• diversity • soil • water • seed • advocacy •

AGROECOLOGY IS BEST PRACTICE

BIOWATCH SOUTH AFRICA'S WORK WITH SMALLHOLDER FARMERS

Agroecology is best practice
Biowatch South Africa's work with smallholder farmers

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"We see **AGROECOLOGY** as a way to work towards **FOOD SOVEREIGNTY** where the control of seed and land remains in the hands of farmers, and the land is used in an ecologically sustainable way."

"**BIOWATCH** challenges the industrialised food system and demonstrates and advocates **AGROECOLOGY** as the ecologically sustainable alternative to ensure **BIODIVERSITY, FOOD SOVEREIGNTY** and **SOCIAL JUSTICE**."

BIOWATCH SOUTH AFRICA

As a country and as a world, we face multiple food, energy and climate change crises. Within this context, Biowatch challenges the industrialised food system and demonstrates and advocates agroecology as the ecologically sustainable alternative to ensure biodiversity, food sovereignty and social justice.

Established in 1999, Biowatch works with smallholder farmers, other civil society organisations and government to ensure that people have control over their food, agricultural processes and resources, and other natural resources, within a biodiverse, agroecological and sustainable system.

- **Biowatch supports** smallholder farmers to make informed choices; have control over their agricultural resources (including land, water, seed, infrastructure); and secure their farmers' rights.

- **Biowatch contributes** to building platforms for civil society to develop joint understanding of and action towards securing biodiversity, food sovereignty and social justice.

- **Biowatch challenges** and supports government to implement policy and practices that promote, facilitate, and actively support agroecology, and that safeguard people and land.

To be sustainable, change on the ground needs to be coupled to change at a national or international level. Our approach is, therefore, two-fold – we work simultaneously at policy level and directly with projects on the ground involving smallholder farmers. This means that any policy interventions are grounded in the experiences of rural people working the land, rather than in a think-tank vacuum; and through the policy work, farmers become more aware of their context, of what needs changing in our society, of their collective power, and of the need to ensure the accountability of decision makers in a democracy. In this, Biowatch serves to provide multiple linkages to all its stakeholders, and this approach serves to orient the organisation in a clear commitment to securing smallholder farmers' rights.

AGROECOLOGY IS BEST PRACTICE

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FOREWORD

Ten years ago, Biowatch started using the term "agroecology" to describe much of our work. It was a big, but risky step to take – "agroecology" was used extensively in many South American countries, but this was not the case in South Africa. We had been looking for a term that would encompass our political, socio-economic and environmental thinking and was practically grounded. Through interactions with organisations and movements in Brazil we realised that "agroecology" described our work, and our values. Ten years later "agroecology" still holds firm for us, despite agri-biz co-opting it with their disingenuous "climate smart" and "conservation" agricultures. It holds firm as globally, long term solutions that are socially and environmentally just, are sought to address the calamities of climate change – drought and floods, destruction of biodiversity and land, and increasing global food and nutrition insecurity.

Last year a challenge was given to Biowatch to write-up our best agroecology practice. At first we jumped at the opportunity – we could see the huge gap in the written discourse – but we didn't fully realise the complexity of the task that lay before us. What is our best practice? How do we write about best practice when the field is evolving, where one encourages innovation? How to write when so much of our work is done by word of mouth, building on oral traditions; and how to give voice to those who provide the knowledge that agroecology builds on? We hope we have done justice to these questions. "*Agroecology is best practice: Biowatch SA's work with smallholder farmers*" was a complex, rewarding book to write; hopefully you will find it an inspiring and uplifting book to read!

While this book speaks to what agroecology is and how it is undertaken in very challenging areas in KwaZulu-Natal, this is not to say that it is only applicable in such contexts – it is what is needed locally and globally to help ensure life on Earth. We hope this book will encourage and catalyse you for action, whether you are a farmer, a policy-maker, in government or civil society, or you work to make clear the underpinning of our current destructive system.

Our thanks go to all those who have so freely shared their knowledge of agroecology with Biowatch over the years, to the donors, and to the regional Seed and Knowledge Initiative (SKI) that this work has fallen under. We also thank everyone who helped make this publication happen: the farmers – several of whom feature in the book; the Biowatch staff who have specifically supported Biowatch's agroecology programme – Lawrence Mkhaliphi, Mpho Gumede and Samu Zuma; the writers – including Mark Mattson and Francesca Alice; the photographers; and my co-editors Desiré Pelser and Vanessa Black.

Rose Williams Director: Biowatch South Africa
September 2018

FURTHER READING and REFERENCES:

- **Agroecology: Environmental, social and economic justice** – a Biowatch Research Paper
- **Agroecology** – a Biowatch Fact Sheet
- **Drought crisis** – a Biowatch Fact Sheet
- **Household seed banks** – a Biowatch Fact Sheet

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INTRODUCTION

Biowatch works to support food sovereignty by building on smallholder farmers' traditional farming knowledge to strengthen agroecology practices. Our support extends to advocacy at different levels (from local to global), and our approach is facilitative, supporting farmers to amplify their voice and engage with decision-makers on issues affecting them. This emphasis on farmers' voice and agency extends to this publication, which is guided by their experiences and how agroecology practices have been put to work in northern KwaZulu-Natal (KZN).

This "best practice" publication, which brings farmers' voices to the fore, is a new kind of publication for us. While Biowatch has research papers, fact sheets and policy briefs on agroecology and related issues, this is the first time we have documented our practice in a way that reflects the learning focus of our work, as an organisation and in the design and implementation of project activities. Our approach has always been: the farmers learn, we learn, and we adapt collectively. The point of difference in this publication is that it foregrounds the stories of smallholder farmers and presents our work in a way we hope will be more accessible to a wider audience.

But the process of putting this publication together hasn't been without challenge. Emerging from the initial thinking about what to include is recognition that best practice in our context may be different for others, in other contexts. So this publication focuses on "our" best practice, based on the universal principles of agroecology but applied in a specific place (northern KZN, South Africa) and at a particular point in time. While we have worked in partnership with smallholder farmers for nearly 20 years to promote, test and innovate to refine our agroecology practice, the stories in this book are snapshots – in gathering content for this book, farmers were visited and their stories captured during the summer of 2017.

We also recognise the challenge of documenting practice when we largely work in an oral tradition, and when the smallholder farmers we work with are constantly evolving their agroecology practice in "real time". So this is not a step-by-step guide, but rather an illustrative collection of some of the practices we have been promoting.

This publication showcases four key areas: diversity, soil & water, seed, and advocacy. The focus on these aspects emerged from a process which examined the main agroecology practices, then honed in on what they are for us and how they fit together in our practice:

- **Diversity** is fundamental to maintaining the "web of life", a phrase we use to describe Earth's biodiversity, but which we also use to describe an agro-ecosystem that uses agroecology principles in its design to maximise the benefits of and connections between all living things.
- **Soil & water** are key resources that we focus on because they are vital to life and one cannot produce food without them – there is a direct, symbiotic relationship between soil and water, yet climate change, pollution, industrial agriculture and unsustainable mining practices constantly threaten their availability and quality.
- **Seed** is a key focus of our work because it is the foundation of food sovereignty.
- **Advocacy** we included because we are working towards changing the system and discourse – working in ways that support farmers' voices on issues that affect them is key for us.

Because we endeavour to ensure our work in these areas and others is always grounded in the experience of rural people working the land, it was only natural that our "best practice" publication share stories from the smallholder farmers we work with. We hope the stories presented bring to life a "taste" of this work to illustrate agroecology in practice and how our approach supports this.

WHAT IS **AGROECOLOGY**?

Agroecology encompasses a holistic science; a practice; and a movement with a bottom-up approach to creating just, ecologically sustainable and viable food systems. Agroecology is an approach to food production (and harvesting) that works in harmony with nature and ecosystems, instead of exploiting them as does the industrialised food system. It builds on local cultures with their unique expressions of knowledge and practice that have developed over millennia around the world.

Agroecology promotes food sovereignty, which is the right of peoples to access and control the resources they need (including land, water, seeds, biodiversity, markets and knowledge), to be able to make their own choices about the kind of food they eat, produce and buy. Food sovereignty aims to democratise the food system, while recognising our dependence on ecological systems for our food.

There is no one "recipe" of techniques for implementing agroecology because each area is unique and has its own climate, ecology, geology, culture, social dynamics and resources. Instead, agroecology applies principles learnt from nature, which guide its practice in each place, resulting in diverse expressions of agroecology around the world. Internationally, agroecology is being recognised as a necessary approach to agriculture in the 21st Century as we realise the catastrophic impact industrial agriculture is having on Earth. Agroecology has many benefits, which are summarised below:

- **Agroecology empowers smallholders to be more productive and helps to alleviate poverty**
  Biowatch specifically works with smallholder farmers, the majority of whom are women, for several reasons. We support social equity and people's sovereignty over their land and resources. Rather than having massive land holdings converted to agroecology we want to see the dismantling of this consolidation and the land returned to smallholder and family farmers. Smallholders harvest 20-60% more produce per unit area than large industrial monocultures, while needing to buy few inputs; and income generated benefits the local economy.

- **Agroecology creates abundance where it is needed**
  Not only is more produced per hectare, but a greater variety of products are produced in an agroecology system – including building materials, medicines, fibres, fuels and foods. The food is healthy and nutritious because healthy soil provides more nutrients and no toxic chemicals are used. This produce is available where it is needed without the extra economic and environmental costs of distribution and transport.

- **Agroecology ensures food sovereignty and livelihoods for many**
  Agroecology satisfies diverse local needs through optimal use of available resources, including a smallholders' most significant resource – their labour – while avoiding the use of harmful outside inputs that create debt and dependency. Technologies like GMOs which commodify life, have no place in agroecology, which thrives on co-operation and sharing.

- **Agroecology conserves water**
  Agroecology conserves water through more plant cover and water harvesting techniques that slow down run-off, so the water has time to seep into the soil. Healthy soils with high organic matter content absorb and hold moisture for extended periods, and water that does flow to rivers or groundwater is cleaner.

Agroecology builds healthy soils

Soil fertility depends on complex dynamics between its structure, nutrients and living organisms. The addition of organic matter to create favourable conditions for beneficial soil organisms is a core principle of agroecology because soil health is the foundation for healthy plants (and humans) and water retention.

Agroecology is resilient in diversity

Agroecology systems are diverse in domesticated and wild species of plants and animals to enhance beneficial ecological interactions between them (for example, pest predation) and to provide us with many useful products in addition to food. Not only is there a mix of many types of plants and animals, but also many varieties within each species – one variety may be better adapted to a particular pest, weather condition, or cultural ritual than another. As a result, agroecology systems tend to be more resilient to climate and economic stresses.

Agroecology promotes zero waste

Agroecology produces food for local consumption – not only is it fresh, but very little perishes between the farm and the consumer, and packaging is not really needed if it is for local markets. This also avoids energy consumption for refrigeration and transport. The small amounts of waste that are produced are biodegradable and can be returned to replenish nutrient cycles on the farm.

Agroecology is non toxic and produces healthy, nutritious food

Agroecology avoids the need for toxic and petrochemical pesticides and fertilisers by nurturing the soil and creating the conditions that foster a dynamic balance between species so that pests and diseases are kept in check. Food is healthier because it receives more nutrients from the soil and has no toxic chemical residues.

Agroecology cools the planet

Agroecology responds to one of the greatest crises of our time: climate change. The diversity in an agroecology food system, as well as the ecological practices used, provide greater resilience and adaptability to varying weather patterns and consequent floods, droughts and pest outbreaks. Agroecology also helps to mitigate and reverse climate change by restoring carbon to soils and not by using chemical fertilisers, which are energy intensive to manufacture and release nitrous oxide which is more damaging than carbon dioxide. Agroecology systems also avoid many of the emissions produced in the industrialised agriculture system by focusing on local food production for local consumption, which greatly reduces the energy and resources needed for refrigeration, packaging and transport.

> "Working in harmony with nature and ecosystems, **AGROECOLOGY**'s bottom-up approach to practicing and organising agriculture creates just, ecologically **SUSTAINABLE** and viable food systems."

