter of 23 hectares was established in 2007, followed by another perimeter of 86 hectares in 2009.
- The village of Goèma, in Sanmatenga Province, was involved in the pilot farm in Guié. The foundations of the pilot farm were laid in December 2008. In 2010 a large bocage perimeter of 130 hectares was inaugurated not far from the farm, which itself extends over 40 hectares.



Integrated approach combining agriculture and livestock

The Project

Definition and objective of the concept

A bocage is a balanced environment, created to combine trees, crops and livestock.

The concept of a bocage perimeter is created to solve the problems associated with extensive agriculture (overgrazing, erosion, fires etc.). A bocage perimeter is the result of land consolidation at the request of owners of a site. The owners work in 'land groups' to make environmental improvements to a plot.

The primary purpose of a bocage is to retain water where it falls by developing bunds, ponds and hedgerows. This helps reduce the erosive action of monsoon rains and helps maintain the biodiversity of an extremely fragile environment.

Principles of the concept

The concept is based on the creation of grouped bocage perimeters composed of individual parcels and outbuildings. Several structures make up the bocage perimeter including, from outside inwards:

- The firewall surrounds the whole area to guard against fire, a constant risk in the Savannah;
- The fence blocks the path from wandering livestock. It is composed of a fence, sandwiched between two rows of bushes;
- The openings allow access to the site. Four gates let in bicycles and pedestrians; a main barrier is used for livestock and tractors;
- The main and secondary roads are used to serve each field;
- A Bulli (large pond) recovers surrounding waters for watering livestock.

Individual plots receive all the benefits in improvement of agriculture and livestock from the outbuildings, while preserving private property. Each owner gets a number of fields in the shape of a square, allowing bunds to move according to slope changes of the terrain, rotating the orientation of the fields inside the square.

Each field is accessible by road and is surrounded by an earth bund lined with a hedge. At the bottom point of the field, a small pond is set up for excess water runoff. Large trees are aligned in the field to facilitate manual or mechanical agricultural practices.

As well as bocage perimeters, other infrastructure is developed including:

- installation of rain gardens near homes;
- development of bullis to preserve rural areas from water damage;
- construction of wide rural roads in and between villages.

The management of a bocage

The management of these fields is organized around a land group of beneficiaries and is based on the implementation of the following:

- maintenance of earth bunds;
- replacement of dead trees for proper implementation of hedgerow seeding and planting;
- maintenance of structures (roads, firewalls, mixed hedges, bullis), the backbone of bocage perimeters;
- cutting hedgerows every 5-7 years.

In addition to these maintenance activities, the following techniques are essential for maintaining soil fertility:

- The use of composting for the renewal of soil humus;
- Crop rotation to avoid the depletion of the soil and prevent pest and weed infestation associated with a particular crop;
- Fallow which promotes the active recovery of land from the effects of exhaustive agricultural practices (development of pests, depletion of certain minerals, impact on soil structure);
- Ecological livestock farming that preserves the environment by adapting the livestock density to the fodder available.



Vegetation in full bloom



Results Achieved

- The recovery of all rainwater without erosion: The earth bunds, hedgerows and ponds prevent rainwater runoff. Water seeps into the soil and can leave the field only by evapotranspiration of the soil and plants.
- The restoration of biodiversity: The project helped to restore the biodiversity of an extremely fragile environment. In the area where the project was developed, a balanced environment, combining trees, crops and livestock, was set up; man and nature are now living in perfect harmony.

Mr Kaboré, member of the local community of Guiè, gives the following testimony:

“This project has revived some plants of great value both from the point of view of food and traditional medicine. Now we see, growing in the hedgerows, trees planted by the wind or birds, which had disappeared.”

- Improving farmers' access to land: Through the creation of bocage perimeters, farmers now have an environment that enables them to better face the future. This environment provides land security, protection against fire and the straying of livestock, improvement of the environment, and food and water security.

In addition to the preservation of the environment, the following results were obtained:

- improvement in the health status of herds that now have an abundance of fodder;
- improvement of production;
- effective integration of livestock with agriculture (through the use of organic manure).

Creation of a training centre for rural developers of Guiè:

Since 1990, the pilot farm of Guiè has informally welcomed many young people to join in with its activities (workshops on nurseries, breeding, sustainable agriculture and development and maintenance of rural space). In January 2008, this was formalised by the creation of the Training Centre for Rural Developers of Guiè (CFAR), which prepares the youth to be operational in the fight against soil degradation.

“

My time at the Training Centre for Rural Developers of Guiè (CFAR) was a unique experience. I learned a lot of things and the main lesson I learnt is that man can rebuild what he himself deconstructed and destroyed. Both the destruction of biodiversity and land degradation are not inevitable. It is possible to reverse the trend if we choose to.

Mr Issouf Ouedraogo, a young student of the Training Centre for Rural Developers of Guiè (CFAR)

”

Conclusion

The bocage perimeter is based on the conservation of rainwater and of the soil. These two elements are closely linked; by preserving one we preserve the other. When water is kept in the field, the vegetation grows sustainably. The pilot Farm of Guiè, and the other farms created afterwards, have developed and compiled techniques to reclaim the degraded land of the Central Plateau in Burkina Faso. They have succeeded at integrating the safeguarding of the environment into Sahelian agriculture. This initiative has helped bring back life where it had disappeared.



CONTACT

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Agroecology for home and market: a winning combination for rural communities in Mashonaland East, Zimbabwe

The State of Food Insecurity in Zimbabwe

The main cause of food insecurity for many communal households in Zimbabwe is their reliance upon a form of subsistence-based agriculture which is dependent on a limited range of inputs often poorly suited to local conditions. The current agricultural system promoted by the government prioritizes monocropping and grain yield over other factors of food security. This has degraded the very ecosystem which should sustain food security and farmer livelihoods. As a result of all these factors, 50% of Zimbabwe's smallholders are regular recipients of food aid today .

Agricultural Livelihood Security Project

Rationale & Stakeholders

Livelihood Security in a Changing Environment: Organic Conservation Agriculture is an initiative involving 791 resource-poor smallholders. It was undertaken in 2011 as a partnership between three organisations: GardenAfrica, Fambidzanai Permaculture Centre, and Zimbabwe Organic Producers & Promoters Association. Initially an 18-month action research project, it was extended a further two years, to end in 2015.

The project was founded on social and market research which revealed a steadily growing domestic demand for

organic produce. Such demand was being serviced by imports from South Africa while Zimbabwe's resource-poor smallholders remained net recipients of food aid. The initiative therefore sought to facilitate livelihood opportunities based on market realities while applying sound ecological management to restore ecosystem functions for sustained productivity and growth.



Solar drying of seasonal vegetables to be consumed and sold out of season when their nutrients are not readily available, and when better prices can be gained by selling out of season (when gaps appear beyond the supply gluts).

Objectives

The primary objective of this project has been to promote a shift to agroecological farming. This involves rebuilding soil organic matter and protecting it from further depletion and promoting a return to productive diversity through intercropping and rotation. By increasing biodiversity and habitats, farmers are restoring the balance between pests and their natural predators and attracting pollinators to improve yields. Such diversity is not only important in restoring the balance of nature, it also minimises farmer dependence on costly inputs.

Agrobiodiversity provides important benefits for farmers and their families: nutritional diversity, health, and reducing ecological and market risks associated with monocropping. With markets in mind, our second objective was to explore the opportunities presented by organic certification and market development for Zimbabwe's smallholder sector in providing certified organic produce. The rationale was that access to lucrative organic markets would increase incomes, which in turn would stimulate a wider uptake of agroecological practices.

Project Area

Mashonaland East Province was selected as the project site due to its proximity to Harare, which has a high demand for organic produce. Furthermore, it spans four agroecological zones from the semi-arid to dry sub-humid, providing a strong empirical basis for testing the project's permaculture methods and the different strategies to be employed.

The initial baseline revealed that all the farming households were producing at below subsistence-level, with extremely low levels of agrobiodiversity, leaving them vulnerable to adverse ecological, social and economic pressure. Those ex-

posed to the highest levels of political insecurity lived in the areas with the most acute resource challenges, with land, food and agricultural inputs regularly used as political tools. Levels of farmer coordination and cooperation were low, affecting information sharing, transaction costs, and collective action to address natural resource challenges. In addition, insecure land tenure was a significant disincentive to the uptake of organic and other sustainable land-use systems, which required medium to long-term investments.

Project Approach and Intervention

The project's approach has been to deliver a wide-ranging series of training courses; to support and guide the establishment of peer networks; to provide farmer field support; and to engage influential actors (from community leaders and buyers to policy-makers) so as to gain their support as they sometimes pose barriers to change, wittingly or unwittingly.

Community Organizing

A careful task-based selection process, in partnership with Agritex, led to the selection of 32 'access farmers' with an interest in organic farming, who could work closely with neighbouring farmers to share skills and rebuild contiguous ecosystem corridors. Each of the 32 farmers then selected up to twenty peers to form associations, creating more entry points for women.

A decision was taken early in the process to actively avoid the term 'lead farmer', guard against information capture, and create awareness amongst the associations that every member had something to contribute. Course attendance by different representatives on a rotational basis enabled more women to attend, who generally would otherwise have been constrained by other commitments .



Facilitating Behavioural Change to Restore Ecosystem Functions

Capacity Building in Agroecological Practices

The focus of the intervention was to build confidence and competence in agroecological practices and to enhance ecosystem functions. By increasing farm resilience and building market-based skills, the project team was confident that farmers would soon see the desired food security and livelihood gains. This knowledge acquisition stage was backed up by regular field support to assess the level and quality of knowledge exchange and accumulation at the association level. The training courses are listed in the boxes below.

Building Leadership and Access

It soon became clear that one of the factors influencing the success of the highest performing association was strong leadership support. An exchange between chiefs and headmen was soon arranged to enable each to see what was

possible when this support was present.

Within three months, all but one association had been granted secured access to virgin or reverted land, with all leaders stating that they would no longer prioritise high-input conventional agriculture, but would instead allocate land to “our organic farmers who are protecting the environment and bringing benefits to the community”.

Furthermore, both access to well-resourced land, on the basis of an ongoing duty of care, and access to markets have been considerable incentives in motivating other farmers to convert to agroecological practices, driven by the sheer determination of the initial group of organic farmers.

Perhaps most significantly for ecosystems and natural resource management, community leaders have become more aware of and engaged in issues relating to the over-exploitation of natural resources and the impact this has on farming livelihoods. The farmers are now able to articulate their concerns clearly and openly.

