Inception report; October- November 2019

PROPOSAL: Agricultural water provision for learning groups engaged in climate resilient agriculture in Sedawa and Turkey villages (Mametja) in the Lower Olifants' region of Limpopo, South Africa.

Figure 1: Discussions with the Sedawa Learning group water committee in August 2019

Background

The Agricultural Support Initiative (AgriSI) was implemented as a sub-grant process by Mahlathini development Foundation within the larger RESILM-O program, funded by USAID and managed by AWARD (The Association for Water and Rural Development) between 2017 and 2019.

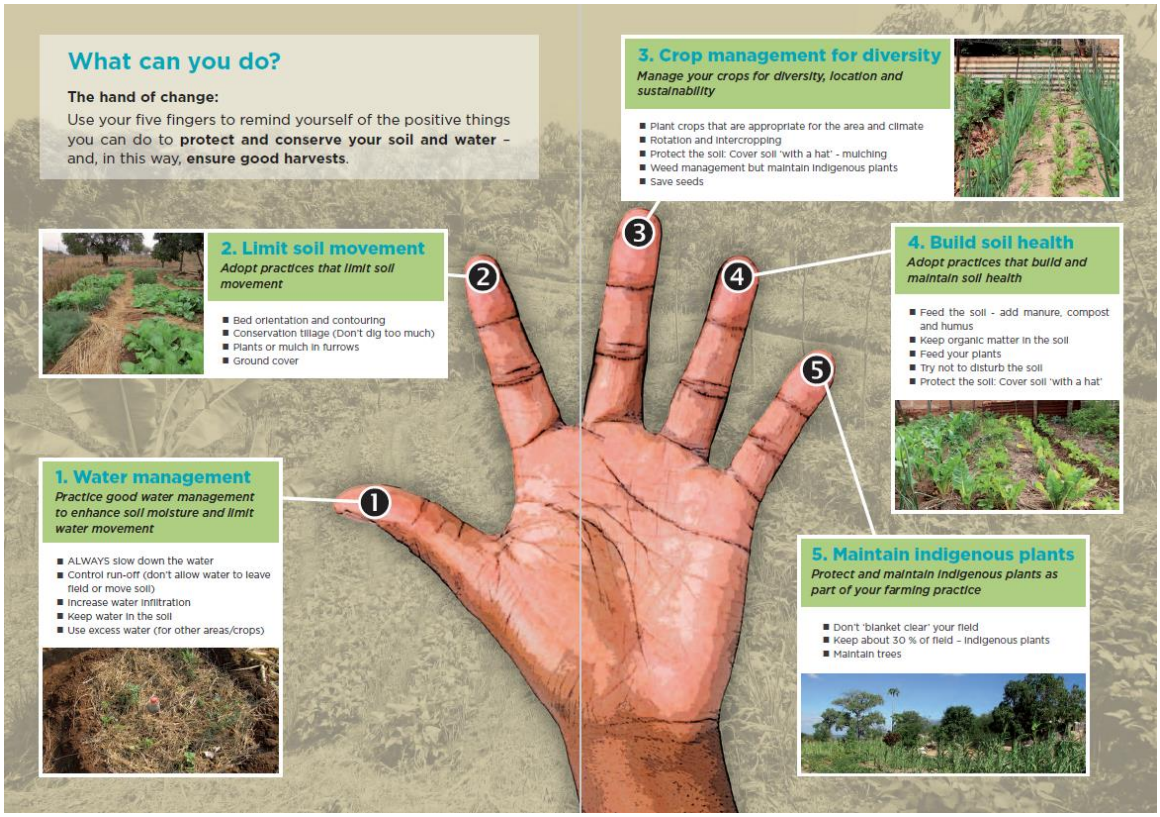
The aim of this support was to enhance the resilience of the people and ecosystems in selected villages (5-7) in the Lower Olifants River basin, using a systemic social learning approach, providing support for increased adaptive capacity and resilience to the effects of climate change for households involved in agriculture in selected communities of the Lower Olifants River Catchment through:

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

Climate change impacts of increased heat (throughout the year) and increased variability in rainfall patterns with associated decrease in water availability, crop failures, livestock mortality and increased pest and disease incidence as well as the decrease in natural resources, were strongly perceived by the participants. The negative impact on participants' livelihoods and the social fabric of their communities was also emphasised.

Baselines indicated a high level of vulnerability of these households with a high dependency on social grants, low incomes (averaging around R2300/ household of 5 members), decreased production and productivity, with little to no livelihood diversification.

Local adaptive measures were grouped around the simple heuristic of '5 fingers' (see diagram below). This means that agroecology practices could be grouped into 5 key categories of water management, soil fertility, crop and seed choices, erosion control and indigenous plant incorporation. Specifically, local adaptation practices included the use of compost basins for planting bananas, planting of indigenous trees, change for dryland cropping patterns, small dams and greywater use.



The five fingers approach categories agroecological practices into 5 main groups.