OUR **APPROACH**

Biowatch advocates for agroecology as a proven way to farm with nature that is empowering to farmers and promotes food sovereignty – local community control over our food and the way it is produced.

We support farmers to firstly consolidate their own household food security through household vegetable gardens and field crops, by strengthening agroecology practices based on their own traditional farming knowledge. As the farmers fine-tune their agroecology methods, surplus production also increases, encouraging farmers to extend to larger plots, and for some to participate in communal market gardening projects.

Considering the principles of agroecology, farmers initially adopt eight simple practices that they can apply to their farming. These practices are also used to measure the extent to which individual farmers have adopted agroecology. On each farm the combination of practices is nuanced and intertwined with the planning of the homestead, which

BIOWATCH'S EIGHT AGROECOLOGY PRACTICES

1. No synthetic fertilisers
2. No synthetic pesticides, insecticides or herbicides
3. No GMOs or commercial hybrids
4. Composting
5. Fertility beds (including deep trench beds, double-dig and single-dig beds)
6. Use of grey water
7. Mulching
8. Saving the seed of at least 14 traditional crops

> "These eight practices have **DIVERSIFIED** over time to include a **RANGE OF PRACTICES** for building soil fertility and preventing erosion, conserving water, increasing diversity and managing pests."

includes buildings that accomodate sleeping, cooking, gatherings and seed storage, arranged according to systems of respect, gender roles, family ritual and security for livestock. The size of farms is typically not more than two hectares. In general, each farmer has an area dedicated to crop production near the homestead. This area may be divided according to production needs: a home vegetable garden; the *amasimu* (near fields) divided for growing of cereals and slower maturing plants that require less water; an area for fodder plants; an area for creeping pumpkins and melons; and plots grown specifically for market crops and seed production. These are intensely inter-cropped and change through the seasons. Fruit and nut trees are increasingly being incorporated around homesteads, or in an orchard area. The homestead also includes enclosures for securing livestock at night (including cattle, goats and chickens) that free range in communal lands. Some families have access to *emasimini* (far fields), but many are fallow due to the high cost of fencing these to protect them from wandering livestock.

Ntombizethu Ntuli's household vegetable garden in KwaHhohho, northern KwaZulu-Natal. *We see healthy, nutritious vegetables grown in well-mulched fertility beds; and in the foreground, bag compost and seedlings grown in basins.*

AGROECOLOGY BEST PRACTICES IMPLEMENTED BY FARMERS

The following is a brief description of how farmers we work with have implemented agroecology practices taught by Biowatch. Some practices are **1) general** and applied to the whole production system; while others are used specifically **2) in the household vegetable garden** or **3) in the rain-fed fields**.

1. IN GENERAL

Compost in a bag

Compost is made in a bag – ready to use – by taking a 50 or 80 litre sack and filling it with layers of fresh green organic materials, fresh manure from animals other than cattle, old cattle manure from the kraal mixed with water and wood ash, and dry organic material. The bag is put in the shade of a tree or under a shelter and kept moist. The compost is ready to use within a month.

Pit compost

Any available organic material and animal manures are composted in a pit near the vegetable garden that is covered with an old carpet or metal sheet. This keeps the moisture and temperature at optimal levels in the compost and prevents scavenging animals from disturbing it.

Pest management

The approach to pests is to keep populations low by discouraging them and facilitating a balance between pests and their predators; only killing pests through organic methodsw. Pests are discouraged by planting strong-smelling plants including *iboza* (ginger bush) and *umsuzwane* (lemon bush) around the edges of household gardens and fields, and between plots. Soil health, hardy farmer varieties of crops and the diversity of planted crops also reduce pest and disease problems. In the case of infestations, natural sprays are made by creating teas from plants including chillies, garlic, onions, and the leaves of paw-paw, tomato, syringa and castor oil plant. These are mixed with a small amount of soap to make the solution stick to the plant.

Various techniques are used to preserve seeds in storage. Traditionally grains are hung in the rafters above the fire pit in the kitchen – smoke from the fires hardens the seeds and deters pests. Strong smelling plants are layered between seeds in granaries. Seeds in bottles are protected by depriving insects of air, and by including aromatic plants and wood or aloe ash with the seeds.

Swales and soak pits

Many people sweep the area around their homes to keep it tidy and reduce the places that snakes might hide. This creates a hard surface over time, and high run-off when it rains. Biowatch discourages this practice, but also encourages farmers to take advantage of run-off by locating their vegetable gardens and fields below the buildings. A swale is a trench with the removed soil mounded on the downslope side of the trench that is dug along the contour (the points of equal height on the slope). A swale catches run-off water so it can slowly seep into the ground. In the vegetable garden a deep swale is dug across the length of the highest part of the vegetable garden, with a deep trench bed immediately below the swale to benefit from this water. Small soak pits are also dug at intervals along garden pathways and filled with old blankets and coarse organic materials, to sink and hold water that can seep into the planting beds at root level. In the fields the runoff water caught by swales percolates into the soil to water the perennial crops or nitrogen-fixing plants that secure the swale mound, and the field crops below each swale.

Companion planting and guilds

Some plants grow well with others and some produce substances that discourage other plants from growing near them. Farmers learn which plants grow better together, and these are planted in the same beds or plots. A group of plants may also grow well together because they provide for each others' needs as a "guild" of co-operative species. One of the most common traditional plant guilds is the "three sisters" of maize, pumpkins and beans. The maize is planted to come up first, then the pumpkin, with its big creeping leaves that shade and protect the soil, and then the beans, which use the maize stalks as a support while providing nitrogen to the roots of the maize and pumpkins.

Crop rotation

In addition to planting crops that help each other to grow better together, crops are also rotated so they are not planted in the same plot or bed in the next growing season. This reduces the spread of soil-dwelling pests and disease, and makes best use of nutrients as each type of crop draws (or adds) different nutrients from the soil, with some being heavier feeders. In the vegetable garden, fruiting crops (for example tomato) are planted first after preparing the beds with fresh composts and manures as fruits are heavy feeders. These are then followed by leaf crops, then root crops, and then legumes as a last rotation to put nitrogen back into the soil. Where the farmer is doing a lot of inter-cropping, they try not to plant the same crop, or a crop from the same family of plants (for example tomatoes and brinjal), in the same bed the next growing period. In the fields, plots are rotated from season to season: first legumes for soil improvement, then heavy-feeding grains, and finally with root crops like sweet potato. Where the farmers are inter-cropping in the same field a combination of grains and legumes are grown in each plot – such as the "three sisters", or maize with peanuts and sweet sorghum – and these combinations are rotated to a different plot each season.

Alley cropping

Alley cropping is a planting system where crops are planted in long thin rows with a different crop in each row. A tall grain crop such as sorghum/millet or a row of shrubs, such as nitrogen-fixing pigeon peas, are planted as wind breaks every three metres. Farmers use alley cropping in their vegetable gardens and seed plots to be able to plant many different crops and varieties in a small space. The tall barrier plants are used to slow the movement of pollen between different varieties of the same crop.

Integration of animals

Animals are an important part of an agroecology system by providing manures for soil fertility. They are also important in the rural economy for food, as an easily-sold resource when cash is needed urgently, and enabling households to participate in cultural rituals. Households have a range of livestock which may include chickens, goats, pigs and cattle. Most livestock is free-ranging in the day, and gathered into the homestead at night. Some households make use of "chicken tractors" where the chickens are penned in an area of the garden where they clear pests and turn and fertilise the soil while scratching.

2. IN THE HOUSEHOLD VEGETABLE GARDEN

Fertility beds

Three types of fertility beds are prepared in the household vegetable garden: deep trench, double-dig, and single-dig beds. The width of the beds should be no wider than one can reach to tend plants without stepping on the beds.

Deep trench bed

This is the first bed below the swale in the vegetable garden. It is dug down 600mm (from underfoot to above the knee in height). The very bottom of the trench is lined with a layer of stones, small branches, and old blankets and cardboard to act as a sponge. The rest is filled with shallow alternating layers of water and ash, topsoil, animal manure, green organic material and dry organic material. The top layer is built above the old ground level to 150mm with a mix of old manure, ash, compost and topsoil. Any subsoil that is dug out of the trench is thrown on the pathways.

Double-dig beds

In these beds, the topsoil is dug out to a depth of 300mm (one spade) over the length of one meter of the bed and the subsoil below loosened with a fork. The hole is filled with organic material and cattle manure and then the topsoil from the next one metre is added on top. This creates a fertile raised bed.

Single-dig beds

The lowest one or two rows in the vegetable garden can be single dig beds. These beds are loosened with a pick and then fresh animal manure mixed with wood ash is dug into the soil with a fork. One wheelbarrow of manure is used over a one metre length of bed. This is watered, mulched and left for a month after which it is ready to be planted. Compost is added at planting. Further nutrients are added by watering with a slurry of cow dung and ash.

Mulching

The beds and even the walkways of the household garden are heavily mulched with grass and other available organic material to conserve moisture in the soil.

Grey water recycling

The farmers collect all their grey water from bathing and washing clothes and dishes. The water is filtered through layers of gravel, charcoal, sand and ash in a funnel made from a cold drink bottle or other suitable container. Thus filtered, it is stored in drums or buckets to which wood ash is added. This cleans the water sufficiently to use on the planting beds, taking care to pour the water on the soil and not directly on the plants.

3. IN THE RAIN-FED FIELDS

Inter-cropping

In the hot and often dry conditions, surplus organic material can be hard to find. In the rain-fed fields the soil is sheltered by a “living mulch” – closely planted cereals inter-cropped with creeping and climbing crops that create shade and add nutrients to the soil. These crops between the main staple crop can fix nitrogen, yield a secondary crop, be used as animal fodder, or be slashed and dug into the soil as organic matter.

Planting basins

To make the most of scarce organic material and water, the fields – especially plots dedicated to seed production – are prepared with planting basins in the winter. The soil is lightly dug out and mounded on the downslope side to make shallow depressions of about 30 x 30cm, and 30cm apart. These are alternated to create a checkerboard pattern across the field following the contours of the slope. Manure, ash and organic material is put into each basin to compost. Before the rains seeds are planted into the corners of each basin with some mature compost. The moisture and nutrients held in the planting basins, gives the seeds an early start to the growing season.

WHY **BEST PRACTICE?**

Biowatch is a learning organisation and the planning and producing of this publication proved an excellent opportunity for us to critically look at our "best practice". Since agroecology is adapted to each local context, we had many discussions and several workshops to develop and agree on a list of criteria that would qualify the range of practices and approaches as our "best practice" to include in this publication.

OUR CRITERIA FOR AGROECOLOGY BEST PRACTICE

In addition to Biowatch's eight agroecology practices (see page 8), we use the following criteria to define agroecology "best practice":

1. Is it effective?
2. Is it successful?
3. Is it easy to learn and implement?
4. Can it be replicated and adapted?
5. Is it "owned" by the farmers?
6. Do farmers want to share it?
7. Does it enhance and protect diversity (plants, animals)?
8. Is it environmentally sustainable?
9. Is it socially and economically sustainable?
10. Is it gender responsive?
11. Does it resonate with local culture?

Learning implies change – as Biowatch and the farmers evaluate and reflect on our practices, these are constantly adjusted and improved. Farmers are scientists; enquiring, experimenting and innovating from week-to-week. Traditional knowledge is often discredited by agricultural extension officers who have been schooled in "green revolution" technologies, and traditional practices are derisively labelled as "Gogo (grandmother) ways". We are all challenged to reflect on our own assumptions; to look and see what really works in this particular context. What you read in this publication can best be described as our "best practice-in-process" reflecting this point in time.

Because ecology is relational, it was challenging to separate practices into themes. The farmers telling their stories each exemplify many good agroecology practices on their farms, and these practices intertwine and complement each other.

> "While the **FARMERS' STORIES** in this book each focus on an identified aspect of best practice, each is a rich illustration of **AGROECOLOGY**'s holistic approach."

Jeselina Mlotshwa, an agroecology farmer in Mtubatuba, shares her sorghum crop with a Streaky-headed Seedeater.
Agroecology best practice respects all life and the role all living organisms play in the "web of life".