Successes

This project on small-scale family farming in Zimbabwe is indicative of the situation in the whole country. The average maize yield in Zimbabwe in 2012 was 85 kg per ha, bearing in mind that the US average is 10 tons per ha. Having started at below subsistence productivity levels, some of the project farmers have since achieved the equivalent of 8 tons per ha, using only organic methods. The word ‘equivalent’ is used here because on their communal smallholdings of between 1 to 1.5 ha each, the farmers are encouraged to diversify their crops to include herbs, fruits and vegetables, some for household consumption and some for market. This is generally not considered in standard measurements of farm outputs which focus on primary crop yields only.

The success of the project was measured through a series of indicators such as relative increases in the farm diversity, yields and incomes of the initial 591 participating farmers. Within the first 18 months of the project, agrobiodiversity had increased by 122%, yields by 72%, and incomes by up to 90%.

By the time the project entered its second phase, a further 200 farmers had joined in, either through new or existing associations. Furthermore 3,562 more members were incorporated into the national organic membership body, resulting in Zimbabwe’s first 160 ha of locally certified organic land with its produce entering the domestic supply chain. After only 30 months, the (now) 40 associations, having begun at below subsistence productivity levels had, between them, earned US\$ 69,800.

Mulch demonstration. The demonstration shows the level of run-off experienced on different soils if not protected by mulch. The volume and colour of the water percolating to the bottles demonstrates that less water and soil is lost by different forms of soil covering/protection, which holds the water, soil and its nutrients in place.



Ongoing & Emerging Challenges

While many of the resource challenges are being addressed by better erosion control, good soil management practices, and natural pest management strategies, not all associations have fared equally well. The ongoing challenges are a combination of lack of individual motivation, weak social organisation and set beliefs in conventional agricultural practices that are difficult to change.

One thing is however clear; the farmers with the lowest agrobiodiversity have the lowest level of confidence, yields and incomes. This presents a challenge to the respective associations. It is clear that more work needs to be done to address the persistent barriers to change. Possibly, not all farmers are ready or able to go commercial in which case increasing their food security and resilience is even more essential. This however requires all the same conditions as those who meet with market success: fully functioning ecosystems which agroecology makes possible.

It is often reported that a market focus has negative impacts on household food security due to the monocropping of high value crops for markets alone. This project has not found this to be the case, however, due to its focus on diversification for household and market. That said, this initiative has found that market-led production, albeit through ecological agriculture, has had a negative impact on groundwater levels despite water reuse and conservation practices.

The solution is not a simple one, requiring effective community-based natural resource and watershed management to recharge groundwater supplies, thus reducing potential

conflicts between household and farm irrigation needs. For farmers to engage in these critical but essential off-farm activities, this requires time and foresight.

Any initiative seeking to promote livelihood development through horticultural production and market development will need to address such potential resource conflicts and manage them effectively. Those farmers who navigate this challenging path successfully will thrive while those who do not will struggle. The role of NGOs engaging in projects like this one is to encourage community leaders to use foresight in taking the lead on matters of environmental conservation.

Conclusion

From the outset, it was clear that aligning the demands of the market with sound ecological practices would be a delicate balancing act. The encouraging fact was that the market was demanding diversity. Central to this project has been facilitating and encouraging the transfer of knowledge, skills and confidence to harness the potential of natural and social capital.

While organic certification is not the only way to protect ecosystem services, the farmers' experiences in this project demonstrate that where conditions are favourable, organic certification can serve as a significant market-based mechanism to build confidence in farmer-led ecosystem restoration.

Through this approach, viable farming communities can once again emerge in Africa.



¹ United Nations: Zimbabwe Humanitarian Gaps (OCHA 2013) https://docs.unocha.org/sites/dms/CAP/2013_Zimbabwe_Humanitarian_Gaps.pdf

CONTACT

This case study is dated May 2014. The information was provided by Garden Africa. Questions may be sent to the author: Georgina McAllister, Programmes Director, Garden Africa at gem@gardenafrica.org.uk

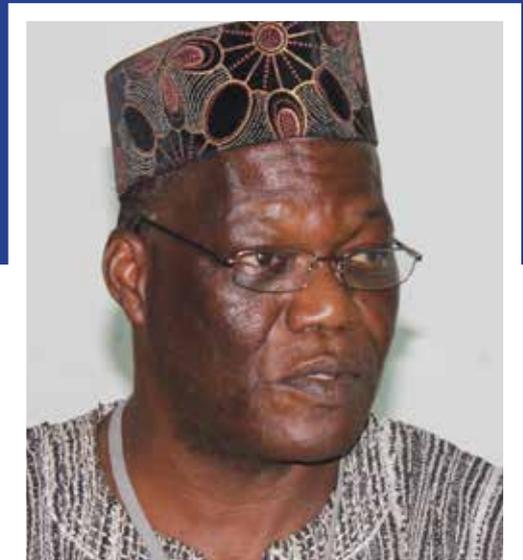


“ Successful innovative production systems, based on indigenous knowledge, meet the nutritional, cultural and spiritual needs of African communities. ”

VALUING LOCAL KNOWLEDGE AND INNOVATION

THE FOUNDATION OF AFRICAN FOOD SYSTEMS

Introduction by: Bernard Y Guri



Local and indigenous knowledge has been given various academic definitions. For local communities, however, such knowledge is that which has evolved over millennia within their societies in their respective geographical territories. Traditional knowledge has thus become “common sense” to the people indigenous to these localities. Local knowledge is time-tested and accepted by the indigenes as valid knowledge that addresses their well-being issues in the context of their cosmovision. While well-being in the West is measured by how much people’s material needs are satisfied, most Africans define it according to how much people’s material, socio-cultural and spiritual needs have been met.

In the worldview of many Africans, the resources of Mother Earth belong to three sets of people: the current population, the population of the past, and the population yet unborn. This worldview underpins the knowledge base of local communities which guides their innovations and development. Africa’s food systems are not designed to maximize production to meet the needs of today’s population alone; they also protect and build the resource base for future populations. This means that the evolution of every local food

system is unique to meet the well-being needs of the people—from past to present and future—in their respective localities. These unique food systems defy the productivist, ecologically and socially exploitative industrial agriculture paradigm that is being foisted onto Africa.

Local communities in Africa have evolved seed systems that meet the triple needs of nutrition, socio-cultural integrity, and spirituality. They have designed innovative ecologically sound soil and land management systems which increase the fertility of the soil and conserve the land for future generations. The following case studies provide evidence of such successful innovative production systems, based on indigenous knowledge, that meet the nutritional, cultural and spiritual needs of African communities.

Bernard Y Guri

Executive Director

Centre for Indigenous Knowledge and Organizational Development (CIKOD)

From Slash and Burn to 'Slash and Mulch'

Sorghum growing on a field where the camel's foot was applied; crusted soils are usable again

Introduction

In the semi-arid cropping regions of West Africa, fallow periods are getting shorter. As land becomes more scarce, farmers are not able to give their soils enough time to rest. This has led to the depletion of soil organic matter, severely threatening soil fertility and damaging soil structure. In the worst cases, crops hardly yield anything anymore. But this is not an option for family farmers. In Burkina Faso, some have found ways to restore their soils by reviving a traditional system dubbed 'slash and mulch'. The improvement and spread of 'slash and mulch' techniques through farmer-agronomist collaboration underscores the importance of partnerships between farmers and researchers in developing locally suited practices.

The Story of Idrissa

Idrissa Ouédraogo lives in Yilou, a village in the Central Plateau of Burkina Faso, with his wife Fatimata Sawadogo, and their children, Nafisatou and Felicité. They grow mainly sorghum and cowpea, and also raise chickens, sheep and goats on a plot Idrissa had been given some years ago from an elder as a gift. The soil had a hard surface crust and was completely degraded (such soil is known locally as zippélé).

Nothing would grow on it, not even grass. But Idrissa had a vision. He knew he had to bring back native vegetation if he wanted to grow food. And he knew which shrub he needed, baagandé, or camel's foot (*Piliostigma reticulatum*).

Camel's foot is one of the most abundant shrubs in the landscape. Local farming communities are well aware of its multi-purpose properties. Its bark is used to make ropes, its leaves are used to wrap food, its pods are a rich fodder for animals, and its branches serve as fuel for cooking. However, Idrissa went further and used it to restore his soil.

Idrissa first built stone bunds along the contours of his plot to decrease rainwater runoff. This was supported by PATE-CORE, a development project that financed the installation of soil conservation measures by farmers throughout the region. Then, branches of camel's foot, including leaves and pods, were cut from the surrounding scrubs and added as mulch to the zippélé areas. After a few weeks, Idrissa noticed that some of the pods sprouted and camel's foot was growing in the field. Months later, Idrissa allowed cattle to feed on the plot during the dry season. The animals would consume the fruits of the camel's foot shrubs while leaving precious manure on the field. When the rains started, the seeds, partly digested by the animals, sprouted from the manure on the field, beginning a process of re-greening the degraded land. Idrissa's job during the first years of this experiment was to observe what would happen and how the land would react.

Idrissa's success in his creative use of camel's foot to restore his degraded land has encouraged other farming families to do the same and plant more native shrubs on and around their fields.

Farming in Yilou

Food production in Yilou, semi-arid Burkina Faso, and in much of dryland Africa, is supported by only three to four months of rainfall each year. The main crops grown in Yilou are sorghum, cowpea, sesame, okra and other vegetables, hibiscus, and maize around the homesteads. Producing enough food to sustain family nutrition year round is an enormous challenge for farmers. Typically, farmers quickly prepare their land at the start of the rains in early June, plant by mid-June, and hope that the rains are abundant and evenly spread throughout the season.

Next to the treasured rainfall, soil organic matter is the next most critical ingredient for productive rainfed farming. Basically, rainfall must be able to penetrate the soil and be held there for the crops to use in the weeks after. Soil that is rich in organic matter is better able to perform these two functions.

As rainfall is short and intense, with only an average of 500-600 mm each year, minimising runoff and increasing infiltration are crucial. Also, the more the soil is covered, the more will the rain infiltrate and the less will it evaporate. Reducing runoff with physical barriers such as stone bunds and mulch has the added benefit of reducing soil erosion and sediment loss, an important measure in rehabilitating degraded lands.



