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AWARD
Tech Report
Series

Farmers are Doing Things in the Lower Olifants

AgriSI

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The Agricultural Support Initiative [AgriSI] to the RESILIM-O programme has been working with smallholder farmers to adapt to climate change for a period of 2 years.

Farmers have analysed the impact of climate change on their livelihoods and developed adaptation strategies to build their capacity to adapt. They have implemented a range of agroecological practices to improve their production capacity and build resilience in their system, to heat and water stress in their gardening and field cropping situations.

Here we showcase a few farmers and their adaptations, their changes in productivity, water and soil conservation and income generation.



Case study: Makibeng Moradiye

Individual garden monitoring was conducted with Makibeng Moradiye from Mametja. Makibeng has been in farming since she was a youth. She has her small homestead garden and inherited a big field from her parents for farming.

Makibeng is now 64 years of age, is unemployed and is the household head. She is living with her daughter and five grandchildren. In the household there is no income except for the income she makes from the traditional mats she makes and selling of vegetables from her garden. She mainly depends on her old age and child support grants.

Her garden size is 30×40m where she plants maize, pumpkin, brinjal, onion, spring onions and herbs (curly leaf parsley, mint, garlic chives and rocket). In one trench bed which is 4.5m she planted rocket which was attacked by downy mildew. She used a chilli and soap brew to good effect.

She also has a two-hectare field where she planted maize and cover crops like cowpeas, ground nuts and pumpkins; she only used 500m² of the field.

Under the five finger principles that she was taught she has adopted the following practices:

- **Water management;** using organic matter in and on the soil, using goat manure mixed with dry tree leaves, with the understanding of increasing water holding capacity and infiltration of soil, so she can harvest healthy fresh produce.
- **Controlling soil movement;** she implemented stone lines to control soil erosion, not only in her yard but also in the garden.
- **Soil health;** she loved trench beds. She has 7×4.5m trench beds outside the tunnel, 3×4.5m trench beds inside the tunnel and 4×3m trench beds inside her extended tunnel. Lastly for soil health improvement she plants legumes to return nutrients to the soil.
- **Improved crop management;** she practices the following; mixed cropping of vegetables and herbs, crop rotation of vegetables, maize and cover crops. She also propagates seeds before transferring to trench beds and lastly she uses a brew made from chilli and soap for pest and disease control.
- **Management of natural resources;** she planted and looks after indigenous medicinal plants such as aloe and mooto which is used to help with tonsils, and indigenous fruit like marula, motlouma, mogogoma, montlho and mokata.



Tower garden- for use of greywater



One of Makibeng's trench beds.



Makibeng used netting that she found lying around and poles cut locally to extend her shade netting area, after seeing good results in her shade netting tunnel.



Makibeng indicating the Downey mildew on her rocket, which has been reduced by the chilli, soap brew she sprayed.



Drip kits she made on her own. She bought small pipes and connected them to a pipe of the same size, and then she connected a 25-litre drum, which she opened at the top.



Learning implementation

Learning and implementation focuses on what farmers have learnt and their experiences in dealing with climate change in relation to farming activities and human wellbeing, also looking at how farmers share their knowledge and experiences with learning group and community members and lastly how they learn.

She explained that before they knew Mahlathini she used her old ways of farming which she learned from her great-grand mother. She met with Mahlathini and attended workshops where they were taught new practices for them to go and try and she did. She was impressed with the results and continued using and learning through attending workshop with the learning groups where they share experiences and she would record down what she learned and implement in her garden. She also shares her experiences during mini-workshops that the learning group holds at Sedawa. She was motivated by the local facilitator Christina Thobejane to join the learning group and she was motivated to see the results of planting vegetables on the trench beds, then she tried them in her garden. The practice of using drip kits she implemented after seeing how one can do deep irrigation without having to be moving around in your garden trying to irrigate.

Sharing experiences of other farmers and recording her planting in her garden has helped her with decision making in her farming. All the practices that she implemented in her garden in terms of yield are very good and don't demand a lot of irrigation. She feels that her soil fertility and soil and water conservation practices have improved, labour is reduced after the initial hard work of making the beds and implementation is not expensive, given that local resources are mostly used.

Household provisioning & food security

Through this project Makibeng has learned and gained knowledge to improve her household situation. She loves farming and being able to make a small income from her garden makes her happy. She can provide staples like maize and butternut to her family twice a week, and provide vegetables like onions, spinach and brinjals from her garden for household consumption twice a week along with selling. She tried introducing herbs to the community with the hope that they will like them and buy, but that was not the case, people in the community are not familiar with herbs.

