

RESILIM-O:  
Resilience in the Limpopo Basin  
Program- Olifants

MILESTONE 7: Final Report  
Under the  
Lower Olifants catchment  
Agricultural Support Initiative  
(AgriSI)

30/11/2017



# Acknowledgements

The USAID: RESILIM-O project is funded by the U.S. Agency for International Development under USAID/Southern Africa RESILIENCE IN THE LIMPOPO BASIN PROGRAM (RESILIM). The RESILIM-O project is implemented by the Association for Water and Rural Development (AWARD), in collaboration with partners. Cooperative Agreement nr AID-674-A-13-00008.

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## ABOUT USAID: RESILIM

USAID's Resilience in the Limpopo River Basin (RESILIM) program addresses ongoing degradation in the Limpopo River Basin in southern Africa, where people face water shortages, increased floods, and declines in crop productivity as climate change further stresses an already water limited region.

There are two components to the program; one operating at a basin-scale (RESILIM-B, which is implemented by USA-based Chemonics and addresses similar issues at the scale of the four SADC member states that share the Limpopo Basin (South Africa, Botswana, Zimbabwe and Mozambique) and a catchment-scale project (RESILIM-O) that It is being implemented by the Association for Water and Rural Development (AWARD). Both projects share the same overall objectives. You can find out more information on the RESILIM projects on [www.usaid.gov](http://www.usaid.gov) website and [www.award.org.za](http://www.award.org.za).

The USAID's RESILIM-O focusses on the Olifants catchment. The program aims to reduce the vulnerability of people and ecosystems in the Olifants Catchment specifically, by improving how transboundary natural resources are managed. By understanding the systemic causes of vulnerability, including climate vulnerability, it is promoting new ways of thinking and acting to promote integrated water and biodiversity management.

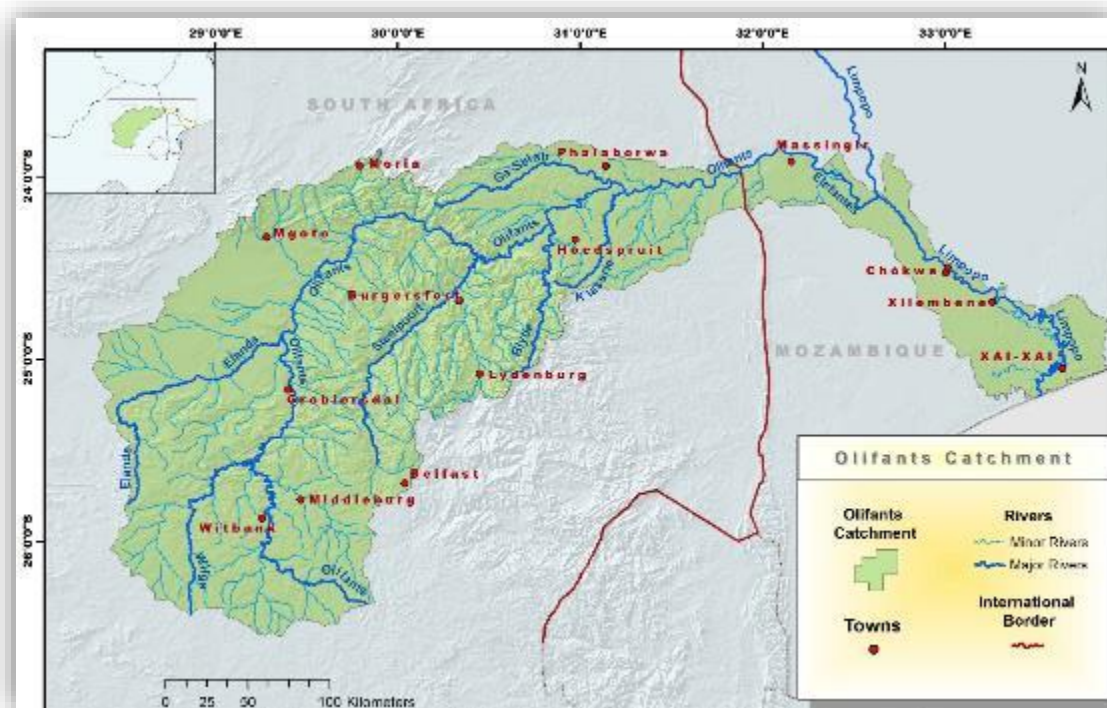
## ABOUT AWARD

At AWARD, we recognize that the natural world's resources are limited, and undergoing rapid depletion and transformation. We know current practices of use and management are inadequate to deal with the changes and challenges we are facing. We design practical interventions to address the vulnerability of people and ecosystems, and merge considerations from both environmental and social perspectives. Our approach involves thinking across disciplines, boundaries and systems.

We are working with diverse people and institutions in the water and biodiversity sectors in the Olifants River Catchment to understand the multiple vulnerabilities to change, including climate change. Along with quality scientific contributions, our engagement in the socio-political context of the Olifants River Catchment allows us begin to begin to institutionalize integrated, resilience-based practices, providing a foundation for robust development policy and practice in the in this river catchment, and beyond.

## The Olifants Catchment: An overview

The Olifants River Catchment falls within the Limpopo River Basin, which is part of an international drainage basin that stretches across South Africa, Mozambique, Zimbabwe and Botswana. In fact, the Olifants River contributes nearly 40% of the water that flows in the Limpopo River making it an important catchment in the system as a whole.



At the heart of this catchment is the Olifants River, a vital artery that flows for 560 kilometres through South Africa and into Mozambique, where it is known as the Rio dos Elefantes in Mozambique.

This mighty river originates in South Africa's Mpumalanga Highveld, flowing northwards before curving in an easterly direction through the Kruger National Park and into Mozambique, finally finding rest in the salty water of the Indian Ocean near Xai Xai, just north of Maputo.

The main tributaries of the Olifants River are the Wilge, Elands, Ga-Selati, Klein Olifants, Steelpoort, Blyde, Klaserie and Timbavati Rivers.

Along with its tributaries, it is one of the six major Lowveld river systems, occupying an area just short of 55 000 square kilometres. It traverses three provinces in South Africa; Gauteng, Mpumalanga and Limpopo. About 3.5 million people live on the South African side of the catchment. In Mozambique, it flows through Gaza Province, which is home to about 700 000 people.

## A system under change

Our catchment is the foundation of our livelihoods and development. Yet the river and associated natural resources in the Olifants Catchment are under threat...

Unchecked pollution, inappropriate land resource use, weak and poorly enforced policies and regulations and poor protection of habitats and biodiversity are degrading the Olifants at an alarming rate. What's more, the area is however under threat from factors such as mining for heavy metals, inappropriate land management, rural sprawl and unsustainable use of natural resources. This affects the level of goods and services provided by the ecosystem.

The diverse population groups living in the Olifants Catchment all have one thing in common; they rely on the river and the catchment's natural biodiversity for their livelihoods. This reliance can be direct or indirect. Rural communities rely on it for things such as traditional medicine, grazing and browse, fuel, food and housing materials. Some people in river-side communities harvest reeds, collect water from the river for washing and drinking and use it for recreational and spiritual practices. Subsistence farmers in



Mozambique rely heavily on the catchment's flood plains. There are also large mines and associated industries, large scale agriculture and the wildlife economy, which all rely on a healthy, functioning river system. Often people forget that what they do upstream affects people down stream, sometimes with dire consequences.

The catchment is our home and it is worth investing in its future. The work reported here is part of the ongoing activities of the RESILIM- O project under the grant from USAID: Southern Africa.





## Project partners



Mahlatini Development Foundation (MDF) is a small public benefit non-profit organization consisting of rural development practitioners who specialize in participatory learning and action processes, sustainable natural resource management and low external input farming systems, including a focus on rain water harvesting, conservation agriculture, intensive homestead food production, food security, micro finance and enterprise development.

MDF designs and implements rural development programmes and training processes providing learning processes for adults all the way from semi- literate farmers to post graduate university level. We work in partnership with government and non-government organisations alike. We are sensitive to and mainstream where possible gender, disability and people living with HIV/AIDs



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# 1 Executive Summary

## 1.1 Progress for the reporting period

During this quarter focus was given to:

- The distribution of 17 drip kits to participants with the 3 (1 x 5m) trench beds and mentoring in installation of these
- Initiation of a new learning group in Sedawa-extension (Turkey); Baseline discussions, climate change adaptation introduction.
- Initiation of 2 village savings and loan associations, upon request from participants (Botshabelo, Sedawa)
- Re-introducing Conservation Agriculture to a larger group of participants, including cover crops - sunflower, millet/sorghum and cowpeas.
- Natural pest and disease control workshops with all learning groups to consolidate and expand knowledge and options.

DICLAD (Module 2-3) workshops have been held for exploration of Climate Change impacts and adaptation for all 6 villages (3 workshops). In addition, in collaboration with Lima RDF, the DICLAD process has been introduced to a village in Sekororo, upon their request, to introduce the concepts of climate smart agricultural practices into their food security programme.

Further learning workshops have been run for all 6 villages, to provide an overview of all the practices introduced thus far, setting up of more drip kits (17) and a re-introduction of Conservation Agriculture trial process for the coming planting season including; intercropping; maize-beans and cowpeas, bird resistant seed (sorghum, millet), cover crops (sunflower, sun hemp) and mulching options. An animal drawn planter (Knapik) is to be loaned to some participants working in bigger fields to test.

Attention has been given to support the local facilitators in their processes of providing advice and support to participants and in completion of the garden monitoring forms. A total of 101 have been translated and analysed (April-Nov 2017).

Informal discussions have been held with learning groups to elucidate their continued intervention and learning needs and broad action plans have been put in place, in anticipation of continuation of the process into 2018. In this respect 2 Village Savings and Loan Associations have been initiated (Botshabelo, Sedawa), fodder production options for livestock have been introduced and an initial exploration into poultry production (both broilers and layers) has been undertaken (Botshabelo). Two new learning groups have been set up in the Sedawa-Mametje villages upon request from participants.

### PARTICIPANTS THIS PERIOD

SEEDS OF LIGHT: Trygive Nxumalo

MAHLATHINI: Erna Kruger, Sylvester Selala, Nozipho Zwane (Intern)

AWARD: Cryton Zazu, Bigboy Mkhabela,

## 2 Project Objectives

### 2.1 Overview of RESILIM-O Project objectives

RESILIM-O is large multi-faceted, multi-stakeholder, cross-boundary programme to reduce vulnerability to climate change through building improved transboundary water and biodiversity governance and



management of the Olifants Basin through the adoption of science-based strategies that enhance the resilience of its people and ecosystems through systemic and social learning approaches. The programme has been running for four years and is being implemented by AWARD (The Association for Water and Rural Development) with funding from USAID.

The Agricultural Support Initiative (AgriSI) was initiated as a sub-grant process within the larger programme towards the end of 2016. This initiative works specifically with climate change adaptation processes with smallholder communities in the lower Olifants River basin. It is being implemented jointly by Mahlathini Development Foundation and AWARD.

The Agricultural Support Initiative (AgriSI) addresses two of the RESILIM-O programme objectives directly:

- i. To institutionalize systemic, collaborative planning and action for resilience of ecosystems and associated livelihoods through enhancing the capacity of stakeholders to sustainably manage natural resources of the Olifants River Basin under different scenarios
- ii. To reduce vulnerability to climate change and other factors by supporting collective action, informed adaptation strategies and practices and tenable institutional arrangements.

## 2.2 Sub-grant Project Objectives

Sound agro-ecological practices for soil and water conservation (SWC) and the ability to self-organise and act collectively are regarded as fundamental for building adaptive capacity and resilience to climate change. Not only do agro-ecological farming approaches require minimum external inputs - which may be expensive and increase dependency if subsidised - but they foster farmers' sense that they can build sustainable futures from local inputs and efforts. With knowledge about the potential impacts of climate change included in the learning journey, farmers can make purposeful decisions around practices such as seed and crop-type. This approach supports livelihood diversification - also fundamental for increased resilience - through 'value-added' associated activities such as seedling production, tree nurseries and bee-keeping.

The overall aim of the Agricultural Support Initiative is to enhance the resilience of the people and ecosystems in selected villages (5-6) in the Lower Olifants River basin, using a systemic social learning approach, exploring the question: *What are you learning about the socio-economic and biophysical characteristics of your environment and how these are changing and how are you able to respond to that?*

The overarching objective of this work is to provide support for increased adaptive capacity and resilience to the effects of climate change for households involved in agriculture in select communities of the Olifants River Catchment through:

- Improved soil and water conservation and agro-ecological practices for increased food security
- Livelihood diversification and supplementation through alternative climate resistant production;
- Increased community empowerment as a result of self-organisation and collective action.
- 

## 3 Milestone Description

### 3.1 Definition of milestone and purpose



Each milestone and progress report indicate activities under the broad themes of learning and mentoring, introduction to innovations and experimentation, collaborative work and networking undertaken during the reporting period.