Farmers observe how different amounts of mulch impact sorghum yields



Branches of camel's foot are cut from the surrounding scrub and added as mulch to the degraded patches of soil

Farmers' Innovation

Minimum tillage and crop diversification are two common agronomic techniques, besides stone bunds and mulches, long known and used by West African farmers. NGOs in the region have also promoted Conservation Agriculture, which encourages a third principle: permanent soil cover. Agronomists recommend using crop residues as mulch to cover the soil. However, farmers prefer to use crop residues as animal feed. This limits the quantity of residues available for mulch. So farming families have to choose between feeding their soils and feeding their cows. This is where the ingenuity of the farmers' comes in, such as in Idrissa's case.

Farmers in Yilou are well aware that they need crop residues for the soil and their livestock, too. They have found a way to get around this trade off. Instead of using only crop residues for mulch (in this case, sorghum stalks), farmers like Idrissa also cut and add branches of native shrubs such as camel's foot that grow in the surrounding area. This has proven to be a successful strategy that allows for sufficient soil cover.

The patches of soil that are covered with mulch attract termites. Just a few weeks before the sowing season, the termites consume the straw, leaves and branches; burrow the debris into the soil; and open up underground tunnels.

These tunnels channel the rainfall, helping water to infiltrate into the soil rather than running off. The result: crusted soils become useable again with enough organic matter and water-storage capacity to grow crops. Farmers in Yilou have observed that crops on such newly restored patches outperform the rest of the field. This 'slash and mulch' approach, using only local resources, is kick-starting a community process of rebuilding soil organic matter.

This process is enhanced by farmers' careful observations. Their soil quality varies, with patches of very good soil intertwined with patches of compacted and crusted soil. So, farmers are precise in their practices and mulch the patches that they see need restoration. They have developed precision agriculture in this semi-arid context. Instead of using global positioning systems, local in-depth knowledge of the soil and the environment is guiding the farmers' ecological intensification of agriculture.

“ This 'Slash and Mulch' approach is kick-starting a community process of rebuilding soil organic matter. ”

Preliminary results show that mulching with two tonnes of camel's foot doubles sorghum yields

“ Nothing would grow on it, not even grass. But Idrissa had a vision. He knew he had to bring back native vegetation if he wanted to grow food. ”

Farmer-Agronomist Partnership

The 'slash and mulch' system was actually originally developed by elders in Yilou and has been in the region for more than 50 years. To better understand how the system works, participatory action research on it began in 2013, involving local farmers and agronomists. Experiments on farmers' fields and research stations were initiated to evaluate how different amounts of mulch impacted crop yields. Farmer field schools and learning sessions where farmers get to 'play' with different management scenarios called 'companion modelling platforms' were also set in place.

Preliminary results on pilot tests in Yilou have shown that mulching with two tonnes of camel's foot per hectare can double sorghum yields. But even the highest crop yields of around one tonne per hectare are still relatively poor in comparison with other regions, and farmers are busy discussing not just the successes, but also the limitations of their innovations. Some of them acknowledge that there used to be much more vegetation in the landscape before and are considering if having more trees and shrubs is what they need to better restore their soil.

Farmers in Yilou know well that crop production is only possible with careful management of soil organic matter, especially where rainfall is limited and becoming increas-

ingly unreliable. Mulching soils with branches from native shrubs and regenerating native vegetation are two practical ways to rebuild lost soil organic matter so as to be able to continue farming.

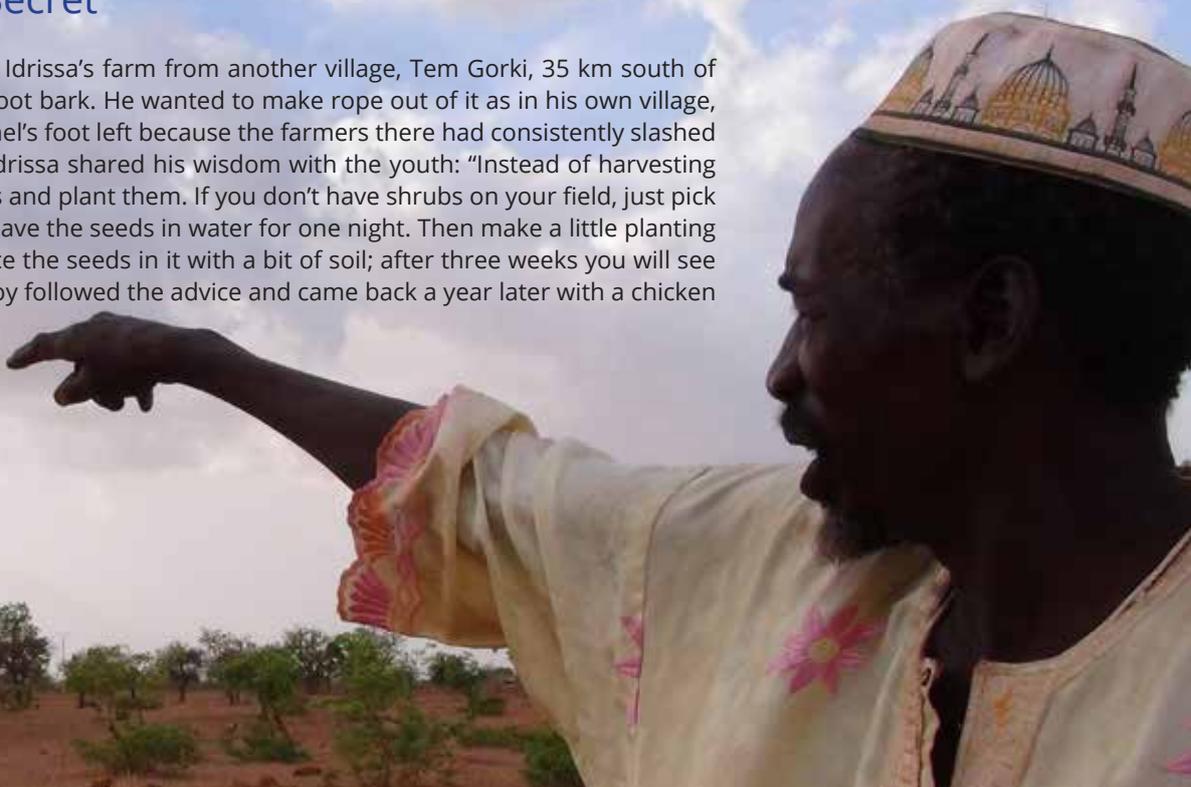
Of course, camel's foot has a number of benefits in the field but it cannot occupy the largest share of cropping land and its presence should not compete with crops nor interfere with tillage operations. However, the doubling of sorghum yields easily compensates for growing camel's foot on part of the cropping land. The challenge now is to find out what the most suitable density of camel's foot shrubs to produce the most food with the least work is.

Collaboration between farmers and agronomists can lead to practical, innovative and technically sound solutions. Putting into practice the conservation agriculture principle of maintaining permanent soil cover and overcoming the trade-off between feeding animals or mulching the soil is only possible when farmers and researchers share their knowledge and start experimenting together. There are farmer innovators like Idrissa throughout the whole of semi-arid West Africa. Their innovations need to be understood, explored, and extended to ensure that life is brought back to their degraded lands and they can produce sufficient food to feed their families and communities sustainably.

Spreading the Secret

A youth came one day to Idrissa's farm from another village, Tem Gorki, 35 km south of Yilou, to harvest camel's foot bark. He wanted to make rope out of it as in his own village, there was virtually no camel's foot left because the farmers there had consistently slashed and burned the shrubs. Idrissa shared his wisdom with the youth: "Instead of harvesting the bark, take some seeds and plant them. If you don't have shrubs on your field, just pick some mature fruits and leave the seeds in water for one night. Then make a little planting hole in your field and place the seeds in it with a bit of soil; after three weeks you will see them grow." The young boy followed the advice and came back a year later with a chicken to thank Idrissa.

Idrissa Ouédraogo



CONTACT

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CASE STUDY

SCI: Planting with space

Finger millet flowering. Bati - Oct 2010

The use of finger millet seedlings has shown very positive results in the region of Tahtai Maichew, near Aksum, Ethiopia, as has the use of alternative management practices for a number of other crops. The principles that make up a System of Crop Intensification are now spreading through the regions of Tigray and South Wollo for a range of crops.

Agriculture, mainly rainfed and subsistence-based, is Ethiopia's main economic activity, contributing 50 percent of the country's GDP, and up to 80 percent of the employment opportunities. However, small-scale farmers are increasingly confronted with a changing climate and need to adapt their practices.

Unreliable rainfall has pressed farmers to shift their cropping patterns – especially in the most water-stressed regions. When the rainy season comes late, and as the moisture constraints become more serious, farmers shift from long growing-season crops like sorghum and finger millet, to wheat or barley, and to tef and chick pea.

This solution creates its own problems, as shifting from one crop to another is costly in kind and cash, and farmers become more likely to fall into debt and or sell their assets.



A farmer's son holding single plant of finger millet. Photo: Kewnit - Oct 2010

A New Technique in the Making

Back in 2002, Ato Aregawi Abay, then head of the Agricultural Bureau of the Tigray region, started working with the Institute for Sustainable Development (ISD) to find ways to tackle crop failure due to unreliable water supply. Knowing that Ethiopia is a drought-ridden country, we started to look for farmer practices in our project areas in Tigray that could help minimise the risk of crop failure.

When we reached the community of Sherafo we heard that its entire crop production was lost during the Great Drought of 1984/85 – except for the crop of Priest Haregot. He had taken the unusual action of uprooting his younger finger millet plants and replanting them in the moist river bed. By doing so, he obtained sufficient crop to have seed for the next rainy season.

This experience added to information we had gained from the Niger river basin in West Africa. Here, farmers raise

seedlings of sorghum and pearl millet in seed beds and then plant them in their fields as the flood waters from the Niger river retreat. We built on these two experiences to look for ways that would help farmers extend the growing season for their slow-growing crops and counter the shortage of rain or moisture in their fields. We started to look at the SRI (System of Rice Intensification) practices developed in Madagascar in the 1980s, and at the possibilities of developing a similar system for wheat or tef.

Now known as SCI, the System of Crop Intensification is based on a series of management practices. It involves directly sowing seeds, or transplanting seedlings, in compost-treated soil, with wider spacing than normal between the rows and plants. The system is referred to by farmers as “planting with space”. Weed control is done with simple tools that disturb the soil, improving aeration. ISD have been working with farmers and local technicians to find out how SCI can be applied in the Tigray region; which crops give the best responses; and how farmers can integrate SCI into their farming practices.