The table below is a summary of what she is selling from her garden at the moment, with prices and income she manages to generate.

CROP/VEGETABLE	DESCRIPTION	PRICE	INCOME GENERATED
CHILLI	Grounded	R5, 00	R25,00 per two weeks
CHILLI	Whole	R10, 00	R50, 00 in a week
ONIONS	leaves	R10, 00	R50, 00 per week
SPINACH	Use two hands as a scale	R10, 00	R70, 00 per week



Case Study: Meisie Mokoena

The compost queen

Meisie Mokoena, from Sedawa, is the bread winner for her household; she sells food at a primary school close to her and she also farms for a living.

She is one of the participants involved in this process who is giving attention to soil fertility issues. She makes compost and also uses liquid manure on a regular basis.

She started planting maize and other field crops (ground-nuts, cowpeas and pumpkin) in December and provided supplementary irrigation from her borehole. She feels that some of the growth potential has been lost due to salty irrigation water.



Above & right: Her compost heap with grass, manure, tree leaf mulch and weeds.



Above left & right : Meisie's field crops, growing reasonably well considering the extreme weather conditions, despite the use of salty irrigation water from her borehole.



Left: Beetroot production in her tunnel

Above: Meisie's liquid manure



Sedawa & Mametja garden and field monitoring

Sedawa and Mametja also face a desperate situation; lack of water and they have set up a water committee, which is working with the AgriSI team to explore options for their group. Through garden monitoring the reality of water shortages was obvious. Participants are struggling to farm as they need to buy water for both consumption and watering their gardens. Not all hope is lost as there are participants with a passion for farming and who are actually farming in their small gardens with the little that they have.

In these groups there are a few farmers with bigger plots outside the village; about 4 -6 hectares. Farmers with big plots either have borehole water or they use water from the mountain to water their vegetables. In their plots they plant different vegetables and one participant also planted the herbs (parsley, coriander and basil) in his fields.



Obridge Thsetla

Obridge is unemployed, so he depends on this field for a living. He also joined hands with his family and other farmers, to collect water from the mountain and share the water in their adjoining fields.

Obridge Tshetlha uses his field to grow a variety vegetable; sweet potatoes, tomatoes, spinach, beetroot, cabbage and herbs to sell.

Mr Maphori

Maphori farms with his wife and his son in another field. He has borehole water in his field. They plant a range of vegetables (cabbage, tomatoes, onions and spinach) and sell in the community. This is their main source of income.



The Maphori family members in their field tending cabbages and tomatoes

Smallholder farmers participating in the AgriSI project love growing tomatoes in their household gardens as they believe it has a good market. Almost all the participants monitored have planted tomatoes. Depending on the size of the tomatoes they sell a bundle of 10-15 tomatoes for R10,00. Tomatoes are a basic food in their community so they can sell close to 5 bundles a day and there is enough demand for all to be able to sell. Participants make between R150,00-R400,00/month selling tomatoes in the community. Mostly they use the traditional ridges and furrows for planting tomatoes and are now aware that they would need to rotate this crop with other vegetables to reduce the incidence of pests and diseases.



Nancy Malepe (Mametja) has tied plastic packets to her tomato stakes to discourage birds.



Tomatoes planted in Odinah Mayebela's garden (Mametja). She is one of the participants who gets water from the mountain through a local arrangement. Presently the flow is very low and she can only fill 3x 210l litre drums a day. She uses the water for both consumption and for watering her garden.



Tomatoes harvested from the small gardens in Sedawa and Mametja ready to sell



Turkey garden monitoring

Turkey is another village with a desperate water situation, but they came together to collect money and buy their own pipes to fetch water from the mountains for both consumption and watering their gardens. They also hired a person to maintain their pipes and ensure that they get water twice a week and they pay R70,00 per household for this. Each group consists of around 10 households. Some of our participants get water for both drinking and watering their gardens from a spring across the main road.

From their gardens they can sell vegetables like spinach and chinese cabbage, beetroot, beetroot leaves and tomatoes. In a month they can generate around R400,00 per household. Participants also plant herbs and they use practices introduced in the AgriSI learning sessions.