The table below summarises these activities against the milestone and indicate achievement of these milestones.

**Table 1: Summary of deliverable completion under Milestone 7: October-December 2017**

	Activities planned	Completed?	Expected outcomes	Completed?	Verification documentation	Completed?	Reference
Learning & Mentoring: In all 6 communities each 2 days	Learning & Mentoring: Facilitator mentoring of new practices Farmer ongoing self-monitoring, -assessment and learning Clusters self-mentoring; review and planning	C	-LF's provide training and mentoring alongside field team  -LF's undertake garden mentoring and monitoring with farmers (3-4 days each), supported by field team  -Learning groups; learning sessions - overview of practices- incl Conservation Agriculture, review and planning for coming season	C  C  C	Progress report on outcomes including the following documentation:  1. Photos & photo diaries 2. Farmer work plans 3. Garden monitoring 4. Monthly assessments 5. Cluster activity records 6. Event materials, attendance registers	C	1. Photos in reports and- All photos saved in directories and kept by Erna  2. Farmer work plans are recorded in the garden monitoring forms  3. 44 Garden monitoring forms across six villages  4. In this report
Intro to innovations and experimentation: In all 6 communities each 2 days	Mentoring by trainers and LFs'	C	- Garden monitoring including trainers and LFs- all participants visited at least once by LFs and a garden monitoring form completed	C		C	5. Appended to this report  6. Appended to this report
Collaborative work: In all 6 communities each 2 days	Site assessments and community contributions to infrastructure support; tunnels, drip kits and RWH storage tanks	C	-Distribution and construction of drip kits (x17) for participants with the three 1x5m trench beds.	C		C	
Networking: 1. Local facilitator networking 2. Open days, cross visits	DICLAD workshops, (modules 2,3) for all villages	C	- 3 DICLAD workshops exploring CC adaptation options, practices and future activities	C  NC		C	



3. Review and planning sessions	DILCAD introduction for Lima RDF in Sekororo		-Cross visits and open days  - Recap of learning, introduction of topics requested for coming season	C			
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## 4 Approach/ Process/ Activities

### 4.1 Summary of activities

This section gives an indication of activities undertaken during the reporting period to achieve the outcomes for this period, time spent and people involved.

**Table 2: Summary of activities for the reporting period October- December 2017.**

DATE	DESCRIPTION OF ACTIVITY	Time	WHO WAS INVOLVED
2017/10/02-04	Working with new intern Nozipho Zwane to set up database for garden monitoring forms	2 days	Erna
2017/10/03-05	Write up of learning events for groups	2 days	Sylvester
2017/10/20	Preparation for DICLAD modules 2,3	1 day	Erna
2017/10/23-27	DICLAD workshops x 3, including team planning and reflection	5 days	Erna, Sylvester
2017/10/30-11/05	Delivery of drip kits - mentoring in construction, garden monitoring progress, introduction of CA for farmer trials in 3 villages (Willows, Botshabelo, Sedawa)	7days	Sylvester
2017/10/30	Meeting with INR to discuss social enterprise options, Planning with Lima head office team for DICLAD collaboration in Sekororo	1 day	Erna
2017/10/02-11/30	Part-time work on garden monitoring database	10 days/month	Nozipho
2017/11/09-11	Write up of monthly activities and reports	3 days	Sylvester
2017/11/20-24	Compilation of final report, database analysis	5 days	Erna
2017/11/26-12/02	Travel to Limpopo, Team preparation and conducting 2 DICLDA processes (2 days ea) for new groups; Sedawa Ext and Sekororo. Introduction of savings groups, poultry production	7 days	Erna, Sylvester, Mazwi, Temakholo, Karabo
2017/12/04-08	Finalisation of CA trial set- up for participants	5 days	Sylvester
2017/12/11-15	Set up of quantitative measurement tools; weather station, chameleon probes, run-off and taking of gravimetric soil samples	6 days	Sylvester

Sylvester: 35 days, Erna: 20 days

### 4.2 Progress and Results

#### 4.2.1 Learning and mentoring

As new participants join in every workshop, this latest round of training was meant to provide an overview of practices introduced thus far. For this participants in the group spoke to what they have learnt and gave descriptions of the practices.





As an example, in Willows the following practices were discussed: The snapshot covered soil water movement (use of line level in design of furrows, diversion ditches), soil testing (bottle test), conservation agriculture (no till and intercropping), soil fertility (trench beds, eco-circles, shallow trenches, liquid manure), crop management (mixed cropping, mulching, natural pest and disease control), water management (RWH, use of grey water) and seeds (bird resistant sorghum, millet and other seeds). Due to time constraints, after the discussion of these practice participants chose to focus on water management and natural pest and disease control.

Greywater management options are important in these villages as there are times that this is the only water available to participants- albeit very little (ave 25l/day). Thus, tower gardens were introduced now in all the villages. These are upright beds, with a high ash content in the soil mix to bind the soaps in the greywater as well as a central column of small stones for filtration.



*Above left and right: Sylvester demonstrates the planting of spinach seedlings into the sides of the tower garden in Willows. And participants mix the soil, manure and ash for placing into the tower garden in Botshabelo*

In other learning review workshops, such as Botshabelo, topics were covered that participants still do not feel too confident in; in this case they chose; five finger principles, liquid manure and natural pest and disease control. This was also covered again in some more detail in Sedawa.



*Above left and right: Multipurpose plants that assist with pest and disease control were introduced; e.g. num-num, aloes, lemon grass, rosemary, borage, chillies, parsley and coriander. And pest control brews using onions, chilli, green bar sunlight soap and paraffin were demonstrated. Those few participants who have already been using these remedies feel they work very well for the common pests they have.*



#### 4.2.1.1 Summary of Learning and mentoring and Future Activities

These have been summarised for the four villages where the learning review was conducted.

**Table 3: Summary of planning for continued activities in four villages**

	WILLOWS	BOTSHABELO	FINALE	SEDAWA
Group expansion	LF's to go to new individuals and mentor them through the gardening practices			Mametje would like to be a learning group by themselves. There are many participants
	More training sessions to be run covering the whole range of practices			Another expansion group is to be started in Sedawa-closer to the main road (Turkey).
	More in-depth information on some of the topics			
Future activities	Cross visit to Sedawa to see and learn about the underground RWH tanks		Reintroduce line level and way to make diversion furrows as well as planting - as it has worked well for some. Most cannot remember how	Mixed cropping works well and will be expanded. Herbs are resistant to pests and diseases and are more heat tolerant than the vegetable crops - so are a good idea, but use is limited
	Incorporate cover crops in field cropping - for livestock fodder		Reintroduce CA and include cowpea, millet and sorghum	Marketing options for herbs to be explored (coriander, parsley, garlic chives, rosemary, fennel). Discussed herb stands in town and local farmers markets
	Grow fodder and store for winter; e.g. Lucerne			Potential to start chicken projects
	CA re- introduction and working on bigger fields- animal traction options- introduce animal drawn planter - Knapik		With shallow and sandy soil and use of salty water, participants believe techniques such as mulching work to some extent	Saving for increased water supply. They have approached the chief to make a small dam in the stream bed. Participants are saving towards this (R20-R200/month for the pipes)
			Making trench beds difficult but worth it,	Setting up a savings group



			Based on the observations made during the cross visit to Sedawa, participants believe tunnels might have a good potential to improving their vegetable production.	Planting cover crops in the bigger fields outside the homestead and also exploring other fodder production options
Requests/ issues	People lose a lot of cattle during the winter. They want to know of options for increasing water and food supply for livestock	Options for helping participants to remember information: The local facilitator could try things with individuals during household visits	Mulch attracts the homestead's or the neighbours' chickens to the garden, and they destroy their vegetables.	Assistance from MDF, AWARD, to also work with Municipality for increased water supply and to find ways to raise funds to do this at community level.
	Plant and seed samples brought to the workshops are not enough for everyone- is it possible for MDF to supply more	Participants could have monthly meetings where they discuss some of the innovations introduced (how the work for each individual and why they do not work for others)	Participants' willingness to try a new innovation is depended on how well that innovation does. But how well this does depends on several factors which include, success of the demonstration and the maintenance afterwards	Access to manure is a challenge in Sedawa; chicken projects now charge for chicken litter and demand is big where they have access to the dip tanks for example.
	Can the LFs be trained to run the same workshops at the same level as MDF - At the moment the information they provide is a little limited.	Having revision workshops every once in a while	Advice on where to find markets for herbs. Many grow well in these conditions but participants have limited use for them	Growing fodder species - more livestock owners have joined the group and interest is considerable - mainly in fields, with supplementary irrigation options
		Sepedi notes (farmers handouts)	Anything to do with digging (trench beds, double digging, eco circle, diversions furrows) is almost impossible in the community, with the top soil of about 10 to 15 cm in depth (where the digging has been done the production is better)	





Suggestions		Putting storage containers closer to where kids discard water after taking a bath (this will help them remember to pour the greywater into the container)	Participants requested that we make a diagram with pictures of all practices and how they are linked together. Some of the information is only required when one is faced with a particular problem (e.g. pest control), therefore it would be useful for us to have something to remind ourselves.	Need pictures and notes to be able to remember practices- especially the pest and disease control remedies, liquid manures and mixed cropping
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In addition to the above-mentioned ideas MDF is keen to also explore the following options in future activities with the groups:

- Seed saving
- Value adding and food preparation
- Seed varieties suitable for a changing climate (including planting calendars)
- Experimentation with decisions support tools for choice and combinations of CSA practices
- Livestock integration
- Erosion control strategies in and around villages to augment gardening activities
- Communities of Practice of all relevant stakeholders to explore increased access to water and more efficient use of available water
- Fruit production options

## 4.2.2 Innovations and Experimentation

Garden monitoring has continued in this quarter. Summaries have again been made of local innovations and introduced innovations being practiced by participants

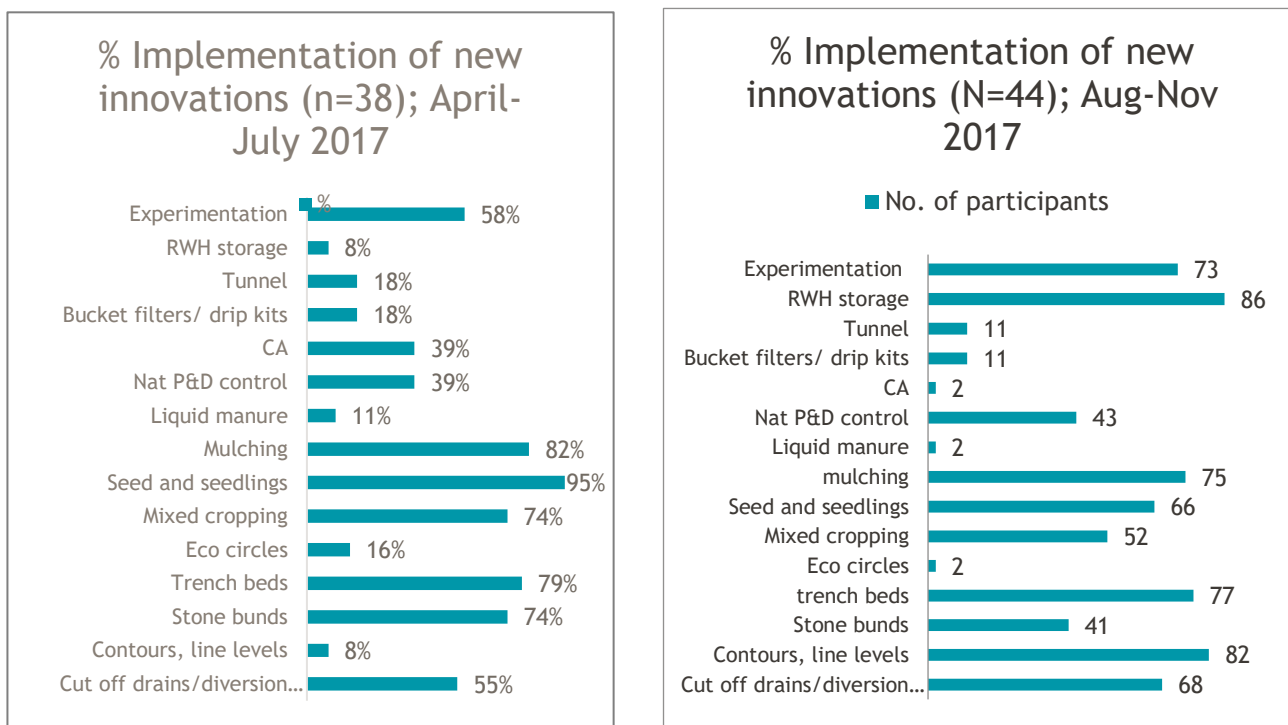


Figure 1: Implementation of new innovations for the periods of April -July 2017 and Aug-Nov 2017

Thus far garden monitoring has been compiled for different individuals over time, rather than repeat monitoring sessions for the same individuals. The above two figures thus represent an overview of practices implemented and can show some trends of increase in uptake of certain practices.