A Case in Tigray

Farmers in Ethiopia have traditionally relied on broadcasting as a technique for sowing all their field crops: randomly throwing seeds within marked-out sections of their field. This type of sowing is faster but not always efficient, and it can be labour-intensive, as it makes weeding and harvesting more difficult.

Broadcasting results in an inefficient use of moisture, with competition between plants for water (as well as nutrients). Farmers are poorly rewarded for the resources and time used, and productivity levels remain low.

We met a group of local agricultural experts in the Tahtai Maichew Woreda (district) in 2003 to address these issues. Seedlings of finger millet were raised for 30 days in a state-owned nursery and then distributed to three farmers in the Mai Berazio village area. Only one of the three had positive results, an elderly woman called Mama Yehanusu Atsbeha. Mama Yehanusu planted the seedlings in a 5 x 5 metre area in a field where she had applied compost to the soil. She left 25 to 30 cm space between the plants. Meanwhile, she sowed the same variety of finger millet seeds directly into the rest of her field, by broadcasting.

The results were impressive. At an early stage, the plot of transplanted seedlings looked sparse; but later on the crop became dense with many tillers, each having longer, denser fingers (panicles) than the seed-sown plants in the rest of the field. She got a yield equivalent to 7.6 tons/ha, compared to 2.8 tons/ha for the rest of the field. Further field observations with other farmers and other crops confirmed the increased strength of transplanted, well-spaced, row-planted crops, which had more tillers per plant. The cereals had larger seed heads and the pulses had more pods along the stem.

Local technicians and many neighbouring farmers were

present when Mama Yehanusu harvested her crop. Not surprisingly, many farmers began adopting “her” way of raising finger millet seedlings before the start of the main rainy season. They have shown that Mama Yehanusu’s field was not a one-time success. In their fields and in different training centres, farmers and development agents have been able to raise the yield of finger millet to 5-7 tons/ha by raising seedlings and transplanting them. With conventional broadcasting methods, average yields remain about 1.3 tons per hectare.



Large finger millet panicles. Oct 2010. Photo: ISD

Spreading the Word

After meeting Norman Uphoff in 2008, and following the successful experience in Tahtai Maichew, reported above, ISD organised a series of training workshops in research stations, farmers' training centres and on farmers' fields. The workshops focused on the preparation of healthy seedlings and on the best way to transplant them, combined with the making and use of compost.

Farmers showed a strong interest in these approaches and many quickly started to try them out, preparing seedlings and transplanting them into small plots. They experimented with tef, other cereals and even pulses.

Tef is Ethiopia's iconic and most popular cereal, and is grown with traditional methods, with an average grain yield across the country of 1 ton/ha. Tef has responded dramatically to "planting with space" with yields of 2.5-5.0 tons/ha being achieved in farmers' fields. Yields of over 6 tons/ha have been observed under research conditions. Improving tef production based on SCI principles is now a major programme of the Ethiopian government's Agricultural Transformation Agency (ATA).

In 2012, more than 50,000 farmers and 1,200 Farmers' Training Centers were expected to use SCI for growing tef. SCI is now becoming the "normal" way of growing finger millet. In 2011 there were 118 farmers using this technology in Tahtai Maichew alone. These practices have spread through farmer-to-farmer contact from a few in the Tahtai Maichew and La'elai Maichew woredas to other districts in Tigray and South Wollo.

Trying them first on small plots, farmers are now applying SCI as standard practice for their most commercially valuable crops. The results from SCI have also convinced development agents, technicians and policy makers.



Hailu standing with finger millet - Oct 2010

Remaining challenges

While the use of seedlings and "planting with space" are spreading rapidly, one of the main challenges is the need for continuous training and follow-up, which is beyond the capacity of ISD. This is linked to another difficulty: many farmers still do not feel comfortable with the wider spaces left between plants. There is a common perception that this is "wasted land".

The practice allows many weeds to emerge during the early stages of the crops' growth and involves an initial additional labour input compared to broadcasting. In a way, SCI requires a leap of trust, which needs underpinning by observation and experience, not just by words. Hence, getting farmers to experiment with the new ideas for themselves is important.

SCI can help farmers to produce their crops more efficiently and address the problems of small fields, food insecurity,

low incomes and climate change. To be successful, SCI needs to lead to a more predictable and increased agricultural production and reduced production costs.

Farmers are showing that SCI has the potential to greatly increase a household's food security and reduce their costs. Its broader dissemination, however, requires support from local administrations, experts and civil society organisations. They will have to draw on their different experiences and expertise, and make effective use of their resources.

“

SCI can help farmers to produce their crops more efficiently and address the problems of small fields, food insecurity, low incomes and climate change.

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Lessons Learned

In addition to increasing production, transplanting seedlings of finger millet and other crops has shown various advantages:

- Using this technique, crops become more tolerant to drought and water-logged soil;
- Transplanting seedlings reduces the amount of seed required by at least 75% compared to broadcast sowing;
- Farm labour is reduced because:
 - » transplanting facilitates inter-row and interplant weed control. This enables farmers to use simple weeding tools to incorporate the weeds into the soil, boosting fertility, or collect them for animal feed. While the movement of animals for grazing is restricted during the growing season, this feed is much needed;
 - » aerating the soil stimulates the growth of plant roots and benefits aerobic soil organisms;
 - » harvesting by sickle becomes easier as plant growth is more uniform and the mature panicles do not get tangled up as they do in a broadcast sown field;

- » Establishing the crop in rows allows for a more efficient use of inputs (e.g. compost) which are placed alongside the seed or in the hole with the seedling rather than being spread over the whole field;
- » These changes in practice can also help farmers mitigate or adapt to changes in climate because seedlings can be raised in small areas, making more efficient use of the available water. They are then transplanted when the soil is moist. Their roots grow bigger and deeper, making better use of the moisture at lower soil depths;
- » Farmers in some moisture-stressed areas using SCI have also started to make water-retention structures between the rows in the fields to help maintain the soil moisture.

“ Yields of over 6 tons/ha have been observed under research conditions. ”



Finger millet with Endris closer, Bati - Oct 2010

CONTACT

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CASE STUDY

Reviving the Ankole Longhorns of Uganda

Ankole cattle at the homestead of a pastoralist in Kiruhura District - Photo by Evelyn Mathias

Ankole Longhorn cattle can survive in extremely harsh, dry conditions such as those in Sub-Saharan Africa – which is becoming drier and hotter. In a context where herders are strongly encouraged to keep exotic and hybrid cattle, the innovative LIFE approach led Ugandan herders to revalue the Longhorns for their economic and cultural value.

Ankole Longhorns are one of the oldest indigenous cattle breeds of Uganda. They have striking, long, large-diameter horns, which assist their blood circulation and help keep them cool in hot temperatures. They are renowned for their hardiness, which allows them to forage on poor quality vegetation and live off limited amounts of water.

Their keepers, the Bahima, are an ethnic pastoral group of the Ankole people who live in an area stretching from the South West to the North East of Uganda.

Extinction and Loss

Uganda is at risk of losing the valuable Ankole Longhorn species. There are two major reasons for this. Since the mid 1990s, Ugandan government programmes have promoted indiscriminate cross-breeding of Ankole Longhorn cows with other exotic cattle. Exotic breeds such as Frisian cows produce more milk and need less land to graze on. But this breeding programme, if continued, will lead to the extinction of the indigenous breed. In addition, increased human

population – among other factors – has reduced the grazing land available for Bahima herders. Many of them have been forced to sell off a significant portion of their Longhorn cattle and switch to grazing smaller herds of exotic and hybrid breeds. And the impact is clear. The government estimated the exotic and crossbred cattle population in 2006 at 17.3%, compared to 4.4% in 1997.

Along with the loss of the Ankole Longhorns, cultural traditions and indigenous knowledge about animal breeding are also disappearing. For instance, elders told us about medicinal herbs they used to treat cows with birthing problems or infections and specific ways of selecting the cows that would produce more milk.



Milking the Ankole longhorn cattle - Photo by Ilse Köhler-Rollefson.

Are Exotic Cows Really Better?

In the short term, there seem to be many benefits to exotic and hybrid cows. They need less land to graze on and produce a lot of milk and meat, thus bringing in more income. However, this is only the case when conditions are favourable, for these exotics and hybrids have poor resistance to harsh environments and climatic stresses such as those that Uganda has experienced in recent years.

For example, they are prone to going blind when bushes and sharp grasses prick their eyes as they graze, and muddy and flooded land easily makes them ill. They get weak and stressed when temperatures increase above 33° C and become tired easily when walking during droughts. During a long dry spell from August 2010 to March 2011 and during floods at the end of 2011, many Frisian and hybrid cattle died – while the Ankole Longhorn cattle endured.

Herders who switched to Frisian cows had to cut down trees and bushes to create grazing land, started using a lot of antibiotics and acaricides, and sprayed the foreign breeds with dangerous chemicals. This makes the exotic cattle an expensive herd to manage, and has resulted in the loss of much habitat for biodiversity.

In comparison, the sustainable grazing practices of the

Longhorn actually increase species diversity and maintain the ecosystem structure. They keep vegetation cover, which contributes to the reduction of fires, drought and flooding. In addition, scientists have proven that Ankole milk and meat are healthier and more nutritious than the products from the exotic and hybrid breeds. Importantly, the local population also prefer their taste.

In the long term, exotic breeds have caused great financial stress to relatively poor herders and are threatening biodiversity.



Churning butter: a tasty, nutritious benefit of the Ankole cows - Photo by Ilse Köhler-Rollefson

Giving LIFE

In 2009-2010, PENHA Uganda and the League for Pastoral Peoples and Endogenous Development (LPP) mobilised Ankole Longhorn cattle keepers in Uganda to document the significance of their cattle. For this they used the LIFE approach, developed by the LIFE Network, with the aim of promoting the conservation of indigenous breeds among their traditional keepers, by drawing on their knowledge, concepts and priorities. The LIFE approach treats breeds as a product of social networks that operate according to certain rules.

The Bahima communities recorded what they know about Ankole Longhorn cattle. This was done through informal inquiries, interviews, discussions and scientific and anthropological studies, as well as working with traditional story tellers, community elders and local experts. They recorded how their great-grandparents carried out selective breeding and other valuable practices that have kept the Ankole Longhorns around for centuries. In doing so, the herders realised the value of their breed and their own value as custodians of this breed.

After documenting their knowledge, the Bahima herders started to share it with the rest of the world, realising they wanted to protect their heritage. They were proud of contributing to the conservation of this breed and local biodiversity. The knowledge they documented is now being used in advocacy campaigns for the conservation and protection of the Ankole Longhorns. Knowledge is also disseminated to other farmers, through radio programmes for instance.