Adaptive measures suggested and explored included; shade cloth tunnels, drip irrigation, mulching, mixed cropping, trench beds and other beds with increased organic matter and water holding capacity, crop diversification, conservation agriculture (including legumes and cover crops), seed saving, cropping calendars, livestock fodder production, poultry and organic fruit production, soil and water conservation practices, rainwater harvesting, small dams and greywater management and use.

Practices were implemented by individuals and small groups through local level experimentation. Of the **new interventions**, the highest uptake of practices was for trench beds (86%) and mixed cropping (82%); followed by stone bunds (61%), planting from seed (50%) and liquid manure (43%). Mulching levels were low (32%), due to lack of mulching material in the environment. The extended drought, heat and lack of agricultural water supply led to very little natural vegetation being at hand for this practice.

A few practices did not "stick" despite our efforts of introduction and re-introduction of these ideas. These include making eco-circles, which use a bottle drip system and soil and water

conservation practices such as swales, diversion ditches, contours, furrows and ditches and checkdams. The use of natural pest and disease control and conservation agriculture for field crops can also still be improved. These practices are all considered knowledge intensive, as farmers need to internalise a number of different concepts to work well with these practices and additionally have to use their own analysis and judgement in the implementation.

The **new innovations;** shade cloth tunnels (35%), bucket drip kits (35%), rain water harvesting (RWH) storage (*underground RWH tanks, surface reservoirs and small dams)* (24%) and small dams lined with bentonite, were limited to participants who received some financial assistance and those who could afford to try out these practices themselves. It was however considered important to introduce these ideas, due to their potential for impact on resilience.

Local good practice options, show that all the participants have tried some version of RWH, around 76% do seed saving and around 64% engage in propagation of multi-purpose plants, with fewer engaging in greywater management (46%), planting of legumes (38%), construction of furrows and ridges for planting (31%), and construction of basins filled with organic matter to plant bananas (18%).

Livelihoods diversification has been noted as the following activities, directly related to this intervention:

- Increased diversity of cropping for food production and local sales; 66% of participants. Participants have included a wider range of vegetable types for both summer and winter cropping, have expanded their field cropping options and have been growing a range of culinary herbs.

- Organic marketing of herbs and vegetables; 21% of participants.

  With the assistance of Hoedspruit Hub (HH) participants have engaged in an "organic box scheme", managed through a Facebook page at HH. They have also been selling independently to a few lodges, restaurants and farmers markets.

- Processing; drying, milling, juice and bottling; 9% of participants.

  This activity, although considered a good idea, has been quite limited in implementation. Only a few of the inherently more innovative participants have undertaken these activities.

- Diversification into small livestock; 16% of participants

  Two groups of participants linked to learning groups have undertaken poultry initiatives; one for layers and one for broilers – assisted through increased incomes through their vegetable production as well as increased confidence in farming activities derived from their participation in the AgriSi program.

A significant step in improved social agency has been the initiation of water committees within three of the seven learning groups (including 98 participants) to explore and implement water provision systems for agricultural activities.

Learning has been substantial and ongoing and was further supported through cross visits, networking and stakeholder engagement at local and regional levels. A total of around 150 participants have been involved over the project period across 9 village-based learning groups.

Improved resilience has been achieved using the following indicators:

- 86% (N=120) of participants implemented more than 3 climate change (CC) adaptation responses,
- 44% show increased knowledge (using farmer experimentation as a proxy),
- 41% have engaged in collaborative activities,

- 77% have indicated an increased availability of food,
- 56% have indicated an increase in income and
- 30% have indicated an increase in livelihood diversification.

Food production through gardening has increased by 120%, field cropping by 15% and livestock production by 9%. Water use efficiency (access, availability, water holding, water saving) has increased by 45% and participants have indicated a strong sense of improved decision-making capacity and a positive mindset towards their future.

In summary participants have managed to improve and diversify their livelihoods through implementation of CCA practices, collaborative activities and building social agency. They have significantly improved their resilience to climate change.

It is within this context that the learning groups came together to explore options for agricultural water provision. They have been suffering under the yoke of an extreme drought for almost 5 years and combined with a lack of action on the side of government to provide adequate water supply in these villages, people felt the need to act and come up with solutions for and by themselves.

There are springs and small streams still flowing in the higher reaches of the villages (along the mountainous ridges). Here it has worked mostly on a first come first serve basis and there are individuals and small groups who have protected and reticulated springs for household and farming use. Further access to such sources is thus now very limited. In addition, there are many boreholes in these communities, some managed by the Municipality, some by institutions such as schools and cooperatives and some by individual households.

The map below indicates the boreholes in the region and the area in the circle is the Mametja area.