RWH storage has increased substantially in this last quarter- but is to be expected as the rainy season has commenced. Along with this, participants have now dug out contour ditches (furrows and ridges) for cropping and worked with cut off drains and diversion ditches. These are also activities related to implementation in the rainy season. More participants have been actively undertaking experimentation

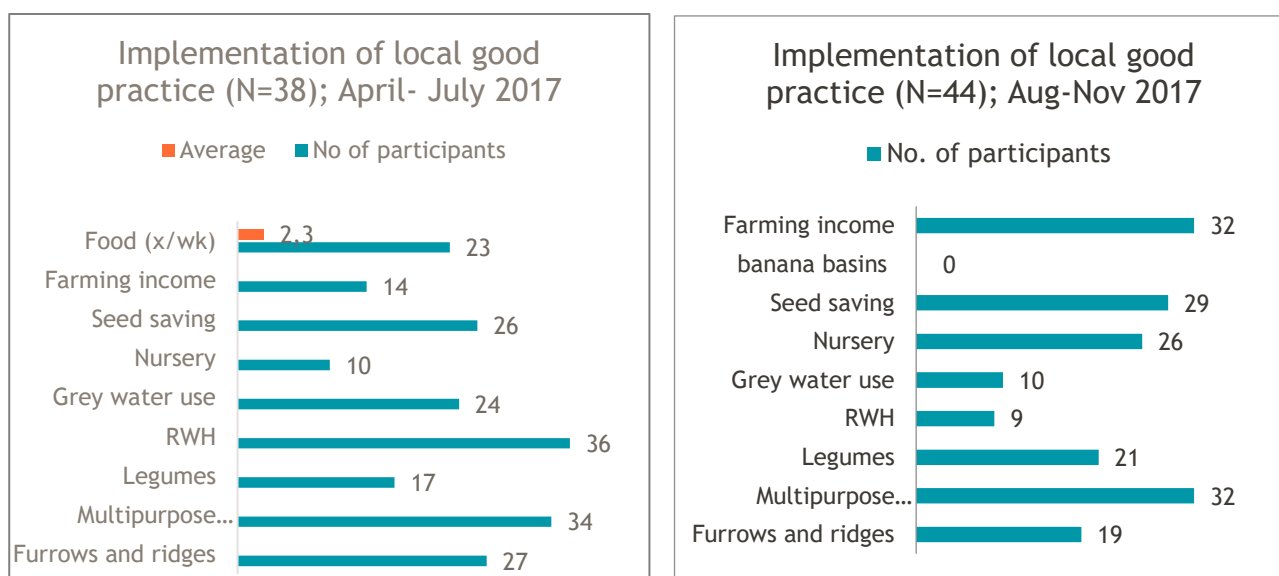


Figure 2: Implementation for local good practice for the periods April-July 2017 and Aug-Nov 2017



For the implementation of local good practices, the trends for the two seasons (quarters) have remained reasonably constant. In this instance the reduction in implementation in the more recent period of furrows and ridges and RWH denote a greater uptake in the improved versions of these practices (as shown in the two small graphs above these) rather than a reduction of implementation of the practices per se.

Overall, the following summaries of implementation of practices and innovations can be made for this intervention

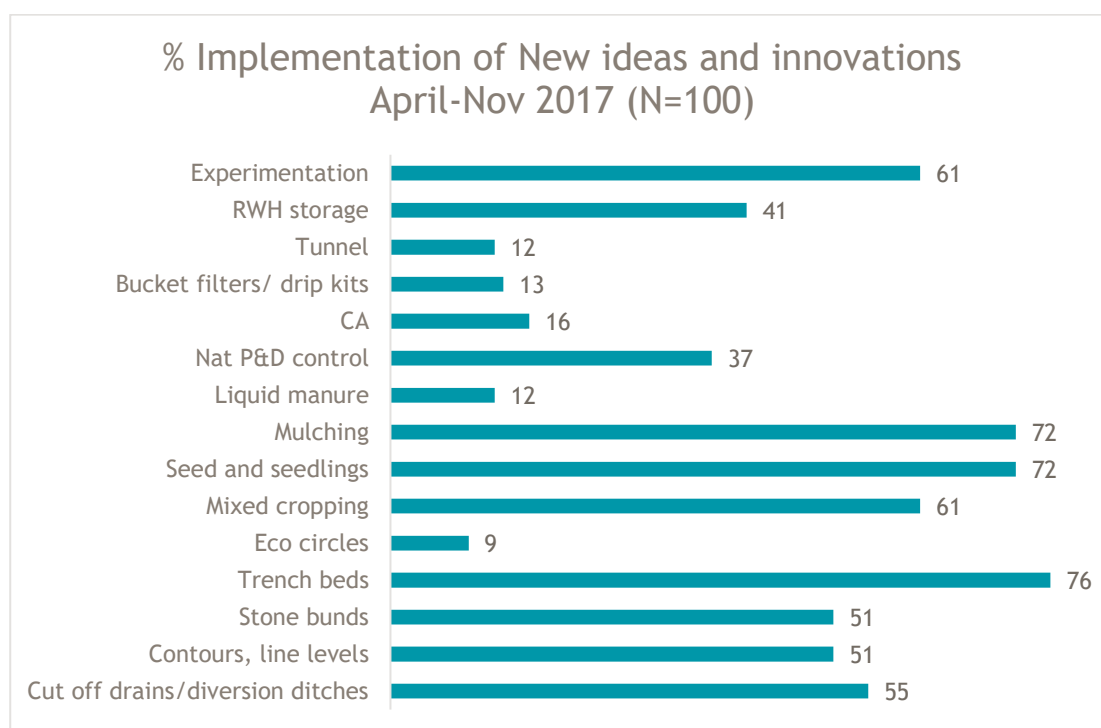


Figure 3: Overall implementation of adaptive practices in the Mametje area for April=November 2017

The graph above indicates the overall uptake of practices across the six villages in Mametje where these were introduced through training, demonstrations and farmer experimentation. Uptake of practices to improve soil fertility, water holding capacity and soil and water conservation have been well received and more than 70% of participants have implemented these ideas over the two growing seasons of this process. This is in fact an extremely high level of uptake and denotes a high level of motivation from participants.

A few practices did not “stick” despite our efforts of introduction and re-introduction of these ideas. These include making and using of liquid manure and eco-circles, which uses a bottle drip system. The use of natural pest and disease control and conservation agriculture for field crops can also still be improved. For the latter two practices- review and farmer experimentation processes have been done very recently (Nov-Dec 2017)

Appendix 2 (7.2) provides a narrative report for each of the six villages showing indications of their assessment of implementation of practices using the traffic light idea of red, yellow and green.

A concerted effort to assist these participants financially and technically to improve upon their rainwater harvesting processes and infrastructure is suggested. Considerable funding will be required for this, but not major strides in increased production can be expected without such interventions.



## Overall implementation of practices; April-Nov 2017 N=100

■ New interventions ■ New innovations ■ Farmer Experimentation ■ Local good practice



Figure 4: Summary of uptake of innovations for the learning group members.

The diagram above summarises the overall implementation of good practices, both introduced and local/traditional good practice. Local good practices such as seed saving, furrows and ridges, multipurpose plants, propagation and nurseries and use of grey water is used by around 40-60% of the participants.



About 40% of participants are able to produce enough food from their gardens to eat from these 2x/week on average and consuming an average of 2 different types of vegetables per week. In addition, 46% of participants are making supplementary incomes from their vegetable production. These incomes range between R80-R2400/ month. The most common level of income is around R200/month. The average income from vegetable production is R700/ month. This is indeed an impressive achievement given the small plots under production and the numerous production constraints that these participants face.

#### 4.2.2.1 Individual experimentation

As farmer experimentation is the main learning avenue of this farmer innovation process, individual experimentation has been promoted at all learning workshops as well as through the local facilitators. Participants were initially a bit slow on the uptake of this, but they have now learnt that this is a great way to find out things and make decisions for themselves. A total of 61% of participants have undertaken experimentation in their gardens and fields.

Below is a summary of the practices that participants have experimented with. This information was gleaned from garden monitoring forms compiled for July-November 2017. It can be seen that working with trench beds, mulching and mixed cropping have been the most popular practices for experimentation.

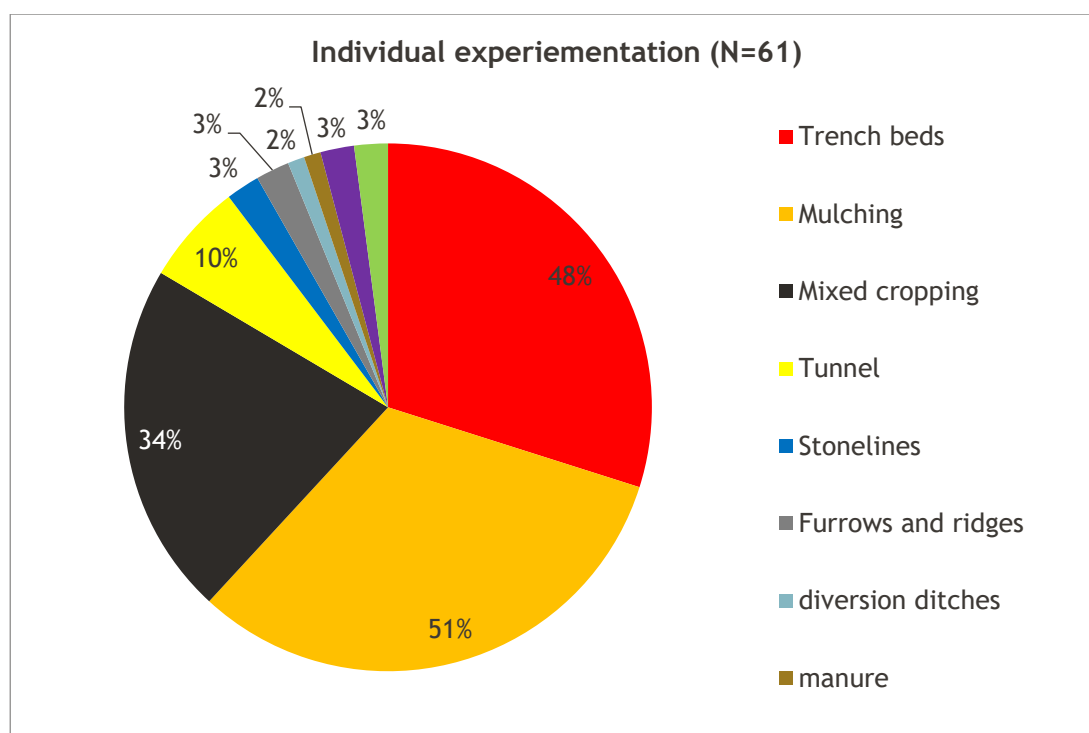


Figure 5: Individual experimentation with different practices among learning group participants.

#### 4.2.3 Collaborative work

A number of learning group participants (17 in total) has made their 3 1x5m trench beds in anticipation of receiving tunnels. Most of these participants only finalised their trench beds after the initial round of



supply of tunnels, where 10 tunnels had been installed - in addition to the 2 tunnels constructed as group efforts.

It was however not possible to supply tunnels to all the prospective participants and an agreement was reached with the learning groups that these participants would be supplied with drip kits (2 ea), some of which were offered by the initial tunnel recipients who had also received drip kits. This was seen as a compromise solution for all and a more equitable distribution of the resources offered through this project.

The list of recipients of drip kits is shown in the small table below

**Table 4: List of recipients of drip kits**

Finala	Sedawa	Sedawa Cont	Lepelle
Sophina Mashila	Lina Malepe	Sophia Molefe	Anna Seotlo
Norah Morapane	Koko Maphori	Thina Mashinye	
Edina Molebela	Mpelesi Sekgobola	Rebecca Morema	
Sarah Myathi	Lema Malepe	Winnie Mametja	
Julia Monareng	Mareta Moloto	Meisie Mokwena	
	Norah Malepe		



*Above left and right: Participants in Sedawa who had prepared trench beds in anticipation of tunnels, have made good use of them in the meantime, planting a selection of crops. They have now received drip kits to irrigate these beds*

The initial 2 tunnels constructed by the learning groups were used for joint experimentation by group members for one growing season (3-6months). These two tunnels have now been taken over by individuals; Christina Thobejane (in Sedawa) and Mr Lewelle (in The Oaks). In all cases tunnels have been planted to an interesting selection of mixed crops; including maize, kale, cabbage, carrots, morogo, spinach, tomatoes, marigolds, okra and peppers





Above Left to right: Christina Thobejane's tunnel (Sedawa), now placed inside her yard; filled with a large variety of crops (peppers, spinach, radish, marigolds, kale, maize and okra shown here) and Mariam Malepe's tunnel (Botshabelo) also planted to a range of crops. These tunnels were constructed by the participants themselves.