Spraying cattle to kill ticks - Photo by Barigye



Wide Appreciation for Ankole Longhorns

The impact of sharing this knowledge is tremendous. Learning from the Bahima experience, many other herders are considering shifting back to breeding the treasure they were almost bringing to extinction. Many Bahima people, including my uncle Mzee Kyomukuku Yokaana, regret selling off their indigenous breeds and have vowed to go back to rearing Ankole Longhorns. They have realised that their indigenous breed is a form of insurance against extreme weather conditions. The work of the Bahima has also inspired other communities to embrace this breed, which was traditionally kept by the Bahima.

Several associations of Bahima herders, such as the Ankole Longhorn Cattle Cow Conservation Association and Cow Protection Conservancy Uganda, are recruiting people and sensitising them to the importance of this indigenous breed. Having a pastoralist background himself, the President of Uganda initiated one of these associations. He called upon herders to save the indigenous breed from extinction by doing what our ancestors used to do: selective breeding so that they produce more milk and thus can compete with the Frisian breeds.

The Chairman of this association, Nayebare Kyamuzigita, says “the main reasons the President is encouraging us to save our breed are because they are more adapted and resistant to the harsh conditions of Uganda, because their by-products, like the horns, have a lot of value, and because their beauty makes them a tourist attraction. Even the President sees that it is not cost effective to keep exotic cows.”

Plans are underway to create special niche markets for Longhorn milk and meat. At present there are no separate market channels for Longhorn products, which are collected and marketed with other dairy and meat products.

Learning from LIFE

In many places around the world, introduced breeds and varieties are promoted with the promise of high yields. But when a community reflects on their past and their opportunities, they are likely to see that high yields may not compensate for the high costs of external inputs such as extra medicines, for the loss of taste and nutritional value, or that of the cultural value associated with the crop or breed. The LIFE Approach encourages owners to appreciate their breeds, continue in situ breeding, and lobby for their rights as the keepers of these precious animal genetic resources.

Yet some challenges remain. Government policy still forces the pastoralists to leave their livelihood and promotes the modernisation of agriculture. Meanwhile rich investors, national parks and oil companies threaten the land on which the Bahima and the Ankole Longhorn cattle depend. Such land issues endanger the biodiversity benefits that the Bahima and their traditional cattle provide. For this reason, it is important for us herders and our supporters to keep lobbying for our rights and for the significance of our indigenous breeds.

“ Shifting back to breeding the treasure they were almost bringing to extinction. ”



“Ugandan cows” - photo by Meng Zhang

The Many Uses of the Ankole Longhorn Cattle

Socio-cultural uses

Our status is rated by the number and beauty of the cattle we possess. The Longhorn cattle function as dowry, are used to strengthen friendships and resolve conflicts and for cleansing sins. Their hides are used for making clothes, mats and bedding, their horns for making beads, trumpets and violins. Their urine cleans containers for churning milk and keeping yogurt. Their tasty milk has a high fat content and the tender meat is low in cholesterol. Ghee from the longhorn cow is served as a special sauce and the Bahima used to make bread and gravy from its blood.

Economic uses

Our cattle live long lives and rarely fall ill. They are resistant to hunger and drought and are a source of income as they produce good dung for biogas. Their maintenance costs us little: they survive on only grass and water under any conditions and can be owned and managed even by poor herders. Income from selling cattle allows us to pay for our children's school fees.

Agricultural uses

Dung is used as manure for grass and plantations.

Medicinal uses

A mixture of Ankole Longhorn milk and urine is used to treat stomach pains, fever and coughs. Dung is used for making casts for broken bones, for treating measles and stopping the lactation of women who have lost a baby. The horns are used to make a medicine for reducing pain and for giving enemas. The boiled hooves are a source of calcium and can be used to reduce joint pains.

CONTACT

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“ What does resilience-building for farming communities look like? Very much like agroecology! ”



TACKLING CLIMATE CHANGE, BUILDING RESILIENCE



Introduction by: Doreen Stabinsky, PhD

Climate change poses enormous threats to small farmers around the world. Temperature rise and increased rainfall variability are making it harder for farmers to grow their crops and feed their families. Building resilience to climate change impacts is essential in order to protect the food security and food sovereignty of communities.

What does resilience-building for farming communities look like? Very much like agroecology.

Building resilience in agricultural systems means, first of all, taking care of soil health. Healthy soils absorb water more easily, so precious rainwater is not wasted; while heavy downpours are quickly drained. Enriched by organic manure, compost, mulches or nitrogen-fixing trees, such soils are able to hold a large amount of moisture over a sustained period, protecting farmers longer in drought conditions.

Building resilience also means increasing the agricultural biodiversity of farms, mainly through expanding the range of crops being grown, in particular those naturally adapted to climate stresses. For example, sorghum, millet, cassava, and cowpeas are able to fare well in drier and hotter conditions. Communities can build resilience by increasing their crop diversity through community-based seed production and seed sharing practices.

Finally, building resilience requires people to strengthen their communities. Climate change will stress not only agricultural production systems, but social systems as well. Resilience-building efforts to create new livelihood opportunities, for instance, will enable people to avoid out-migration and stay in their communities and prosper. Enterprises such as community seed banks, home-bakeries using local products, and self-help groups that pool funds to help out those in need or to enable children to go to school are other examples of socially resilient communities.

The inspiring success stories in this section weave together all these essential elements of resilience. They showcase how good agroecological and social support practices can build resilient ecosystems and communities. In spite of so much bad news about the growing severity of climate change impacts in Africa, the tools provided by agroecology give small farming communities much reason to face the challenges with confidence and courage.

Doreen Stabinsky
Professor of Global Environmental Politics
College of the Atlantic
Bar Harbor, ME USA



CASE STUDY

Finding a way out of the maize

Maize crop – Photo by Mary Mwendwa

Recurring drought and crop failure in many parts of the world have led to food and nutrition insecurity, and a dependence on food aid. But recently, some farmers in Kenya have been developing their own sustainable way to secure enough nutritious food along with extra income so that they can send their children to school. Traditional drought tolerant, nutritious crops such as cassava, sorghum and millet, that were losing popularity due to a surge in maize production, are again becoming commonplace, with reliable harvests improving diets and income.

The dryness of the soil in Mutunga's farm shows that it has not rained for a long time in Mutomo district in eastern Kenya. "The last time I had a good maize harvest was in 2003," says Mutunga. He is among a growing group of farmers in the area who are diversifying their crops as a way of dealing with the changing climate that is putting their lives at risk. But this has also had other benefits, including greater nutritional diversity.

The Coming of Maize

Following colonialism, maize gradually became a staple in the Kenyan diet, replacing traditional crops such as sorghum and millet. Nutritional repercussions from this dietary shift were significant, as maize alone does not provide a balanced diet in terms of proteins, vitamins and minerals. Sorghum and millet are rich sources of B-complex vitamins,

and cassava is a source of calcium and vitamin C, as well as a major provider of calories.

"People here were used to planting maize, but harvests have failed more and more, so they have turned to drought tolerant crops such as sorghum, millet, cowpeas and cassava," says Benedict Mathitu, an extensionist. These crops are not new. In fact, they used to be highly valued but we have forgotten about them. Neglected by people and science, they are also sometimes called 'orphan crops'. Musenya Joseph, one of Mutunga's neighbours explains, "These crops were planted by our ancestors a long time ago, but we abandoned them. Now that things have turned bad on us in terms of the harsh climate, we are going back to these crops as they can withstand drought. We have seen the benefits and no doubt this is our best option for now."



Farmers in a training on cassava in Mutomo – Photo by Mary Mwendwa

Spreading Risk

The average annual rainfall in Mutomo district is 300-600 mm. It is one of the poorest parts of Kenya. Farmers find it difficult to invest in planting anything that is not drought tolerant. They need to spread their risk and also plant as many different crops as possible. Intercropping sorghum, millet and cowpea with cassava and maize is one way of doing this. Cassava is suited to areas where rainfall is uncertain. A well-established cassava plant can resist drought by shedding its leaves, and resuming growth only when the rain starts. Similarly, sorghum and millet are relatively easy to maintain. They are less susceptible to pests and diseases, and when harvested and stored in a dry place, they can be kept for long periods.



Maize plant – Photo by Mary Mwendwa

Diversifying Crops and Diets

The benefits of returning to orphan crops are primarily felt in farmers' bellies. Although the main motivation for returning to these traditional or neglected species was to guarantee a harvest during drought years, moving from maize to cassava, sorghum and millet has also had profound implications in terms of nutrition. Anastancia Musenya, whose farm is dotted with cassava plants, says, "Cassava is our saviour in this hunger-stricken region where we get regular droughts and famines. Cassava can withstand harsh weather and its nutrition is really good." Cassava is a good source of carbohydrate, though there are considerable differences between varieties in their nutritional content, with some containing cyanide that requires a lot of cooking to break down. But where Anastancia lives, cassava has become the new staple crop replacing maize.

