

Report of the In-Scaling of Water Infrastructure Project in the Hanzila Community, Monze District, Zambia

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December 2025



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Acknowledgements

This work was conducted under the CGIAR Climate Action Program. We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund (www.cgiar.org/funders).

Also, we convey our gratitude to the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan for its support. Further, we would like to thank the government officials of Sri Lanka who participated in this event.

CGIAR Climate Action Program

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Citation

Mweemba, C. E.; Amarnath, G.; van Koppen, B. 2025. *Report of the in-scaling of water infrastructure project in the Hanzila Community, Monze District, Zambia*. Colombo, Sri Lanka: International Water Management Institute (IWMI). CGIAR Climate Action Program. 36p.

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Front cover photo: Miyoba 2025

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Summary

In February 2023, the Local Led Climate Adaptation Champion (ACTION) Grant Program, with support from CGIAR ClimBeR, partnered with the Ministry of Agriculture and Monze District Council to implement a solar-powered borehole in Hanzila, southern Zambia. The borehole was completed and handed over to the community in September 2023, marking a significant milestone in improving access to water for drinking, domestic use, gardening, and livestock watering. This intervention addressed long-standing water scarcity challenges in a drought-prone area.

However, an evaluation conducted in 2024 revealed persistent challenges for households located beyond the initial 1 km coverage radius of the implemented solar-powered borehole. These underserved households continued to face difficulties accessing water, prompting a scaling-up initiative that began in September 2025. The extension process was highly participatory, involving community engagement sessions where men and women mapped preferred locations for new water access points. The community also collaborated with a local contractor to support all extension works.

During assessments, it became clear that the first borehole's water yield could not support an additional network. In response, the community demonstrated resilience and collective action by raising funds to drill a second borehole. Households contributed USD 80 (ZMW 2,000) per tap to finance the drilling, and the new borehole was successfully drilled on November 1, 2025. Further, other borehole parts procured through project funds were obtained through transparent procurement of materials and strong community participation in construction activities. Men and women contributed labour and locally available materials to build tank stands, tap points, and cattle watering troughs, reinforcing a sense of ownership and sustainability.

The successful implementation of the extended water supply system highlights the effectiveness of community-led problem-solving, participatory planning, and collaborative resource mobilisation. It also highlights the importance of adaptive strategies in addressing technical and logistical challenges in rural water infrastructure projects. Through these efforts, the Hanzila community has significantly improved equitable access to water, strengthened resilience against drought, and laid the foundation for better livelihoods and food security.

1. Background

In February 2023, the ACTION Grant Program, with funding support from the CGIAR Research Initiatives on Climate Resilience "ClimBeR," partnered with the Ministry of Agriculture and the Monze District Council to initiate an impactful project aimed at enhancing the water supply for the Hanzila community, located in rural Monze District, southern Zambia. This collaboration focused on the development of a solar-powered borehole, which represented a significant step towards addressing the persistent water challenges faced by community members of Hanzila. The primary objective of installing the solar-powered borehole was to ensure reliable access

to water, which is essential for various daily needs, including drinking, gardening, and livestock watering—all important components for the community's sustenance and economic development.

By September 2023, the implementation of the borehole was successfully completed, and the project was officially handed over to the Hanzila community. Following the first year of the borehole's operation, a comprehensive evaluation was conducted to assess its impact on the livelihood outcomes within the Hanzila community. The findings were largely positive, indicating that access to water for essential needs, including drinking, gardening, and livestock water, had been significantly improved for many households.

However, the evaluation also highlighted some challenges that persisted within the community. It was noted that certain households situated farther from the borehole's access points in the initial design, which covered only a 1 km radius, continued to struggle with obtaining sufficient water for their various needs. Others continued to access water for drinking and domestic uses but did not use it for gardening. On the other hand, those who used water for distant gardens had to draw water in huge drums and transport it using oxen and ox-carts to the gardens. These revelations initiated discussions with IWMI partners and local facilitators on the project in June 2025 to secure additional funding aimed at scaling up water supply services by extending the supply lines to better serve these underserved households. The goal of this extension was to further enhance access to water not only for household use but also for gardening and livestock drinking, which would ultimately contribute to improved livelihoods and resilience to the impacts of droughts in the Hanzila community.

This report provides an account of the scaling-in activities for enhancing water supply to underserved water needs, including drinking and domestic uses, gardening and livestock in the Hanzila community.

2. Methodology

2.1 Introduction

The process of extending the supply lines to better serve underserved households was threefold:

- First, a community engagement was conducted to understand the state of affairs two years after the borehole was handed over to the community, including its use and management, as well as technical changes made to the initial design of the water supply system for the Hanzila borehole.
- Second, community engagement to map new locations where the new network of water supply would be implemented, and the new location of taps.
- The third was the engagement of the local contractor to support the implementation of new supply lines to underserved locations to enhance access for drinking and domestic uses, water for livestock drinking and vegetable gardening.

2.2 Assessment of Changes to the Initial Design of the Water Supply System

2.2.1 Participatory dialogue on water access and equity

The process began with engaging the community leader to arrange a meeting with the community. The aim was to better understand whether any alterations have been made to the

initial design of the water supply system for the Hanzila borehole. The aim was also to understand how community members were utilising the borehole for various activities, including drinking, domestic use, gardening, and watering livestock, following its construction.

On June 20th, 2025, the Hanzila community, comprising men, women, and youth, and the IWMI project facilitator came together through a focused group discussion (FGD) to share about changes made to the initial design of the borehole. They also showed their experiences with water access following the installation of the solar-powered borehole.

The FGD was convened in response to a community-wide invitation. Community members highlighted observed changes to the borehole and shared their perspectives on how water was being used for priority needs, such as drinking, domestic uses, gardening, and livestock watering.

Through an open and inclusive discussion, participants, responding to questions from a semi-structured questionnaire (see Annex A), expressed issues surrounding the technical, operational, and social challenges they encountered during the two years of using the borehole. The discussion also focused on understanding the differences in access to water among community members from various locations, specifically those situated closer to the access taps and those situated farther away. This provided a good understanding of the equity and accessibility issues surrounding water distribution and access for the people of the Hanzila community.

While there was no specific limit on attendees, around 40 people attended the FGD. Figure 1 depicts the gathering in the Hanzila community.



Figure 1. Community members of Hanzila discussing experiences post construction of the solar-powered borehole (photos: Carol Mweemba 2025)

In September, another round of interviews was conducted with two groups: one comprising men and the other comprising women, to complement the findings from the initial discussions held earlier in June. The interviews focused on the technical performance of the borehole, maintenance challenges, and community-led solutions. Annex B shows the interview guide that was used to conduct the interviews.

Annex B was also used to interview key informants who were members of the borehole committee to gather their perspectives on governance structures and the management of the water resource, including water use prioritisation.

2.2.2 Transect walk

Following the open dialogue, select community members—both males and females, as well as young people—and the IWMI project facilitator conducted a transect walk in the village to contextualise some of the issues raised during the discussion. This helped to put into perspective the revised designs of the water supply system since its implementation, the additional sources of water people relied on for various needs, and the actual prevailing challenges on the ground, as highlighted during the meeting.