"The principles and practices of **AGROECOLOGY** value and contribute to **DIVERSITY** in the greater environment, the local landscape and the fields."

Diversity

The strength of the Earth's ecosystem is in its diversity and richness. Agroecology intentionally increases the beneficial biological connections between species, above and below ground, and over time. In practice, this means that instead of vast industrial monocultures, agroecology mixes crops, trees and other beneficial plants and animals; uses successions of plants and crop rotations to increase diversity between seasons and over the years; and uses cover crops and micro-climates within the system to optimise soil fertility and planting niches. We call this the "web of life". Yet, since the birth of industrialisation and the so-called Green Revolution of the 1930s–60s, which heralded large-scale industrial agriculture as the solution to world hunger, there has been a rapid decline of global biodiversity and an increasingly vulnerable agro-ecosystem.

Industrial agriculture has destroyed much of the Earth's biodiversity. Many habitats are threatened by expanding industrial monocultures and commercial aquaculture. More than 30% of land globally has been converted to agricultural production, which uses high yielding, resource intensive crop varieties, large-scale mechanisation and irrigation, and petrochemical fertilisers and pesticides. This affects not just human nourishment, but our health and spiritual wellbeing. At least 7000 plant species have been cultivated over time. There were many types of crops and incredible diversity within each. For example, where potatoes originated, in the Andes, some communities grow as many as 178 different types of potatoes. Southern Africa is the centre of origin for finger millet and melon, and many other traditional crops including pearl millet, sorghum, cow peas and jugo beans originate in Africa. Yet despite the huge diversity in plant species, 95% of our current calorie or protein intake is from just 30 crops. Sugar, soya and palm oil have become new staples in the globalised diet. While the variety and quantity of commercially grown staples may be more available, it comes at the expense of food diversity, with staple foods from traditional diets, such as millet, rye, yams, sweet potatoes and cassava, dwindling and diverse vegetables and fruits that provided micro-nutrients no longer eaten. The replacement of staple foods with new varieties and land clearing for mono-crops threatens diversity, with an estimated 75% loss of crop diversity to date.

The traditional knowledge that made such diverse cultivation possible has been hugely impacted by these developments. At least 2000 plant species are used for medicinal purposes in South Africa, and much of the natural food basket of rural households in Southern Africa consists of indigenous fruits and wild plants. Use of these wild products is also part of indigenous knowledge and practices that are being eroded as wild space is developed and indigenous culture is globalised.

But the challenge is not just in relation to food security and nutrition. Traditional crops are key to culture, heritage, identity and sense of community. Seed is often inherited, with strong beliefs surrounding its importance for ancestors and future generations alike. Exchanging seed with relatives, community members and other farmers strengthens social bonds and networks and builds community resilience. In the face of increased urbanisation, the breaking down of the social fabric of communities, the weakening of traditional seed systems, and the decline of indigenous knowledge transfers to the next generation, this becomes all the more important. It is not surprising that many farmers have become increasingly vulnerable to complex challenges, such as changing climate, pests, deteriorating soil quality and the availability of water.

OUR BEST PRACTICE

The principles and practices of agroecology value and contribute to diversity in the greater environment, the local landscape and the fields – ensuring the agricultural landscape supplies not only cultivated food but wild food, building materials, medicines, fodder and habitat for other creatures. Smallholder farmers growing crops for household and community consumption seek to satisfy a range of social, cultural, economic and production needs. Farmer seeds are also productive indefinitely when they are part of an active system of use that includes the introduction of new germplasm (genetic material) through seed exchanges and cross pollination or breeding from wild relatives.

Agroecology best practice, as we see it, requires a level of understanding of each strand in the "web of life" so that farmers can design how best these strands connect to each other. Agroecology, as described earlier, encourages the planting of many different kinds of crops and using a range of farming practices that emulate and harmonise with the natural ecosystem, a landscape made up of a community or "patchwork" of diverse parts to fulfil the ecological principles of agroecology, but adapted to the planning of the homestead. We design for functional diversity within the agro-ecosystem to create these connected landscapes, where all farmers' homesteads within a community work to benefit each other beyond household food security. We see agroecology as being about connections between crops, animals, communities, farmers and consumers. It is also about building social movements. Diversity for us is vital, and our approach respects all life and the role all living organisms play in the "web of life".

The farmer stories that follow illustrate the richness of traditional farming knowledge and agroecology design that honours the "web of life", nurtures diversity, and builds connections in the greater environment, the local landscape and the fields:

- "**A legacy in farming**" Selinah Mncwango, Ingwavuma
- "**Farming close to nature**" Thombithini Ndwandwe, KwaHhohho

A **LEGACY** IN FARMING

Selinah Mncwango

Selinah Mncwango was born in the village of Khwelelani near Ingwavuma in northern KwaZulu-Natal in 1948. Married at the age of 20, she used the traditional beans, jugo beans, maize and peanuts her parents had always grown, and farming became a way of life, and a means of earning an income and feeding her children.

Like many rural farmers Selinah grew commercial maize, but continued to plant her parents' traditional varieties, noting their superior performance during periods of drought. Selinah joined a Biowatch-supported farming project in 2006, becoming a fine practitioner of its methods. Schooled by her parents, agroecology came naturally to Selinah who appreciated the importance of diversity and soil fertility, seed banking, field crops and household vegetable gardens, and their integration with livestock.



A traditional umshayo (left) in which smoke repels pests from maize and sorghum hung in the rafters above an open fire. The inqolobane (centre) is used to store larger amounts of maize and other field crops, and beneath which pumpkins, gourds and water melons are kept. The contents of the inqolobane are protected from pests with the common aromatic shrub Lippia javanica (umsuzwane) which is packed among the cobs and seed heads of field crops. Selinah's seed bank, some of which was moved outside to be photographed (right), contains pumpkin; two varieties of water melon; velvet, dwarf, jugo, mung and kidney beans; two varieties of cowpeas; pearl and finger millet; sesame; peanuts; white sorghum; and calabash.

The management of seeds is a millenia-old practice, evident as a living tradition at Selinah's homestead. Maize is protected from pests in an *umshayo* (a room in which an open fire is made beneath the maize which is hung from the rafters above), and stored with other foods in an *inqolobane* (granary).

Housed in the *umshayo* is Selinah's seed bank. Seed banking promotes the continuity of field crop production, helping farmers to maintain reserves that are ready in time for planting. At the time of our November visit, Selinah had just planted maize, cowpea and sesame in rock-terraced fields near her home.

The planting preparations are understood by Selinah as "saving water and energy; it gives you a good yield, and surpluses to sell." The field also contained cassava, an occasional sweet watermelon, and a large guava tree at the base of its slope. A neighbouring field lay fallow, but returning in April we saw cowpeas and maize, and cut sweet sorghum stalks to chew on. As the sun set we were shown a small mid-slope seep area with rich soils, trenched to channel water into a mulched planting of bananas, *amadumbe* (taro potato), pumpkins, and when rains are good, cassava.

Selinah's homestead offered more elements of agroecology practice. Fruit trees include the exotic jambolam-plum, a trellis with grapes, orange, mango, guava, paw-paw, banana and avocados, and the indigenous *umvuthwamini* (turkey-berry) and *umviyo* (wild medlar).

On the periphery of the homestead are a cattle kraal and goat enclosure, and chickens scratch in the shade beneath scattered trees; on leaving, we drove past Selinah's traditional sheep, an unusual addition to livestock in the area, and further evidence of her readiness to experiment. Selinah recounted earlier that she had become interested in the sheep at a training programme run by the Department of Agriculture in Jozini. Told that she could breed and sell them, she purchased four from Swaziland, which she paid for with sales of vegetables from her household garden, and of maize and beans, sold at pension pay-points and in nearby Swaziland. Her flock has grown and thrived, and as they enter their enclosure for the night, she muses: "I can't say why, but I love them very much".



Selinah's fields are terraced (left) and have contoured planting stations (centre) dug in preparation for her summer planting of intercropped maize, sesame and cowpeas. Both pictures show windbreaks of pigeon pea. The planting stations are mulched and maize seedlings (right) are given pinpoint applications of manure.



An orange tree, protected from cattle and goats (left). A field crop of cowpeas (centre). On a small mid-slope seep area rich, damp soils allow for an area-specific planting of mulched banana, amadumbe and cassava, and a row of pumpkins on the drier upslope field edge (right).


The valley's small stream has been kept open by stabilising its banks with boulders, and a small water point is maintained in the same way. The cattle kraal (centre) and goat kraal provide manure for Selinah's field crops and homestead garden. Upslope of the riverbank plots, an area has been cleared for use as pasturage for Selinah's traditional sheep, which return to their enclosure for the night (right).


Selinah's homestead vegetable garden makes use of the boundary fence of her property as a means of protection against wandering goats, cattle and chickens. The photos above juxtapose similar views of the garden, photographed in November 2017 (left) and on a follow-up visit in April 2018 (right), and illustrate the seasonal nature of fresh produce production.

The following day we hike to the bottom of a forested valley, descending steeply to witness the long residency of Selinah's family in the area, at the site of the first fields she cultivated here, over 25 years ago. On the valley floor, on both sides of a small stream, is an orchard of guava, banana, *umviyo* (wild medlar), mango and avocado, punctuated by terraced plots of maize and long, narrow fields, demarcated with stone walls and cleared for peanuts and beans. The narrow stream has been lined with rocks to keep its channel accessible, and a small pit has been sunk to capture water.

The final component of Selinah's rich patchwork is her household vegetable garden, a narrow, linear strip of land following the boundary of her property. An examination of the garden's narrow confines reveals peach, pigeon pea, orange, banana and paw-paw trees, which provide scattered shade for mint, spinach, lettuce, brinjal and beetroot. Thyme, *imbilikicane* (goosefoot), fennel and comfrey occupy sunny patches alongside sweet potatoes, pineapples, tomatoes, the medicinally useful Bulbine and a single curry leaf tree. A species of Plectranthus believed to discourage moles, a single specimen of tobacco, lemon grass for making tea and a solitary sunflower suggest the openness to diversity and experimentation that agroecology fosters. At the garden's far end a tree tomato grows alongside an indigenous nettle used as a pot herb (*imifino*).

In summarising her approach to farming, Selinah says that she "found it easy to learn" because Biowatch's methods reminded her that "my parents did this." She thanks her husband for his support and says of their independence: "Our children do not have to look after us. We are not a burden on them." As a Biowatch "Agroecology Spreader" Selinah offers her seeds and knowledge to neighbours and fellow farmers with whom she shares fields, and has busied herself with many other activities, including an agricultural project for widows, a community garden, traditional weaving and a food garden at the nearby Lundini school. Through such activities Selinah maintains a powerful identity as a valued community member – "I'm involved because I am very proud of what I have done. I wish to leave a legacy."

NOTE: Most of the farmer stories in this book are snapshots – farmers were visited in summer (November/December) when their household vegetable gardens are largely fallow. In the case of Selinah, we were able to visit again, in April, when these winter gardens flourish. Given this opportunity, we have roughly juxtaposed November and April photographs of Selinah's vegetable garden, because they are instructive in illustrating how these gardens change through the seasons.

FARMING CLOSE TO **NATURE**

Thombithini Ndwandwe

Thombithini Ndwandwe came late to farming, starting at the age of 35 after moving to KwaHhohho with four children after 14 years of working in Durban as a carer and cook. Arriving in 2005, she had “no experience of farming”, and initially found it “very difficult”, but persisted, after observing that the Biowatch farmers around her all earned an income from their efforts. In 2006 she joined the Biowatch-supported Zimele Rural Women’s Empowerment Organisation, where her outspokenness, agency and enthusiasm became an asset to the group.

Thombithini’s induction into farming was hastened by Biowatch’s structured approach, which she took pleasure in following; the recommendation to establish a household garden for fresh greens, and specific food and seed-bulking plots appealed to her, as did the detailed instructions on agroecology practice. Like many Biowatch farmers, her adoption of these methods is nonetheless individual, with many personal preferences and understandings at play.