#### 4.2.3.1 Summary of Collaborative work

- 12 tunnels (4x6m) have been constructed across 3 villages (the Oaks, Sedawa, Botshabelo)
- 39 drip kits have been set up (20l bucket for 1x5m bed) across 4 villages (Sedawa, Botshabelo, Finala and Lepelle)
- 3 x 25 000l underground RWH tanks have been constructed in Botshabelo and Sedawa

In all cases participants have been centrally involved in learning and working together to construct these 'structures'. There is a high level of interest in the tunnels and RWH tanks and a good indication for the tunnels that productivity and resilience is increased quite dramatically. For the RWH tanks, participants are already adapting the use of these tanks to also filling them with water, pumped or carried from nearby sources to augment the rainwater stored. All three tanks are now fully operational.

Right: A monitoring and maintenance visit to Mariam Malepe's tank, where the inlet pipe filter was cleaned and secured more firmly. The diversion ditch carrying water into the tank is visible - a row of bananas flanks this ditch.



#### 4.2.3.2 Future

- Given the high interest in tunnels, attempts will be made to secure funding and resources to continue with the supply of these structures to learning group members
- Experimentation with cropping options in tunnels is to continue; this will be augmented by water productivity measurements and different irrigation practices





- Village savings and loan associations have been initiated, to enable participants to save for these structures (both tunnels and RWH tanks)
- Options for hand and or foot pumps for the underground RWH tanks are to be explored, as participants are not too keen to take the water out using buckets.
- A big push for further support for underground RWH storage is very important in this region.

## 4.2.4 Networking

Networking has been undertaken at a number of levels.

At village and community level networking has been undertaken and some group participants as well as all local facilitators have undertaken cross visits to other villages in the implementation cluster. The intention here has been for participants to showcase their work to each other and learn from each other's implementation of practices. This has also led, among other things, to the initiation of a new learning group in an extension of Sedawa, at a village called Turkey (Zone 2).

NGO's active in the area; Seeds of Light and Lima RDF have been drawn in to ensure collaborative work and coherent implementation on the ground. In the case of Lima RDF an arrangement has been reached where the DICLAD process has been introduced in Sekororo with the groups they are working with there. It was felt that an analysis of climate change impacts and an exploration of potential adaptive measure could be very useful for the Lima programme in food security (supported by Wesbank and the Frist rand Foundation). Lima facilitators also supported this process in the new village, Turkey, where joint implementation is planned. Lima has also offered access to their revolving loan fund (Jobs Fund), for individuals venturing into commercial production.

Government and municipal stakeholders have been engaged for the open days held to outline and showcase the CC adaptation work undertaken by the learning groups. It would be important in the future to bring these stakeholder on board and work much more closely with them.

## 4.3 Success and Challenges in meeting milestone.

### 4.4 MERL.

#### 4.4.1 Indicators: Assessment November 2017

Figures in the table reflect numbers for the period of reporting, in this case October-December 2017. A combined team meeting to review this assessment sheet has not been conducted in the reporting period. Figures have been summarised from field reports and discussions with the field team.

**Table 5: Summary of indicators assessments for the duration of the AgriSi project**

Indicator	Overall target	Actual_ Nov 2016	Actual_ Jun 2017	Actual_ Sept 2017	Actual_ Dec 2017
No of participants in learning groups	100	108	73 (Open day, Soil fertility and natural P&D control workshops)	46,43 (DICLAD workshops), 55 - household visits, garden monitoring, 60	13,23,36 (DICLAD workshops), 17 drip kits, learning workshops



					(30,12,8,31) new groups (28, )
No of learning groups	5	5	5	5	7
No of local facilitators	5		7	10	8
Percentage of participants engaged in CC adaptation responses	1-2 (45%) 2-3 (25%) >3 (10-15%)	1-2 (10%)	1-2 (67%) 2-3 (15%) - for this time period OVERALL: 1-2 (60%) 2-3(15%)	1-2(75%) 2-3 (20%) >3 (10%) This time period OVERALL 1-2 (65%) 2-3 (20%) >3 (10%)	OVERALL 1-2 (74%) 2-3 (62%) >3 (39%)
No of participants experimenting with new innovations					
-local	15	5	5	20	34
-co-designed	45		50	60	64
No of participants showing increased knowledge	80		73	89	76
Percentage of participants engaged in collaborative activities	45%	-	14%- individual implementation of tunnels and drip kits- 10 Underground RWH tanks - 4	12% individual implementation of tunnels and drip kits- 10 Underground RWH tanks - 3	28% - individual implementation of tunnels (10) and drip kits (27) Underground RWH tanks - 3
Percentage of participants with improved livelihoods			(summarised from garden monitoring)	(Summarised from garden monitoring)	(Summarised from garden monitoring)
-increased availability of food					- 40%
-increased income	40%	-	-15%	- 25%	- 46% (small incomes) -R700/ Month
-increased diversity of activities and livelihoods options	5% 5%	- - -	- - -	- 15%	- 16%
Qualitative assessments; -stakeholder engagement -Increased understanding and agency to act towards increased resilience - Adaptation and innovations into local context -Potential for increased resilience -Social engagement	Stories, case studies, photos, cluster activity records, group session minutes,		Stories: -Open day -Underground storage tanks implementation - garden monitoring	Stories: Local facilitators- progress Building of RWH storage tanks Implementation of construction of individual tunnels Case studies: WRC- AgriSI project implementation	Stories: -DICLAD; impact of practices - Adaptations and innovations into local context....
<b>Understanding:</b> Examples of people showing an increased understanding of CCA adaptation	- Through the DICLAD workshops many people have shown a coherent understanding of the impacts of CC and the value of their activities in SWC and gardening in dealing with these (80%). There is however also a sense that this is not enough and that peoples' livelihood options are steadily deteriorating. There is a general feeling that more people in the community need to appreciate these problems better and that youth need to be educated. There is a request for support for larger production				



	efforts (field based), for support in RWH storage infrastructure and a call for support for saving the natural environment (grazing, indigenous trees, water) -
<b>Actions:</b> Examples of people showing an increased agency towards increasing their resilience	<ul style="list-style-type: none"> <li>- There are many examples of individuals increasing and diversifying their food production efforts and their soil and water control practices across all six villages</li> <li>- In two of the villages there is a definite move towards broadening the reach of these activities by involving the local and traditional authorities and the will to work towards improved management systems for allocation and management of water sources in the villages, management of natural and riverine vegetation, management of cutting of firewood and also for constructive engagement with the municipal structures around access to water (Botshabelo, Sedawa).</li> </ul>
Examples of increased potential towards resilience	<ul style="list-style-type: none"> <li>- There is a strong push towards diversification of livelihood activities (from gardening to field cropping, fodder production for livestock, small livestock enterprises, grazing management and planting and supply of indigenous trees. Participants feel that if they can engage in all of the above activities that they will be a lot more resilient. There is a request in Lepelle to bring more people on board into commercial fruit production and to increase the management efficiency of these practices</li> </ul>

#### 4.4.2 Project Life Change Questions:

1. *Do we have examples or stories of how we or others are in the process of adaptive management related to CC? (adapt, reflect and respond to....) and examples of what this adaptive management is?*
  - o This is evident in a number of small changes and improvements made by participants in the gardening practices: including mulching in traditional furrows and ridges, making trench beds, mixed cropping, collecting grass and leaves for mulching, use of greywater, making diversion ditches to channel water and planting in and on these, seedling production and diversification of crops in vegetable gardens.
  - o Learning inputs are being tailored by the facilitation team to also be more appropriate for field cropping as participants are finding applying the principles from gardening into their fields a difficult task. They requested assistance with this.
  - o Participants are making small intensive gardens to accommodate for the lack of water.
  - o Some participants have attempted to manage their microclimates, by making windbreaks with grass and feedbags around their small gardens.
  - o The shade cloth tunnels introduced show a huge potential to increase production and all participants with tunnels are using them actively. They are selling small quantities of produce from these tunnels.
  - o A few individuals have volunteered to build their own underground RWH storage tanks to have access to water.
  - o In Mametje learning group participants have formed small subgroups in their localities who meet regularly to discuss issues, exchange ideas and ensure that they know how to implement the new practices.
  
2. *Do we have stories that show innovation or lack of innovation towards positive change? What insights have we gained into how innovation can lead to positive change?(INCREASED RESILIENCE)*

About 65% of participants have tried out some of the new innovations introduced and are able to clearly articulate the potential benefits of these practices. For many however the cost of water does not justify the outcomes of their gardening activities. They feel that what they produce does help with food, but does not help them with increasing their incomes and they still spend more on



production than they make. Many of the older female participants believe that having fresh food available locally outweighs the cost issues and will continue to try and improve their gardening to be able to make a small income from this. For the younger participants- their feeling is more that they are not even prepared to try unless it looks like they will make reasonable amounts of money.

3. *Do we have stories that show evidence of, or an interest in self organisation towards collective action? What insights have we gained into how self organisation can lead to collective action?*

Local facilitators are already playing an important role in bringing people together and providing for collective action, albeit on the level of working in the gardens. They are dealing with conflict in the groups and supporting individuals in their implementation. They are coordinating some collective action in the villages. New members have been joining in the last three months in most of the villages and in a few groups are meeting by themselves to learn and implement together.

4. *Do we have stories to show that learning together is happening or that there is an interest in learning together? What insights have we gained about how to learn together?*

The LFs who have grasped the concept to learning with the participants and working with experimentation as an idea to promote implementation have been very successful - notable Sedawa, Mametje and Botshabelo. Those who have worked within a model of being in charge of the groups and 'ensuring' that they do the right thing have in fact seen their groups dwindle to almost nothing- Willows, The Oaks and Lepelle.

Participants feel that learning in the groups vastly outweighs what they can learn on their own and have set up ways in which they work together. They also feel however that the LFs may not know enough about these new techniques and still value the input of the facilitation team higher than that of the LFs.

5. *Do we have stories of how we and or others are able to think systemically? What insights have we gained?*

The DICLAD workshops have pointed to a remarkable capacity in the community members to make the linkages and realise the larger impacts of actions. It is however hard for them to translate this into ideas about how collective action can change the systemic interactions- or more precisely they do not feel that they can work together on these issues without assistance from the outside.

6. *Do we have stories of how we and or others are able to be inclusive and democratic? What insights have we gained about how this can be achieved? (STAKEHOLDER ENGAGEMENT).*

Some advances have been made in stakeholder interaction in working with other NGOs active in the area towards working together and limited sharing of implementation budgets. Cementing the process around climate change and adaptation has assisted stakeholders to more clearly understand the needs for this cooperation. Lima RDF has agreed to share the learning and training processes and to augment the process where they have specific strengths. They have agreed to be party to the CC adaptation approach and to frame their interventions and discussions in this way and also to support beneficiaries with small grants for provision of more tunnels and drip kits.

#### 4.4.3 Work Plan for 2018.

Continuation of activities depends largely on a renewal contract into 2018. Limited activity is possible from a different grant within MDF under the auspices of the Water Research Commission:

1. Negotiation for continuation of the process through AWARD for the coming year
2. Negotiation of a partnership with the WRC project on community level adaptation to ensure continuation and co-funding of the process going forward (2-3 years) - albeit on a much reduced level of implementation



3. Collaboration with Lima RDF in combining activities across the two programmes- their food security and small business initiative and AgriSI. Training of facilitators in climate sensitive facilitation and implementation of best options for good practices will be undertaken.
4. Continuation of garden monitoring and support for Local Facilitators and learning groups
5. Introduction of new facets such as VSLAs (Village Savings and Loan Associations) and small livestock production activities
6. Introduction of fodder production and management options for livestock.
7. Limited support for a focus on fruit tree production, notably in Lepelle and Willows where participants have requested trees.
8. Monitoring processes are to be put in place for management of the tunnels constructed and also the 3 underground RWH tanks, alongside continued garden monitoring processes. Quantitative measurements are to be undertaken to assess water productivity of some of the CSA practices
9. Village level cross visits for all participants to explore and interrogate the options for tunnels and RWH storage, as well as other innovations introduced.
10. Use of participatory video as a tool to build agency in the villages for CCA activities and communicate successes and issues with relevant stakeholders

## 4.5 Other activities

The second round of DICLDA workshops were conducted between 24-26 October 2017. The participants groups were: Botshabelo (13), Oaks, Finalie, Lepelle (23) and Sedawa, Mametje, Willows (36) A summary report for these activities is provided below in Appendix 1 (7.1).