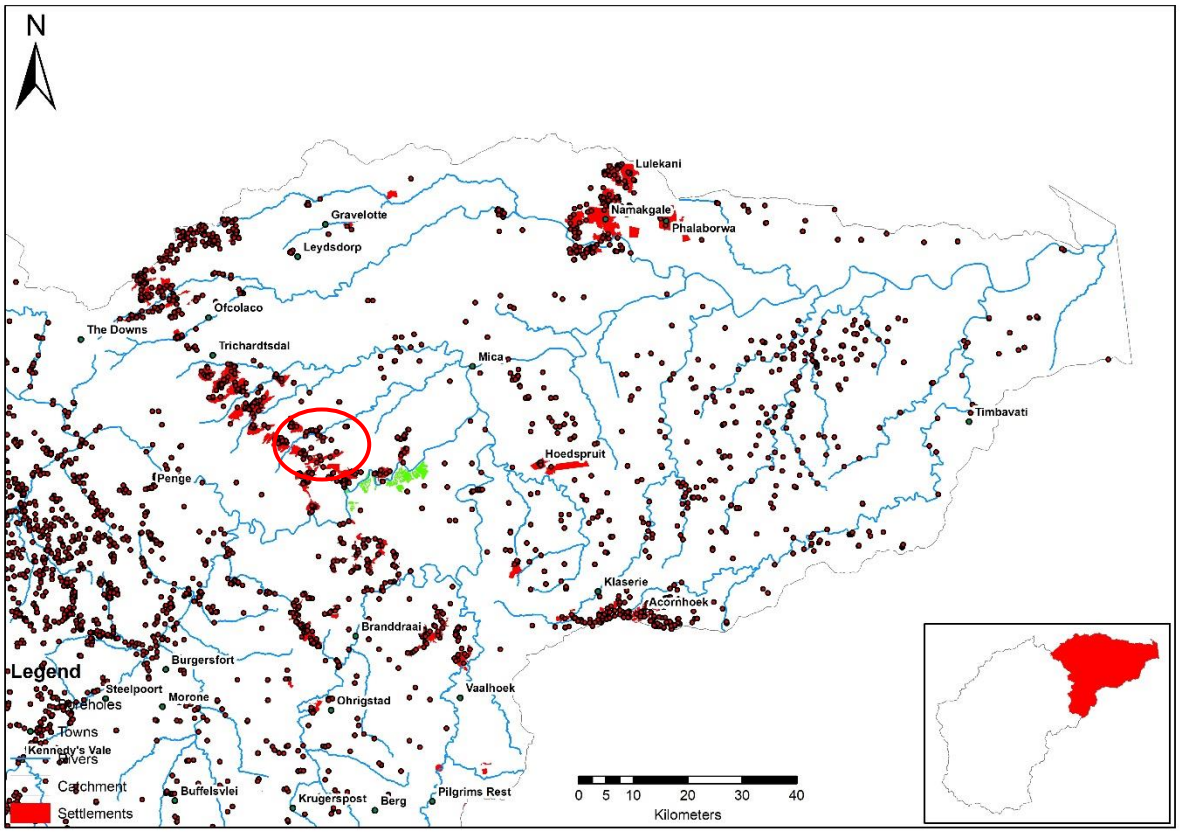


Figure 2: Map of boreholes in the Lower Olifants region 9supplied by Derick du Toit – AWARD)

Although drilling of further boreholes is questionable in terms of overall water management for the catchment, it is also the only option presently available. That is also why working with groups of people to share this limited resource and to put viable and sustainable water management plans and practices in place is so important.

Sedawa

The learning group has divided itself into two – for two different areas to have access to borehole water. There is a final list of 19 participants for borehole 1 and 5 participants for borehole 2. They have collected a total of R17 500 as their initial contribution (around R600/participant); a few households have more than one participant residing there and for one household (Mr Mtshana) payment was doubled for access to water both at his household and at his field.
There are still contributions from a few participants who are now no longer on the list – as they are further away and will not be able to join given the chosen borehole sites. These contributions will be returned to them and some has already been returned.

From the hydrological survey that was conducted by Mr Raymond Vonk, three potential sites were identified. Mr Vonk surveyed the areas around potential borehole sites suggested by the learning group participants, to find the most suitable locations close to where participants wanted the boreholes.
The learning group prioritised 2 of these; firstly, using the criterion of participants who have little to no access to other water for household and farming use and secondly on being able to provide water to the largest number of participants. Thus borehole 1 was prioritised and borehole 2 was prioritized for the people on the other side of river in Sedawa. The third borehole site was too far away to be practical.

Summary of discussions from earlier meetings:

1. Participants need to be clustered around potential borehole sites in a way that makes sense. Those that are too far away will need to be reimbursed – A limited amount of funding has been secured and this will not be able to accommodate complicated works or very long distances. The idea is to keep it simple and work with a gravity fed system to reduce the need for pumping.
2. Pumping would be limited to pumping from the borehole to a heard tank that can feed the household tanks through a gravity fed process.
3. From an exploration of the participants' water requirements, each household needs around 600l of water per day for household needs and another 715l for gardening; THUS **1500l-2200l/ day per household**.
4. It was thus agreed that each household would need a 2200l JoJo tank and that a float valve would be installed to ensure that each household receives one tank of water per day – or per cycle. It was discussed that participants may need to be allocated days on which they would receive water to ensure that everyone receives their allocation – as the borehole may not be strong enough to provide that amount of water to all the participants, every day.
5. Medium to strong boreholes in the area, supply around 60 000l/day with 24hours of pumping. Considering pumping for 10 hrs per day (to accommodate for a solar pump), would mean provision of around 20 000-25 000/day. This means that only 9-11 participants can receive an allocation of 2200l on any one day.
6. The issue of pumping continuously was discussed and participants conceded that boreholes could be pumped dry quite easily and that when this happens the boreholes often do not function properly thereafter. Thus, a period of recharge is important and pumping for only 8-10hours per day is preferable.
7. Community members got 2 quotes from drilling companies that operate in their area and who they consider cheap and reliable; Alexander drilling and Savuki drilling.
8. Alan Malepe, the Maruleng Ward 5 chairperson of SANCO has attended these meetings. The agreement is that they will liaise with the councillor and the LM to get support from the Municipality.
9. It was agreed that participants needed to add another R200, to the R400 they initially collected, as a more suitable contribution. There is a group account that has been opened at the Post Office and Magdalena Malepe has the account statements.

