PREVENTIVE MAINTENANCE AND DIAGNOSIS APPROACH IN OFA, ETHIOPIA

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Ministry of Water & Energy

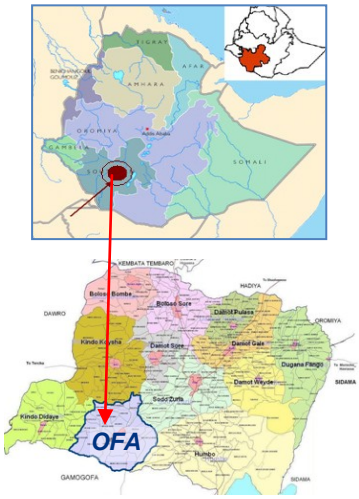
Introduction: maintenance in Ofa Woreda, switching from a curative to a preventive approach

All water supply systems have a limited lifespan and performances decrease over time, especially if maintenance is not regularly undertaken. In Ofa Woreda, most of the users previously regarded maintenance as being necessary only when there was a breakdown and hence they did not implement regular checkups to prevent failure and ensure continuous access to water.

A important precondition before initiating the preventive approach is the necessity to have someone take the decision at the appropriate time (usually once or twice per year) to exhaustively inspect the system.

Only an in depth checkup allows for the dysfunctions to be identified and to anticipate the potential risks of breakdown. **This diagnostic visit is an essential step which then leads to the establishment of an action plan to implement corrective measures**.

Switching from "only solving breakdowns" to "anticipating and preventing their occurrence" is also a more effective way to use the contributions of the users. Intervening after the problem occurs is much more costly than doing regular preventive operations to maintain the system in a correct state and minimize the risks of heavy breakdowns.



Ofa Woreda represents 110.000 inhabitants and is located in Wolayita Zone (Region SNNPR).

The Woreda Water Office is composed of 7 experts and provides services to the water users of about 150 systems (132 gravity systems, 1 motorised, 13 boreholes equipped with hand pumps)

To encourage the adoption of the **preventive approach**, the Water Office of Ofa has worked jointly with the Kebele and the Water Associations to setup routine mechanisms for the review of all water systems. By reminding the communities that it is time to conduct their yearly diagnostic and by supporting them in this process, more than 80% of the communities have maintained their system this year.

The approach of the Woreda Water Mine and Energy Office (WWMEO) of Ofa: *from the diagnosis of the systems to the validation of the maintenance operations*

1. Initial training & appointment ⇩	1. An initial training was first organized by the WWMEO for all Water Associations on the management and maintenance of their water supply infrastructure. During this training, the WWMEO set appointment to the Water Associations to jointly conduct a full diagnostic of their system.
2. Participative diagnostic visit ⇩	2. Each Expert of the Water Office was then assigned to facilitate the diagnostic visits in a group of 4 to 5 Kebeles (= cluster), which corresponds to approximately 20 water points. Each diagnostic was done by the Water Association, with the assistance of the Expert. It focused on the identification of the problems or risks, and the research for possible solutions. Technical check lists were previously created by the WWMEO Experts to facilitate and guide the diagnostic process.
3. Report Recommendations, cost estimation ⇩	3. At the end of the visit, a report, including a set of recommendations, was written by the WWMEO expert and given to the Association (with a copy to the Kebele).
4. Action plan ⇩	4. Based on this visit and report, an action plan was then defined by the Water Association, with the support of the Expert when necessary, to plan the required maintenance operations.
5. Maintenance ⇩	5. For the implementation of the maintenance, most of the operations were directly done by the community, with the support of the WWMEO Expert. But in some cases of operations requiring specific skills, the Water Association had to call the support of local Artisans or local Contractors.
6. Validation	6. Regular visits have then been done by the WWMEO Experts to support the Water Associations, to monitor the operations and to validate that the recommendations raised during the diagnostic were correctly addressed

PREVENTIVE MAINTENANCE AND DIAGNOSIS

Step 1 - Organising participative diagnostic visits

"During these diagnostic visits, the users were usually aware of the problems and dysfunctions. But they were not considering them before, as they often never take the decision to exhaustively inspect their system."

In order to promote the maintenance of the existing systems, the WWMEO Experts have invited all Water Associations members to proceed to a self-diagnostic of their water points. Experts were mainly facilitating and orienting its development by pointing out possible risks and alterations.