# 5 Overall Progress of Project

## 5.1 Integration of milestone status.

The table below indicates overall completion of activities according to milestones. Activities are all well on track for completion in December 2017

**Table 6: Milestone target completion October-December 2017.**



## 5.2 Project risk and mitigation summary.

### 5.2.1 Implementation risks and mitigation

- Stability and continuity of learning groups: It is clear now that the local facilitators have had a major impact on the learning groups; in some cases they have grown substantially and interest has increased and in other they have dwindled quite dramatically. This was unforeseen as the intention of the LFs was more to assist individual gardeners with their implementation and do

MAHLATHINI	MILESTONE COMPLETION: target completion to date % (in black) vs actual (in red)						
Key activities / Milestones	MILESTONE 1	MILESTONE 2	MILESTONE 3	MILESTONE 4	MILESTONE 5	MILESTONE 6	MILESTONE 7
Inception report	100% / 100%						
Setting the scene		67% / 65%	100% / 80%	100% / 90%	100% / 100%		
		less coverage, more villages	visioning + final LFs outstanding	Some visioning + 2 LFs outstanding	LF selection and training complete. Additional visioning in Lepelle		
Learning and mentoring		10% / 15%	30% / 40%	50% / 65%	70% / 85%	90% / 95%	100% / 100%
		6 villages not 4	6 villages Some garden mon + LF outstanding	6 villages; continuation with learning schedule; LFs elected in 3 villages	6 villages; continuation with learning schedule; soil fertility and P&D control. Mentoring and garden monitoring by LFs	6 villages; review learning sessions including tower gardens P&D control and CA	6 villages; planning for coming season, introduction of specialist topics requested
Experimentation & intro to innovations		25%	25% / 50%	50% / 75%	75% / 85%	90% / 90%	100% / 100%
		for all 6 villages	6 villages not 4	6 villages	For all 6 villages	For all 6 villages	For all 6 villages
Collaborative work				25% / 40% 6 villages: Introduction to drip kits and tunnels; 3 villages RWH and erosion control options	50% / 65% 6 villages; tunnels, drip kits, greywater management, RWH and erosion control options	75% / 100% 10 tunnels with drip kits constructed, 3 underground RWH tanks (24m <sup>3</sup> ) constructed	100% / 100%
Networking and cross visits				25% / 25% cluster based workshop in good farming practices	50% / 50% Open day: cross visit of all learning groups. World biodiversity day workshop	75% / 75% LF visits to other villages, 2 DICLAD workshops	100% / 100% 3 DICLAD (2) workshops, introduction of new learning group

garden monitoring. A strategy has been put in place to manage the impact of the LFs on the groups. In some villages another process of expansion of groups is required. This will be managed



through the facilitation team and minimising the influence of the LFS. In the other cases, where positive change has been noted, LFs will be supported to expand their work

- Extreme water shortages brought about by the continued dry and hot conditions and further collapse of some of the municipal water provision schemes has put extreme pressure on productive activities. In cases where participants now have to buy water, they have not been able to afford buying of water for gardening, only household necessities. An increased focus on greywater use and management will provide a small amount of relief. In addition the focus on RWH storage and also on water conservation has shown to be advantageous for those individuals who have some access to water. The larger issues of water supply in these villages through government processes are however outside of the scope of this project
- High levels of poverty and food insecurity in the villages have made the introduction of self-motivated action a challenge. There is a huge cry for external support from community members. Many lose interest the moment they realise that free inputs are not forthcoming. In this social climate the response from the individuals in the learning groups has been remarkable and a number of participants have taken on the challenge of improving their lives even under these difficult circumstances. They are to be commended for their courage and hard work.

### 5.2.2 Financial risks and mitigation

## 6 Conclusion and Recommendations

In conclusion, the project is on track to fulfil all deliverable requirements and also to be able to continue and expand into the future.





# 7 Appendices

## 7.1 Appendix 1: DICLAD Modules 2 & 3 with AgriSI stakeholders in the Lower Olifants 24<sup>th</sup> to 26<sup>th</sup> Oct 2017

### OVERALL PURPOSE

To build climate change literacy among stakeholders with regards to climate change adaptation options related to small scale agriculture.

### EXPECTED OUTCOMES

- Re-enforced understanding of climate change impacts pertaining to small scale farming in the Lower Olifants.
- Identification of tenable adaptation options to some of these impacts, particularly those that can be further supported through the AgriSI project and other RESILIM-O projects.

### 7.1.1 Participants

Botshabelo (13)

Oaks, Finalie, Lepelle (23)

Sedawa, Mametje, Willows (36)

### 7.1.2 Recap of concepts covered in DICLAD Module 1

Participants were walked through the concepts covered in the 1<sup>st</sup> Module

Climate change concepts were expressed using temperature and rainfall seasonality charts. Concepts can be summarised as:

- Increased temperatures throughout the year- high certainty
- Overall similar amount of rainfall but over a shorter period of time and more variability (intense rainfall events - storms, floods, droughts) - less certainty.

Participants also went through the five fingers concepts of themes for good agricultural practices and examples of practices for each theme were elucidated. Examples given were:

Water management: diversion furrows, contour ditches, greywater management, small dams, drip irrigation, stone lines, garden beds

Control soil movement: reducing run-off, furrows and ridges and planting on ridges (aloes, sweet potatoes)

Soil health/fertility management: trench beds, eco-circles

Crop management: mixed cropping, mulching, shade for crops, natural pest control, increased organic matter, close spacing, tunnels

Indigenous plants: less burning, planting and propagation of indigenous trees, multipurpose plants (windbreaks, fruit, medicine), careful cutting/ pruning for firewood, rather than chopping down whole trees,

At Botshabelo, the workshop was held at the Local facilitator's home (Meriam Makgoba) and thus we could do a walk through the garden to review some the practices. This added to the examples participants were giving.



Above left to right: Tunnel with mixed cropping in beds for water soil health and crop management; tower garden for greywater management, soil fertility and mixed cropping; Diversion furrow with sweet potatoes, planted on ridges and bananas and paw-paws planted in the furrow for water management and soil erosion control; and an eco-circle with mulching planted to herbs for water management, soil fertility and pest control. Herbs include lemons balm, parsley, mint, rosemary and thyme.



Left: Inlet furrow, silt trap (where Ancois and Sylvester are standing) and underground RWH tank - circular structure with roof.

One of the main points that came from discussing these CSA practices is that most of them cover a number of the five fingers e.g.:

*Underground RWH tanks:* deal with water management and soil erosion control

*Tunnels:* deal with water management by reducing evaporation and temperatures as well as increasing soil water holding capacity, with erosion control by having paths laid out on contour and deep organic beds, with soil fertility through the trench beds and with crop management through providing windbreaks, pest control.

*Tower gardens:* deal with water management, soil fertility and crop management (mixed cropping, intensive planting, pest control)

*Furrows and ridges with cross ties:* Should also have mulching. Deals with

water management by increasing infiltration and reducing run-off, soil erosion control and soil fertility-through incorporating organic matter in the ridges, and adding manure, leaves and mulch to both ridges and furrows.

Participants were then divided into small groups to continue with strengthening their understanding of impact of climate change and to begin to outline potential adaptations that could be implemented.

Activities in small groups:

- Outline impacts
- Choose goals (around 5) of priority changes or adaptation strategies
- Then look at actions/practices to achieve these goals and for those ones we have already tried think about how well they have worked



### 7.1.3 Outlining impacts

Here cards were used from the mind maps created in the first workshop and the small groups briefly reconstructed a mind map, discussing in detail the potential linkages and importance of the issues



Right: A mind map of CC issues reconstructed by one of the small groups from Okas, Finale and Lepelle.

Water is the over-riding constraint in all cases. Although all participants save some rainwater, mostly in 210l drums or large basins, they feel this is not nearly enough and it doesn't last long. In all three sessions the participants felt that storage of large quantities of rainwater was about their only option for having a reliable supply of water, especially if rainfall decreases further. Municipal systems are unreliable and intermittent at best and individual boreholes are too expensive for most and there are already cases of boreholes drying out or salinizing. Greywater is used extensively, but not all participants were aware of options for 'cleaning' greywater prior to use.

Some mention was made also of community members working together and working more cooperatively with Municipalities to increase the efficiency of water supply in their villages. Examples include:

#### SUGGESTIONS:

1. Discussions were held also about improving spring protection in the mountains, that people rely on, as a matter of priority - making small dams with pipes for gravity fed systems, exclusion of livestock and making proper livestock watering facilities.
2. A major priority is rainwater harvesting. Present options give too little water and are expensive (basins, drums, Jojo's..)
3. Using the underground RWH storage tanks, or Jo-Jo tanks, to store water provided by municipalities, to allow for intermittent provision. Also storage of water collected by hand from the river
4. Participants felt that they had no way to access water from the river. They did not seem aware that they could in fact not be allowed to, but were talking more about pumps and pipes.
5. In Sedawa however, participants suggested committees need to be formed to work with allocation of water from the river (a smaller riverbed- dry for most of the year but with water access in the sandy riverbed) and also the municipality.
6. Some groups discussed natural resource management in conjunction with the water management - judicious cutting of trees, saving of riverine vegetation, preventing veld fires and communal management of water infrastructure. They felt that the K2C facilitators could also assist in this process along with traditional structures linked to the learning groups
7. Tunnels featured centrally as helping a lot, as did trench beds and mulching.

### 7.1.4 Botshabelo CSA practices

ACTION	CONSTRAINTS	HAS IT WORKED	FUTURE; NEXT STEPS
<b>GOAL: Improve water use efficiency and increase access to water</b>			
Grey water	White soap build up on soil level, crusting	Yes; works well with trees, but not tomatoes and ibece, where the plants	-More grey water management practices like loosening soil, tower gardens



		become more prone to diseases	Experiment with different kinds of soaps and their effect on plants -try out moringa seed to clean water
Mulching	If it's too dry mulching doesn't work Hard to find enough material	Yes; retains soil moisture and crops look better	-Infiltration pits, -Making compost
RWH : Underground tanks	Not done: lots of labour Expensive	Yes (for few demonstrations). Now it is possible to use multiple sources of water for the tank - rain, river and municipal)	-We should save towards these tanks and maybe implement in a step by step way over time to make them more affordable -On slopes can have gravity fed systems that can also irrigate by gravity -Allows for planning for off season when there is no rain
RWH: 201l drums, basins		Yes; but the water is little and does not last long	
Spring protection		Yes, but only few individuals and limited attempts	-Need to store a bit of water at the springs to feed the pipes -Need water and social management structures to deal with pipes and taps and rules
Boreholes	Too expensive	Yes- some 'richer' individuals- but some are drying up and water yield is sometimes too low to justify costs	Not an individual homestead solution
Farm smaller areas		Yes; participants adapt the size of land they use to the amount of water they are likely to have available.	
<b>GOAL: decrease dry, hot soil</b>			
Trench beds	Hard to find enough organic matter	Yes, many have tried this. Provides for excellent growth of crops and very good moisture retention,	-Planning to do more trenches -Collect the materials when they are available to pack the trenches later
Tower gardens	Need shade cloth and many participants still unaware of this process	Yes; good growth, good use of greywater and easy to do	Buy a big roll of shade cloth together to make it cheaper- making the net available will allow for participants to try this out.
Tunnels/shade cloth structures	Some participants have dug the trenches as requested (3x5x1m) but have not received the tunnel kits	Yes; work very well for crop growth, cooling of soil, water retention, windbreaks, and pest control	-supply more kits as promised -participants can save together to buy the kits which are quite cheap -Train each other in how to construct as there are small





			teams in each village who know how -Perhaps set up a system where participants contribute 50% of finances and MDF or support organisation contributes the other 50%
Soil fertility		Yes; increase organic matter, trenches, tower gardens, furrows and ridges, using more manure	Continue with soil fertility improvement
<b>GOAL: Improve crop productivity</b>			
Growing trees for shade		Yes; a few participants	Plan for afternoon shade as temperatures increase
Liquid manure	Most participants are somehow unaware of the liquid manure. Thought you could not do it without bananas		
Drought tolerant crops	Indigenous fruit trees take too long to fruit and are no longer eaten on a daily basis Mangos are more heat tolerant but need to be well fenced-	Yes; tried the bird resistant sorghum and millet in the CA plots- worked well and participants harvested seed. Indigenous crops and trees such as Marula work well	Plant mangos in furrows to ensure enough water supply as it gets hotter Want more seed of bird resistant sorghum and millet
Pest control; traditional practices (apply powder of dried insects), natural pest control brews, pest repellent plants and mixed cropping		Yes- traditional practices work adequately Marigolds are pretty and work against nematodes and wilting problems in vegetables With mixed cropping see fewer pests and fewer holes in spinach plants for example	Continue with traditional practices Increased mixed cropping Using natural pest control brews in the tunnels - this is enough do not need chemicals.