Borehole sites

Upon inspection, both sites are close to small streams/ riverbeds and both are in areas with a lot of public traffic/access. Borehole 1 is right next to a school and is in the middle of a track/small road for vehicle access. Potential for damage/vandalization is reasonably high, especially for borehole 1. For this borehole around 12 of the participants are situated comfortably below the borehole for a gravity fed system. It is possible to pump to a header tank (at Joyce Seotlo's homestead), which would provide access for 18 of the 19 participants. A late entrant, Joyce Mahlaku is situated much higher up the ridge and quite far away (1600m), with added challenges of needing to traverse a large donga and streambed.

Borehole 2 is close to a municipal pump-station which is not in use. The difficulty here is that the borehole is situated on the opposite side of a deep streambed and much lower down than the 5 households that need to be serviced. In addition, these households are all far away – between 1100 and 1900m. It was considered worth exploring an alternative borehole site – as the engineering and pumping for the present option would be prohibitive in terms of cost.

Figure 3: The municipal pump station, not in use, but which participants thought provided an example of the kind of "protection" they would like for their borehole. It was explained by the facilitation team that such a structure is costly and was not budgeted for.

Sedawa borehole 1

A meeting was held with the water committee and the Sedawa learning group to finalise contributions and participants and also to start discussion on some of details of the proposed implementation.

Participants and permissions

The group reiterated that they have permission from the Traditional Authority and that members of the council are also on the water committee. As such they do not foresee problems in the community. They volunteered to take their proposal also to the Local Municipality, both to inform them of this activity and also to provide a letter to request a donation from the Municipality.

One participant, brought on board a lot more recently, Joyce Mahlaku – lives quite a distance away from the proposed borehole site (~1,6km). Her homestead is also at a higher elevation than the site chosen for the header tank and the pipe to her homestead would need to cover rugged terrain (dongas, and eroded streambeds), necessitating metal pipes and construction of a pipe line. This can not be covered within the confines of the present funding. **Joyce Mahlaku will be asked to withdraw and or the surveyor will be asked to site a second borehole from which water can be gravity fed, as a possible solution**

An issue that emerged upon visiting participants, is that the pipes will need to cross both local roads and also properties of participants who are not involved in this process, to get to participants' homesteads. These issues will need to be very carefully considered on a case by case basis and local arrangements will need to be put in place. In addition, the pipes that will be buried alongside the road, will need to be done in such a way as to not interfere with the road reserves, as specific permissions will need to be obtained, which could hamper and delay implementation of this process.

Other permissions that will be required will be from the local Roads Agency, to be able to lay some of the pipes underneath and across the roads. Wayleave applications will need to be submitted and approved, before work can begin and will be inspected by the Agency upon completion.

Figure 4: Christina and Magdalena form the water committee, study the google earth map with proposed participants and pipe layouts to clarify potential options.

In addition, the plans for these boreholes will be lodged with the local Water Service Authority (with assistance from AWARD -the Association for Water and Rural Development), who works closely with this authority (Maruleng Local Municipality). This is mostly a formality, but also the avenue to discuss whether water users' licences will be required for these boreholes. It is presently assumed that the water use will fall under Schedule 1, for which no permissions are required.

"As part of the new allocation system incorporated into the National Water Act, a land owner, or legal occupier of the land, has a right to reasonable use of water taken from an aquifer on that property. This 'reasonable use' is defined in Schedule 1 to NWA as:

- *'reasonable domestic use in that person's household';*
- *'small gardening not for commercial purposes';*
- *'the watering of animals (excluding feedlots) which graze on that land within the grazing capacity of that land'.*

Schedule 1 water uses do not require any permission or registration.
Although an upper limit for Schedule 1-uses has not been set in the NWA, a catchment management agency may in terms of item 2(e) of Schedule 3 limit the taking of water under Schedule 1. For the purpose of applying these provisions, it is assumed that if a person uses more than 10 kilolitres of groundwater per day (10 000 litres/day) for a 'non-commercial small garden', then they are exceeding the limits of Schedule 1, and the water use should be registered" from https://bwa.co.za/the-borehole-water-journal/2016/7/3/to-register-or-not-to-register-permitted-water-use-explained-in-terms-of-the-national-water-act (accessed on 20191107)