2.3 Participatory Mapping to Extend Water Access Points

Participatory processes were a foundational step in ensuring that community members jointly selected sites to extend the water supply to locations suitable for drinking, domestic uses, gardening, and watering livestock, reflecting their priorities and needs.

The process began with an open invitation to all community members to attend a meeting on September 26, 2025, at a public venue. The invitation emphasised the inclusion of all community members, including men, women, individuals with gardens, and those owning cattle. The purpose of having everyone present at the meeting was to ensure that all voices were included in planning the extension of the water supply system and that everyone felt their contributions were considered.

To ensure balanced representation by recognising different priorities among genders, the facilitators temporarily separated the large group into two groups: one for males and another for females. The temporary division of mapping for water sources allowed each group the freedom to articulate its priorities without the immediate negotiation of dominance by one group over another, a common dynamic in mixed-gender meetings in some cultural settings.

Each of the separated groups was given pieces of paper and asked to map out locations where they preferred to have water access points and pipe routes. The goal was to improve access to water for drinking, domestic uses and gardening. The groups were also asked to map two locations where they believed the water troughs should be placed to improve access for livestock in the community.

Using pieces of paper, women and men separately mapped out locations where they wanted the taps to be situated for drinking, domestic uses and gardening. They also drew locations where they wanted the water troughs for livestock drinking to be implemented.

Women's choices were influenced mainly by considerations such as the proximity of access points to homesteads, ensuring enhanced convenience in accessing water for drinking, domestic use, and gardening. Further both men and women's preferences also prioritised locations closer to homes to have access to water for gardening and to protect their crops from encroachment by cattle.

Figure 2 shows men and women mapping out locations for new sites of water access for drinking, gardening and livestock.



Figure 2. Men and women mapping out locations for new sites of water access for drinking, domestic uses, gardening and livestock in Hanzila community (photos: Carol Mweemba 2025)

After completing the first part of the exercise, a joint meeting was reconvened, where each group was asked to present the priority locations for the access taps of the new water supply extension. Women shared their suggested locations and provided their reasoning behind the choices. Afterwards, men also shared their suggested sites and provided justification for choosing the sites they presented, as shown in Figure 3.



Figure 3. Men and women making presentations about the selected sites of water access for drinking, domestic uses, gardening and livestock in Hanzila community. (photos: Carol Mweemba 2025)

After each group made their presentations, men and women identified both similarities and differences in their choices. There were more similarities than differences in the men's and women's choices of locations for access points. Where the differences were noted, rather than letting the differences in choices become points of conflict, facilitators encouraged the groups to engage in dialogue. The men's and women's groups engaged in dialogues to deliberate and agree on the final sites, ensuring fairness in the site selection process. This stage was also crucial in ensuring shared ownership of the final decision. For example, in cases where one group felt the location should be placed in a location not favourable to the other group, compromise solutions were adopted, such as placing an access point midway between the two initially proposed sites. In some cases, particularly regarding access to water for elderly people and other vulnerable groups in the community, water access points had to be placed closer to their homes to ease access and provide opportunities for gardening activities nearby.

By the time mapping came to a close, everyone in the meeting, regardless of their initial preferences, not only felt represented in the final outcome but also had clarity on where the access taps would be located, how the pipes would be laid, and the exact locations of the water troughs for cattle watering. Apart from promoting equity and equality in access, this process was also essential to ensuring a greater sense of ownership of the project, which increases the likelihood of protecting the infrastructure and ensuring the sustainable use of the water.

2.4 Engagement of a Local Contractor

In the lead-up to the September meeting, several community members proposed that the local leader, along with a few representatives, approach a local contractor known for implementing similar water projects in the area. The purpose for this meeting was to assess his availability and willingness to support the extension of the water supply to underserved areas of Hanzila community.

Following this informal engagement, the contractor agreed to attend a community-wide meeting scheduled for September 26th, 2025, where all members of the community were invited to attend to ensure transparency and collective agreement in selecting the person they would work with. During the meeting, the contractor was formally introduced to all community members, including those who had not previously met him. This provided an opportunity for open dialogue, where community members asked questions about his approach, timelines, and what they could expect during the implementation phase of the project.

After a thorough discussion and addressing all concerns, the community held a vote of confidence to decide whether to proceed with the contractor. The voting outcome reflected

strong community support for the local contractor, and it was collectively agreed that they would be engaged to extend the water supply system.

3. Results – Assessment of Contextual Issues of the Solar-powered Borehole Pre-extension of Water Supply Services

This section presents findings of an assessment to determine whether there had been an alteration to the initial design of the water supply system for the Hanzila borehole. The section also presents findings from an assessment of how community members utilised the water from the borehole for various activities after its construction, aiming to determine issues of equity in water access.

3.1 Modification of Solar-powered Water Infrastructure Post Initial Construction Design

Since the implementation of the solar-powered borehole, only a few modifications have been made. The first change involved extending the supply lines from the main line to two households, which were funded through their own initiatives in 2023 and were not included in the initial design. Initially, the borehole investment covered a radius of only 1 kilometre and included just 10 access taps. Two households approached the borehole committee to request connections to the main water supply lines, bringing water closer to their homes. As a result, these community members now have better access to water, despite initially being disadvantaged by their distance from the water source.

“Only two members of our community who live farther from the access taps, not provided with water the first time the borehole was installed, bought materials for themselves so that they could be connected to the solar-powered borehole, to which the committee agreed to connect them to the system”. *Male respondents during the FGD, Hanzila Community*

Furthermore, other households located closer to those who extended the water supply also benefited from this resource, as they were able to access drinking water and for domestic uses more easily due to reduced distance from the project’s allocated taps closer to the solar-powered borehole and those situated in the 3 ha land.

While the majority of those remaining without access expressed a desire to extend supply lines closer to their homes, they faced challenges in procuring the necessary materials. They considered a difficult year, marked by drought after the borehole was constructed, to be a significant setback. This caused financial strain because many people were unable to harvest rainfed crops to sell, which limited their ability to fund improvements to their water access.

In addition, many households, particularly poorer ones that could not afford to extend supply lines, faced significant limitations in accessing water from the solar-powered borehole. They often had to rely on neighbouring communities or limited water sources, which constrained their ability to maintain gardens and meet their daily needs for drinking and domestic use. These households have been prioritised during the scaling-up phase of water infrastructure to improve access to essential water for drinking and domestic purposes.

The second modification involved changing the direction of the solar panels to maximise energy storage. The community noticed that the pump worked well only at certain times of the day when the sun's energy was highest and hit the solar panels most. This was only part of the day of sunshine. After observing this, the borehole committee called a local engineer to examine the system and advise whether any adjustments needed to be made to maximise solar energy for pumping water. The local engineer advised that the community needed to shift the solar panels to an angle that would enhance sunlight to hit the panels for a more extended period of time in a day. This change was made, and the community reported an improvement in the pump's pumping capacity after enhancing the solar energy.