### 7.1.5 Lepelle, Oaks and Finale CSA practices

ACTION	CONSTRAINTS	HAS IT WORKED	FUTURE; NEXT STEPS
<b>GOAL: Improve water use efficiency and increase access to water</b>			
RWH : Jo-jo's, 210ldrums, basins	Building bigger concrete tanks- Not done: lots of labour Expensive	Yes; short time, too little water	Find types of tanks that use local labour for construction to make it cheaper Store more water Find partners to assist



Mulching		Yes; doesn't work when it's too hot - still need water to break down the mulch	Methods of incorporation of organic matter into soil may work better than mulch
Greywater; drip kits, ash		Yes; but not on food crops. Helps with pests in the soil Bucket filter clogs up over time	-Methods for cleaning greywater
Spring protection	Not for access for everyone- used for religious purposes		N/A
Boreholes; communal and home	Too expensive	Irrigation water in Finale is salty. In Lepelle water quality is good	This is an expensive option, but is easy and reliable Information about how to deal with borehole water of bad quality for irrigation
Minimum tillage	Plough smaller and manageable areas	It works well, it saves water, but might not work without some shading - plants still wilt at some point	Timing, tunnels, decisions to be made by observation
<b>GOAL: soil management</b>			
Increase organic matter; incorporate leaves, crops, ash, manure Trench beds		Yes, but will want to see also how these perform under optimal conditions	Set up these with drip irrigation
Erosion control; contour bunds, diversion furrows		Yes; requires regular maintenance- sometimes they get blocked	Combine this with some of the water and crop management techniques
<b>GOAL: Livestock/ grazing management</b>			
Reduce livestock numbers and plant fodder	We are going to need water	Planting fodder works well under irrigation - good idea as it feeds both animals and people	Find ways to harvest the seed of the fodder species so as to plant again The fodder radish is good for people (morogo) and animals- grows quickly can be a good idea.
<b>GOAL: Improve crop productivity</b>			
Mixed cropping- vegetables and herbs		Yes, fewer pests where mixed cropping was tried Heat tolerant crops: parsley, millet, watermelon, butternut, different types of greens- e.g. the kale introduced Bird resistant sorghum quite good.	Find better ways (and more) to do mixed cropping Do experiments with different heat tolerant crops to check Cross visits to other learning groups to see what they have planted and what is possible Three plantings per year of different greens to have continuity in production
Pest control; traditional practices (apply powder of dried	Do not have access to the plants; chilli and garlic	Yes- only a few people tried, but for those it worked well	Learn more pest control remedies Continue with traditional practices



insects), natural pest control brews, pest repellent plants			Increased mixed cropping Using natural pest control brews in the tunnels - this is enough do not need chemicals.
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This exercise was followed by doing an “Impact matrix “ where we asked the question “How do you decide whether a practices is working, what criteria do you use? And then discussed the overall question of how well did these practices work using those criteria.

Summary of criteria from the three workshops

Botshabelo	Oaks, Finale, Lepelle	Sedawa
Water efficient	Good water management	
Increased soil fertility/ organic matter	Better soil fertility	
Better growth/health of crops	Better growth	
Increased yield	More food	
Cheap		
Easy/labour efficient	Easy to do	
Knowledge		

Oaks, Finale, Lepelle: Impact of CSA practices								
SCALE: 1=low; 2 = medium, 3= high (agreement between participants)								
CRITERIA PRACTICES	Easy to do	More food	Better growth	Good water man	Better soil fertilit y	Score	Rank	COMMENTS
trench beds	1	3	3	3	3	13	5	Very good for growth, soil health and water management. The best practice- but difficult to dig
mulching	3	3	3	3	3	15	2	Less irrigation providing more food
furrows	2	2	3	3	3	13	4	more moisture, better growth, carries some fertility in the water
rock bunds	2	3	3	3	3	14	3	deep irrigation, catches more fertile soil
adding organic matter to the soil	3	3	3	3	3	15	1	easier than trench beds
Crop varieties	1	1	1	1	1	5	7	we do not have the knowledge-but will be easy once we know
Planting times	2	1	1	1	1	6	6	would be nice to have a calendar to remember.

Participants commented on the scores and ranking and suggested that these could be used to decide what practices to start with - such as mulching, adding organic matter to the soil as the quickest and easiest, then moving on to rock bund, furrows and trench beds, and so on.

## 7.1.6 Sedawa CSA practices





ACTION	CONSTRAINTS	HAS IT WORKED	FUTURE; NEXT STEPS
<b>GOAL: Improve water use efficiency and increase access to water</b>			
RWH : Jo-jo's, 210l drums, basins, small dams, underground tanks	Jojos are easy but expensive - in digging for dams labour does not cost so that could help Increases mosquitos	Yes; Small dams have been dug by few- if not lined they lose a lot of water. Water in Jojo only lasts about 1 month- so it is not enough for gardening	Plan to do roof structures and gutters properly If we do joint saving we can work together to buy Jojos There are some challenges with savings groups, but we are used to them from burial societies etc We can harvest water form the road for the underground tanks
Keep riverine vegetation	People are still chopping down trees next to the river for firewood	There is knowledge about pruning trees rather than chopping whole trees	Need to work with traditional authority to ensure we keep riverine vegetation
Prevent veld fires	No		Can work with the traditional authorities and spread the word through our learning groups
Infiltration pits/areas/ reconstructing wetlands	NO	We can get some reeds form other wetlands to get the process going	These are joint activities through community meetings- but there is now more cohesion through the learning groups, so it can be possible
Water infrastructure management	No		Would like to set up an awareness campaign in the area, so that all community members take care of infrastructure
Planting in beds with Mulching Trench beds		Yes; reduces watering form every day to every 2-3 days. Contributes also to soil fertility, carrots grow nice and straight	Provide shade for these beds - potentially using maize stover to keep them cool.
Greywater; drip kits, ash	No- more a supplementary activity when there is no other water	Yes; works at household level in gardens if you use ash to clear the water. The ash residue with soap then goes into the toilet to reduce smells	-Impact not that great, but worth doing.
Irrigation methods		Timing- am or pm to save water	This is a standard practice
<b>GOAL: soil management</b>			
Increase organic matter; incorporate leaves, crops, ash, manure Trench beds, eco-circles		Yes, The new bed types hold water for a very long time if you can start by saturating them. Eco-circles are easier than trench beds and work just as well	Plan for continuity in different circumstances



Erosion control; stone lines contours, diversion furrows	No- not aware of line levels and how to measure contours	Yes; plant just below the stone lines or furrows as there is more water and fertility there. Diversion furrows are good, but difficult to dig.	-If you add infiltration pits below the stone lines it works very well - can plant in that. -It is easier to make furrows and ridges in the garden than diversion ditches -Continue with improved furrows and ridges- on contour, with mulching and planting various crops.
<b>GOAL: Crop management</b>			
Trees in the garden		Yes - afternoon shade is important	
Close spacing - linked to minimum tillage (CA)	No- not many participants are aware yet of this option	Yes; close spacing in field crops gives quick canopy cover - cooler and wetter, it also helps with erosions control and there is still enough air movement	Include bird resistant sorghum and millet as good harvests can be realised from these drought resistant crops. Cowpeas can be harvested twice in a seasons.

### 7.1.7 Learnings

These are summarised in point form below:

- Planting trees for shading crops
- Some trees help with pest control
- We are realizing how most of the things MDF has covered fits into CCA- for example the tunnels
- Some of the practices such as mixed cropping are good; one can see the results you are working towards
- There are good ideas in terms of practices for CC and extreme temperatures- but it is not enough
- We learnt about heat tolerant crops from each other, and also when to plant.
- We learnt about promoting pest predators- lizard hotel
- We learnt about the erosion control furrows and what to plant now
- We learnt about planning according to quick wins (from the matrix that was done)
- Water saving techniques - including tower gardens
- Harvesting water from the road using diversion ditches
- Garden refuse as mulch rather than burning it

### 7.1.8 Future CC actions

- **More focus on access to water (all three workshops)**
- **More CSA techniques and deepening the implementation of the present ones (in all three workshops)**
- **Tunnels and trench beds have worked particularly well (All three workshops)**
- Can grow the dryland crops in summer, but need water in winter for vegetable production
- Can try layers; but cost of feed is an issue and access to clean water. Sunflowers and sorghum can be grown for the chickens. Indigenous chickens are no longer kept - as they are not very productive and destroy crops
- For broilers there are already a number of projects in the area, but can still do this competitively - can do chicken pieces as a value add.
- Need also to deal with livestock - the effects of CC on livestock production
- We shouldn't end here. We tried these ideas under the worst situations (drought) - they may do a lot better now in a better year



- One of the highlights has been the cost-benefit analysis in our learning sessions; where more inputs could mean a much better yield- rather than low inputs and low yields.
- Savings can be introduced
- **Planting calendars: CC based crop choice calendars (all three workshops)**
- -Make a committee to continue to explore options for spring protection and efficient management of water from them.
- Need now to implement the improved erosion control measures that have been introduced.
- Once water is sorted there needs to be more focus on commercial production
- Bulk buying for Jojo tanks- MDF to find potential discount options
- Bring DRD representatives on board with the NGOs already working in these areas (Sedawa) to see if more things can be brought.
- Also work with the municipality - improve the relationship with the councillors and then set up a joint strategy with community and NGOs working together
- NGOs must make sure they keep their promises as community members cannot trust them otherwise
- NGOs need to take more care to help support local produce when catering and also local caterers.

## 7.1.9 Planning for DICLAD-AgriSI Module 3 (2018)

- The following themes were suggested for Module 3.
  - Planting calendars, and how climate change could change these (e.g. should we stop growing maize or look at ways to assist the growth of maize?)
  - Introducing new varieties of crops that are more resilient to the expected impacts of climate change
  - Consider the option of livestock grazing - although this would require a long-term intervention
  - Consider the option of poultry production
- We should include in the design of the process the farmers' own knowledge, namely, changes that they have observed that confirm the reports from the scientists. Information is needed from both sides.
- The following questions were raised which will determine the framing of the project within climate change.
  - We need to consider the following two focus points to guide our activities for 2018.

How is climate change changing *what we can do*, i.e. what options / alternatives we have?

*versus*

How is climate change impacting *what we are currently* doing, i.e. vegetable gardening?
  - Specifically for DICLAD, we need to consider its role.

Is DICLAD used for integration? Then, how can we use it to integrate the science into what we are doing?

*Or*

Are we using DICLAD as a “planning tool”?
  - Overall, we (DICLAD team, AgriSI project manager and Mahlathini) will have to engage in further discussions to clarify the roles and responsibilities of each entity. For example, it was proposed for Mahlathini to focus on implementation at the local level, for the DICLAD team to open up conversations with climate change as the focus point, and for the AgriSI Manager to take on an oversight role and link these two. This still requires further discussion.
- It was proposed to develop learning materials on climate change for farmers - something tangible we can give them. DICLAD has an allocated budget for this. We can consider developing a process next year to design such materials with inputs from the farming communities. The process should be fun and in their preferred local language.



- There was some discussion questioning the usefulness of providing planting calendars to farmers, as these often just re-affirm what they already know. Perhaps the real question is how climate change could impact these planting seasons, and then the repercussion for planning. Also, we need to ask what do farmers exactly mean when they ask for calendars. Would farmers still plant high value crops even when conditions become too unsuitable? What approach should we follow when farmers for example choose to grow irrigated GMO maize which has short-term benefits but in the long-term has challenges with high heat and limited water resources?
- We also discussed the usefulness of sharing technical information on maps related to climate change, e.g. shifts in the geographical areas where maize can be planted. Seasonal forecasts can also be considered, but these are more relevant for dry-land crops and not vegetable gardens (which *always* require water).
- We must encourage and improve information sharing within the clusters. (Reference here was made to the use of bird-resistant millet seed which Mahlathini introduced.)
- We can start by introducing drought-resistant crops. (Mahlathini has used a round-robin process in previous projects to introduce seeds for fruit, vegetables and medicinal plants.)
- We also need to create awareness of resource management at the landscape level, e.g. considering our rivers and trees. This would require the involvement of local Indunas.



## 7.2 Appendix 2: Garden Monitoring narrative report; April- November 2017

A total of 101 garden monitoring forms were completed and analysed from across 6 villages in Mametja (Botshabelo, Lepelle, Oaks, Finale, Willows, Sedawa/MabinsA) by the Local Facilitators since April- November 2017.

An analysis of the garden monitoring forms was conducted according to the number of participants who have implemented various practices; including local good practices, new interventions (new ideas around gardening and S&WC introduced through learning sessions), new innovations (such as tunnels, drip kits and underground RWH storage tanks) and those who have done farmer experiments. Furthermore, an analysis was done according to the five finger principles that is inclusive of water management, soil management, crop management, soil health and, indigenous plants. Each practice is rated according to the traffic lights; green<sup>1</sup>, yellow<sup>2</sup>, and red<sup>3</sup> as to how the participants have gone about implementing the introduced practices.