Protection of borehole

PARTICIPANTS: Suggested building of a sturdy blockhouse (see Figure 2) to protect the borehole and also suggested collecting rocks to build such a structure.
FACILITATION TEAM: Proposed an alternative solution of creating a small subterranean chamber for the pump and wiring, but to locate the actual pump at one of the participants' homesteads. **This was agreed to. The pump would be situated at Magdalina Malepe's homestead (around 400m away)**

Pump

PARTICIPNTS: Suggested an electrical pump and that participants would pay monthly for pumping

FACILITATION TEAM: Proposed that a solar pump be used and that the panels be paced on a house roof, welded into a permanent frame to reduce the risk of theft. **This was agreed to.**

The limitation of a solar pump, is that pumping can only happen during the day and is also limited in overcast conditions. Participants were initially not very keen on this option. They mostly feared that the solar panels would be stolen., but agreed it is a better option, given that there are no ongoing costs for pumping. The group also suggested that if savings could be made, then perhaps 2 deep cycle batteries could be procured to ensure some pumping in overcast and rainy conditions. **This option will be budgeted in.**

Figure 5: The Sedawa learning group discusses options with support from the MDF field team and an agricultural engineer, Mr Chris Stimie

Fields

In the October meeting, participants started talking about taking the borehole water to their fields. This was not initially discussed- as we agreed on households and gardens. Tour participants; Norah Malepe, Esinah Malepe, Paul Maphoru and Frans Malatji were insistent, even though not all participants in the meeting agreed with this. Some participants felt that they should receive the JO-Jo tank like everyone else and pump to their fields themselves if that is what they want to do. The participants who want water at their fields volunteered to shoulder the cost of extra piping that would be required and that they would manage the water according to the group requirements. **It was agreed to include these fields in the initial survey of distances, but that a final decision would still need to be made.**

Upon inspection the following was found:

- For Norah and Esinah their fields are a considerable distance from the homesteads (`2km), crossing rugged terrain, that includes dongas and streambeds. In addition, neither has cultivated there for some time. In addition, neither of these ladies is presently fully utilising their homestead lots and thus the facilitation team will not recommend taking water to their fields
- Paul and Koko Maphori's fields already has a borehole, which is presently running dry. It is the opinion of the facilitation team that this is because the borehole has been over- used. Again, the team will not recommend taking the group water to these fields, as the allocation is very small compared to the size of the fields under irrigation and as the boreholes present in these fields are not being well managed.
- Fields for Taola Maphuri and Refilwe Mogofe are > 500m away and across rugged ground. This will require metal piping and engineering processes that were not part of the initial understanding of the process.

Digging of trenches/ ditches for laying pipes.

The group agreed to work together on all ditches as a group. Some of the older ladies felt that they would need some assistance with digging (Koko Maphori, Joyce Seotlo, Tamara Malepe, Mpelesi Sekgobelo and Tryphina Malepe) and requested that funding be provided for this. Upon further discussion within the group **it was agreed that those who need help will need to find someone to help them and that this cannot be paid through the funding provided.**

JoJo tanks

The group members felt that they could not afford to buy JoJo tanks on top of the contributions they have given, even though in previous meetings it was agreed that the payment towards water, would need to be seen as an initial payment and that people would probably need to contribute more.

It was agreed that the facilitation team would price a bulk order of JoJo tanks and that the R17 500 already collected by the group would be used towards this cost.

.

Individual boreholes

During the discussions, it became much clearer that a number of the participants in this learning group already have their own, individual boreholes, either in their fields or at their homesteads. A number of these participants have withdrawn from this process, as they in fact already have water. A few however are determined that they should also benefit from this process and voiced that this water would be a back-up for them if their own water runs out and also, that given that they have paid their contributions, they have a right to be part of this process. The facilitation team was not in agreement with this and feel quite strongly that this water should favour those who do not have and those who are too poor to provide water for themselves. In addition, those individuals who do have boreholes are presently "selling" water to their neighbours and the community, providing a further reason why they should not need to be included. This point needs to be discussed further as there was no agreement in the group during the meeting.

Those with individual boreholes include: Christina Thobejane, Mpelesi Sekgobela, Paul Maphori…..will be asked to withdraw from this process by the facilitation team.