“We noticed that the pump only worked well when the sun was at its peak, and only for a few hours. So the committee members called an engineer to have a look at the system, and it was discovered that the solar panels were not put at the right angle, and adjustments had to be made”. *Male respondents during the FGD, Hanzila Community*

3.2 Uses of Water from the Solar-powered Borehole in Hanzila Community

The solar-powered borehole in Hanzila community primarily serves the community's drinking and domestic needs, as well as gardening and livestock watering. Annex C was used to collect statistics on the different uses of water in the Hanzila community, including drinking, domestic, gardening, and livestock uses. The succeeding sections show different access needs for water supply in Hanzila community.

3.2.1 Access to water for drinking and domestic uses

Access to drinking water and domestic uses remains one of the primary benefits of water from the solar-powered borehole in the Hanzila community. Out of an estimated 500 households in Hanzila, approximately 200 rely on the solar-powered borehole for their drinking water needs and other domestic uses.

In terms of actual headcount of people benefiting from the current establishment of the solar-powered borehole for drinking and domestic uses, the total number of people in the Hanzila community is 1,632. This includes 257 women, 175 men, and approximately 1,200 children (Tables 1 and 2).

However, approximately 300 households still do not benefit from the solar-powered borehole.

Table 1. Number of households using water for drinking and domestic uses in Hanzila community

Description	Estimated number of households using solar-powered borehole for drinking and domestic uses
Number of households in Hanzila accessing water from the solar-powered borehole for drinking and domestic uses	200
Number of households in Hanzila without access to water from the solar-powered borehole for drinking and domestic uses	300
Estimated Total number of households in Hanzila Community	500

Table 2. Number of men, women and children using water for drinking and domestic uses in Hanzila community

Description	Estimated number of people using solar-powered borehole for drinking and domestic uses
Number of women benefiting from drinking and domestic uses	257
Number of men benefiting from drinking and domestic uses	175
Number of children benefiting from drinking and domestic uses	1,200
Total number of water users for drinking and domestic uses in Hanzila community	1,632

Not many people have closer access to the taps because at the initial design of the network system for the solar-powered borehole, it only covered a radius of 1 km from the borehole. The borehole being situated in the middle of the village meant other people located farther from the borehole did not have closer access to the borehole and therefore carried water on their heads to get water from the nearest taps, while others used ox carts to get water in drums that were stored at home for a few days of use.

Households that lived farthest from the taps or water access points opted to use alternative water sources that were seemingly closer to their homestead. They used a nearby hand pump, an old source that had not been operational for many years but had been recently refurbished by the Roman Catholic Church, although it still yielded very low water volumes. During the assessment, the borehole was undergoing repairs due to poor water yield, and in most cases, water would not come out despite several attempts to pump. It was suspected that the rings in the borehole had collapsed or that the borehole was nearing dryness.

Other households situated farthest from the taps of the solar-powered borehole still accessed water from boreholes in the neighbouring villages. This was the standard practice for accessing drinking water during both the rainy and dry seasons.

3.2.2 Access to water for drinking and domestic uses

During the rainy season, the solar-powered borehole was not used heavily for gardening activities. The majority of people stopped growing vegetables situated both on the 3 ha piece of land and those at homesteads and concentrated their farming activities on rain-fed crops, such as maize, groundnuts, and sweet potatoes. A few households, approximately 20, who continued gardening activities, mostly growing tomatoes and kale, relied on rainwater collected through shallow ponds and also water from a weir in the south-east part of the village.

Although the beginning of the rainy season had some promising rainfall, midway through, the amounts of rain reduced, causing dry spells. During this period, people who had gardens resorted to accessing water from the solar-powered borehole to water their gardens. A similar situation was experienced for rainfed crops in large fields. People, especially those whose fields were closer to the access taps, began watering parts of their maize fields with water from the borehole to avoid losing their entire crop to the dry spells. However, most maize and groundnut fields are situated in the outskirts of the villages; therefore, people cultivating in these areas did not benefit from using water from the solar-powered borehole to mitigate their crop losses.

On the other hand, others obtained water from a weir located on the outskirts of the village, using ox carts to transport water to their gardens for vegetables and maize fields. This was a tedious task, and people were only able to cover smaller portions of land to water their fields.

By mid-April, the weir had dried up completely, and it was no longer usable. Figure 4 shows the dried weir, where people collected water for their gardens and maize fields to mitigate crop losses from the dry spells experienced during the rainy season.



Figure 4. Dried-up weir (mid-April) where people obtained water for their gardens during the rainy season (photo: Carol Mweemba 2025)

At the beginning of May, when harvests for maize were done, a few more households resumed tending to their gardens. At that time, the community had almost 60 gardens belonging to households, individual women and men and some owned by young people, both men and women.

The assessment conducted from June 2025 revealed that there were approximately 20 households with joint or family gardens in Hanzila community using water from the solar-powered borehole. For gardens owned by men only, this number was 14, whereas gardens owned by women only were 9. Young men and women also owned their own gardens, with young men accounting for 9 and young women at 6 (Table 3).

Table 3. Number of households and people using water from the solar-powered borehole for gardening in Hanzila community

Description	Proportion of people with gardens
Number of jointly owned gardens at the household level	20
Number of gardens owned by women only	9
Number of gardens owned by men only	14
Number of gardens owned by youth/young men only	9
Number of gardens owned by youth/young women only	6
Total number of gardens in Hanzila	58

Those who engaged in vegetable gardening mostly focused on growing tomatoes. The assessment revealed that the majority of gardens had tomato crops, as shown in Figure 5. It was reported that the tomato crop fetched a high market value compared to other crops, and therefore, farmers in Hanzila prioritised this crop for sale in markets to earn an income.



Figure 5. Tomato fields in Hanzila community (*photos: Carol Mweemba 2025*)

The water used to water the gardens came from various sources. At the beginning of May 2025, most farmers obtained water from the solar-powered borehole because their gardens were situated closer to the access taps, with the majority being located on the 3ha of land owned by the community.

However, a shift was observed soon as vegetables began to grow. Most gardens could not thrive in that location because cattle would often evade the gardens, destroying the crops. The fencing for the gardens was not necessarily strong, as only thorny shrubs and twigs were used to fence the gardens.

As a result of this situation, some households and individuals stopped their gardening activities because they were deemed impractical. Those who continued to maintain gardens relocated them closer to their homesteads to monitor and guard their fields. This means that the 3ha plot, which was initially allocated a significantly higher number of taps for irrigation during the design of the solar-powered project, is no longer compelling. The plot had been abandoned, with only a few people who lived close by using it.

Shifting gardens closer to homesteads made access to water even more complicated for people who continued to maintain gardens. Approximately 30 people, including households, opted to carry water from taps supplied by the solar-powered borehole using oxen and large drums to transport it to their gardens, which were closer to their homes. This defeats the purpose of improving water for people closer to productive locations.

As of September 2025, the community had only 10 gardens dotted in various locations near people's homes, first because of the challenge of carrying water in large drums to water gardens and second, water from the solar-powered borehole had reduced in output due to the pumping capacity failing to meet the needs of the entire community. This was also reported during a community-focused group discussion:

“We used to have almost 60 gardens as a community [...] We now have only 10 functioning gardens benefitting from the solar-powered boreholes due to low water output from the new pump. A good number of us have had to stop or just reduce the sizes of our gardens as the current water pump is unable to meet all the water demands of the community”. *Female respondent during a FGD, Hanzila Community*

To further safeguard their crops, people would often spend nights in the gardens to watch over the cattle and prevent them from entering during the night. Some also created small, makeshift

structures within the garden areas where people spent nights to keep cattle away from the fields.