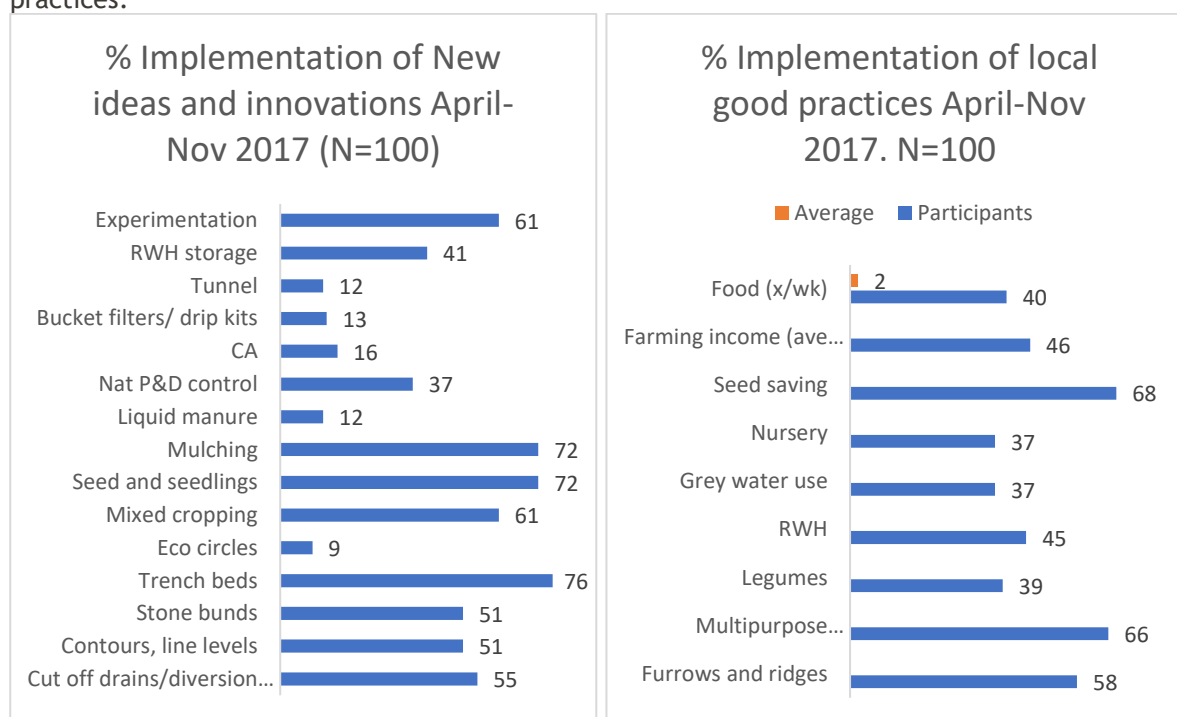


Figure 1 implementation of new ideas and innovation Figure 2 implementation of local good practices

The diagram above illustrates the percentages of participants who have implemented different practices within their homestead gardens, as well as the percentage of local good practices being implemented. Among the new ideas and innovative practices implemented between April and November, from the 100 participants, the majority (76%) of participants made trench beds, followed by mulching, planting from seed and production of seedling at 72%. Individual experiments were undertaken by 61% of the participants. However, some practices were not implemented by that many participants; eco circles (9%), liquid manure (12%), tunnels (12%), bucket filter (13%), drip kit, and CA (16%) were the least (below 20%) implemented practices.

<sup>1</sup> Green traffic light indicates that the participant has engaged and implemented the practice and is doing well with it.

<sup>2</sup> Yellow traffic light indicates that the participant has tried in implementing the practice but is still not doing well with it.

<sup>3</sup> Red traffic light indicates that the participant has not implemented the practice.



Local good practices are being implemented by a somewhat smaller number of participants than the new innovations introduced; Seed saving (68%), multipurpose plants (66%), greywater use (37%), planting of legumes (39%) and small nurseries (37%). On average the participants would eat 2 types of vegetables twice a week from their gardens and 46% of participants make a small income from their produce.

Below an analysis is provided of the specific practices within principles of good management (the five fingers), for each village and learning group. Variations exist in the villages for implementation and uptake of different practices.

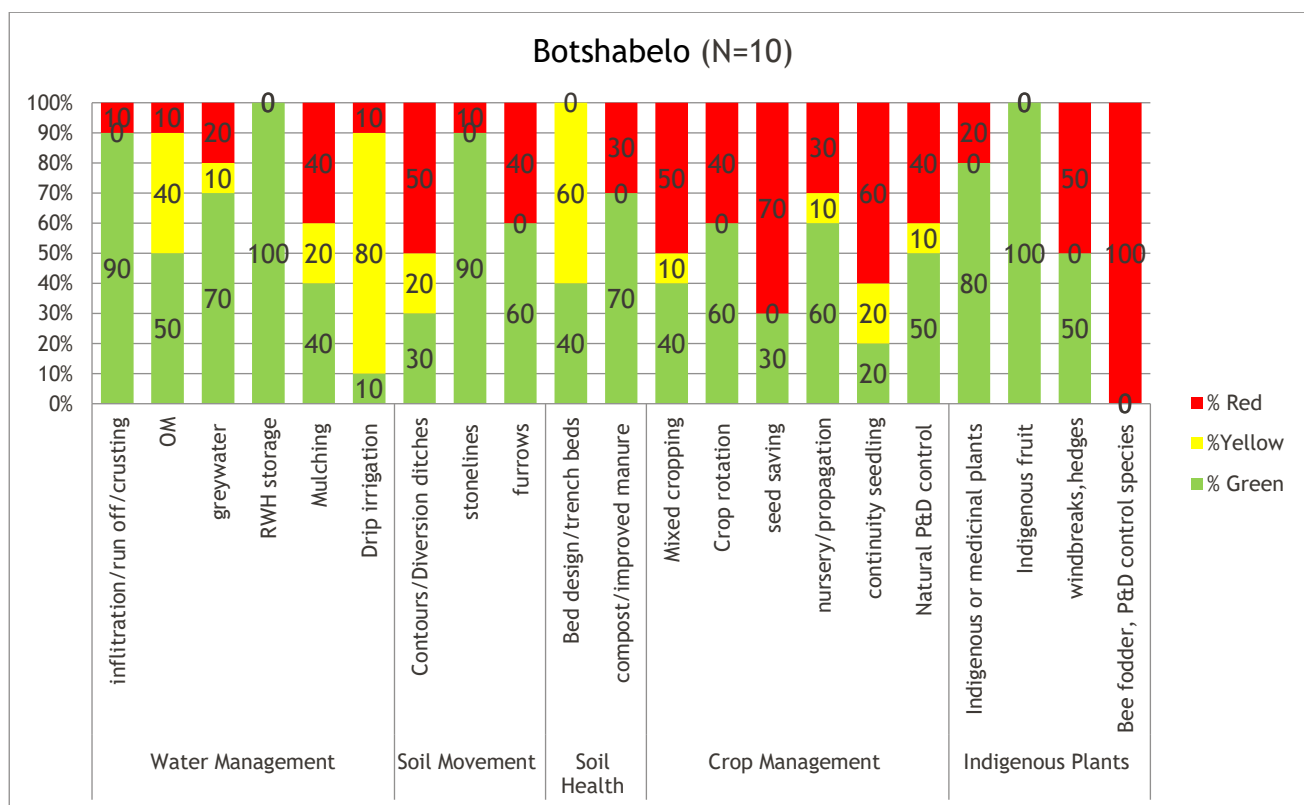


Figure 3 percentage of participants in Botshabelo adopted practices, rated in traffic lights

## 7.2.1 Botshabelo

In Botshabelo 90% of the introduced practices were implemented by the participants. Reported as a green traffic light, 90% (9 of 10) participants have good infiltration and less run-off with no crusting, and 50% of the participants use organic matter. All participants harvest rain water and store in 210 litre drums, this is a very popular and well adapted practice that has always been used in the village. However only 10% (1 of 10) participants have drip irrigation, this is because the drip irrigation is a now technology not so many participants are familiar with it, they use buckets to irrigate their gardens. Indigenous plants and fruits are very much popular in Botshabelo as majority of the participants have; they also serve as medicinal plants. Nine of the participants (90%) have stone lines and 3 (30%) made contours/diversion ditches to control soil and water movement during erosion. None (100% on red traffic light) of the participants reported to have bee fodder as their pest and control disease species; however they make use of the natural pest and control disease remedies such as crushed aloe, onion, black jack and sunlight bar in water. See figure 1 above for more detailed information.



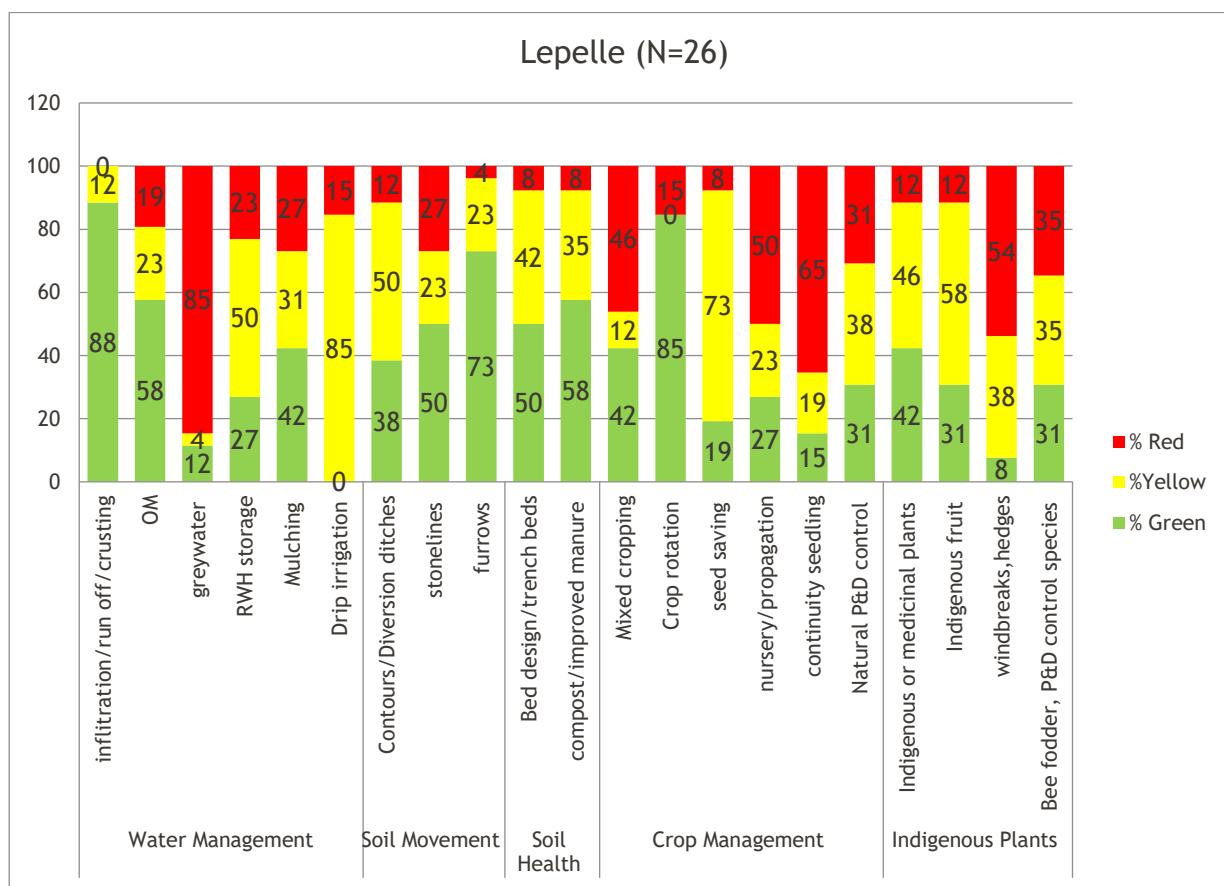


Figure 4 percentage of participants in Lepelle adopted practices, rated in traffic lights

## 7.2.2 Lepelle

Implementation of practices in Lepelle are indicated to be much lower than in Botshabelo. In managing their water, 88% of the participants have good infiltration as they've made use of stone lines (50%), furrows (73%) and banana circles to control erosion. Around 58% of participants use organic matter, trench beds (50%), legumes and plant residues to improve soil fertility (58%), and crop rotation (85%).

Due to the availability of water supply in the Lepelle area majority of the participants do not make use of grey water and do not see the importance of storing rain water. 85% of the participants use buckets and pipes to irrigate because they are not so familiar with the new technology of using drip irrigation.

Participants often save seeds and buy others hence why 73% reported more yellow meaning they try to save seed, 65% (17 of the 26 participants) reported red which means they are not engaged in seed saving and seedling production.