Without this diagnostic phase, it appears difficult to get the necessary overview to then plan remedial maintenance actions. The coming of an external actor (here, the WWMEO experts) to remind and to support the Water Associations has significantly increased the dynamic and interest in maintaining the existing investments.

⇨ ***For spring capping with gravity-flow system***, the diagnostic usually focuses on the protection perimeter around the spring, the prevention of infiltrations of rain water in the spring box, the state of the doors and overflows, the need of antierosive and protection measures around the spring and the pipeline, the absence of leakages in the pipeline, the correct burial of the pipes, and the state of the water point and the slab. The yield regularity is controlled and users are asked if they feel any changes in the quality of the water. If there are any doubts, the diagnostic should point out the need to conduct water quality analysis.

⇨ ***For wells or boreholes equipped with a hand pump***, particular attention is done on the fencing, the cleanness and conditions of the platform, if there are cracks on the apron or the headwall, if the cover is well sealed and that there is no infiltration, if the drainage is correct and eventual soak away pits are cleaned. The pump is controlled to check if any unusual noise is noticed, if the pump stand is shaking, if the flow and water quality is normal, if nuts are correctly tied, when the pump model has a chain if it is regularly greased, if rods and wearing parts are in good conditions.

Step 2 - Setting clear recommendations

After the diagnostic phase, the role of the WWMEO experts was to make clear recommendations and help define the priorities. Depending on the severity of the observed problems, four categories were used to present the recommendations:

Two experts (right side) conducting an interview of water scheme's users during the diagnosis in Okoto Sore 1

The cleanness of the system: typically, the cleaning operations belong to the regular maintenance (+/- once per month). It corresponds to cleaning the inside of the spring box, emptying and cleaning of the cattle through, cleaning the slab of the water point, greasing the pump ... The diagnosis may point out an absence of a regular cleanness of the system and assess how remedial organisational actions can be taken.

The protection of the system (preventive maintenance): commonly, the protection of the spring area (fencing, drainage at the upstream, protection wall, reforestation, antierosive measures to protect the spring box, antirust painting of the door), protection of the line (mainly with antierosive preventive measures), fencing of the water point, greasing hand pump chain, tightening nuts...Such measures can usually be managed directly by the community as they do not require skilled competences.

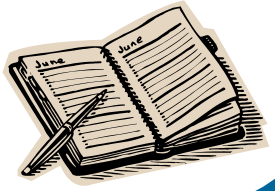
The repair of one or several elements of the system: adjusting or replacing a part of the system that is damaged or broken (re-plastering of the slab, surface of the washtub, changing wearing parts such as hand pump cylinder or seals...). Usually, repair operations are beyond the skills of the Water Association and require the intervention of an external actor (local artisan, WWMEO Expert or local contractor).

The rehabilitation of the system: the diagnosis indicates the need to re-build an important part of a system or the addition of new components in order to restore or to improve its functionality. The rehabilitation needs to be designed by an Expert of the WWMEO and implemented with the support of a qualified person (local contractor).

The report of the experts done after the diagnosis included:

- a brief description of the system, some words about the yield, the water quality, the identified deficiencies
- a set of recommendations, with a list of priorities, proposed solutions and options
- a budget forecast
- advises for possible purchase of spare parts
- when necessary, the requirement for technical resources (artisans or contractors) and quotations,
- an indicative schedule for the implementation of the operations needed

The report is then given and validated by the Water Association, which then presents it to the users to get their consent for its implementation.



Step 3 - Monitoring and validating the maintenance operations

According to the conclusions of the report and the interventions to be planned, a timeframe for the execution of the remedial actions is defined, with clear indications of the deadlines. At this stage, the role of WWMEO Experts was very important to support the Water Association for the implementation phase. The number of visits of the Expert depended on the heaviness of the maintenance operations and of the reactivity of the Water Association:

⇨ **For simple operations** that can be implemented by the community (fencing the spring catchment, greasing the chain of the pump...), the Experts has only to organise a final check up visit;

⇨ **For operations beyond the skills of the community**, the Experts provide support to the Associations at different steps:

- listing the require spare parts and organising the purchase;
- estimating the maintenance costs and the manpower (mainly when the service of a Local Artisan or Contractor is required);
- comparing the budget and the financial situation of the Water Association;
- if necessary, organising additional money contributions to reach the required budget;
- contacting a Local Artisan or Contractor and agreeing on the intervention modalities;
- supervising the intervention;
- validating the quality and the conformity of the intervention.