These different dynamics of life in rural areas highlight the importance of locally led designs in co-creating infrastructure that continues to respond to the community's evolving needs. And above all, it highlights the importance of post-construction follow-up and scaling after some time, to address the evolving issues and situations that emerge.

3.2.3 Access to water for cattle watering

In Hanzila community, about 150 households own cattle. The estimated population of the cattle in Hanzila community is 3,200.

The cattle rely on different sources of water for drinking. During the rainy season, water was collected in a shallow weir on the outskirts of the village, but within a reasonable distance for all community members, which people used for cattle drinking (see Figure 4 above). However, this was a seasonal weir and tended to dry up by mid-April. When this happened, people switched to using alternative options, including the solar-powered borehole, other private boreholes, and distant dams.

From mid-April, when the water from the weir dried up, approximately 1,050 cattle in the community, belonging to over 20 households, began using taps supplied by the solar-powered borehole to meet their cattle's drinking needs. At the time, the village had not succeeded in creating a water trough for its cattle and continued to water its livestock using large basins.

Figure 6 illustrates an example of the basin used to water livestock. At each tap, during the allocated time, people went with their basins and lined up their cattle to take turns to drink water. This ensured that cattle would simultaneously have a drink of water and return to grazing, allowing them to graze without spending too much time watering livestock.



Figure 6. Basins used to water cattle in Hanzila village (photo: Carol Mweemba 2025)

However, the process of providing water for cattle took a long time because only a few cattle could drink water from the basins at a time. Those who found the process tedious, especially those with large herds of cattle, would take the cattle to a distant dam, approximately 20 km from the village, to obtain water for drinking. These were among the 2,150 cattle in the village that did not access water from the solar-powered borehole, but went to drink at a distant dam.

3.3 Challenges with Water Access from the Solar-powered Borehole

The current solar-powered borehole system has been unable to meet all the community's water needs. While it is unclear whether the borehole has a low yield of water, what is clear from the community's perspective is that the pump has a limited capacity to pump the water required to meet all the main water needs, including drinking, domestic uses, livestock watering, and gardening.

“...Currently, the only challenge the community experiences with the borehole is its slow pumping of water. [...]. The initial pump, which was 2 horsepower and was stolen in 2023, had better pumping capacity and was able to fill up the tank to full capacity within a few hours. The replacement that was installed following the theft takes much longer to fill the tank”. *Male respondent during a FGD, Hanzila Community*

Soon after the borehole was implemented, with all parts completely operational, a theft occurred in which the pump, control box, and several other accessories were stolen. The initial pump installed in the borehole was a 2-horsepower pump. When this was replaced, a 1.5-horsepower pump was used. For several months, this did not seem like a problem, especially that from September when the borehole was officially handed over, the months that followed from November until March, it was rainy season and there was no way of knowing how much strain the borehole would take in terms of water needs, because with the rains come alternative sources of water for livestock watering and gardening. When the rains stopped in April 2024 and other sources that supplied water for gardens and livestock dried up, the solar-powered borehole remained an important source of water for all needs. At that point, community members began to notice that the pump's ability to pump sufficient water was failing to meet all their water needs.

The situation of water shortages has been compounded by other villages going to Hanzila to water their livestock. While it inconveniences the community from having adequate water, they understand the challenges their neighbouring villages are facing and continue to allow them to use the water for their animals to drink.

“Unfortunately, we are unable to stop them (other villages) from bringing their cattle to drink water from here because we fully understand what our friends are going through, and we are just fortunate that we have the solar-powered borehole, which changed our narrative.” *Male respondent during a KII, Hanzila Community*

With all the challenges of water, gardens have been most affected, as the village currently has only 10, with the majority of people having stopped gardening due to water shortages. This has contributed to losses of income for some households that were previously realized from the sale of vegetables.

Although the committee was tasked with raising sufficient funds to purchase a larger pump with 2 horsepower, this has not yet occurred.

3.4 Prioritisation of Water Use: Drinking/domestic Uses, Gardening, and Livestock Water

Hanzila community has prioritised some water uses more than others from the solar-powered borehole. Access to water for drinking is priority one in accessing water. Community members were given no limitations on accessing water for drinking and domestic use, and such water could be accessed from the taps at any time they needed it for household purposes, including drinking, cooking, bathing, and other domestic uses.

This is followed by water for livestock watering. It ranks higher compared to water for gardening because the community is located in a very dry region that lacks many alternative sources of water for livestock. Moreover, livestock keeping and ensuring they are healthy has a traditional connotation for the area where people try to preserve the livestock. According to a respondent in a women's focus group discussion:

“The livestock takes priority because that is our cultural identity as Tonga-speaking people, and without cattle, a Tonga is nothing. [...] Cattle are our lifeline in times when we have no other sources of income or nourishment; we can sell cattle to earn money that allows us to feed families. This is why we make it a priority to ensure they have adequate water and are well taken care of”. *Female respondent during a FGD, Hanzila Community*

In previous years, when Southern Zambia, including the Hanzila community, experienced drought conditions, people suffered from hunger due to crop losses, and their cattle died from a lack of adequate pasture to graze and water to drink. Farmers ended up getting desperate and began selling their livestock at giveaway prices to avoid completely losing out on earning any money if all the cattle died from hunger and thirst.

“It was a sorry sight over three years ago when our cattle used to die from hunger and exhaustion from the long distances they used to walk to go and find water to drink [...] we did not even have a chance to sell our cows for meat as the cows just wandered off into the bush and died [...]. If we managed to find a buyer for the cattle, the price would be low as the buyers took advantage of the drought situation, knowing that most farmers were desperate to sell off their cattle to avoid losing everything from death resulting from lack of pasture and sufficient water.” *Female respondent during an FGD, Hanzila Community*

With the availability of water from the solar-powered borehole, cattle are now given priority to drink so that they avoid walking long distances in search of water and therefore save their energy reserves from depleting, seeing as this season, there is a limited amount of pasture, hence the need to allow cattle to rest and not use up all their energy.

“... We ensure that cattle drinks water so that even if we do not have enough grass for them to graze, they have enough water to drink and stay hydrated because now, good grazing pasture has run out in the bushes. If you take a look at our cattle, they still look

healthy even when the pasture is not enough, compared to our neighbouring communities' cattle that do not have water because those look unwell". *Female respondent during an FGD, Hanzila Community*

Furthermore, in nearby communities, it was reported that cattle were still dying due to a lack of sufficient water, and therefore, the Hanzila community prioritised water for cattle to prevent the deaths of their livestock.

Gardening was the least prioritised water use in the Hanzila community. With the water pump at the solar-powered borehole producing limited amounts of water, which is required to meet the demands of people and for productive use, most community members have been asked to reduce the size of their gardens to avoid depleting the water for both human use and cattle. Further, for those that still have large portions that need watering, they have been advised by the water committee to avoid watering their crops when there isn't enough sunlight to boost the pumping capacity of the water pump.