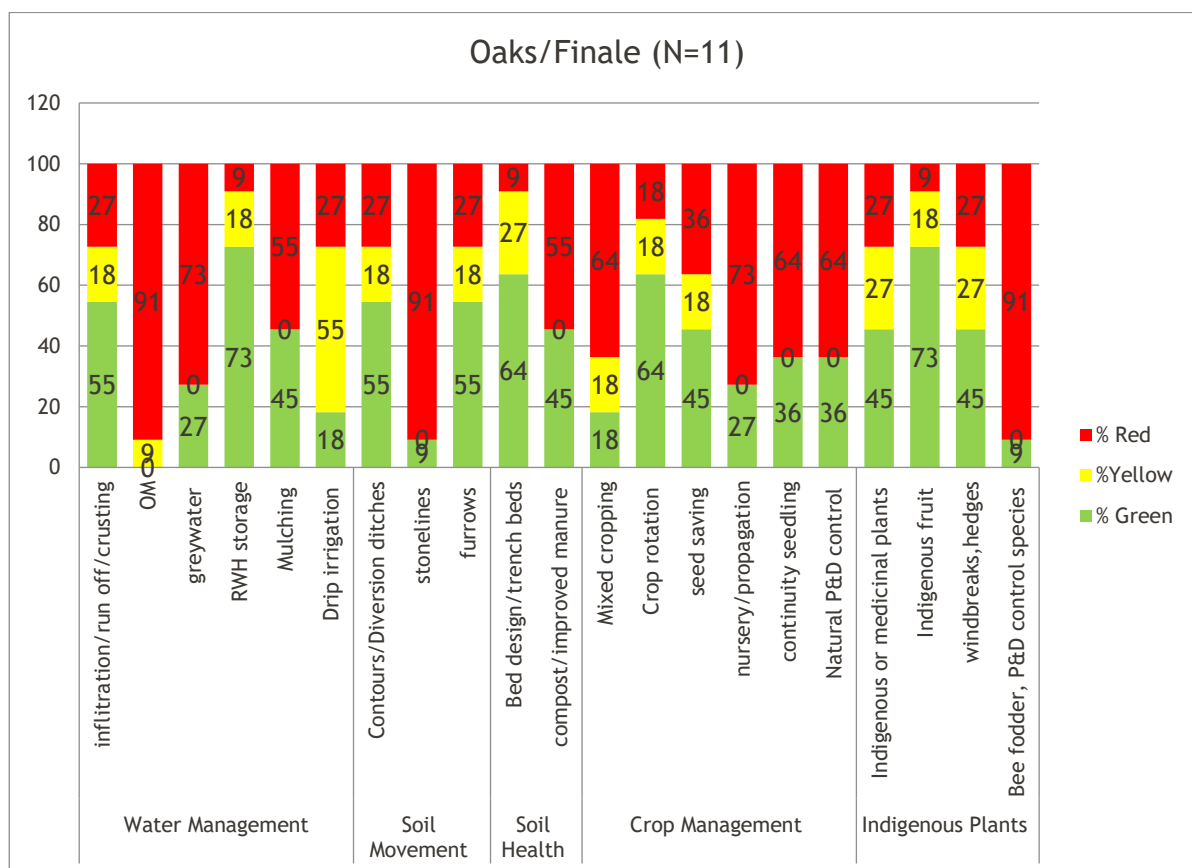


Figure 5 percentage of participants in Oaks/Finale adopted practices, rated in traffic lights

### 7.2.3 Oaks/Finale

In the Oaks and Finale village, only 5 of the 11 participants have adapted the practices introduced to them, this is illustrated by the green on the above diagram. Due to the water shortage in the area 73% of the participants practice rain water harvesting. The leading practices reported on the green are; the management of indigenous plants (73%), trench beds (64%), crop rotation (64%), infiltration and furrows (both reported at 55% on green) implemented by 55% of the participants. Mulching, improved manure, seed saving, and indigenous/medicinal plants are all fairly implemented by 45% of the participants and have been reported on green.

91% of participants here do not use OM and around 9% have made some attempts to include organic matter in the soil. The use of stone lines and planting of species for bee fodder and natural pest and disease control are also low.

Implementation of practices such as mulching, trench beds, furrows and crop rotation is reasonable at around 50-60%

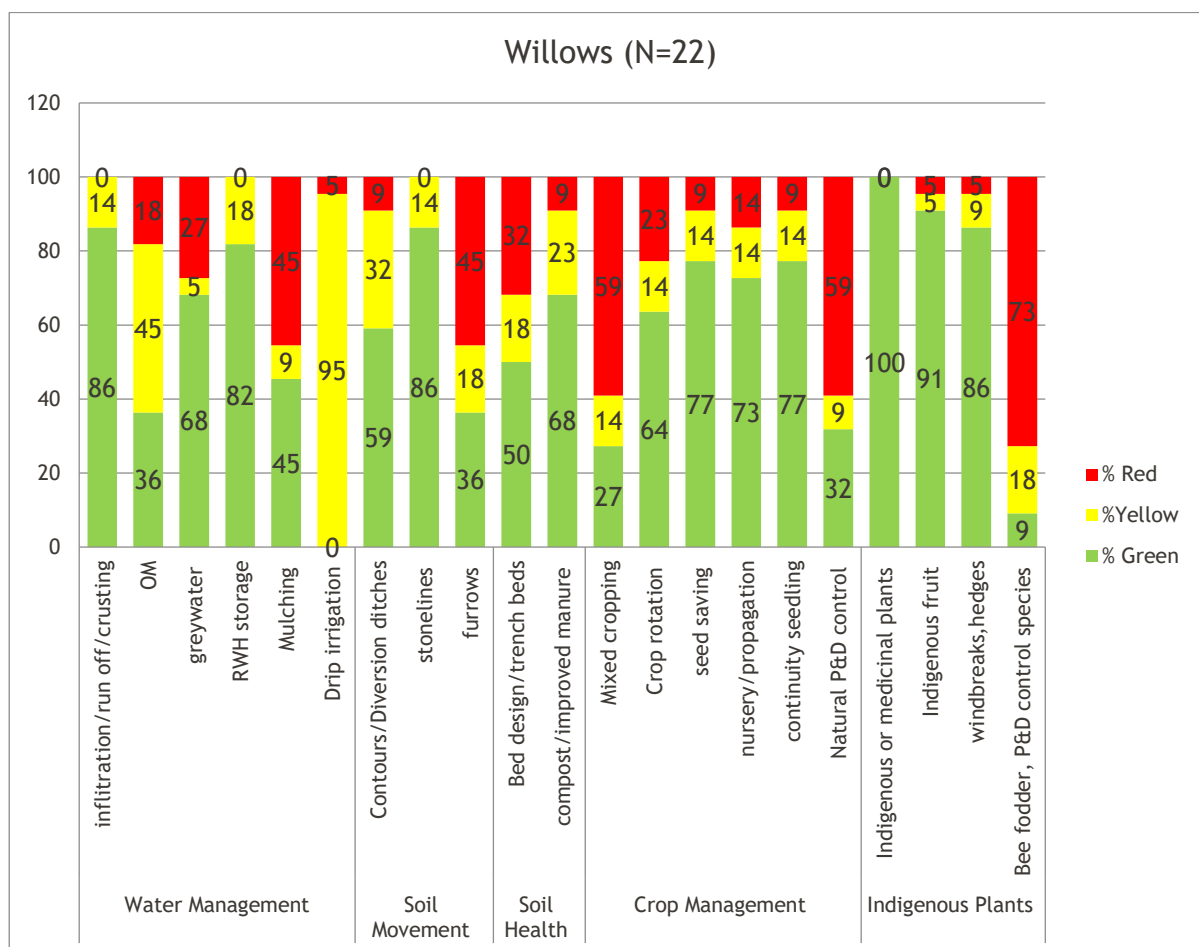
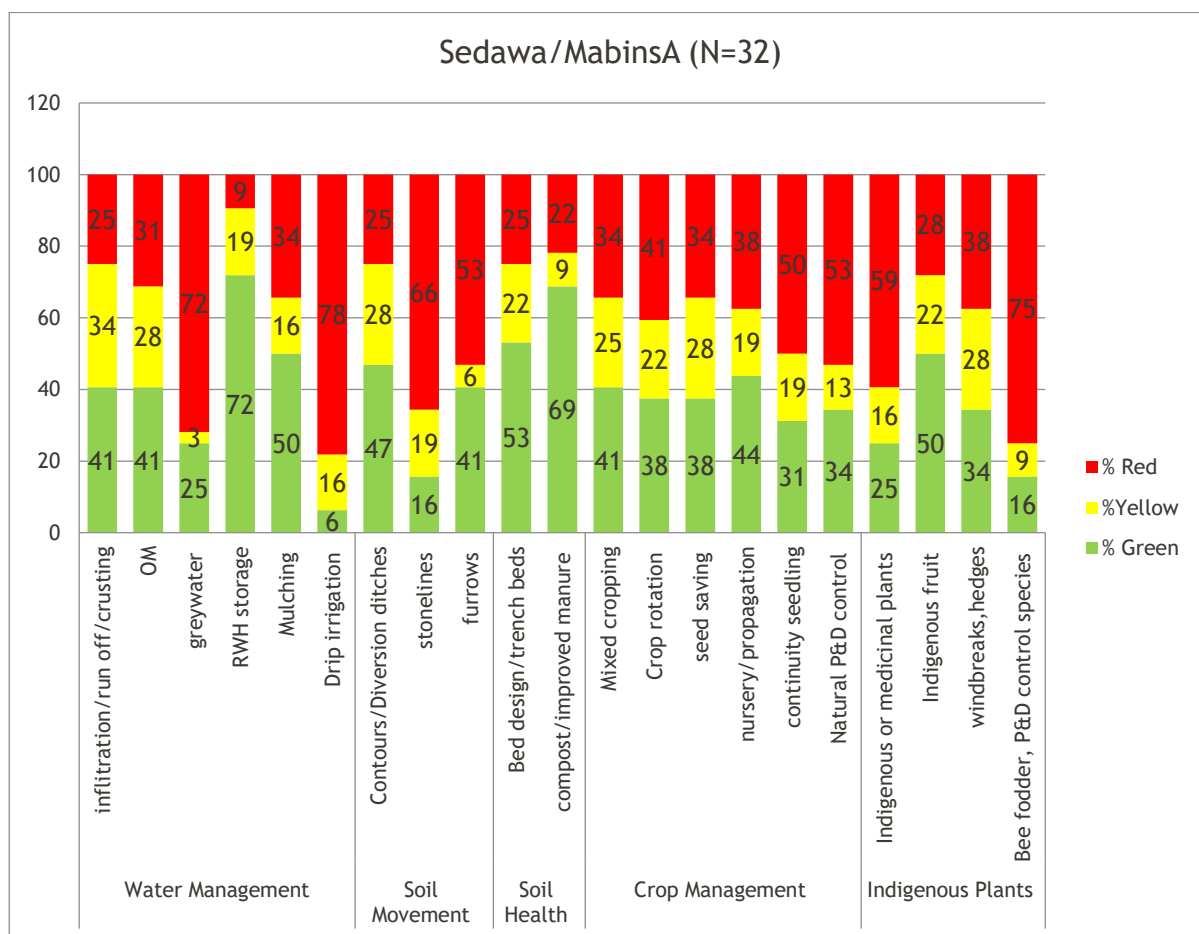


Figure 6 percentage of participants in Willows adopted practices, rated in traffic lights

## 7.2.4 Willows

The chart for Willows for the 22 participants where monitoring was conducted shows a large overall percentage of practices tried by participants. All participants have valued their indigenous medicinal plants as 100% of them have reported as green, followed by the indigenous fruits at 91%. The practices that more than 80% of the participants reported on green and have been implemented successfully in Willows include; infiltration/ less run-off/ no-crusting (86%), rain water harvest storage (82%), stone lines (86%), and windbreaks (86%). Those practices that 50% - 79% of participants reported on green include; greywater use (68%), contours and diversion ditches (59%), trench beds (50%), improved manure (68%), crop rotation (64%), seed saving (77%), nursery/ propagation (73%), and continuity seedling (77%). When compared to the practices reported as red (73%) the bee fodder, P& D control species participants are still new to the practice and have not implemented any bee foders. As well the natural P&D control were 59% of the participants reported as red, possibility because they do not have much pests and diseases in their fields.



## 7.2.5 Sedawa

In Sedawa participation and engagement with the practices is much higher than all villages with 32 participants. Those practices that more than 50% of participants reported as green include; rain water harvest storage (72%), mulching (50%), trench beds (53%), improved manure (69%), and indigenous fruits (50%).

Those practices which a smaller percentage of participants have implemented 3-19% were reported on yellow as an indication that they have tried, include; greywater (3%), furrows (6%), improved manure (9%), drip irrigation (16%), indigenous/medicinal plants (16%), mulching (16%). Stone lines (19%), nursery/propagation (19%), continuity seedling (19%), and bee fodder P&D control species (9%).

These charts provide an idea for each village of how participants see or judge their implementation of practices. It is thus a qualitative indication of how well they think they are doing, rather than an indication of overall implementation.

The value of these assessments lies in being able to pin point areas where further work and mentoring could be required and where further support from the local facilitators may be useful.