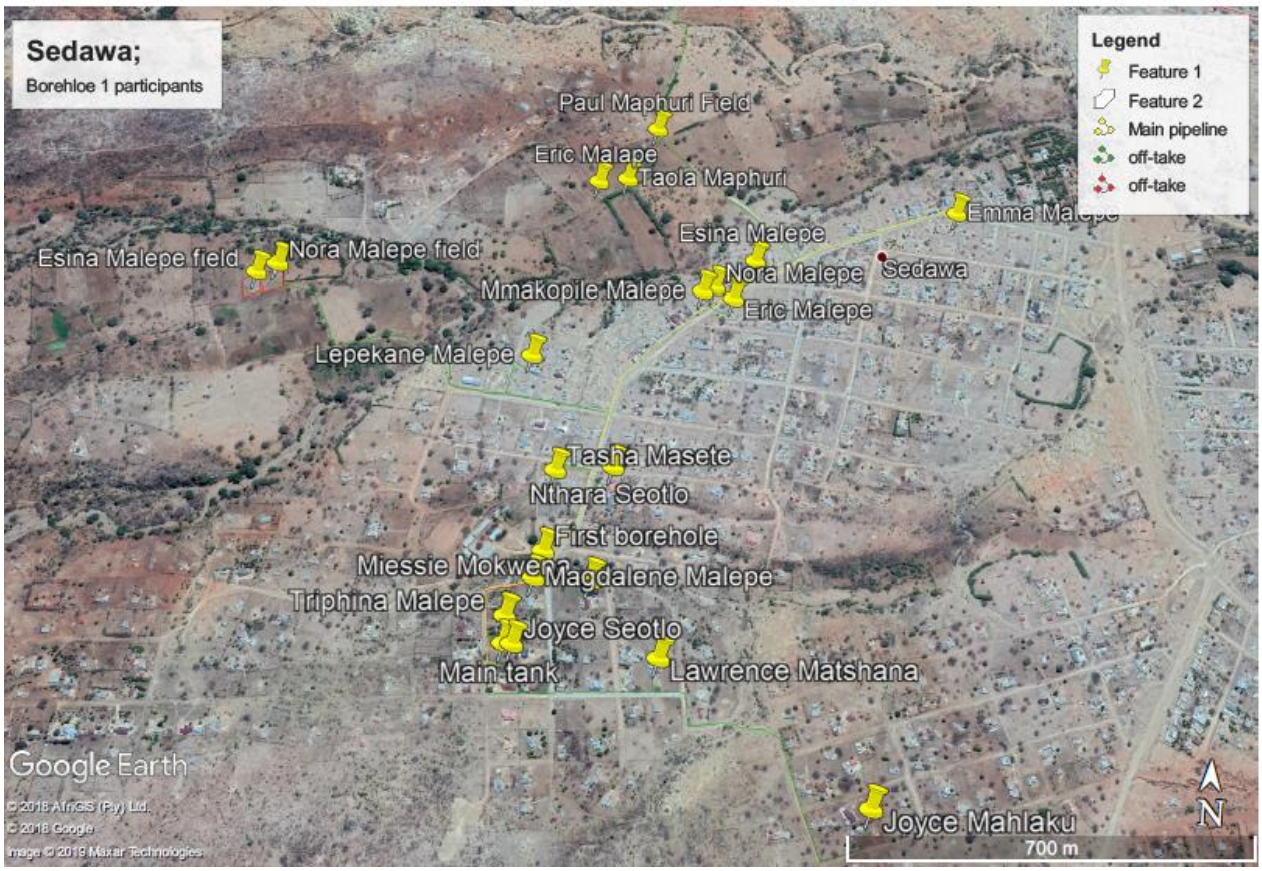


Figure 6: Google earth mapping of participants (with distances indicated.

Sedawa Borehole 2

For this borehole there are presently only five participants, scattered over a wide area, of whom at least two already have their own household boreholes. The surveyor has been requested to resurvey the area to ascertain whether a more appropriate and more easily accessible borehole site could be found as a first step. In addition, those with boreholes need to withdraw and the question as to whether the funding should rather be spent on the bigger group only needs to be considered.

This was done (7 November) and the borehole site was moved across the stream bed. This makes it easier for 4 of the 5 participants as they are all on that side of the river bed. The distances to their houses are however are all close to 1km and at a higher elevation than the borehole. In addition, the landscape is rugged and

eroded, making this process unlikely within the present budget constraints. Given also, that 2 of the 5 participants already have their own household boreholes, alternative options need to be sought here