"... We have been told that if there is poor sunlight during a particular day, we cannot water our crops in the afternoon to preserve water for domestic use and livestock drinking and also to avoid leaving the water tank empty for its stability". *Female respondent during an FGD, Hanzila Community*

3.5 Management of Water Resources at the Solar-powered Borehole

For the last two years, the community in Hanzila has maintained a water committee responsible for managing the operation, repair, maintenance, and general management of water use at the new borehole. The water committee has established rules to meet quarterly to discuss the management of the borehole. However, by mid-2025, they had only met a few times since the borehole's implementation in 2023, and there is no proper structure in place to guide the actual dates for the meetings. However, while there is no formal agreement on meetings, other commitments and responsibilities of the water committees, including the operation and maintenance of the borehole infrastructure and the collection of user fees from all users, are ongoing.

3.5.1 Setting the rules for using and accessing water from the borehole

The water committee, in collaboration with the community, has established a structured timetable to ensure equitable and efficient use of the shared water from the solar-powered borehole as shown in Table 4.

Table 4. Schedules used previously and currently to access water for various uses in Hanzila community

Type of water uses	Previous schedule for accessing water for various uses	Current schedule for accessing water for various uses	Major changes observed

Drinking and domestic uses	Throughout the day	Throughout the day – preferably early mornings	No change – access for drinking and domestic uses still happens throughout the day
Gardening	Watered gardens day one, skipped the day that followed and watered on third day	First set: 07:00 to 10:00 hours Second set: 15:00 to 17:00 hours	Watering can be done same day provided one does not water on both times allocated
Livestock watering	12:00 to 14:00 hours	10:00 to 15:00 hours	Time allocated has increased from 2 to 5 hours in day

First, the community agreed that drinking and domestic use of water should take precedence over other uses. Community members have been permitted to fetch water for household uses from any nearby tap at any time, with early morning access especially encouraged to avoid congestion during peak hours.

“... During the community meeting we held, the community voted to say that water for domestic uses and drinking can be fetched early in the morning, and people would be free to come for a refill at any time, as domestic use takes priority”. *Female respondent during an FGD, Hanzila Community*

Allowing people to access water for drinking and domestic use throughout the day, with a focus on the morning, was encouraged to ensure that households had a reliable water supply for drinking, cooking, and cleaning at all times.

Soon after the borehole was implemented, the water committee devised schedules for accessing water for various uses. For example, gardens were divided into different sections for watering, and people watered their gardens on a day allocated to them. They then voluntarily abstained from watering the following day to allow other gardens to water their crops.

Currently, the schedule has been revised. Two times a day have been allocated to watering gardens. From 07:00 to 10:00 hours in the morning, the first set of gardens is watered, allowing crops to receive moisture during the cooler part of the day. Again, later in the afternoon, from 15:00 to 17:00, the second set of gardens is watered. In terms of taking turns, gardens that water in the morning are not allowed to water their crops in the afternoon to ensure there is sufficient water for others who need to use it later in the afternoon. This schedule is currently considered the most plausible way to balance agricultural needs and other water access needs for the community.

While cattle were given a dedicated two-hour window from noon to 2 pm daily to access water from the solar-powered borehole, soon after the borehole was implemented, the schedule for water for animals was also revised to address growing water needs for cattle.

From 10:00 to 15:00, livestock from Hanzila community and neighbouring communities that have started coming to use the water from the borehole are allowed to get water from 10:00 to 15:00 hours daily. The extended period of access has been necessitated because the borehole not only caters to animals from the Hanzila community but also to other animals from nearby villages that come to water their livestock.

3.5.2 Operation, repair and maintenance

In terms of borehole operation, repair and maintenance, some committee members are responsible for day-to-day monitoring to ensure the borehole's condition remains good. They are also responsible for ensuring that people use the borehole in accordance with the set agreements, specifically avoiding overuse and using the water at the designated times. Where they identify a fault in the borehole, they are responsible for coordinating the repairs. Earlier in the year, the challenge with the direction of the solar panels not maximising energy storage was rectified because the committee responsible for the proper operation of the borehole sought local engineers within nearby villages who had the expertise to advise on what to do and repair a solar-powered system.

Furthermore, a few days prior to the assessment, the borehole had stopped working, and a local engineer was again called upon to rectify the problem. The downtime for the borehole was only two days, thanks to having responsible people monitoring the borehole and ensuring that maintenance was prioritised. This was also reported by a key informant who is a member of the borehole committee:

“... Four days ago, the borehole broke down and, like always, we called Mr Maleya, our local engineer based in another village, to come and fix it for us. The borehole was only down for two days and soon after he fixed it, we were able to have water”. *Male respondent during KII, Hanzila Community*

3.5.3 Fees for different water access needs

After the borehole was implemented in 2023, the community agreed that each household would pay ZMW 30 (USD 1.20) towards the maintenance of the borehole in the event of a breakdown. In the recent past, the fees have been revised upwards to address the growing demand for water needs, especially for livestock use, now that other villages apart from Hanzila, get water from the Hanzila community to water their livestock. The assumption is also that frequent pumping of water for long hours reduces the lifespan of the pump and may also cause frequent breakdowns of the borehole; therefore, the community needs to be prepared with adequate funds in case the borehole breaks down.

Currently, households that get water for drinking and domestic uses only pay ZMW 50 (USD 2) per month. Those using water for both drinking/domestic uses and cattle watering pay ZMW 100 (USD 4) every month, and the same amount is paid by households using water for gardening.

“...We agreed that all households with gardens or cattle will contribute ZMW 100 per month, allowing for the establishment of a water management fund to support the borehole's maintenance and sustainability in the event the borehole broke down”. *Male respondent during FGD, Hanzila Community*

The amounts of user fees were determined to create equality in water use, as some households used more water than others. It was assumed that those using more water created more wear and tear on the infrastructure and therefore had to cover a larger share of the cost for repairs and maintenance. These decisions were made during the two community meetings held after the construction of the solar-powered borehole, led by the borehole water committee.

The collections of funds make it easy for the repair of the borehole to be done quickly, within record time, once the borehole breaks down, as exemplified by the recent incident where

people did not wait for funds to be raised but the committee used funds, they have previously collected to buy new cables that had gotten damaged and also pay the person that was fixing the borehole.

While this practice of making monthly contributions has mainly been successful, some households have recently struggled to meet their monthly obligations because they either had to reduce the size of their gardens or stop gardening altogether due to low water output from the borehole. This led to a further decision to reduce the amount for such households to ZMW 50.

“...Unfortunately, some households are unable to pay the ZMW 100 due to the low water output, which has affected their ability to continue gardening. It was later agreed that the amount to be contributed should be reduced to ZMW 50”. *Male respondent during FGD, Hanzila Community.*

3.6 Impact of Solar-powered Borehole

During the community engagement meetings, it was widely acknowledged by women, men, and youths that the solar-powered boreholes had brought significant benefits and positive changes for people in the Hanzila community and the surrounding communities. In the women’s focus group discussion, participants expressed deep appreciation for the solar-powered borehole, indicating that having access to water consistently had empowered them economically by enabling them to earn an income through gardening. They reported that their financial dependence on their husbands had decreased, which in turn had led to fewer financial conflicts within their households.