In Thombithini's field (left), jack bean, finger millet and water melon lines are flanked on both sides by maize; while downslope, sesame and a cover crop of pumpkins are similarly flanked. Maize grows alongside a bean/cowpea mix, the dense canopy of which prevents weeds from establishing. In a different part of the field (right), sorghum, mung beans and maize grow side-by-side –and an often-used method protects sorghum heads from birds.

Thombithini's homestead hosts four fields – one contains her household vegetable garden, one is a food field, and there are two separate seed bulking fields. We are taken first to her main seed multiplication plot, with its characteristic perimeter plantings of pigeon pea as a food plant and windbreak. The field was planted in August and its rows are meticulously laid out. The *umsuzwane* (lemon bush) commonly-used as an insect repellent is present, and scattered pigeon pea trees provide scaffold for beans and even refuge for birds.

These fields appears to have great significance. Thombithini states emphatically that "I know exactly where my seeds are"; that it is important to know "that all your seeds are in one place, and in order." She explains that the close plantings suppress weeds and that the planting basins retain moisture, producing her best yields and healthiest crops. It is obvious that this is important to her – "My children should know these seeds by name and by seeing them." The methodical approach to its establishment seems also to have smoothed Thombithini's late-life initiation into farming, and provided her with much satisfaction; on a few occasions and in different ways she states that "it's important that we can do what we have been asked."

At the time of our visit the adjoining household vegetable garden is well past its prime. As Thombithini explains, vegetable gardens are generally planted in March, and while productive until October, are best viewed in June when the first harvest appears. Nonetheless, when we visit, on a hot day in November, it still contains spinach, cabbage, green pepper, New Zealand spinach, onions, sesame, water melon and sweet water melon, pumpkin, butternut, kale and tomatoes, as well as kidney, dwarf and lablab beans. It also contains scattered trees – avocado, mango, peach, banana and paw-paw.

Interestingly, the garden is also full of maize, and scattered specimens of sorghum, an unusual sight in household vegetable gardens. The maize was planted by Thombithini in September, after her major maize planting in the food and seed multiplication fields in August, just as productivity in the vegetable garden begins to tail off. According to Thombithini, the maize helps to suppress weeds as the vegetables thin out, and provides extra food. In March, all produce is removed from this garden; the beds are cleaned, enriched with dry grass mulch, compost and manure, and, in response to temperature and rainfall, planted with carrots and spinach, followed by tomato, lettuce, onions,

Many of the plants in Thombithini's seed multiplication field have been grown in their own planting basins, such as these three maize stalks which a flowering bean is using for support. The stations are prepared with ash and kraal manure in June/July and topped up with compost and ash when planting takes place in August. In another part of the field (right), a pigeon pea provides not only food, mulch and a windbreak, but also a nesting site.

The texture of the off-season vegetable garden (left) reveals kale seeds, maize, a row of green peppers, sesame seedlings, dwarf beans and spinach, banana and peach trees, and an iboza (ginger bush) hedge along the fenceline in the background, used to make a natural insect repellent. Lablab beans grow alongside a remnant cabbage (right).

A sweet potato field contains two different sweet potato varieties (left). Intercropped maize, jack beans and water melon, planted in October (right). The beans climb the maize for support, while the water melons provide a soil-protecting cover crop.

A seed bank (left), housed in a dedicated room in Thombithini's home, contains 18 species of traditional and useful crops. Thombithini (right) with a fellow Biowatch farmer after harvesting spinach from the Zimele community garden from where it is supplied to a local supermarket.

beetroot and other winter greens. As winter wanes, these greens give way to hardier melons, beans, cowpeas, mung beans, sesame, and finally maize. In this way, the vegetable garden is managed in two distinct phases to provide year-round food.

Yet more plants are revealed in an adjoining food field containing various interplanted combinations of maize, peanuts, calabash, beans, jack beans and water melons. This field is planted between August and October, depending on rainfall, and yields December crops of maize, beans, jugo beans and jack beans. Plans for the field include the introduction of fruit trees and a swale. Thombithini's second seed multiplication field is, unlike her first, unstructured, adding primarily to her holdings of peanuts and cassava, but also bulking many other crops in a tapestry of personalised interplanting.

The wealth of Thombithini's four fields is reflected in her seed bank, which has a dedicated room in her home, and contains lablab, dwarf, kidney, mung, zebra and jack beans; lettuce (three varieties), maize, pumpkin (two varieties), sesame, cowpeas, water melon, pigeon pea (three varieties), gourd, okra and finger millet seeds. Her field crops are represented by two varieties of sweet sorghum, red and white sorghum, and pearl millet. Thombithini plans to build a separate storage and display room for her seed bank later in 2018.

Thombithini is talkative, larger-than-life – and her opinions and reflections on farming are many and varied. Her life as a farmer has been anchored by the satisfactions of following a method, of mastering it, being acknowledged for it and sharing it with others. This trajectory has bestowed a confident, proud identity as a farmer and activist with a great generosity-of-spirit. She has helped Zimele to register as a co-operative, establish a contract with a local supermarket, acquired a pack house, and work closely with local government. She has travelled to provincial government's public hearings and to Parliament to advocate for seed sovereignty and farmers' rights. Farming has touched her personal life too – "Agroecology enables me to feed healthy food to my family, and my four children and four grandchildren all love traditional food, and know the names of all of my seeds, and how to make compost." Thombithini's daughter, witnessing her mother's accomplishments, is studying agriculture in Durban. And while farming "close to nature" underpins a life of effervescence and zeal, it is what Thombithini speaks of more quietly that stays with us – "Farming helps me ... every morning I go and look at my fields and it makes me feel calm."

"Nurturing a living, healthy **SOIL** and conserving and managing **WATER** resources is the foundation of **AGROECOLOGY** practices."

Soil&Water

Nurturing a "living" soil is the foundation of agroecology practices. There is a direct, symbiotic relationship between soil and water; soil needs moisture as it needs air. Good soil provides healthy plants, which produce healthy food and therefore healthier people. Soil is a living system and the base for the entire food web. But industrial agriculture, which overworks the land and then adds fertilisers, herbicides and other chemicals, kills soil by destroying organic matter and soil organisms, leading to poor soil fertility and reduced water-holding capacity.

Healthy soil with high organic matter (such as manure and compost) acts like a sponge for water, enabling it to be absorbed and stored for longer periods. Soil is the best store of water and has a far greater capacity than building dams. Each 1% increase in soil organic matter can help soil hold up to 75 000 litres more water per acre. Soil organic matter is affected by the parent material of soils, plant cover, tilling methods and climate; more organic matter needs to be added to soils in hot and humid areas, and where there is increased ploughing.

Virgin soils in South Africa have low levels of soil organic matter, ranging from 0.5-4%, but with most of the country having less than 2%. Our soils are fragile and prone to crusting (preventing rain from soaking into the ground) and rapid loss in quality with poor cropping or grazing management practices. The ideal amount of organic matter possible in agricultural soils varies depending on the type of soil: around 2% in sandy soil and 4-6% in clay soils.

Dead soil, caused in part by the introduction of chemical fertilisers, becomes hard so that water runs off it when it rains, causing erosion that washes topsoil into rivers and ultimately out to sea, taking polluting chemicals, such as pesticides, herbicides and fertilisers, with it. Salinisation and toxins affect the quality of groundwater, on which 65% of South Africans are entirely dependent. Excess phosphorous and nitrogen from fertilisers lead to "eutrophication" – an over-supply of nutrients in rivers and oceans causing excessive growth in algae or phytoplankton that then uses up the oxygen, killing fish and other aquatic animals.

South Africa is the thirteenth driest country in the world, with water scarcity expected to increase with climate change. Despite this, inefficient agricultural irrigation continues to consume 60% of fresh water resources.

OUR BEST PRACTICE

We encourage smallholder farmers to consider water on their homestead and in their fields and how it can be managed. This includes storage but also how to slow it down so that it soaks into the soil and doesn't become a destructive force. Most of the farmer households we work with have no piped water at all or rely on communal water points. Some collect from streams, and in some communities, there may be a communal tap connected to a borehole. In times of drought, these taps often run dry and water has to be trucked in. Water conservation is therefore an absolute necessity.

To conserve water and provide good conditions for soil organisms, our practice is to always cover soil either with a mulch of cut grass or waste leaves/stalks or a "living mulch" of closely spaced or groundcover crops. This is a core principle of agroecology because soil health is the foundation for healthy plants and water retention. Mulching helps prevent evaporation and keeps the soil moist, keeping the soil organisms and plants alive. In our practice, household vegetable gardens are deeply mulched and rain-fed fields are covered with intercrops of spreading legumes or pumpkins. Legumes release nitrogen into the soil in a symbiotic relationship with the bacteria that live on their roots.

We support smallholder farmers to carefully plan the layout of gardens and fields to make best use of available water, utilising methods such as swales (a ditch and mound), water retention ditches and pits to slow run-off, catch and sink water. Healthy soils with high organic matter content – trimmings, grass cuttings, the residues after harvesting crops, bones, manures and ash from wood fires – absorb and hold moisture for longer periods, and the water that does flow on to rivers or groundwater is cleaner. Planting beds and basins/stations are made more porous and fertile with the addition of organic matter. Since most of the farmers have no piped water, rainwater is captured in tanks and every drop is saved by reusing grey water – the water used for bathing, washing dishes and clothes – in the household vegetable garden. Filtering the grey water through sand and adding wood ash treats it so it can be kept in containers and re-used.

These practices are essential in northern KZN, where the smallholder farmers we work with survive and thrive in the most challenging conditions in the Province, which often include poor soil and water scarcity. The farmers' ability to adapt to these conditions and risks, such as crop failure, increases their resilience to ensure food security and variety throughout the year. Resilience is helped by a diversity of components in the system, but also needs a diversity of connections between things. This is what makes the "web of life" strong: considering the many connections between the different parts, and fundamentally, soil and water, to support the overall system.

The stories that follow highlight many agroecology best practices used by farmers in relation to soil improvement, water conservation and management, and to build resilience in the face of climate change and drought.

- "***Ingadi* at road's end"** Doris Myeni, Tshaneni
- **"My plot is beautiful"** Mavis Nhleko, Pongola
- **"Gift of the *isivande*"** Rhoda Mvubu, Ingwavuma

INGADI AT ROAD'S END

Doris Myeni

Doris Myeni was born near the Mkuze River at Tshaneni in 1955. By the age of 13 she was helping her mother weed the family fields, and when she married, moved to her husband's family homestead high in the hills at Esikhalenisomthonga. To this day, the homestead lies, literally, at the end of the road; water is scarce, and the soils are rocky and shallow.

Recently widowed, Doris has spent little time in her *ingadi* (garden) of late, and Tshaneni in early summer is dry and hot. But she invites us to enter and look around. There we see scattered specimens of *umsobo* (African nightshade), valued for their sweet berries, and the pot herbs or *imifino* cooked like spinach – *uqadolo* (blackjack), *imbuya* (pigweed), *imbilikicane* (goosefoot) and *iklabeklabe* (milk thistle). Mango, orange, paw-paw and peach trees are scattered along the fence lines; along the lower boundary lemon grass holds the soil and occasional pigeon pea trees provide food and enrich the soil; and lemon bush, Bulbine and chives repel pests. The baked soil still offers sweet potatoes, chillies, spinach, onions, beetroot, pumpkin, cabbage and wild radish.

Tshaneni, with its commanding easterly views over the uMkhuze Game Reserve, the Makhathini flats to the north, and the N2 and town of Mkuze in the west (left). The last borehole is approximately three kilometres from the Myeni homestead, which lies at the turning circle (right). At the bottom of the hill, a 2 200 litre water tank is occasionally filled by the local Municipality.

Despite its windblown aridity, the household vegetable garden remains functional, the centrepiece and anchor of her homestead, a locus of endurance and identity at the end of the road.

At road's end Doris raised 10 children, becoming a capable farmer of field crops. But her efforts to grow homestead greens were disappointing. Too often, the lack of rain and difficulty of obtaining water thwarted her efforts. As the years went by, she paid increasing attention to the persistence of gardens belonging to local farmers trained by Biowatch, and when she joined the Biowatch group in 2008 she was ready for a new approach.