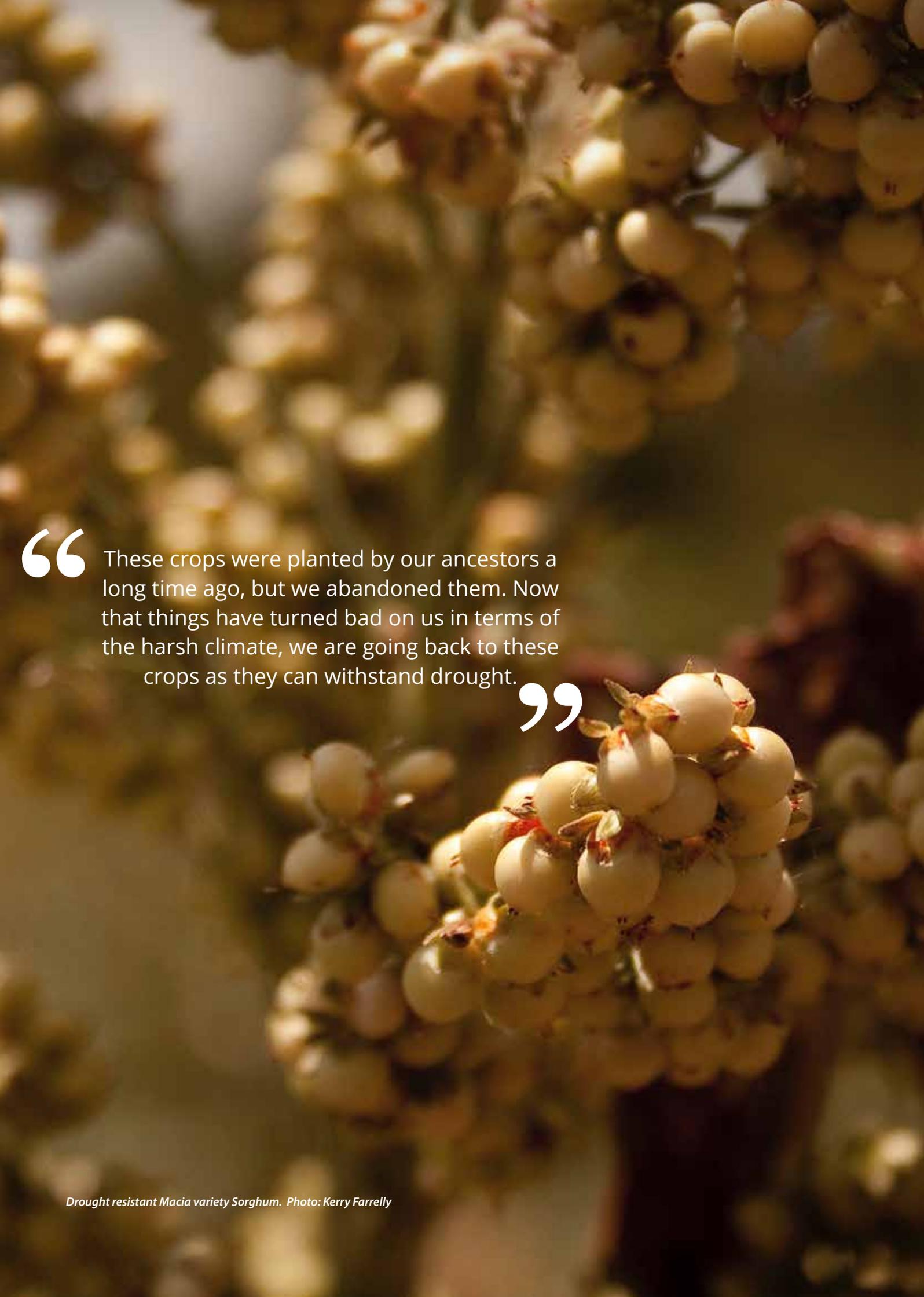
Farmers in Mutomo also know that a diverse diet is more than just the sum of its parts, and is more than just calories. "We don't grow cassava alone, we have cowpeas, millet and sorghum too," says Musenya. "Sorghum and millet are some of our traditional crops which we grind to make highly nutritious porridge flour" adds Mutunga. "Lactating mothers and babies feed on it and even during drought everybody is saved by the porridge."

Orphan crops are regaining popularity as farmers realize the nutritional wealth that was left behind by their forefathers. Intercropping is also becoming common as farmers strive to cultivate diversity. Tamarind trees, pigeon pea and green gram are just some of the traditional legumes that had been forgotten but are now being grown again. Anastancia says, "Tamarind and pigeon peas were a part of our forefathers' diet. Tamarind is very good for adding to the porridge which we cook here, for flavour and more protein." Other complementary crops growing in popularity over recent years include mangoes, bananas and other fruits.



Anastancia Musenya in her cassava farm – Photo by Mary Mwendwa

“ The diversity brings nutritional value into the home, onto the market and at the same time builds resilience. ”

A close-up photograph of a sorghum panicle, showing numerous small, round, yellowish grains. The background is blurred, creating a bokeh effect. The lighting is warm and natural, highlighting the texture of the grains.

“ These crops were planted by our ancestors a long time ago, but we abandoned them. Now that things have turned bad on us in terms of the harsh climate, we are going back to these crops as they can withstand drought.

”

Support and Self-help

Although recurrent drought forced many farmers to start diversifying their crops, the transition needed community level support to address remaining challenges. Cultural barriers such as associating cassava with a 'poor man's diet', and practical barriers such as pests and diseases, needed to be overcome. A large number of self-help groups became established to discuss and tackle these challenges, enabling many more farmers to make the change.

Mutunga is a leader of several self-help groups. One of the groups, *wikwatyo wa Kandae*, meaning 'the hope of Kandae', organises training on cassava farming for its members. The group receives a lot of support from the Ministry of Agriculture and from community based organisations.

Musenya, also a member of the group, says that the biggest challenge they faced when starting to grow cassava was getting hold of quality seeds. Two problems were that the cassava mosaic virus and cassava brown streak virus are common, and that cassava takes longer to mature meaning that more planning is needed. Thankfully, Dr. Cyrus Githunguri, a government agronomist and crop physiologist, helped to develop a disease resistant and quick-maturing variety. He calls upon farmers to use such new varieties of old crops to help fight poverty and poor nutrition in their homesteads.

Martha Mwangi works with more than 40 farmer groups in the region. Her role is to assist them with training on farming methods that are more suitable for the current climate. She works closely with KARI and the Ministry of Agriculture, and facilitates communication between them and the farmers in Mutomo. She believes that cassava farming has greatly improved the livelihoods of many farming families

in the area. Extensionists confirm that farmers have really welcomed the shift to drought tolerant crops after participating in training through their self-help groups.

New Crops, New Opportunities

The self-help groups do more than just facilitate training on growing crops, however, explains Mutunga. "We also have a savings scheme where members contribute money, which is used in times of emergencies like drought, and for providing school fees for our children."

They motivate each other to learn more about making nutritious and tasty food and support farmers to sell the surplus from the crops they now grow, such as millet, sorghum and pigeon pea.

The groups that Martha Mwangi works with own a bakery which makes bread from a mix of wheat and cassava flour. Cassava chips, crisps, cakes and chapattis are also made and sold in local markets, with sales contributing an estimated 300-500 Kenyan Shillings (about US\$3-5) per day to each household. This is an important addition to farm income, and it provides more nutritious foods for others to consume.

This renewed diversity means that more food is available from the harvest. The diversity brings added nutritional value into the home and market while also building resilience. This is a real boost to farmers who have until recently been suffering from recurrent drought and relying on food aid. Having rediscovered traditional crops, farmers spread their risk, learn together, and pass on the nutritional benefits to their families and others who buy their new processed products.



Wikwatyo wa Kandae farmers being trained by Martha Mwangi. Photo by Mary Mwendwa

CONTACT

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CASE STUDY

Improving traditional systems of soil fertility in Togo

Introduction

The project is a response to land degradation in the Savannah region and its impact on agricultural production. The area suffers from overexploitation of natural resources, particularly forest products, linked to human activities. The result of these activities is the destruction of vegetation, leaving the soil bare and highly eroded. The combined effect of declining soil fertility, linked to the destruction of vegetative cover, and unpredictable rainfall, caused by climate change, is the gradual decline of agricultural production causing poverty in local communities.

Farmers have tried to reverse this misfortune by making use of chemical inputs to fertilize their farms and fight against pests. But this does not seem to be a sustainable solution. Production is gradually decreasing from year to year, although the amount of fertilizer applied is the same.



The Project

The location of the project

The project covers two districts of the Savannah region in Togo: Tandjouaré and Oti.

The size of the operation

The initiative covers many areas, but the focus was on two low land sites of 5 hectares (ha) in total. The sites were selected for the promotion of agroecological cultivation of rice in the rainy season and organic market gardening in the dry season. Producers are supported through the process of reconversion to ecological agriculture.

Beneficiaries

The activities involve more than 1,500 producers, of which 67% are women, divided into seven groups.

The problems identified in the project

- Soil degradation due to environmentally damaging farming practices;
- Food insecurity leading to malnutrition and undernourishment;
- Lack of financial autonomy especially among women and young people.

Objectives

- Make local people aware of the harmful effects of the use of toxic chemical inputs on the environment, biodiversity, ground water, ozone layer, and farmers' autonomy;
- Sustainably increase agricultural production by preserving nature;
- Improve the health of local populations through better diets.

Activities & Results

Through awareness raising sessions and trainings, 1,500 beneficiaries have adopted traditional techniques of soil fertility conservation and management. Hundreds of compost pits have been dug. The technique of using Mycotrifungus has helped boost the production of compost, improving existing practices in the area. An agroecological field for the production of Sorvato1seed (an improved sorghum variety) has been installed and is being monitored. Through fertilization of the field with compost and soil conservation practices, such as stone lines, productivity has risen to 3tonnes/ha. This success has helped the system to spread throughout the area.

To support producers in the implementation of agroforestry practices, 24 nursery growers were trained and equipped.

Solutions proposed

- Implementation of best practices to substantially improve the incomes of seed producers;
- Capacity building of farmers and women producers (1500 in total) on organic manure and its impact on the sustainability of soil fertility;
- Implementation of rice cultivation in the lowlands through effective production and market-gardening techniques;
- Protection of plant biodiversity through the implementation of a botanical garden.

Project strategy

The strategy is based on the cooperative approach to meet the new legal requirements for farmers' organizations and to facilitate access to markets. A key part of the project strategy to reorient farmers to agroecology is to use examples of health problems that emerged with the advent of toxic chemical inputs. This helps to spread awareness of the risks linked to the consumption of products from conventional agriculture.

Gender and social inclusion, with a focus on women's access to land, are also key considerations of the project.

Project resources

The resources are primarily local, consisting of indigenous knowledge relating to good agricultural practices and community involvement in the project. The project is also supported by grants from partners.

Food Sovereignty and Empowerment

The initiative helps to ensure food sovereignty in grassroots communities. It also facilitates access of women, youth and marginalized people (living with disabilities) to land and decision-making. Finally, the project allows producers to renew their links with nature, to regain the lost partnership between humankind and nature.

Eleven nursery sites have been installed for this purpose, with 20,000 fertilizer plants. Seedlings were distributed to beneficiaries for the reforestation of their plots.

To help promote the production of rice and quality vegetables, a site of 5 ha of lowland has been established and set up to benefit local populations. Two solar-powered boreholes supply the site with water in the dry season for vegetable growing. Rice production, using SRI (System of Rice Intensification), takes place in the rainy season.

Finally, a botanical garden of 5 ha was selected and enriched with local, endangered species. This initiative aims to conserve species of the Savannah region for future generations. The garden is also being used for conducting tests on some local leguminous species for soil fertilization.

“ We do not inherit nature
from our ancestors; we
borrow it from our
children.