“... Having this borehole has helped us reduce dependence on men for financial support, as we are now able to make money for ourselves through gardening. [...] Even financial conflicts have reduced in our homes because we no longer have to beg our husbands for money”. *Female respondent during FGD, Hanzila Community.*

Community members also shared that their overall well-being had improved, indicating that they now felt healthier and more confident due to better hygiene and nutrition. Being able to grow their own food and sell the surplus had allowed people in Hanzila to diversify their diets and purchase other essential items, even in seasons when rainfall was poor and maize was scarce.

Young men and women also shared their perspectives on the impact of the solar-powered borehole. They highlighted a shift in behaviour and lifestyle overall. It was reported that many young people had stopped engaging in theft and other illicit activities, as they were now occupied with gardening and could earn money independently. Some youths had even managed to build houses and acquire household items, reducing their reliance on illicit means to gain finances.

“As youths in this community, we have managed to raise funds through gardening and selling vegetables to build houses, purchase household items such as beds, mattresses,

TVs, Bicycles, and many more essentials. Gardening has ended the dependence on parents for financial help among the youth”. *Male respondent during FGD, Hanzila Community.*

The community further noted that livestock from both their village and neighbouring areas had survived recent droughts because of the steady supply of water from the solar-powered borehole, which eliminated the need for long-distance travel to access water.

“...Since we started using this borehole, no cattle had been lost due to water shortages, and the animals remained healthy despite poor grazing conditions”. *Male respondent during FGD, Hanzila Community.*

Results – Implementation of the Extension of the Water Supply Line to the Underserved Area

Following the participatory planning and mapping exercises, the Hanzila community transitioned to implementing the extension of water supply lines.

4.1 Community Efforts to Address Water Supply Challenges: From Initial Proposals to Successful Borehole Drilling

The initial plan to modify the water supply infrastructure involved extending supply lines from the main borehole, implemented in 2023, to the remaining underserved households. The proposal was to have two tanks supplied by the same borehole, but install two pumps in the borehole (at different depths), with each supplying a different tank and subsequently supporting different parts of the community and meeting different water needs. The proposal was also intended to address the challenge of the 1.5-horsepower pump's low pumping capacity, which was found to be unable to fill the initial 10,000-litre tank, let alone fill two 10,000-litre tanks. Having two pumps working simultaneously allows water to fill both tanks quickly, thereby supplying the fields and cattle troughs.

However, when the pump testing was conducted, attempting to fill two tanks, the borehole's capacity proved insufficient. The community then moved on to another suggestion: using a borehole (a hand pump) that the Church had recently refurbished to convert it into a solar-powered borehole. The borehole was also situated on the southern side of the village, where the solar-powered supply lines were not included in the initial design of the 1-kilometre radius. During the community engagement meeting, all households using the borehole were called upon to consent to the proposal, and there was agreement to the suggestion.

However, project facilitators could not consent to this proposal because a church organisation had recently resuscitated the borehole, and proceeding with its use would require obtaining permission, which would take significantly longer. Moreover, there were already complaints of low yield from that borehole, so this was also not a practical option.

With all these suggestions failing to materialise, community members again held another meeting and agreed that the best option was to drill another borehole specifically to supply water for the underserved households. Requesting additional funds from the project was not

possible because the project had no budget allocated for drilling a borehole. Ultimately, community members were to drill a borehole using their own funds, as all other requirements had been met. Several households were committed to selling their cattle. This solution was opposed because some households had few cattle and could not afford to part with any. The community ended up agreeing that instead of selling cattle, several households that would use a single tap, out of the 15 allocated, for drinking/domestic uses and gardening purposes, would raise ZMW 2,000 (USD 80) to contribute towards the drilling of the borehole after consulting with the drilling company on how much it would cost to drill a borehole. This decision was welcomed, and the required funds were raised. On 1st November, 2025, the borehole was successfully drilled.

4.2 On-site Physical Mapping for Water Supply Extension

On-site mapping of the water supply extension was facilitated by the project facilitator, the contractor, and a select group of community representatives, who conducted an on-site physical mapping of the proposed pipe routes and water access points, as shown in Figure 7. The team, guided by the earlier participatory maps, walked the terrain to determine the most practical and efficient paths for laying the pipes. Marking of each access point and expected bends where pipes would make a turn was done by young men digging holes as markers and leaving large rocks.



Figure 7. The team conducting a physical mapping exercise of sites to lay pipes and water access points (photo: Carol Mweemba 2025)

This exercise helped confirm the distances for laying the pipes and identify potential obstacles that needed to be overcome during the extension of the water supply lines. The exercise also helped to ensure that the final layout aligned with the community's priorities for drinking/domestic uses, gardening, and livestock watering.

4.3 Procurement of Materials

Once the physical mapping of the pipe routes and water access points was finalised, the project moved into the procurement phase. This stage involved close coordination among the project facilitator, community representatives, and the local contractor to ensure that all necessary materials were sourced in a timely and transparent manner.

Together, they procured a comprehensive set of materials necessary for extending the water supply system. These included PVC pipes and connectors for the primary and branch lines, a water storage tank and elevated tank stand, a solar-powered pump, solar panels, and cement and construction tools for building the infrastructure. Additionally, components for the water troughs, including reinforcing concrete bases, piping, and fittings, were procured. Figure 8 shows some of the procured materials before they were installed.



Figure 8. Example of some of the materials procured for extending supply lines to underserved areas in Hanzila community (photos: Lubaya 2025)

Working in collaboration with all interest groups represented to procure the required materials ensured that the materials met the project's technical requirements and also improved trust among community members that the process was transparent from the outset.

4.4 Construction of Water Supply System

Once the materials were purchased, the actual implementation of the water supply system was initiated as outlined below.

4.4.1 Assessment of borehole capacity for water supply

First, a pump test was conducted on the newly drilled borehole to assess its capacity to meet the water needs of all underserved households in the Hanzila community. This test was crucial in determining whether the borehole could reliably supply water to a 10,000-litre elevated storage tank, which serves as the main distribution point for the community. The local engineer was on hand to monitor the pump's performance, measuring it in terms of flow rate, pressure, and sustainability over time. The results indicated that the borehole could operate efficiently without risk of over-extraction over time. However, it was still recommended to continue monitoring the pumps' and boreholes' performance after the rainy season in April to assess how the borehole was functioning, especially since the area is typically dry from April to November.

4.4.2 Community collective efforts towards the implementation of the water project

Once the pump testing revealed that the borehole could run efficiently and supply all water needs, the community mobilised to begin the next phase of implementation. During the community engagement meeting, the community agreed to mobilise materials that did not

require purchasing with money, such as sand and crushed stones, to erect the tank stand and build water troughs for cattle.