Already open to the idea that the trench gardens advocated by Biowatch could "store water underground and supply it to plants", Doris began immediately. "In a hurry", she measured the first deep trenches "two spades long and one spade wide" and helped by her children, dug the trenches "as deep as my hips." In her enthusiasm to begin she had dug deeper than the knee-deep trenches advocated by Biowatch. However, this misunderstanding proved a boon for which she was especially glad at the height of the drought. Down the slope the deep trench beds are followed by double-dug beds. Rocks were used to terrace the sloping terrain, and to raise the various types of fertility beds for the containment of composted soil.

Doris and her team placed bones, dry grass and tins in the trench bed bottoms, followed by layers of soil, dry grass, kraal manure, ash and water. The supply of moisture to the beds was improved by the excavation of a deep upslope water harvesting trench (swale), that catches all the run-off from the neatly swept area around the buildings. Although the work was difficult, Doris knew from her observations of the gardens of other Biowatch farmers that her efforts would be rewarded.

In a single year, she developed a 15x15m garden with fertility beds that have served her to this day, enabling rain-fed production during good years and needing twice-weekly top ups of grey water during droughts. The longevity of her trenches is secured through ongoing applications of kraal manure and compost. Compost is produced in pits using maize stalks and cobs, cowpea leaves, green grass, kraal manure, newspaper and water; and in watered bags using dry and green grass and leaves, kraal manure and ash. Compost is either worked into the top soil layer of beds as a top up, or mixed with the soil in holes dug for planting.

The Myeni homestead (left) has four rainwater tanks but no piped water, and only grey water and rainfall are available for the homestead vegetable garden. Even during the recent drought, one of the worst local farmers can remember, Doris's household garden (right) produced edible greens and vegetables for her family.

The use of rocks for terracing, containment and raising of the planting areas all add to the overall productivity of the garden, allowing for planting on level, well composted soil that is easy to water and mulch (left). An upslope water harvesting trench/ swale visible along the fence line (centre), viewed close up (right), allows water to move downslope to the trenches under the influence of gravity.

The cattle kraal (left) adjoins the household vegetable garden, allowing for efficient transfer of manure. Doris with her "chicken tractor" (right). Chickens are penned in an area of the garden where they clear pests and turn and fertilise the soil while scratching.

Doris is also a meticulous mulcher. Kraal manure from the nearby cattle enclosure is placed close to seedlings, and dry grass mulch is anchored with soil to stop it blowing away. Fig leaves are used to protect the soil when grass is not available, and a "chicken tractor" (chickens are penned in an area of the garden where they clear pests and turn and fertilise the soil while scratching) is sometimes used to add manure.

Intercropping also helps to maintain soil fertility, and to manage pests. During droughts Doris harvests more selectively for her own consumption as produce quality declines; when drought is severe her withered vegetables must be fed to goats and pigs, and are thus not entirely wasted. Without these interventions, Doris says, household production of fresh greens would not be possible.

Doris's confidence as an agroecology farmer has grown. During the recent drought, one of the worst local farmers can remember, her garden continued to produce edible greens and vegetables for her family. She only needed to buy potatoes, meat and milled maize at the shops and some extra vegetables during the holidays when the household swelled to 15 people. Over the years she has grown onions, spinach, cabbage, carrots, beetroot, tomatoes, pigeon pea, sweet potatoes, chillies, green peppers and pumpkins; and in good seasons she sells beetroot and spinach in Mkuze. Her efforts have proved instructive to others, and she has taught local farmers to make their own trenches, and motivated fellow Biowatch farmers to increase their efforts.

In concluding our interview, Doris says – "I've farmed with trenches and without them, and seen the difference; I feel proud to make the soil fertile, and to provide for my household."

MY PLOT IS **BEAUTIFUL**

Mavis Nhleko

Mavis Nhleko is unassuming and softly-spoken. But she is proud to show us her fields in Emagengeni, Pongola, confident of what she has accomplished here. Her story begins with the soil, with moisture and fertility. The homestead cattle kraal presides over her fields, along with a water retention trench/swale. Everywhere we look, cup-shaped planting basins catch water, and are interplanted with soil-sheltering cover crops. Dry kraal manure is scattered over the field, or placed deliberately into planting basin hollows. This combination of labour and attention to detail maintains long-term soil fertility on Mavis's food plot, on which she has farmed using agroecology methods since 2012, "... developing an interest in this kind of farming and learning to love what I could do for my family."

Care of the soil is a continuous theme in Mavis's methods. Her household vegetable garden, which we visit next, is close to her goat kraal, goat manure being highly valued as a soil enricher. Composting and mulching feature strongly.



The proximity of cattle or goat enclosures to fields or homestead gardens is an important agroecology design element. Mavis's cattle kraal (left) looks over her field (centre). Directly below the kraal, on the field's upslope border, is a water retention trench/swale (right). Stored along the trench/swale edge are dry grass and last season's maize stalks, to be used as mulch.



Farming begins and ends with the soil. Mavis's fields are a honeycomb of angled hollows, or planting basins (left), which catch and concentrate rainfall. In early December, each basin contains a pellet of manure and is interplanted with maize and cowpea (centre), a valued food plant and nitrogen-fixing soil cover crop. Dry kraal manure has been scattered onto the soil (right).

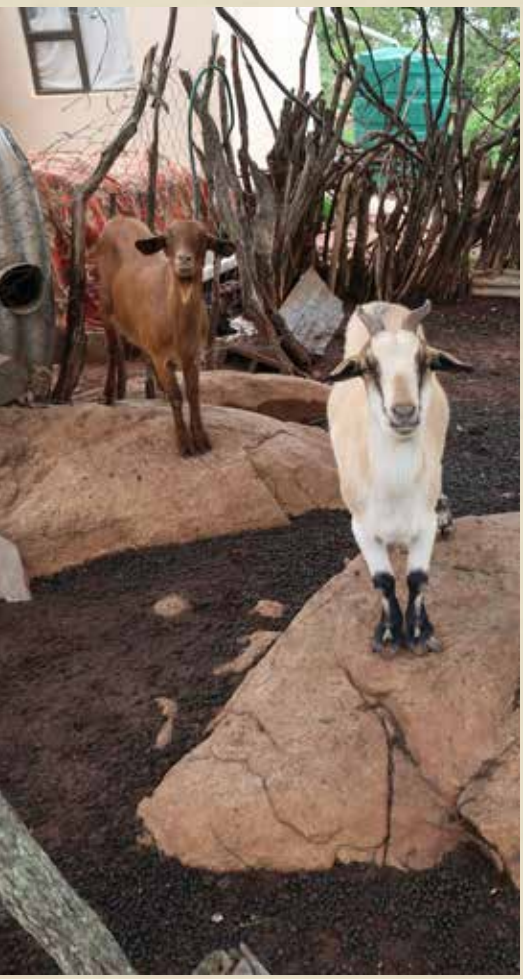
The garden's fertility is further enhanced by its swale and its fertility beds, filled with layers of cartons, bones, tins and dry grass, overlaid with goat manure-enriched soil. Household vegetable gardens are generally at their most productive between June and October, and when we visit in December the garden is past its prime. But it is nonetheless a picture of abundance, filled with citrus, mangoes, bananas and paw-paws, *imifino* (pot herbs), cabbage, spinach, chillies, green peppers, onions, chives and grapes in an overhanging, fruit-laden marula tree. The garden also contains a single macadamia nut seedling, reminding us of attributes common to Biowatch farmers – their curiosity, attraction to diversity and willingness to experiment, all of which are encouraged by agroecology.

Lastly, we make our way to Mavis's seed bulking field, which clearly is special to her – "I am the only person who cares for this field, and I do not eat what is produced here. This field is for multiplying seeds so that they are ready for planting next season, and so that I don't have to buy them." This sentiment is expressed by many Biowatch farmers, who are proud of their autonomy as custodians of their own seeds.

Here, in a plot which Mavis considers "beautiful", and which for her exemplifies her agroecology practice, mung bean and dwarf beans are flowering, part of a tapestry of intercropped lines. The intertwining profusion of greenery slowly



Mavis's meticulous approach is further revealed in the sweet potato bed in the food field's bottom corner (left). Sweet potatoes, a staple food for farmers, are inserted as runners into raised earth mounds in November and December. Mavis has covered the mounds with grass to protect the soil, facing the grass roots upwards to prevent them from taking root.



The goat kraal (left) provides "Number One" soil fertiliser and shares a fenceline with the vegetable garden. Compost is made in a series of pits adjoining the vegetable garden (centre) which contain grass, bagged leaves, maize stalks and kraal manure and are covered with plastic or corrugated iron to keep them shaded. Inside the garden maize stalks are stacked for mulching (right) and a large bale of dry grass mulch can be seen in the background.

While much of its produce for the season had been harvested, Mavis's vegetable garden (left) still provides food for the Nhleko household. Toward the bottom of the slope in the food field (centre), more recent plantings reveal clear consecutive lines of dwarf beans, small specimens of sesame, beans, cowpeas and maize, flanked by a water retention trench (swale) along which pumpkins and trailing water melons grow (right).

reveals itself as a methodical arrangement of lines – maize; cowpeas; dwarf beans, kidney beans and mung beans; sesame; pumpkins; and water melons. The field's combination of mulch (plant and animal), cover crops, nitrogen-fixing plants, composting, swales and inter-cropping produce an impressive bulking or multiplying effect. According to Mavis, her efforts are "because I like farming, I produce my own food and store my own seeds and have learned to love what I can do for my family."

Mavis has been farming at her homestead at Emagengeni since 1987, and became a Biowatch farmer in 2012. As her confidence as an agroecology farmer and provider for her family has grown, so too has her desire to share her knowledge and enthusiasm, an outlook typical of many agroecologists – "I get good yields, I'm eating healthy food with my family, I record what I plant and have shared my knowledge with my neighbours, others around Emagengeni and outside the village."

Leaving the fields, we pass an ancient marula tree, heavy with fruit, but also bearing grapes from the vine planted beneath it – the two fruits hanging side-by-side above the goat kraal and swale. This image remains with us – the constant interweaving of elements, the patient care of water and soil. And how, from this humble wisdom, autonomy and quiet passion are born. For Mavis Nhleko, this unassuming ecology *is* wholeheartedness in the face of a difficult life, richly lived.

GIFT OF THE ISIVANDE

Rhoda Mvubu

Rhoda Mvubu is a 73-year-old farmer from Manhlali, near Ingwavuma. Her mother, she recalls, "was a farmer who always had food", and taught her about "jugo beans, peanuts, sweet potatoes and cowpeas." Rhoda's father tended the trees at the Mosvold hospital, and planted avocado, mango and bananas on behalf of his church. Recalling her childhood homestead, Rhoda remembers mulberries, apples, oranges and loquat trees given to the family by a friend from Pongola.

Rhoda and her siblings learned early how to farm, and on losing her husband when she was 48, she decided "to find my own way of living by using the soil." She joined Biowatch trainings and began working with her aunt, Minah Mkhonto, selling enough maize to finance a house for her and her children. Rhoda's farming practices confer food security, sustainability, independence and resilience, as illustrated by the devastating drought which struck South Africa in 2015 and 2016 . This period is reviewed here in the context of her practice as an agroecology farmer.



The rich selection of fruit trees at Rhoda's home include mulberry (left), loquat (centre) and wild medlar (right). The fruits of the wild medlar are boiled, and mixed with uphuthu to form a porridge known as umbhantshi.


Rhoda's household garden (left) where vegetables are planted in mulched, raised beds. In the banana plot, next to the vegetable garden, Rhoda grows amadumbe (right).

Arriving at Rhoda's homestead, her long association with trees is immediately apparent in the orchard-like surroundings. Her house sits in an orchard of avocado, mango, guava, granadilla, marula, peach, mulberry, paw-paw, banana, apple, loquat and wild medlar trees – all planted by Rhoda; a legacy of both her father's influence, and her own desire to have fruit trees for her children "so that they will have food when I am no longer here."

Across the road from Rhoda's house, her household vegetable garden contains red ivory, mango, peach, paw-paw and banana trees; and onions, peas, tomatoes, beans, wild radish, lettuce, pumpkins, peppers, cabbage, potatoes, Amaranthus, beetroot, spinach, cowpeas, sugar cane, maize, sweet potatoes and carrots, planted in mulched, raised beds. Adjoining the vegetable garden and hugging the edge of a small wetland is Rhoda's banana plot. Abutting the wetland as it does, the area is a prime agricultural asset.