”



Impacts of the project (local and national)

The initiative has gained the trust of producers. There was a particularly strong uptake of organic manure in the project area. As part of the conservation of biodiversity, some forgotten crops such as sorghum and early millet have re-surfaced. This year, soybean producers have seen strong demand for their produce due to its high quality. At the national level, an association of promoters of agroecology has emerged.

Mrs. Catherine Ayaovi, an agricultural producer, gave the following testimony:

“The application of organic manure to my plot of land allowed me to get unexpected results. Before, it was almost impossible for me to sell my soybeans on the market, because not only was production insufficient but also of poor quality. The taste was not at all appreciated. Today the trend has been reversed. Not only is production enough to feed my family, but I sell the surplus more easily on the local market.”

Multiplier effects of the project

Having seen the results of the initiative (which is still on-going), at least 500 other producers have opted for natural soil fertilization systems to increase their production. Over 1000 hectares of soil were recovered through erosion control works. Initially, the crops in focus were sorghum, early millet, soybeans and rice. Given the results, the practice has spread to include other crops such as maize and vegetables.

Opportunities and Challenges

Producers in the region are open to agroecological innovations. The good practices they learn are appropriate for the skills they possess, and implementation costs are low compared to the benefits they generate. The resulting

products are healthy and more attractive and thus more competitive in the market place, especially in this time when all eyes are on the highest quality products. However, the biggest challenge is to get all of the producers in the region to shift to agroecology.



Conclusion

We do not inherit nature from our ancestors; we borrow it from our children. So we have the urgent duty to take good care of it, so as to return it in good condition to future generations. Agroecology by its practicality, simplicity, productivity and quality of product, is the only approach that takes into account the preservation of the health of nature, including that of humankind.

CONTACT

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CASE STUDY

Chololo Ecovillage - a model of good practice in climate change adaptation

Chololo farmer Minza Chiwanga intercroops grains and legumes to feed her family. Photo: Michael Farrelly

Agriculture

Traditionally, farmers in Chololo practiced shifting agriculture using “kuberega” slash and burn methods. Often a field was planted with the same crop year after year, and crop residues were burned. When the soil was depleted of nutrients, the farmer would shift to a new field, cutting down the trees to clear the land, and preparing for planting using hand hoes. Farmers planted seeds saved from the previous year’s harvest, and hoped that the crops would survive. Now there is no more room for expansion, and for most farmers the often-recycled seeds have low yield potential.

The project has introduced a package of ecological agriculture technologies to make the most of the limited rainfall, improve soil fertility, reduce farmers’ workload, and improve the quality of local seeds.

Ox-drawn tillage implements like the Magoye Ripper reduce farmers’ workload when preparing the land, and improve rainwater harvesting in the dry hard-pan soils.

Soil water conservation measures, like contour ridges, fan-ya juu bunds, grass strips, and gully healing, all help to capture rainwater and prevent soil erosion.

Farmyard manure improves soil fertility, supplying the crops with nutrients, improving the soil structure and water holding capacity.

Improved early-maturing, high-yielding seed varieties of maize, sorghum, millet, cowpeas and groundnuts have rejuvenated the village seed system.

Optimal plant population with correct spacing distance, then thinning and weeding, reduces competition between plants and improves yields.

Community seed production ensures that a good supply of quality seeds is available for planting each year.

Intercropping and crop rotation improve yields per acre and help control weeds, pests and diseases.

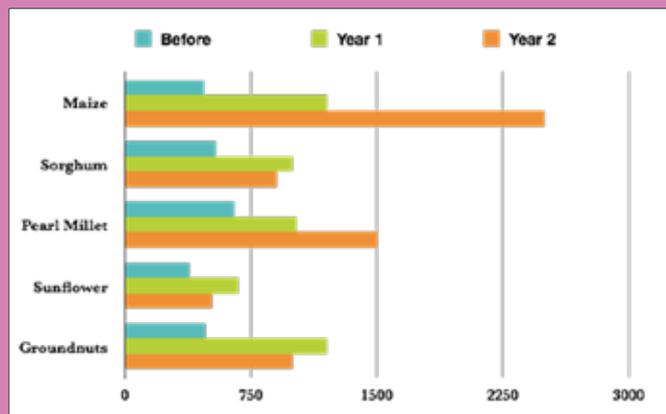
“ With crop rotation and good agricultural practices I was able to double the yield.

Keneth Ndal, Chololo farmer

”

Yield Increases through Adoption of Innovations

Data gathered by Hombolo Agricultural Research Institute supports farmers' testimonies that yields have more than doubled since the project introduced the improved seeds and good agricultural practices.



Livestock

Livestock often have a negative impact on natural resources and farming, through overgrazing of common land, compaction of earth, eating crops, and competing for scarce water resources. The project aimed to reduce the negative impact on natural resources and develop positive interactions between livestock and arable farming.

Oxen are now being used to prepare land for planting, reducing farmers' workload. Farmyard manure is now being used to help fertilise the soil. Crop residues are being used to feed livestock.

Improving Chicken-Keeping Leads to Women's Empowerment

The project made a commitment to ensure that women are empowered to act at the forefront of transformation. One way was to identify and develop market sub-sectors of particular benefit to women. Community workshops ranked income-generating activities against criteria assessing both market demand and women's attitudes: Can women do it? Do women like it? Can women keep the money? Local chicken clearly emerged as the most beneficial sub-sector for women.

As a result of training on local chicken management, cross-breeding of local hens with improved cocks, and training villagers on poultry house construction, women report increased chicken and egg production, and have been empowered with additional incomes to be able to meet the needs of their families - contributing to better housing, health and education.

Leather Tanning Diversifies Livelihoods

Chololo village has almost 3,000 goats, while the neighbouring village market slaughters 100 goats every month. The skins are sold to 'middlemen' at a very low price of about 2,000 Tshs (1 Euro) each. Vegetable leather tanning using Mimosa tree bark extracts now enables villagers to produce grade one leather.

“

Tanzania is highly vulnerable to the impacts of climate change, and adaptation is our highest priority. More than 80% of the population depends on climate sensitive rain fed agriculture for their livelihood. Reducing vulnerability to climate change through different mechanisms is crucial for strengthening socio-economic development and assurance of food security. Chololo Ecovillage as an exemplary is empowering communities to test, evaluate and apply a wide range of adaptation innovations in key sectors such as agriculture, livestock, water, energy and forestry”

Dr Julius Ningu, Director of Environment, Vice President's Office.

”

A piece of goat leather from Chololo village can produce about 5 pairs of sandals, which sell for 15,000 Tshs (€7) each on average. In this way, one goatskin is transformed into sandals which fetch around 70,000 Tshs (35 Euros). Diversifying livelihoods away from rain-fed agriculture (tanning leather and making leather goods requires relatively little water) makes people more resilient to climate change.



A sandal made from goat leather.

Water

Water is a big problem. When the project began in October 2011, there was no drinking water supply to the village as the borehole equipment had broken down, so people (mostly women and girls) had to walk for two hours a day to get a bucket of water from the next village. When the rains come, the water soon runs away, creating gullies, and causing soil erosion, while the groundwater aquifer is not being recharged. Seasonal rivers fill up during the rains then dry up as the water flows downstream.

The project is tackling these issues through several innovations:

- School roof rainwater harvesting provides 60,000 litres of fresh water - The project constructed a roof catchment rainwater harvesting system at the village primary school.
- Solar powered village water supply is cheaper and more reliable - The project replaced the old borehole system with an electric submersible pump powered by a solar panel array.
- Subsurface dams and Sand dams capture thousands of tons of rainwater - The project has constructed two dams - one in each of Chololo's two seasonal rivers - to capture the passing rainwater, and store it in the sandy river bed, providing thousands of tons of water for use during the dry season.

“ I have benefited a lot from keeping goats and chickens. I spent the money I got for paying school fees for my children, investing in farming and business and some for household use. I now have a modern house. The project has changed me a lot. If I get problems I am able to resolve them myself without depending on my husband.

Jeri Masianga - livestock keeper ”



Trees Help Adapt and Mitigate

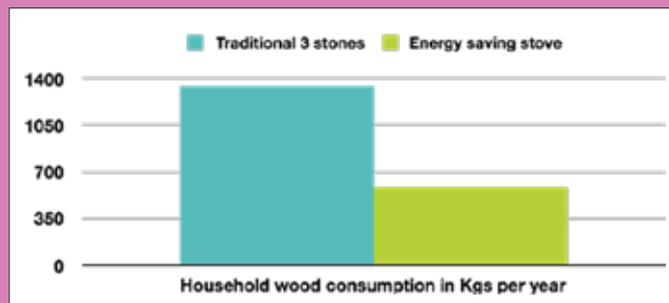
- Trained 133 community members and village leaders on afforestation, nursery management and tree planting;
- Created tree nurseries at the school and several community institutions
- Planted 33,650 tree seedlings (including leuceana, acacia polycanth, neem, mango, guava) at hundreds of households, six churches, the primary school, and the dispensary;
- Planted 3,000 trees in three acres of village forest reserve.



Alternative Energy Reduces Deforestation

Tanzania loses around 1% of its forest cover every year. Reliance on wood fuel and charcoal for cooking is a key driver of deforestation, a major cause of global climate change. The project has supported the community to take up, test, and evaluate a range of alternative energy technologies, including energy saving cooking stoves, and low cost domestic biogas plants:

Energy saving stoves use half as much wood. Made with locally available clay, grasses, and water, the stoves construction cost is only 10,000 Tsh (about 5 USD) - the price of a local chicken.



Innovations Assessed by the Village Community

A community workshop assessed the 26 innovations using criteria of effectiveness, gender friendliness, and affordability. The top ten innovations are:

Rank	Innovation
1	Livestock disease management
2	Improved seeds
3	Intercropping
4	Good agriculture practices
5	Farm yard manure
6	Tree planting
7	Soil moisture conservation
8	Ox-tillage implements
9	Fuel efficient stoves
10	Improved cockerels

“ You can cook two pots at a time and there is no coughing due to smoke. In the past I was using two bundles of firewood a week on my three-stone traditional stove but now I am using less than one bundle with the energy saving stove.

Mama Chifaguzi - Chololo community member

Success Factors

Many people ask what is the secret of the success of the Chololo Ecovillage experience. Here we try to identify some critical success factors:

Multi dimensionality - touching every aspect of village life.

Multi disciplinary delivery - with a partnership of experts in different fields.

Strategic fit - aligning the project design with national policy

Project management - a strong governance structure with a steering committee of experts.

Participation - working with the community, starting from what they know, building on what they have.

Flexibility - to innovate, diversify, test, evaluate, reflect, learn, and adapt.