After agreeing on the materials needed to implement all works, women and men began gathering crushed stones and building sand from nearby dried riverbeds and streams using ox-carts. They heaped them at sites selected for erecting the tank stand, tap stands, and cattle watering troughs. The community also identified a few individuals who would contribute to the project by building a water trough for livestock watering. Two men in the village were selected for that work. The water troughs were built paying attention to the locations identified through the earlier mapping. Two locations, one near the north end of the village and another near the south end, were selected to ensure accessibility for cattle while minimising the risk of animals encroaching on household gardens. Community members worked together to construct durable troughs using both procured and locally available materials. Figure 9 shows ongoing work on developing the water trough for livestock watering.



Figure 9. Construction of the water trough in Hanzila community (photo: Miyoba 2025)

Men in the community prepared the site for the tank installation. They contributed by digging ditches where to place the tank stand and also supported the local engineer in building the concrete to erect the tank. After a day of curing the mortar of cement and crushed stones, the site was ready to erect the tank, and all men in the community helped to lift the tank stand and place it in position. Everyone had to participate because the tank stand was heavy and required enough manpower to put it in position. Figure 10 shows men attempting to position the tank stand during the implementation of the water supply project.



Figure 10. Men in Hanzila community attempting to place in position the tank stand (photo: Miyoba 2025)

In terms of extending supply lines, men in the community took the lead in digging trenches and laying pipes to carry water from the borehole through the main supply lines. For trenching from the main supply lines leading to access taps for multiple homesteads, a group of household owners—both men and women, including members of their households who would use such access taps—grouped together to trench those particular sites.



Figure 11. Men in Hanzila community digging trenches for laying water pipes (photo: Miyoba 2025)

Women also participated in fetching water for the construction. Women also took turns preparing local beverages and food to feed people working on the project, as well as during meetings.

All these efforts to ensure everyone participated were intended to instil a sense of ownership for the water infrastructure. For the Hanzila community, this was a defining moment because it demonstrated solidarity in implementing the extended supply lines for the water project and showcased the active participation of community members, who contributed to the project through their labour.

Conclusions

5.1. Assessment of Contextual Issues of the Solar-powered Borehole Pre-extension of Water Supply Services

The implementation of the solar-powered borehole in Hanzila community has brought improvements in access to water for drinking, domestic use, watering of livestock, and gardening. However, the benefits have not been evenly distributed across all households. While approximately 200 households now rely on the borehole, around 300 remain without direct access due to limitations in the initial design and financial constraints that hindered infrastructure expansion.

Community-led initiatives, such as the self-funded extension of supply lines by two households, show the potential for local solutions to bridge access gaps. These efforts also indirectly benefited nearby households, highlighting the ripple effect of small-scale investments. Technical adjustments to the solar panel orientation further improved the system's efficiency, emphasising the importance of adaptive maintenance and local problem-solving.

Despite these gains, significant challenges persisted. Poorer households continued to face challenges in accessing water. The borehole's limited coverage and reduced pumping capacity also constrained its use for gardening, resulting in a reduction from 60 to just 10 functioning gardens, which were once a source of income and nutrition and have now been deprioritised. This impacted food production and income generation, particularly for women and young people.

Cattle watering remains a critical priority due to its cultural and economic significance, with community members making considerable efforts to ensure livestock hydration is unaffected, even when it means letting go of gardens that contribute to immediate income generation. However, the lack of a dedicated water trough and the community's reliance on basins made the process inefficient for households with large herds. Further, the strain on the borehole was exacerbated by neighbouring communities also relying on it, further stretching its capacity.

Despite these challenges, the community has demonstrated resilience and adaptability through the establishment of a water committee, the implementation of structured water access schedules, and proactive maintenance efforts. The introduction of a tiered fee structure, for example, has enabled the community to maintain the borehole effectively, ensuring timely repairs and continued functionality. Aligning water usage fees with consumption levels has created fairness in the community's water usage, despite some households facing challenges in meeting their financial obligations.

Despite these challenges, the borehole has had a profound impact on the lives of those who rely on it. Women have gained economic independence through gardening, reducing household financial tensions, while youth have redirected their energy toward productive activities, leading to improved social outcomes. The availability of water has also safeguarded livestock during droughts, preserving a vital source of income and cultural identity.

5.2. Implementation of the Extension of the Water Supply Line to the Underserved Area

The collaborative work and successful implementation of the water supply line extension in Hanzila are evidence of the community's collaboration and commitment to enhancing access to water in an area that is primarily prone to dry conditions and has limited rainfall. While the community faced numerous technical and logistical challenges, including limited borehole pumping capacity, failed suggestions, and funding constraints, they did not relent in seeking alternative solutions that ultimately achieved the desired outcome. All this demonstrates outstanding commitment and the ability to mobilise internal resources to achieve one of the most desired resources of the community: water. It is also evident in how community members were willing to part with some of the treasured livestock to drill a new borehole.


Participatory planning, physical mapping, and transparent procurement processes ensured that the extended water infrastructure was both technically sound and socially inclusive. Furthermore, the construction phase demonstrated strong community ownership, with men and women contributing labour, materials, and support to build essential components, including tank stands, tap points, and cattle watering troughs. Community solidarity was reinforced through this process, as well as local capacity for developing and managing water infrastructure.

While this initiative addressed the immediate water needs, there is a need for continued monitoring of the new borehole's performance and sustained community engagement to maintain the system and ensure long-term water security for all community members of Hanzila.

6. Lessons Learnt

The implementation of the extended water supply system in Hanzila offered several valuable insights that can inform future community-led infrastructure projects:

- **Community-led problem solving is effective:** When technical solutions didn't work out, such as having a dual-pump system or repurposing an existing borehole, the community remained committed to finding a solution that works. They came together, explored alternatives, and ultimately raised their own funds to drill a new borehole. This demonstrates how empowering communities to lead decision-making can lead to practical, locally owned solutions.
- **Participation is key in building ownership:** The participatory mapping and planning process helped ensure that the final design reflected the community's actual needs. Because people were involved from the start, they felt a strong sense of responsibility and ownership over the project and had no problem contributing to its success.
- **Transparency builds trust:** The involvement of the community members in the procurement of materials helped to build trust and confidence in the process. It also ensured that the materials met technical standards while keeping everyone informed and engaged.
- **Collective action is key to success:** The project's success was largely due to the community's willingness to contribute labour and resources. Men and women worked side by side, digging trenches, collecting sand and stones, and preparing food for people working, demonstrating that there was unity and shared purpose in enhancing the water supply services for Hanzila community.

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- **Designs should be open to flexibility:** The initial technical plan didn't work as expected, but the community adapted quickly. This highlights the importance of designing projects with flexibility in mind and being prepared to pivot when necessary.
 - **Local skills should be prioritised for sustainability:** The use of a local engineer helped ensure the technical reliability of the borehole and reduced dependence on external support. Tapping into local expertise can be both cost-effective and empowering. Furthermore, for future maintenance needs, the local resource available through the local engineer remains an important asset to ensure that when a problem arises with the borehole, there are no challenges related to not having someone to repair it in a timely manner.
 - **Equity should guide resource mobilisation:** Rather than asking households to sell cattle, which would have disadvantaged poorer families, the community agreed on a more inclusive way to raise funds. This decision helped ensure that no one was left behind.