Rhoda is also a member of the Msebe community garden where she shares fields with 25 other farmers from the group. Among other species, Rhoda grows beans, *amatabhane* (Zulu potatoes) and tomatoes here.

NOTE: Between January and December 2015, according to the South African Weather Service, South Africa received the lowest rainfall since records began in 1904. Five provinces were declared drought disaster areas. The drought, ascribed to climate change and a powerful El Niño effect, also brought record high temperatures, and in the Free State, KwaZulu-Natal and the North West, summer crops, especially maize, could not be planted, or were damaged by drought and heat. Late summer rains did little to improve this situation, and in January 2016, the uMkhanyakude District Municipality, in which many Biowatch farmers live, was declared an emergency disaster area.

In May 2015, Rhoda's homestead maize field was fallow (left), but contained the remains of the previous season's harvest. Cut maize stalks (right) were dragged into piles and ploughed back into the soil in preparation for the following season.

By January 2016, the shading effect of intercropped sweet potatoes and pumpkins was clear (left) and sorghum ratoons (centre) were sprouting from the stubbles or roots of plants grazed by drought-hungry cattle the previous month. Rhoda's method of planting maize: four maize seeds at a depth of 5–10cm in a shallow, composted depression of 30cm x 30cm (right).

Rhoda's long-lived immersion in agrarian life, and her adoption of agroecology came sharply into focus during the devastating drought of 2015; and while resilience was conferred by her overall agrodiversity and agroecology practice, the management of her maize field was of particular interest, and caused us to visit on two separate occasions. While this area was referred to loosely as the maize field, and was fallow at the time of our first visit in May 2015, close inspection revealed the area to be richly intercropped.

After visiting this field in May 2015 the area in which Rhoda lives was declared an emergency disaster area in January 2016. Despite some relief from rain at the end of February, high temperatures, hot winds and livestock invasions had caused Biowatch's Ingwavuma farmers to suffer significant crop losses. Our second visit was prompted when a green field was observed at Rhoda's homestead in February 2016 at a time when no neighbouring farmers had produced crops. Curious, in late April 2016 we returned to the field, in the hope that something instructive would be revealed.

We established that Rhoda had begun preparing the field in September 2015, three months after our previous visit. This practice is common among Biowatch farmers as they ready themselves to plant their summer rain-fed crops of maize, beans, pumpkins, gourds, jugo beans, groundnuts and sweet sorghum. Some farmers begin planting early in small fields close to their households (called *isivande* or *isife)* in an attempt to benefit from possible early rains. Rhoda had begun while the soil was still dry, turning it with a hand hoe and slashing weeds, a practice she undertakes



The diverse aspects of Rhoda's farming are illustrated here by her bean varieties (left). Some stored and fresh produce, including chillies, paw-paw, bananas, guavas, wild medlar, granadilla, avocados and a monkey-orange fruit, peanuts, beans and jugo beans (centre). Igusha, a wild-harvested imifino species, being prepared for the evening meal (right).

annually at this time. With her land prepared, she planted maize and beans loosely intercropped with cowpeas, water melons, pumpkins, peanuts, sorghum, jugo beans, mung beans and sesame.

The first summer rains fell in October, but because Rhoda's field was only partially fenced, it was invaded by cattle in search of grazing, and her crop losses were considerable. However, Rhoda did not abandon the field, and continued to weed, and replanted with an intercrop of beans, sweet potatoes, pumpkins and cowpeas to shield the soil. In this context, it is worth noting that weeds pulled from the field are left on the ground where they conceivably serve as a green mulch, protecting the soil from the abnormally hot temperatures.

In January 2016, and over the following months, Rhoda observed the emergence of sorghum ratoons, sprouting from the stubbles or roots of plants grazed by cattle the previous month. By the end of January she had harvested 10 litres of beans and salvaged small, but significant quantities of ratoon sorghum, mung beans, cowpeas, beans, pumpkins, sesame and peanuts. Inspecting the field in April, these crops were still in evidence, as were the remains of ratoon sweet sorghum, and maize uneaten by the cattle. Rhoda's method of planting maize in planting basins was noted, and may have accounted, in part, for the survival of her first crop.

During discussion following the field inspection it was noted that Rhoda was well placed to harvest sweet potatoes, cowpeas and pumpkins going into winter, and had been able to obtain a harvest during the drought because of her early planting, and meticulous, persistent inter-cropping with these cover crops, which help to reduce soil temperatures and conserve soil moisture. Peanuts and sesame persisted in the field, seemingly having been ungrazed by the cattle. Always having farmed in the same area, and with seed stock acquired from her mother, it is possible that Rhoda's crop varieties are locally adapted and drought resistant to some degree.

Seed banking is fundamental to agroecology, and Rhoda's seed bank occupies half of her kitchen, containing maize, three varieties of sorghum, mung beans, sesame, cowpeas, water melon, pumpkin and peanuts. As a seed banker,



Rhoda in her kitchen holding a pumpkin and a water melon from her fields (left). The kitchen doubles as a storage area in which various seeds are stored in plastic bags or buckets, and maize is stacked against the wall (centre). Rhoda's three sorghum varieties (right).

Rhoda promotes the continuity and availability of the traditional varieties in her possession, and shares her seeds with fellow farmers, contributing to on-farm, in situ conservation of agricultural biodiversity.

At the age of 73, Rhoda Mvubu is a vital and positive farmer who, with no formal education, has survived the loss of her husband and supported five children into adulthood. With the assistance of family members, she remains self-sufficient, boasting a rich, enduring engagement with her chosen occupation. And it is perhaps this – both the difficulties and the richness of her life as a farmer – that explains Rhoda's refusal to be discouraged, and to persist in her efforts in the face of adversity. She says – "I'm proud to be a farmer because nobody forced me to do it, it comes from my heart."

Corinne Mngomezulu, Ingwavuma, with her seed bank which is held in clay pots, glass jars and other available containers.
Her traditional seed varieties were given to her by her mother, and she looks forward to passing them down to her children, keeping the farming culture strong in her family.

"**SEED** is a cornerstone of food security and **AGROECOLOGY** best practice; farmer-saved seed is diverse and constantly adapts to local conditions."

Seed

Seed has been part of humanity's culture for more than 10 000 years, starting with the domestication of wild plants for food and nurtured by countless farmers through the ages in a careful process of observation, seed selection and saving. Without seed, one can't grow food, which means that whoever controls the seed, controls the food system. In the past 100 years, corporations have largely captured the seed and food system, and industrial agriculture has reduced these age-old practices. Commercial seeds are pushed on to governments by corporations, with no consideration for the users of seed and the impacts commercial seed has on traditional culture, knowledge and food systems. Commercial seed also comes with caveats such as plant breeders' rights or GMOs where the crop also belongs to the company, discouraging or even penalising seed saving practices.

Chemical corporations have been steadily buying out seed companies and merging, resulting in just four big companies owning the commercial seed sector in South Africa. This affects every farmer's ability to survive and farm as corporations move to displace farmer-saved seed. The commercial seed they promote instead is bred to grow with industrial inputs (such as fertilisers), and has "distinct, uniform and stable" properties. These suit processing, storage and transportation within the industrial system, such as shape and size suited to processing through machinery, durability in storage and transport, tough in handling, a long shelf life, and so on. This has narrowed seed diversity to only a few crops and varieties.

In contrast, farmer-saved seed is diverse and constantly adapts to local conditions and a range of social, cultural, economic and production needs. Their traits are diverse and could include: taste and appearance when cooked; ease of cooking; ability to satisfy more than one purpose, such as food and fodder; hardiness in drought; adaptability to particular soils; resistance to pests and disease in the field and in storage; ceremonial and spiritual use; and so on.

When compared to commercial seed, farmer varieties may not yield as well when inputs are provided, but they can be relied on for stable yields when conditions are poor, particularly during times of drought. The diversity in the seeds' genetic material is what provides resilience in varying farming conditions and is much needed for future unpredictable challenges and climate change.

OUR BEST PRACTICE

Seed is a fundamental part of our work with smallholder farmers, which seeks to revive diverse traditional crops and varieties. We take a multi-faceted approach, working at the community level to promote networking and exchange between projects and with farmers supported by other non-government organisations (NGOs), as well as at the individual level, supporting smallholder farmers to network with others within and outside their community. This facilitates the exchange of seeds from trusted sources as well as shared learning and exchange of traditional knowledge and solutions to challenges. It also helps the community to identify seed custodians – elders who save many varieties of seeds and have in-depth knowledge of local seed knowledge and practices. In addition, we have introduced an annual seed survey as a way to measure what seed farmers have, and in particular, what traditional varieties are being used. We then work with farmers on how best to store seed to ensure it is viable come planting season. These activities, among others, help to promote farmer-led seed systems, as we believe seed must stay firmly in the hands of farmers.

More practically, we promote household seed banks, where seed is selected from the field and stored at the homestead, to help ensure food security; if you have seed, you can grow food. These in turn create a community seed network or "virtual" community seed bank which means that if a neighbour or a member of the community loses their seed for whatever reason, there is support at a community level. Bulking seed is another, more recent, practice we have been engaging in. Seed bulking aims to ensure there is enough seed for the next season for planting, food, and sharing with others. The need for seed bulking came to the fore because of the extended drought, where the farmers we work with had to replant several times and lost some varieties when the rains didn't come, or they didn't have enough seed to spare to plant sufficient food. Dedicated seed plots were introduced, which are given extra care and nourishment to ensure good seed harvests and seed quality.

Agroecology is grounded in traditional knowledge and practice, but also takes a holistic view, so the revival of rituals and festivals is a key part of our work on seed. This includes blessing the harvest and the seed before planting – although this is now reinterpreted as a Christian ritual in many communities. These are sacred events to celebrate the diversity of seed held by the community, and they encourage others to save seed and practice agroecology.

The range of practices we promote in relation to seed means that there is diversity in the community as seed is conserved and constantly adapted. The stories of the seed are passed on with the seed between farmers. And together, the farmers, their knowledge and ongoing innovation, the community and environment, seed exchange networks, and community culture, spirituality and rituals form a living seed system that ensures food and seed sovereignty into the future.

The farmer stories that follow bring to life Biowatch's seed work with farmers, focusing on three examples of agroecology best practice: seed plots, household seed banks and seed rituals.

- "**Proud to have 'gone back'"** Winnie Mngomezulu, Ingwavuma
- "**This field is important to me"** Corinne Mngomezulu, Ingwavuma
- "**Seed means life"** Ntombizethu Nokuthula Ntuli, KwaHhohho

PROUD TO HAVE **"GONE BACK"**

Winnie Mngomezulu

Winnie Mngomezulu is a lively, bright-eyed Ingwavuma resident in her late 60s who farms near the Swaziland border. The centrepiece of her isolated homestead is a small seed banking room which, when one enters, feels like a shrine – its door "looks to the East, and the wind blows in."

The meticulous presentation, and the care taken in its layout, are deeply affecting. For Winnie, this humble room, which she refers to as "Eden", is symbolic of a treasured cultural context in which food is produced, enjoyed and understood. Eden is also the symbol of a lifetime's journey in which Winnie's seeds were lost, and found.

Winnie's story begins with a memory of her parents "who kept their own seeds" and encouraged her to do so. But she also remembers the "shame" these seeds carried, because "traditional foods were associated with poverty." On leaving school Winnie studied at the Owen Sitole College of Agriculture and spent her working life as an extension officer for the Provincial Department of

Winnie's seed bank is housed in a small stone-walled hut with a conical corrugated iron roof (left). Its contents are reverently presented and meticulously laid out. "I'm happy in my seed room," says Winnie. "When I'm sad or cross I go there."

Agriculture. Both experiences undermined her skill as a farmer, and specifically devalued the seeds she knew as a child. Speaking about these seeds, she says, sadly – "I lost them."