“ In my village everybody has benefited from the project. Nobody is going out of the village in search of food. Those who have shortage get food within the village from farmers who have enough to spare

Michael Mbumi - Village Chairperson

CONTACT

For additional information on the case study, write to: Dr Francis Njau, Institute of Rural Development Planning, Dodoma, Tanzania. Email: frabe59@gmail.com • www.chololoecovillage.wordpress.com

LESSONS AND CONCLUSIONS



The world faces numerous problems related to agriculture and food; millions suffer persistent hunger and malnutrition while even more are obese and overweight; environmental degradation, pollution and loss of agricultural biodiversity threaten the very resource base that agriculture is dependent on; high greenhouse gas emissions contribute to climate change; and policies and laws marginalize small farmers, their practices and rights. These are all symptoms of a broken food system.

No less than a complete transformation of our agricultural and food systems is needed. The International Panel of Experts on Sustainable Food Systems (IPES-Food) is among the latest to call for a paradigm shift away from the model of specialized industrial agriculture that is dominant today, towards diversified agroecological systems¹. This publication echoes that call, showing that agroecology works.

Agroecology applies ecological principles to the design and management of agroecosystems. Its practices diversify farms and farming landscapes, increase biodiversity, nurture soil health, and stimulate interactions between different species, such that the farm provides for its own soil organic matter, pest regulation and weed control, without resort to external chemical inputs.

Agroecology has consistently proven capable of sustainably increasing productivity and ensuring adequate nutrition through diverse diets. It has far greater potential for fighting hunger and poverty, particularly when there are economic and climate shocks. Evidence is particularly convincing on the ability of agroecology to deliver strong and stable yields by building environmental and climate resilience².

These benefits are confirmed by experiences on the ground. As evidenced by the case studies in this publication, agroecology has contributed to nutrition, health and food security; it has led to higher yields and increased productivity due to improved soil fertility and diversified crops, contributing to higher incomes and improved livelihoods; its practices such as intercropping, rotation and crop diversification improve functional biodiversity and soil fertility, reducing

“ No less than a complete transformation of our agricultural and food systems is needed. ”

reliance on external inputs; and there is lower risk exposure and increased resilience to climate change.

Critically, agroecology draws on the knowledge and experiences of farmers. Many answers lie in farmers' fields and in farmers' knowledge, for example, how to create healthy soils that store more water under drought conditions or how to grow a diversity of crops to create the resilience needed to face increased unpredictability and to provide food security. The case studies demonstrate that community-led approaches focusing on knowledge sharing are the most effective. Farmers' groups play an important role in spreading and sustaining agroecological practices. The participation of farmers, and rural women in particular, is therefore key to success.

The case studies show that there is hope to reimagine our food and farming systems. Agroecology is not simply about changing agricultural practices; it also provides a viable alternative to the industrial food and agriculture system, with food sovereignty promoting more localized food systems and farmer participation. This systemic transition would lead to the emergence of alternative food systems that are based around fundamentally different logics, with more equitable power relations. Agroecology is, indeed, the bold future of farming in Africa.

Lim Li Ching
Third World Network and
Member, IPES-Food

¹ IPES-Food (2016). *From uniformity to diversity: A paradigm shift from industrial agriculture to diversified agroecological systems*. International Panel of Experts on Sustainable Food Systems, Brussels. www.ipes-food.org

² See IPES-Food (2016) for a review of the evidence across various dimensions.



Agroecological farms are friendly to beneficial insects. Photo: Saidi Singo



THE FIVE LEVELS OF FOOD SYSTEM TRANSFORMATION

Agroecology is a way of redesigning food systems, from farm to table, with the goal of achieving the three pillars of ecological, economic, and social sustainability. A system of “5 Levels” of transition¹ can be used to assess food system transformation towards the ultimate goal of sustainability through agroecology and away from modern industrial agriculture with its negative impacts. The first three levels describe changes on the farm while the last two go beyond to the broader food system and society at large.

“ Basic beliefs, values, and ethical systems change, and we learn what it really means to live sustainably. ”



Level 1 is for farmers who use simplified monocultures and depend on the intensive use of industrial inputs. Practices are changed so that fewer inputs will be needed and the negative impacts of their use, reduced. However, the dependence on external human inputs and monoculture practices persists.

At Level 2, external input-intensive and environmentally degrading products and practices are replaced with those that are renewable, natural, and more environmentally sound. Organic farming is one example. However, the farm is not usually altered from its primarily monoculture form, hence, many of the same problems that occur in industrial systems will continue to occur in an input-substitution system.

The focus at Level 3 is on the prevention of problems before they occur. Farm structure and function are better understood so that appropriate changes in design can be implemented beyond just the application of external inputs. Diversity and complexity are major tools employed.

During Level 4, a kind of “food citizenship” is formed, where communities of growers and eaters form alternative food networks, building a new culture and economy of food system sustainability. Food is once again grounded in direct relationships between those who grow the food and those who eat it. Examples include farmers’ markets, community-supported agriculture, direct exchanges, consumer co-operatives, and other direct marketing arrangements that shorten the food chain.

¹ Gliessman, S.R. 2015. *Agroecology: The Ecology of Sustainable Food Systems*. Third Edition. CRC Press/Taylor and Francis Group, Boca Raton, FL.

Level 5 involves change that is global in scope and reaches beyond the food system to the nature of human culture, civilization, progress, and development. With Level 5 thinking and action, agroecology provides ways to build upon farm-scale and farmer-driven change processes to a full rethinking of how we all relate to each other and to the Earth that supports us. Basic beliefs, values, and ethical systems change, and we learn what it really means to live sustainably.

The case studies documented by the AFSA network fit very well with the 5 Levels of change. They show how multiple entry points are possible and how farmers and their com-

munities can actually function at multiple levels simultaneously. But most importantly, they show how agroecology, by linking research, practice, and social change, can motivate and guide change that restores social equity, ecological soundness, and the vitality of local economies, grounded on the principles of food sovereignty, self-sufficiency, and sustainability.

Steve Gliessman

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University of California, Santa Cruz



*Khamis Mohamed uses Marigolds for integrated pest management.
Photo: Michael Farrelly.*



THE BOLD WAY FORWARD FOR AFRICA

As a reader of this publication, you have seen from the wealth of evidence presented that agroecology works. You have seen the clarity with which agroecology has been expertly and scientifically documented, conceptualised and analysed.

You have read about the catastrophic failure of the industrial food system, which voraciously devours precious natural resources, spews out a third of global greenhouse gas emissions, and fails on almost every count of sustainability. You have been shown that no less than a complete transformation of our agricultural and food systems is needed.

As an alternative, you have been offered a vision of a global food system that is sustainable and equitable for all; a vision with people-centred values and ethical systems, where we can learn what it really means to live sustainably, and in harmony with nature.

Leading experts have explained to you how agroecology reforms food systems to promote better nutrition and health, especially among poor communities; how it diversifies livelihoods and defends the dignity of women farmers; how it enables and empowers us to revive our soils and lands, cultivate relevant crops, advance food sovereignty, and build resilient ecosystems and communities; and how such innovative production systems, based on indigenous knowledge, meet the nutritional, cultural and spiritual needs of Africa's peoples.

The case studies show that many farmers in Africa are already practising agroecology successfully. A growing movement of African farmer organizations and networks is committed to agroecology as the way forward.

But in order for Africa to make this full leap towards agroecology, we need everyone on board. Are you a farmer, a consumer, a teacher, a student, a policy-maker, a researcher, a donor, or a journalist? No matter who you are, Africa needs your help. This bold transition to agroecology needs the commitment of people from all walks of life; people ready to work together in solidarity to bring about the necessary changes at all levels, such as those described below.

“

It will forever remain an accusation and a challenge to all men and women of conscience that it took as long as it has, before all of us stood up to say enough is enough.

Nelson Mandela,
Notes to the Future”

”

Policy

- Shift public support and subsidies away from industrial agriculture and towards agroecology.
- Create holistic food policies based on nutrition security, climate change resilience, sustainability and agricultural biodiversity.
- Use public procurement policies to support the transition to agroecology; for example, schools, hospitals, and public institutions could offer healthy food grown using agroecological practices.
- Use agroecology to support the achievement of the Sustainable Development Goals.

Food Systems

- Enable farmers to understand the political economy of farming and food, and strengthen farmers' associations that are advocating the transition towards agroecology.
- Build farmers' and women's knowledge and skills in managing small enterprises and marketing.
- Strengthen local markets and marketing channels for local produce and ensure farmers have full access to these.
- Shorten the food chain to enable producers and consumers to gain maximum benefit from direct interaction.
- Stimulate and help community-based enterprises to thrive in the transition towards the new system.

Research

- Support agroecological research in collaboration with farmers to identify and tap the full potential of agroecology, as well as how to overcome the challenges in making the transition.
- Shift the focus of agricultural research away from mere yield/productivity towards holistic agroecological indicators such as nutritional value, ecosystem biodiversity and services, climate change resilience, and farmer innovation.
- Develop farming technologies that support small-scale application and innovation, use local resources in a sustainable manner, respect local cultures, and are low carbon and labour-saving.
- Build upon widespread indigenous and local knowledge systems.

Seeds

- Strengthen and develop farmer managed seed systems, the main source of seeds in Africa.
- Save endangered seeds and improve farmers' varieties through farmer-centred systems like participatory plant breeding.
- Secure the legal rights of farmers to freely save, share, exchange and sell seeds, and safeguard them from being victimised by laws that protect corporate intellectual property rights and trade in seeds.

Indigenous Knowledge

- Rebuild and strengthen the cultural heritage and indigenous knowledge systems of African peoples.
- Record and recognize indigenous and local knowledge in all learning platforms.
- Strengthen the practice of farmer-to-farmer sharing and learning.
- Make agroecology the foundation of agricultural extension services.
- Introduce agroecology and nutrition into the curriculum at all levels of education from primary to tertiary.

Consumer Awareness

- Raise widespread awareness among consumers about the nutritional and other benefits of agroecology.
- Strengthen consumer associations that advocate a transition towards food sovereignty and agroecology.
- Promote collaboration among policy-makers, farmers, and consumers' organizations to ensure mass adoption of agroecology.

In a world threatened by anthropogenic climate change, environmental degradation, hunger and poverty; in a world committed to ambitious sustainable development goals and to the phasing out of fossil fuels; now is the time to call a halt to life-destroying business-as-usual food systems and begin the journey towards life-giving agroecology and food sovereignty.

Let Africa take that bold step now!





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