Annex A. Interview guide to assess technical changes and water use for the solar-powered borehole in Hanzila Community.

1. Management and modifications to the water infrastructure

- After two years of borehole use, we want to know whether Hanzila community has addressed the operational challenges of the solar-powered borehole system. In terms of:
 - operation,
 - repair & maintenance
 - management of the new technology,

Share details about what has happened so far.

- As an in-scaling initiative, we want to analyse design adaptations made by the community that address the limitations expressed in the study of 2024, such as
 - extending supply lines for the few poor households at a far distance to the taps to improve their access to water;
 - adding cattle troughs;
 - or pipes
 - and possibly efficient drip irrigation to irrigation fields.

It is common for communities to continue to redesign public or self-supply schemes to expand opportunities.

- Is the water committee still in place and functional?
- How often do they hold meetings?
- How much money does the community have for borehole maintenance?
- Are payments only made by those using the borehole? Are their proportions based on how much each household pays, or is it equal for everyone?
- How many meetings has the community had since the borehole implementation, and what were the discussions about?
- We want to assess the community's water distribution, including
 - seasonal rotation
 - and the prioritisation across uses (domestic, irrigation, livestock).

2. Gaps in equitable access to water, particularly for the poorer households

- How many households do not have access to water for drinking and domestic uses from the borehole?
- How many do not have access to water for gardens?
- What are the limitations of not having access to water for this?
- Is cost a limitation to accessing water for household and productive uses?
- Are older women, children and people with disabilities facing challenges with accessing water?

3. Small-scale Investment to address identified problems

Based on the participatory analysis of identified issues, this project will facilitate a small-scale investment to improve sustainability and have an additional equitable impact.

- What kind of support do you need to improve access to the borehole?
- What kind of modifications to the borehole will help? Additional pipes, storage, etc?

Annex B. Interview guide to assess contextual issues of the solar-powered borehole in Hanzila community pre-extension of the water supply to underserved households.

Introduction

This interview is designed to gather your insights and experiences about how the solar-powered borehole has been working in Hanzila community over the past two years. We're interested in what has happened since it was implemented in 2023, particularly in how well it has been operating.


We want to hear about any technical challenges you've encountered, how much water it's producing, how maintenance has been handled, and how involved the community has been in maintaining the borehole. Additionally, we aim to understand how the borehole has impacted access to water for various purposes – drinking, gardening, and watering livestock.

Your honest reflections and experiences are incredibly valuable to us as we assess how well the borehole has been meeting your needs throughout the different seasons and identify any areas that could use improvement.

Thank you for sharing your thoughts!

Description	Key Questions
<p>a) General experiences with borehole use: Technical and operational challenges</p>	<ul style="list-style-type: none"> • It's been two years now since the borehole was implemented. Can you describe your overall experience with the solar-powered borehole over the past two years? <ul style="list-style-type: none"> ○ "What actions did users already take themselves to redesign and improve the system technically?" (Talking about households that extended supply to their households – how many households are these and how many are benefiting from their source?) ○ What were some of the technical challenges you faced after the borehole was implemented? ○ Water yield? ○ Breaking down of the water source? What kind of breakdown? How often has it broken down from implementation to date? • How did you resolve the challenges? Who took the initiative to fix the borehole? Did you have to bring in external help? • Who within the community is responsible for organising repair efforts (e.g., committee members, headman, any other)? • Were the challenges communicated to the Monze Council? • In its current state, how do you feel about the ability of the solar-powered borehole to meet the community's needs in both dry and rainy seasons? Drinking, livestock and gardening?
<p>b) Prioritisation of water use:</p>	<ul style="list-style-type: none"> • Last time we heard, how different water users (livestock, gardening and gardening) agree on how water should be shared. <ul style="list-style-type: none"> ○ Can you tell us how that is working now? ○ Is there a formal agreement, rules, or system in place to prioritise different water uses? (e.g., domestic use, agriculture, livestock) • How do community members, particularly women, feel about the fairness of the rules? <ul style="list-style-type: none"> ○ Are there any complaints or suggestions for improvement? • Have you ever experienced a situation where there is not enough water for everyone or all uses?

- How do you handle the situation when there is not enough water for everyone or all the uses?
 - Are some users or uses prioritised over others?
 - Does the prioritisation differ depending on the season (e.g., dry vs. rainy)?
 - How do women versus men view the prioritisation of water use?
 - Are there any differences in the perspectives of women versus men?
 - How are any conflicts regarding water access typically resolved?
 - Can you share an example of a conflict and how it was handled?
-
- c) Management of water the resource**
- Walk us through how Hanzila community manages water usage?
 - How are these rules communicated?
 - How are the rules enforced?
 - Who plays the role of enforcing the rules? Committee members, or other specific people within the community?
 - Is there a community fund or pool where people contribute regularly for the operation of the water system?
 - How was the amount decided upon?
 - Who is responsible for collecting it?
 - What happens if someone is unable or unwilling to contribute? Is there any form of consequence for non-payment?
 - Have there been any challenges in organising funds for repairs? How do you manage the situation when funds are insufficient or there is a lack of financial participation?
 - Do people feel that the financial contributions are fair, or do some people feel overburdened compared to others?
-
- d) Impact of solar-powered borehole**
- How has the availability of water from the borehole affected your livelihood (e.g., farming, water for livestock, household use and drinking)?
 - Has there been any impact on the health and well-being of the community, especially in terms of water quality and availability?
-
- e) Sustainability of the borehole**
- In your opinion, how sustainable is the current system of repair and maintenance in the long term?
 - Are there any risks to its sustainability?
 - Are there any local initiatives or innovations that have helped to ensure that the borehole continues to function well?
-
- f) Lessons learnt and suggestions for future projects**
- What do you think are the biggest lessons learned from the Hanzila project that could help improve future water systems or similar community-driven initiatives?
 - Looking back, what have you learned from the challenges and successes of managing the borehole over the past two years?
 - If you could suggest one improvement for future projects based on what you've experienced, what would it be?
 - Are there any new practices or systems you would like to see introduced to help with the operation and maintenance of the borehole?

- 
- Do you think there is enough community engagement in terms of decision-making and inclusion in managing the water infrastructure project? How can this be improved in future initiatives?

Annex C. Guide used to collect number of direct beneficiaries of the solar-powered borehole in Hanzila Community.

Description	Estimated number people/households
Number of households in Hanzila accessing water from the solar-powered borehole for drinking and domestic uses	
Number of households in Hanzila without access to water from the solar-powered borehole for drinking and domestic uses	
Estimated Total number of households in Hanzila Community	
Number of women benefiting from drinking and domestic uses	
Number of men benefiting from drinking and domestic uses	
Number of children benefiting from drinking and domestic uses	
Total number of water users for drinking and domestic uses in Hanzila community	
Number of jointly owned gardens at the household level	
Number of gardens owned by women only	
Number of gardens owned by men only	
Number of gardens owned by youth/young men only	
Number of gardens owned by youth/young men only	
Total number of gardens in Hanzila	
Number of households with livestock	
Population of livestock in Hanzila	
Number of livestock using borehole water	
Number of livestock not using borehole water	



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