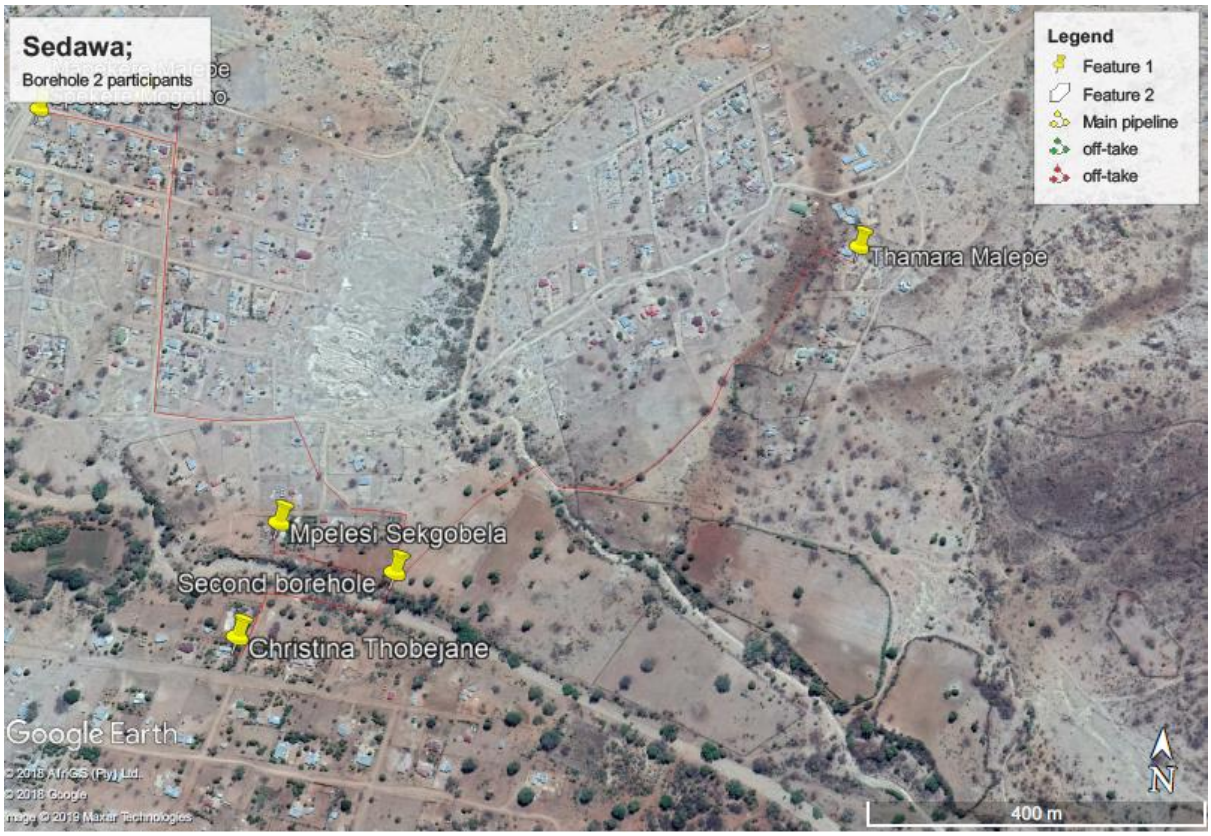


Figure 7: Google earth map of participants for borehole 2 in Sedawa

Turkey

The follow-up meeting was held on 24 October at the Phediseng Centre in Turkey 2
Attendance: 19 participants (Turkey 1 and Turkey 2)
This group started slightly later than the group in Sedawa, but have been somewhat more coherent in their thinking.

Summary of thinking thus far

TURKEY 1: 14 participants. They have chosen a site in the mountains, as the municipality and others who have gone there have found water. Some participants in this group feel that this site is too far away and have selected a 2nd potential site close to the households and the river. They feel there are security issues with a borehole far away and also that digging the ditches and laying pipes for such a distance would be too expensive.

-TURKEY: 13 participants. They have chosen where they think they want the borehole. They considered existing boreholes, whether the site has a high enough elevation for gravity feeding water and whether there are electrical poles close by, in their choice

Figure 8: Two potential sites for the borehole in Turkey 1 and Turkey 2. In both cases participants have chosen options right next to existing boreholes.- which could be problematic. The issues will be decided once the surveyor has been to the area.

The facilitation team re-explained the thinking behind this process for those new participants who have not been involved to date. This came about from community members choosing a water committee to try and solve some of the water issues and collecting of monies, which MDF was going to match in terms of funding. The idea was to drill boreholes and reticulate these to peoples' homesteads for water for household use and gardening. The work would need to be done by the community themselves. Now we have secured a small self-help fund from the US Embassy; around R51 000 for each borehole This covers drilling, header tanks, pumps and mainlines (~1000m and branching lines also around 1000m)

Mr Malatji, the chair of the learning group, who proposed the potential site in the mountains, maintained that the surveyor would make the final decision about the borehole sites. He understands also that if the borehole is in the mountain then using a solar pump would not be possible, as it is far from any of the participants' homesteads.

The participants have an agreement to come together once the boreholes have been dug, to buy JoJo tanks and then evaluate how much water can be obtained from this borehole in a day to be able to rotate the use between the participants, to ensure everyone gets equal amounts without over using the borehole.

The group has informed the traditional Authority and have lodged the lists of participants with them. They felt that getting permissions from the Municipality would not be a problem as the Traditional Authority would negotiate on their behalf. He also stressed that the group would close up and fix and ditches they have made and ensure that the roads are left in a good condition. AN advantage here is that there are no paved roads – all the roads in turkey are basically dirt tracks, where digging and re-surfacing will not pose a problem.

Ditches

The group members will do the digging. All agreed to assist, without any exceptions.