But in 2006 Winnie joined Biowatch trainings and the Lindizwe group of farmers. She joined because "Biowatch reminded me where I came from", and because "traditional food is associated with so many happy memories and stories of my family; stories that I wish to pass on to my children and grandchildren."

Disregarding the policies of her employer, Winnie returned swiftly to her roots, farming traditional crops and banking their seeds. Her seed bank sits alongside a traditional *inqolobane* (granary), both vital expressions of a reclaimed identity. The seed bank contains the seeds of 16 species, a number of which are represented by two or more varieties, while some are held in greater numbers in larger containers.

The seeds are the basis of a passionate identity, independence and adoption of skilful behaviours. Winnie is secure in her knowledge of how to plant, harvest and store her seeds, and speaks proudly of their effect on her family's health – "I'm very happy, I've returned to eating what my parents fed me as a child, and my family is healthier."

The seeds also represent a liberating alternative to agro-chemicals and GMOs – "GMOs must be purchased each year, but these seeds will stay in my family for generations." Seeds also serve as a medium of generosity and social cohesion; they are shared freely within the Lindizwe group so that all members have enough to plant their fields, anchoring food security in a culture of reciprocity and stabilising cultural norms.

In 2011 Winnie retired from the Department of Agriculture and is now a full-time farmer, known in her community as "The Traditional Mother", an accolade in which she takes obvious pleasure.

Winnie credits Biowatch with restoring the tradition of seed saving that she learned from her parents as a child – "Biowatch revived this tradition. I've lost so many seeds, but Biowatch showed me a way to keep them. Thank you!"


The inqolobane (granary) is used to store field crops, sorghum and maize prior to the removal of seeds (left). Calabashes and other gourds are stored beneath the inqolobane (right).


Extra stores of maize (left) for planting and sharing. Seeds in Winnie's seed bank are stored in glass bottles and labelled with her name, the project group to which she belongs, the area in which she farms, and the name of the plant (right).



Seeds are protected from weevils and other pests with a mixture of ash (left) and the ground leaves of aromatic plants (centre). This mixture of ash and leaves can be seen in the bottle of cowpeas (right).

Nomusa Ngwenya, Pongola, sits surrounded by her abundant seed bank. *Her large selection of seeds is stored for protection against pests in glass jars and in clay pots sealed with cow dung.*

THIS FIELD IS **IMPORTANT** TO ME

Corinne Mngomezulu

Corinne Mngomezulu is an Ingwavuma farmer, and we have come to visit one of her fields. Before she opens the gate and invites us to enter, the purpose of the field is made clear: It is simple. The field is used specifically, exclusively for seed multiplication. As we pass through the gate, we enter an intensely-felt space, scribbling furiously in our notebooks in response to the weight of her words: "These seeds are very precious to me. I need this field to save them so that they don't get lost. I inherited these seeds from older generations and I want people to see them and use them – they are for my grandchildren, for coming generations and for other farmers."

On its upslope edge and fenceline a swale has been dug to stop, sink and spread rainfall, releasing it to gravitate downslope. Similarly, a mid-slope trench was recently added. Lines of pigeon peas serve as windbreaks, separating different areas for maize which is grown in sunken, composted planting basins. Elsewhere, we are able to view the long-term underpinnings of the field's fertility. Corinne is busy preparing future planting stations by digging compost pits.

The entrance to Corinne's seed bulking field (left). An upslope water harvesting trench/swale has been dug along the fence line (right) to stop, sink and spread rainfall, releasing it to gravitate downslope.

These are dug well into the second soil horizon. Maize and pearl millet stalks are placed in the pit bottoms and then overlain with layers of kraal manure, soil and compost, before being capped with a protective layer of maize and pearl millet mulch. These large, deeply dug planting stations are an innovation that Corinne has devised following the success she has had with the shallower 30cm x 30cm planting basins introduced to the farmers by Biowatch.

These labours cannot be understood as solely pragmatic, and are illuminated by Corinne's words – "When planting I speak to the soil." Her efforts appear to emerge out of heartfelt dialogue – "I love my seeds and my crops. I am proud of them, and this is why I speak with them."

While the management of the field is geared to maximise production through soil moisture and fertility enhancement, the field's significance is also evident in its diversity. Not only does it contain a small planting of cassava, but boasts four varieties of sweet potatoes and six different named varieties of maize, all of which can be viewed in labelled containers in Corinne's seed bank. More evidence of the field's output is revealed in Corinne's seed bank, the meticulous presentation of which mirrors the care and attention to detail so evident in the field.

In addition to serving as a "precious place" for Corinne, the seed bank is also a point of distribution for sharing seeds with fellow Lindizwe group members, neighbours, and farmers from further afield whom she has identified as worthy recipients.

Corinne still lives in the homestead where she was born. After working as a nursing assistant at Ingwavuma's Mosvold Hospital for 30 years, she began expanding her seed bulking activities after joining a Biowatch-supported farming group in 2008 and learning about field preparation, interplanting and seed saving. Her household vegetable garden, too, is a model of agroecology practice.

At age 63, Corinne's sense of purpose is palpable, and visionary. Her work with seeds has invigorated her identity as a farmer, causing her to expand her efforts and aspirations. Her life as a farmer is rich in meaning, and she reflects on this gift – "I grew up working in the fields. This has given me a happiness and made me strong to this day."



Composted planting basins (left) contain ungerminated maize, while young plants can be seen on the other side of the pigeon pea windbreak. The soil around the planting basins is mulched with the previous season's maize stalks (centre). A newly-germinated cowpea (right) with small pellets of kraal manure at its base, intercropped with maize.


The long-term production potential of the seed multiplication field is enhanced through intense soil fertility management measures. Near the larger planting stations that Corinne has innovated (left) are compost pits (right)


Corinne's seed bank (left) houses 18 species of traditional crops, a number of them represented by different varieties and/or held in large volumes in separate containers. Corinne leading the dance at a seed celebration (right).

Thokozile Mkhwanazi, KwaHhohho, sits with her son Mbuso, proudly displaying part of their seed bank. *Thokozile helped to establish the Zimele Rural Women's Empowerment Organisation, a Biowatch-supported group of agroecology farmers who assist other smallholder farmers in their area.*

SEED MEANS **LIFE**

Ntombizethu Ntuli

Ntombizethu Ntuli was working in her vegetable garden when we arrived. Hearing that we will take photos in the golden afternoon light she hastens to change into a clean pinafore. Other Zimele project members who have come from the communal market garden to greet us, joke that we mustn't photograph them in their garden clothes and faces coated in the red mud that protects them from long hours in the sun.

Born in 1963, Ntombizethu started farming as a girl at her nearby family home with its fields full of sorghum. She came to live and farm at her present home in KwaHhohho near Mtubatuba when she married. At first, she bought seeds to plant, but upon joining the Zimele project group in 2006 she saw the importance of saving her own seed. Now her three children help her with planting; and she saves the seed of traditional crops. When invited to view her seed bank, which is laid out on the living room floor of her home for us, we find the seeds of 18 crops including maize, sorghum, finger and pearl millet grains; calabash, water melon and various pumpkins;

Ntombizethu tends to her household vegetable garden, where she has been preparing beds for the next planting.

sesame and several legumes including peanuts and jugo beans. Although she still buys seedlings for some vegetables, she saves the seed of spinach, chilli, onions and fennel and has four types of sweet potatoes. Ntombizethu explains that she received sorghum and pumpkin seeds from her family, but the seeds for other traditional crops were gifted by the Zimele group members and elders in the area. The seed has become central to her farming – "I eat and get life from the seeds. Having seeds reminds me where I come from." Later in our conversation, she notes that she would like more traditional seed, but not the other seeds like GMOs with "mixed genes".

Projects in all the areas that Biowatch works have revived seed blessing rituals as part of the re-valuing of the traditional seed they breed and save. While many of the projects Christianised these rituals, Ntombizethu explains that the Zimele group is trying to conduct the rituals in the old way because "we are saying 'back to our roots'." She describes how in the old ways the blessing would be held at a field that belonged to the iNkosi. This field would be one of the *emasimini* (far fields). The elders would scatter the blessed seeds in this field, where they would be left to grow unharvested, to be eaten by the birds. Nowadays, farmers prefer to cultivate their *amasimu* (near fields) rather than the *emasimini* as they no longer have oxen and ploughing is difficult – "We want to do the blessing the traditional way even if there is no longer such a field."

This ritual has great significance for Ntombizethu – "It gives me an opportunity to bless the seed, but also to invite other people from the area to see the seed and how to bless it. We show other farmers how important traditional seed is." The ceremony is also an opportunity to invite local Izinduna (headmen), Ward Councillors, pastors, and representatives from government departments – "Some come, some don't. Some show interest and promise support." Although there is a sense of disappointment with government in Ntombizethu's remarks, she also reflects that this approach has gained a water tank, pump, pack house, some trees, and fencing for the Zimele community garden.

Ntombizethu has the honoured responsibility of brewing the *umqombothi* (traditional sorghum beer) used in the ritual – "There is no celebration without beer." A virgin, prepubescent girl carries the beer in an *ukhamba* (clay pot) on her head. At the entrance to the tent erected for the celebration, she spills the beer for the ancestors. All the girls who have not yet reached puberty jump over the line of spilled beer after which the elder women "who have no husbands" take seed and scatter it, saying, "We are going to plant now." The rest of the women stand to one side and enact the process of planting. Although Ntombizethu has not yet reached 60, she participates in the scattering of seeds and leads the songs and dances which are an important part of this ritual. In one of these, the women sing – "Plant *amadumbe*, bride; put down the hoe," meaning it is the time for planting when the ceremony is finished!

Ntombizethu has proudly laid out her household seed bank, and she explains the diversity of seed she saves (left). She takes beautiful lablab beans out of their pods to show us (right). Legumes store better when kept in the pods.

Ntombizethu hand waters her vegetable garden using grey water made safer by this filter. The water drips through a bed of organic matter (which filters the fats), and then layers of sand and charcoal. The clogged organics are added to the compost heap when changed. Wood ash is added to the water that collects in the bottom basin (left). A deep trench bed abundantly planted with three varieties of sweet potatoes (centre). Ntombizethu picks spinach to sell to a neighbour (right).

Biowatch agroecology farmers organised a protest march in rural Ingwavuma, in support of the annual international March Against Monsanto. *"Phansi ngo manyolo" ("Down with fertilisers"), a rallying cry, calling smallholder farmers to unite and speak out against industrial agriculture and the disregard for farmers' rights and the right to healthy, nutritious food and traditional seed.*

"**AGROECOLOGY** has social and political components; it is not just about individual farms and household vegetable gardens, but also policy frameworks, resources and **FARMERS' RIGHTS**."

Advocacy

Agroecology also has social and political components; it is not just about individual farms/homesteads but the management of and access to resources such as land, water and seed; support for farmers; and the policy frameworks that govern these. These should sit within the context of farmers' rights, which seek to protect traditional knowledge from loss and erosion; maintain crop genetic diversity; enable participation in decision-making related to resources; and preserve farmers' self-determination regarding seed saving, use, exchange and sale.

In South Africa, despite the government's commitment to reducing poverty and improving food security, farmers' rights – widely acknowledged for their positive contribution to these issues – have yet to be given formal recognition.

This has resulted in a situation where government programmes often support the agenda of multinational companies. An example of this "on the ground" was the introduction of GM cotton to smallholder farmers in the Makhathini Flats in the late 1990s, accompanied with substantial public-private support that included irrigation, a cotton ginnery and loans. Monsanto gained long-lasting publicity by capitalising on a study heralding the project's initial success to promote the benefits of GM technology for African smallholders. Selected farmers in Makhathini were paraded as evidence to numerous scientists and decision-makers flown in from around the world. However, within a few years falling cotton prices, erratic weather, an increase in secondary pests, and the withdrawal of financial support lead to farmers giving up on GM cotton, leaving them deeply in debt. The need to counter the disingenuous marketing from biotech corporations and find a sustainable alternative for smallholders in the area was the origin of our work with smallholder farmers.