*Below right: A picture of a spring in Turkey from across the main road not far from the clinic which provides water to a number of households in Turkey, including one of our participants **Dinah Masete** from Turkey 1. She collects water for both consumption and watering her garden from this spring.*



*Above: A spring protected by one of the participants, **Elphas Machete** also from Turkey 1. He also collects water from a nearby river to water his vegetables.*



*Above: **Sarah Madire's** (Turkey 2) trench beds. She planted kale, spinach and mustard spinach (from seed provided through AgriSI)*



*Above: **Norah Tshetlha** (Turkey 1) holding beetroot she planted in her trench beds.*



Above: Trench beds planted to onions, carrots, beetroot and mustard spinach

Progress for tunnels in Turkey

Four shade netting tunnels were constructed in Turkey One towards the end of 2017. Below are some photos of progress and innovations from the participants



Above: Spinach and onion inside Mtashego Florence Shaai's tunnel.



Spinach in Sarah Mohlale's tunnel

Right: Florence dried her coriander, as it matured prior to the sales arrangements being in place. She sells this dried herb by the teaspoon full.





Summer harvests in the Lower Olifants: Climate resilient agricultural practices made the difference

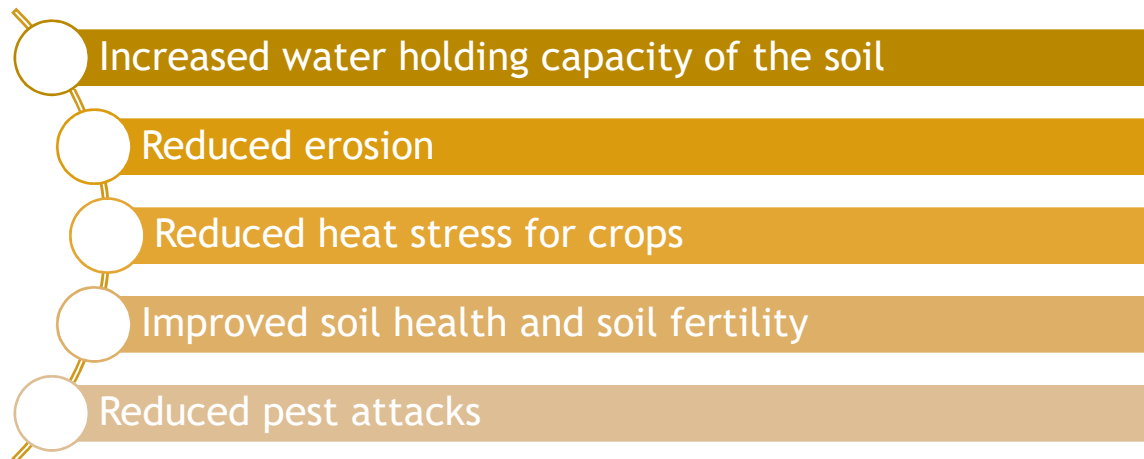
It has been 4 years since farmers in the Lower Olifants Basin have had enough rain to harvest their dryland crops at the end of the summer season. This season started like the previous years, with rain only properly starting in early January 2019. Despite this late start farmers in the RESILMO Agricultural Support Initiative took to their fields with enthusiasm. They included experiments in field cropping, using the Conservation Agriculture principles introduced; namely, minimal soil disturbance (no ploughing), keeping the soil covered (mulch and crop residues) and crop diversity (intercropping and planting of legumes and cover crops).

With all the changes in rainfall patterns and extreme heat, farmers are acutely aware of the impacts of climate change on their environment and their farming patterns. The effects on their ability to produce food under rainfed conditions have been significant, as besides not being able to farm for the past four seasons, this time period has also meant that many smallholders have lost their seed stock for planting. In pockets, individuals with the ability to provide some supplementary irrigation have managed to keep seed stocks of groundnuts, jugo beans (bamabara groundnuts), cowpeas and sorghum, alongside their traditional cucurbits, pumpkins, butternut and watermelons. They have been supported to re-introduce maize and a range of cover crops such as sugar beans, cowpeas, sunflower, sunnhemp, millet, black oats, fodder rye and fodder radish) on the understanding that the increased water use efficiency allowed through CA could sustain these crops, or some of them at least, in the lower rainfall years. Although maize is not a particularly drought resistant crop, the farmers were determined to plant maize, despite the potential of low yields and crop failure.

Around 50 farmers from 3 villages in the Lower Olifants (Sedawa, Botshabelo and Turkey) participated. They all planted a range of crops; maize, legumes and cucurbits, from which they managed to harvest - even though in some cases crops did not survive. They all harvested different crop; maize, butternut, pumpkin, water-melons, Mokopu (traditional gourd), cowpeas, groundnuts and sugar beans. Some farmers planted in their household plots, while others took a chance and planted in their larger fields.



Potential advantages of CA include:



Farmers noticed the difference between their local system and the CA experiments. Firstly, they noticed that the narrow spacing of crops in the CA system worked a lot better than the preferred wider spacing in the area. They worked on the understanding that the wider spacing reduces water stress, as does monocropping, but found that the intercropping and close spacing increased the potential of survival of their crops considerably.