Pump

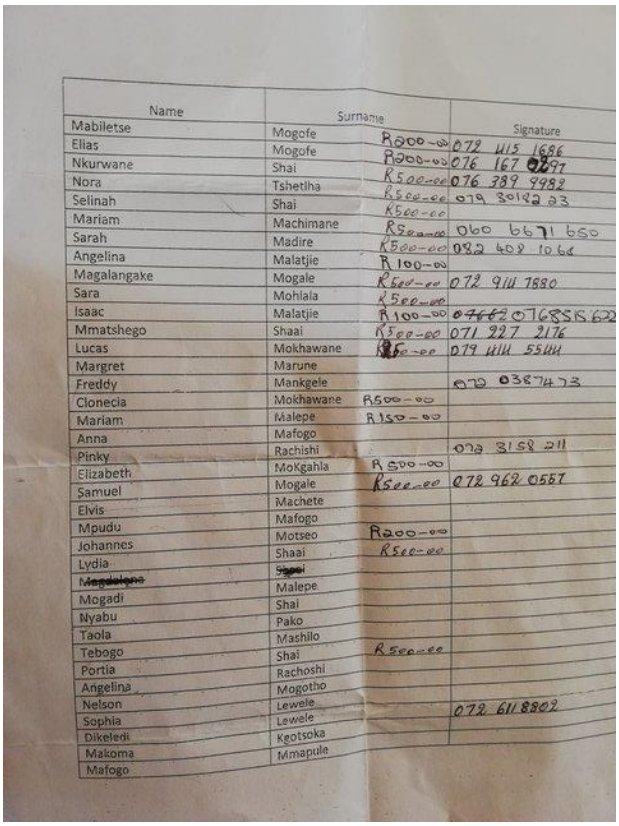
People are expecting an electrical pump and all will contribute every month towards costs. The idea of a solar pump, at someone's household and secured against theft was introduced here as well. Participants agreed readily and also felt that it is a good idea to only pump for 8-9hrs per day, as they can fill their JoJo tanks and then use the water from there. They also understood that there would be little to no pumping when it is raining.

Borehole strength

The facilitation team suggested, given the strength of boreholes in the vicinity that there should be enough water to provide around 1500l/day per household. This was acceptable for the participants.
If the boreholes here in the village are weak, then we will need to consider the mountain- even though at the moment we do not have a budget to deal with that option.
Participants also felt that having two x 5000l header tanks would work a lot better than just having one .

Community contributions

The issue was raised that there are quite a few community members who have adopted a wait and see attitude and have not paid their contributions. It was decided that the two groups of paid up participants would remain as they are and any further participants who would want to be involved would need to form another group



Name	Surname		Signature
Mabiletse	Mogofe	R500-00	072 115 1686
Elias	Mogofe	R500-00	076 167 0297
Nora	Shai	R500-00	076 389 9983
Selinah	Shai	R500-00	079 30182 83
Mariam	Machimane	R500-00	
Sarah	Madire	R500-00	060 6671 650
Angelina	Malatjie	R100-00	082 409 1066
Magalangake	Mogale	R500-00	072 911 7880
Sara	Mohlala	R500-00	
Isaac	Malatjie	R100-00	07662 076855 622
Mmatshego	Shaai	R500-00	071 227 2176
Lucas	Mokhawane	R500-00	079 111 5511
Margret	Marune		
Freddy	Mankgele		079 0387473
Clonecia	Mokhawane	R500-00	
Mariam	Malepe	R150-00	
Anna	Mafogo		
Pinky	Rachishi		079 3158 211
Elizabeth	MoKgahla	R500-00	
Samuel	Mogale	R500-00	072 962 0557
Elvis	Machete		
Mpudu	Mafogo		
Johannes	Motseo	R200-00	
Lydia	Shaai	R500-00	
~~Magalangake~~	~~Shai~~		
Mogadi	Malepe		
Nyabu	Shai		
Taola	Pako		
Tebogo	Mashilo		
Portia	Shai	R500-00	
Angelina	Rachoshi		
Nelson	Mogotho		
Sophia	Lewele		072 6118802
Dikeledi	Lewele		
Makoma	Kgotsoka		
Mafogo	Mmapule		

Each participant was meant to pay R500. Some have paid towards their R500, but have not paid the full amount as yet. The treasurer (Mabiletse Mogofe) has been keeping the money. It should go into the bank, but they have still not done that. Finalising contributions and opening of a bank account is now a priority.

The secretary has recorded R10 500 that has been paid. According to her record sheet alongside – she recorded around R7 900. She will also prioritize updating her contributions list, as some people paid on the morning of the meeting.

What will their contribution pay for?

It was suggested that participants procure their own JoJo tanks. However, those participants who already have JoJo tanks (9 of the 27 participants) felt that they would not pay for others to get JoJo tanks if they di not also benefit.

After some discussion and also incorporating that the group accepts that they want to help the poorer members in the group first, it was agreed that the contribution would go towards piping leading from the mina pipes to their homesteads and that the remainder would be used to buy JoJo tanks for everyone. If the monies are not enough for that, all participants would provide a further contribution. 2200l JoJo tanks will be bought in bulk to ensure the cheapest possible price.

Actions

Thursday 31st October: Mr Vonk will come to survey the chosen borehole sites; Mr Malatji, Mr Mogale, Sarah Madire and Eilzabeth Mohatla will join him
Visit from US Embassy; Friday 22 November… Meet here at Phediseng.
Walkabout to proposed borehole sites (24th October)
Choose a drilling company – start as early in November as possible.

Drilling company

Savuki Drilling is a company that they are familiar with, but they do not really have a preference.