Biowatch's advocacy against GMOs and their impacts, led us to request information from the National Department of Agriculture about the environmental releases of GM crops in South Africa. After repeated requests, Biowatch sought to have the public right to access this information enforced in court. While the judge ruled in our favour, this led to a lengthy legal battle that cost us greatly. The state was ordered to provide the public with information on GM permits, but a cost order was awarded against us. Monsanto, which had sided with the state, insisted on legal costs from us, with the knowledge that this would have a devastating effect on our work and sustainability as an organisation.

It took nine years before our appeals succeeded and the Constitutional Court reversed the costs order in the landmark "Biowatch Judgement" in 2009. This set a precedent: organisations acting in the public interest can now litigate for their rights without fear of the chilling effect of cost orders against them. A further implication for the legal profession is that constitutional rights need to be taken into account when cost orders are made.

OUR BEST PRACTICE

Our advocacy work takes place at multiple levels, from local to global. This includes: supporting smallholder farmers "on the ground", which becomes evidence of the benefits of agroecology; engaging in national advocacy, such as challenging the South African policy framework (as in the Biowatch case mentioned above); supporting global initiatives with local action; and networking at regional level through the Seed and Knowledge Initiative (SKI). As an organisation, we engage at an international level with key stakeholders; make submissions on national and provincial policy and legislation; and produce in-depth, well-researched materials and policy briefs.

Another important aspect is supporting the farmers we work with in their own advocacy. This has included influencing others' practice by "spreading" agroecology approaches through knowledge sharing and learning activities; presentations at public hearings and in Parliament on changes to laws governing seed; sharing their experience at regional and national networking events; and public events in solidarity with the international March Against Monsanto.

The collection of farmers' voices that follow evidence a clarity of purpose and commitment in speaking up and out on issues that affect them and their farmers' rights.

"We do not want to eat or grow GMOs. The Department of Agriculture must stop distributing GM seeds through the farmer co-operatives. The Department is just acting like a warehouse for multinational companies like Monsanto and Pannar."

Petros Makhanya, KwaNgwanase

"Seed is important because if you have enough seed you are food secure – food comes from seed, and if you don't have seed you won't have food. I have seed, so it is always available to plant. Seed is important because it identifies who you are. I am Zulu; I am also a seed because I came from seed."

Khayesakhe Mkhwanazi, KwaHhohho

"As agroecology farmers we are independent and grow nutritious food for our families. But now the government is changing the laws on seed. We are worried that these new laws will take away our right as farmers to freely save, exchange, and sell seed and produce. Farmers have always saved and exchanged seed; and this is what makes our seed diverse and strong."

Thombithini Ndwandwe, KwaHhohho

"The Department of Agriculture must come closer to hear what we need: we need land so we can multiply our seeds, we need water tanks, and we need fencing to protect our fields from livestock. We want other farmers to learn about agroecology, so they can use what they have to produce healthy food without harming the environment."

Richard Mthembu, Ingwavuma

"Government is busy spreading commercial farmers that only plant one crop. When are you going to support us, because we want our seeds to be saved and available because they are our children's heritage."

Tholakele Mfekayi, KwaHhohho

"Seeds are important, and we are saving them as we want our future generation to know about our cultural background. We want these seeds documented [by government] to remind our children what seed was there when they have forgotten."

Rachel Nyawo, Ingwavuma

"GMOs are very bad because you can't see them with your eyes; you can't see the maize where the genes have been changed. GMOs are dangerous to the health of people, they damage the soil and the environment."

Nompilo Mkhabela, Ingwavuma

"We can save our seed to plant in the next season. This is important because they cost us nothing and are original seeds that we have inherited through generations. Each of us has a household seed bank, so we are always ready to plant as soon as the rains come. We do not need to wait for or rely on anyone."

Ntombizethu Ntuli, KwaHhohho

"We farm to support our families, generate income, increase our seeds and help vulnerable people in our communities. We grow our own food to know how it was planted; we know what we are eating. As agroecology farmers we work together with nature. This way of producing is important for us as we don't rush to the shops for food and save our money."

Senzeni Siyaya, Pongola

"There was a time when we were not farming the way I grew up and I nearly lost interest in farming. I was not able to grow my own nuts – part of my indigenous foods – and I had to buy them instead. But the taste was not right. Now there are many people in KwaNgwanase interested in farming the way I do; I motivate those who are interested, and I share my seeds."

Bhelina Mahlangu, KwaNgwanase

"Agroecology is important because it helps us to connect with our ancestors. It helps us to revive seeds, and to remember the seeds we have forgotten. My family is also benefiting because we are growing healthy and nutritious food."

Eunice Mthembu, Tshaneni

"I am an 'agroecology spreader' because it's important to help people to use their own hands to produce their own healthy food. With agroecology, our families have food in winter and summer."

Thokozile Mvubu, Ingwavuma

PLANT LIST

The following is a list of plants mentioned in this book, with their commonly used English and isiZulu names, as well as their botanical names. The commonly used English names are those that are commonly used in KwaZulu-Natal (KZN), South Africa, whilst the isiZulu names are those that are commonly used by the farmers we work with in northern KZN.

There are always challenges with using commonly used names – they are meaningful at a local level, but often vary from area to area. What is "monkey apple" to one person might be "monkey orange" to another! There may also be two (or more) isiZulu names for the same plant – this relates to the richness and diversity of the Zulu language which is linked to the richness and diversity of the landscape in northern KZN.

Other scenarios include an isiZulu name being in common use by English mother tongue speakers, for example "*iboza"* is often used by English language speakers in KZN instead of the English "ginger bush". And sometimes an English name such as "apple" is adapted into isiZulu and is anglicised and is known as "*ihhabhula*" or "*i-apula*".

Botanical or scientific names are internationally recognised, but are often not in general use. Plants such as the banana which has been domesticated for centuries, have a complex classificatory system. So, we have erred on the side of caution with these names, using *Musa* spp. for banana – indicating there are several species of *Musa*. However with plants which are indigenous to our region we are able to give reliable botanical names with genus and species, for example *Tetradenia riparia* for *iboza*.

We hope this explanatory note is helpful to you the reader!

ENGLISH name	BOTANICAL name	isiZULU names
African nightshade / umsobo	*Solanum retroflexum*	*umsobo*
apple	*Malus domestica*	*ihhabhula / i-apula*
avocado	*Persea americana*	*ukwatapeya / ukotapeya*
banana	*Musa* spp.	*ubhanana*
bean (sugar bean, kidney bean, black bean)	*Phaseolus vulgaris*	*ubhontshisi*
bean (dwarf bean)	*Phaseolus vulgaris*	*isambasamba / uchokwane*
bean (green bean)	*Phaseolus vulgaris*	*ubhontshisi / oluhlaza*
beetroot	*Beta vulgaris*	*ubhithirudi*
blackjack	*Bidens pilosa*	*uqadolo*
brinjal	*Solanum melongena*	*ubrinjolo*
Bulbine	*Bulbine* spp.	*ibhucu*
butternut	*Cucurbita moschata*	
cabbage (& red cabbage)	*Brassica oleracea*	*iklabishi*
calabash	*Lagenaria siceraria*	*amaswela*
carrot	*Daucus carota* subsp. *sativus*	*iziqadi*
cassava / yam	*Manihot esculenta*	*umdumbula*
chilli	*Capsicum annuum*	*upele-pele*
chives	*Allium schoenoprasum*	*isweli / isixohosha nyoka*
comfrey	*Symphytum officinale*	*amakhambi*
coriander	*Coriandrum sativum*	
cowpea	*Vigna unguiculata*	*imbumba*
cucumber	*Cucumis sativus*	*ukhukhumba*
curry leaf	*Murraya koenigii*	
fennel	*Foeniculum vulgare*	*imbozisa*
finger millet	*Eleusine coracana*	*uphoko*
ginger bush / iboza	*Tetradenia riparia*	*iboza*
goosefoot / fat hen / lambs quarters	*Chenopodium album*	*imbilikicane*
granadilla	*Passiflora edulis*	*ugranandila*
grape	*Vitis vinifera*	*amagelembisi / amagilebhishi*
green pepper	*Capsicum* spp.	
guava	*Psidium guajava*	*igwava*
jack bean	*Canavalia ensiformis*	*umaduma ezinqeni*
jambolan-plum / black plum	*Syzygium cumini*	
jute mallow	*Corchorus tridens*	*igusha*
jugo bean	*Vigna subterranea*	*izindlubu*
kale	*Brassica oleracea*	*ukhokhishini*
khaki bush	*Tagetes minuta*	*unukani*
lablab / dolichos beans	*Lablab purpureus*	*lablab*
lemon bush	*Lippia javanica*	*umsuzwane*
lemon grass	*Cymbopogon citratus*	*utshani obuyitiye*
lettuce (& red lettuce)	*Lactuca sativa*	*ulethisi*

ENGLISH name	BOTANICAL name	isiZULU names
loquat	*Eriobotrya japonica*	*amanumbela / umnumbela*
macadamia	*Macadamia integrifolia*	
maize	*Zea mays*	*ummbila*
mango	*Mangifera indica*	*umango / umangoza*
marula	*Sclerocarya birrea*	*amaganu*
milk thistle / sow thistle	*Sonchus oleraceus*	*iklabeklabe*
mint	*Mentha* spp.	
monkey orange / monkey apple	*Strychnos madagascariensis*	*amahlala*
mulberry	*Morus alba*	*ijinkijolo*
mung bean	*Vigna radiata*	*umngomeni*
New Zealand spinach	*Tetragonia tetragonioides*	
okra	*Abelmoschus esculentus*	*igusha lesilungu*
onion	*Allium cepa*	*uhhayanisi / u-anyanisa*
orange	*Citrus aurantium*	*iorintshi / iwolintshi*
paw-paw/papaya	*Carica papaya*	*uphopho / upopo*
pea	*Pisum sativum*	*uphizi*
peach	*Prunus persica*	*amampetshisi*
peanut	*Arachis hypogea*	*amakinati / amatongomane*
pearl millet	*Pennisetum glaucum*	*unyawothi*
pigeon pea	*Cajanus cajan*	*udhalli*
pigweed	*Amaranthus* spp.	*imbuya / ugobolo / imifino*
pineapple	*Ananas comosus*	*uphayinapha*
pumpkin	*Cucurbita maxima*	*ithanga*
sesame	*Sesamum indicum*	*udonca*
sorghum	*Sorghum bicolor*	*amabele*
spinach	*Spinacia oleracea*	*isipinashi*
sugar cane	*Saccharum officinarum*	*umoba*
sunflower	*Helianthus annuus*	*ubhekilanga / ujikanelanga*
sweet potato	*Ipomoea batatas*	*ubhatata*
sweet sorghum	*Sorghum bicolor*	*imfe*
sweet water melon	*Citrullus* spp.	*ikhabe*
syringa	*Melia azedarach*	*umsilinga*
taro potato / amadumbe	*Colocasia esculenta*	*amadumbe*
thyme	*Thymus vulgaris*	
tobacco	*Nicotiana tabacum*	*ugwayi*
tomato	*Lycopersicon esculentum*	*utamatisi*
turkey-berry	*Canthium inerme*	*umvuthwamini*
water melon	*Citrullus lanatus*	*ibhece*
wild jute /wild mallow	*Corchorus asplenifolius*	*igusha*
wild medlar	*Vangueria infausta*	*umviyo*
wild radish/hot spinach	*Raphanus raphanistrum*	*imifino ebabayo*
zebra bean	*Phaseolus lunatus*	
Zulu potato	*Solenostemon rotundifolius*	*amatabhane*

isiZULU names

The following is a list of isiZulu words and names mentioned in this book, which are commonly used by the farmers we work with in northern KwaZulu-Natal, South Africa.

isiZULU	ENGLISH
amasimu	near fields
emasimini	far fields
igusha	greens
imifino	pot herbs, cooked like spinach
ingadi	garden
iNkosi	chief
inqolobane	granary
isivande / isife / sasekhaya	small fields close to the household
izinduna	headmen
ukhamba	clay pot
umbhantshi	a porridge made with *uphuthu* and the boiled fruit of the wild medlar tree
umqombothi	traditional beer
umshayo	a room in which an open fire is made beneath the maize which is hung from the rafters above
uphuthu	maize (dry) porridge

Agroecology

FOR LIFE

"I heal the soil, I save my seed, I feed my family."

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