They realised that the cover provided by the closely spaced grain-legume intercrop improves water holding and reduces the effect of extreme heat.

Farmers also combined their traditional practices of making furrows and ridges, with the use of compost and manure to good effect.

In this way and despite a high stalk borer load in the maize, farmers managed to harvest a range of crops, including maize. For their conventionally planted plots, most farmers suffered crop failure again. Yields in the CA plots have still been rather low, at around 80kg/ 1000m² (~1,5t/ha). In good seasons, in the past, farmers remember averaging around 240kg (~6,5t/ha) for similar sized plots. The maize harvested is used to make maize meal locally, at a cost of R50 for 12,5kg of maize. Although these yields are only around 25% of the locally understood yield potential, farmers remain determined to produce maize.

Below are a few snapshots of the farmers' cropping and learning process for 2018-2019.



Above are examples of maize planted using CA principles in Sedawa and Turkey villages



Mpelesi Sekgobela's (Turkey) CA intercropping plot (maize and bambara groundnut), planted across a slope for erosion control and water retention. Right: Her field with maize, cowpea and pumpkin intercropping.



In Meisie's field she tried a number of different practices; different planting times, intercropping and monocropping, mulching, stone lines and furrows and ridges.



Meisie Mokoena's (Mametja) conventionally planted maize and cowpea plot; most of the maize didn't germinate and Above right; a maize, cowpea and pumpkin intercrop planted in furrows and ridges, with addition of compost.

Mariam Malepe is the local facilitator for Botshabelo. She didn't follow the CA principles in her household when she was planting maize and cover crops, opting instead to have a young boy plough for her. She had zero harvest from this plot, where a combination of run-off damage and heat destroyed her crops. She then decided to follow the CA principles in her big field, a small distance from her homestead and here she harvested of water melons, pumpkins, ground nuts, cow-peas, Mokopu (traditional gourd) and maize.

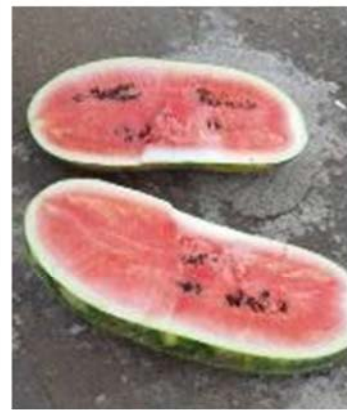


Miriam's watermelon yield. She sells them at R10/ melon in her village and will make around R700, to use towards household needs.



Miriam drying and preparing her maize.

Maria Morema from Sedawa planted maize, sorghum, pumpkins, cowpeas, watermelons and ground nuts both in her field which is in the mountain and her household plot. She also sells both pumpkins and watermelons locally for R10 each and they are also eating them.



Top left: Maria's maize and pumpkin intercrop

Above: A watermelon

Left: Some of her sorghum harvest

Mmatshego Shaai from Turkey planted ground nuts and Bambara nuts in her household plot. She did not plant maize, due to the dryness of the season. She has received a good harvest and has sold both the peanuts and the jugo beans locally, making around R600 to supplement household use and also has kept seed for future planting.



Mmatshego's groundnut harvest being dried and right; her jugo bean harvest



Mmatshego's groundnut and jugo bean field



Makibeng Moradiya providing some green maize to her friend and local facilitator Christina Thobejane



A good stand of CA maize in Obridge Tshetlha's field in Sedawa



Conclusion

These smallholder farmers have shown a remarkable ability to adapt to their changing conditions through using a combination of traditional and introduced climate resilient practices and through planting a variety of drought tolerant crops alongside their maize.

Even though maize didn't grow all that well, farmers have found ways to incorporate and keep this crop going in their farming system.



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The Association for Water and Rural Development

AWARD is a non-profit organisation specialising in participatory, research-based project implementation. Their work addresses issues of sustainability, inequity and poverty by building natural-resource management competence and supporting sustainable livelihoods. One of their current projects, supported by USAID, focuses on the Olifants River and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems to sustain livelihoods and resilient economic development in the catchment.

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About USAID: RESILIM-O

USAID: RESILIM-O focuses on the Olifants River Basin and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems that support livelihoods and resilient economic development in the catchment. The 5-year programme, involving the South African and Mozambican portions of the Olifants catchment, is being implemented by the Association for Water and Rural Development (AWARD) and is funded by USAID Southern Africa.

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