The role of the WWMEO experts in the planning, supervising and evaluating of the Local Artisan or Contractor's work was essential for the communities, especially for the ones lacking experience on these more technical aspects.

In some rare cases of delay or reluctance, mediation was provided by the Kebele. If still not fruitful, and as a last resort, Kebele or Woreda Officials can decide to dissolve the Water Association and institute new elections.

In Ofa Woreda, the water users can rely on a network of 21 homologated Local Artisans (usually 1 per Kebele), who have been trained, and recognized by the Water Office. A contact list of these local artisans has been communicated to all Water Associations and Kebele administrations. For more complex technical work, certified local contractors can be called upon.

Results: thanks to the organisation of systematic diagnostics, **116** out of **146** targeted Water Associations have already maintained their system.

In the cluster she is in charge, the Expert Wzo Meseret Tora, is supervising the community of Kodo 1, composed of 100 households.

The water scheme is a gravity flow system built 25 years ago. The initial diagnostic pointed out that the door of the spring box had to be replaced, fences had to be built and some elements on the line were to be changed (taps, elbows, etc…).

It took time to obtain progress in the implementation of the recommendations, and Wzo Meseret and her colleagues had to organize more than 10 visits to see results.

Some inactive members of the committee managing the system have been replaced and the money contribution for water had to be reactivated…

The system is now maintained. The Water Association spent about 1 000 ETB: for the door made by a contractor identified by the members, for the spare parts replaced by the local artisan, and for the installation of the fences.

After the maintenance, they remained with 800 ETB in the bank account and the users are now mobilized to contribute for their water. But the community recognizes that they still need the support of the WWMEO Experts, especially for technical questions.

Ato Dagafe Dansa, Association's secretary for the scheme of Kodo 1, showing bank book ①, contribution register book②, water point logbook ③

"…Initially, communities started to collect money but stopped as time passing. With the diagnosis approach, they understand that the system belongs to them and see the interest of contributing…".

Ato Fikru Tema,
Ofa Water Expert

In the community of Washiga Esho, villagers were expecting an NGO to repair and maintain a borehole that was equipped with an Afridev pump in 2001 (EC) but that unfortunately worked for only one year. Until the visit of the WWMEO Experts, people were fetching water in a small unprotected spring, 1h30 away. Within 2 months after the diagnostic was conducted with the support of the WWMEO experts, the problem has been solved: the community collected additional funds, bought new spare parts and material for the repair of the fountain and the concrete slab, and contacted a local artisan who fixed the system (*using some tools borrowed from the WWMEO*). The intervention of the local artisan has then been validated by the assigned Expert.

PREVENTIVE MAINTENANCE AND DIAGNOSIS APPROACH IN OFA, ETHIOPIA

CREATING CONDUCIVE ENVIRONMENT FOR THE MAINTENANCE OF THE EXISTING SYSTEMS

We saw that one of the key elements to trigger maintenance is the organization of systematic diagnostics, done with the technical support of the WWMEO experts. For that, a conducive environment is absolutely necessary to enable regular maintenance of existing water supply systems:

Competent and active Water Associations	• They have the capacity to manage the users' contribution and address the maintenance expenses, which implies different elements (updated census of the users, regular users' contribution, adapted recording system of the cash flow, bank account to, use of official receipts, organization of regular audit…) • They have access to basic tools to carry out routine maintenance operations
The presence of technicians	• A network of local artisans (available for each Kebele) and qualified licensed contractors (at Woreda level) are able to handle more technical operations that are beyond the capacity of the users. • A tariff frame for their service is defined
An efficient service of the Woreda Water Office	• WWMEO has a clear mapping of the existing systems to plan and monitor the maintenance activities • The experts have the required skills to conduct technical diagnostics and support the implementation of the maintenance operations • An organisation per cluster allows to ensure a proximity with the communities
Access to spare parts at adapted price	• A close access to spare parts with a clear price list is developed : users need to know where to find the spare parts

SOME CHALLENGES FOR THE WWMEO EXPERTS

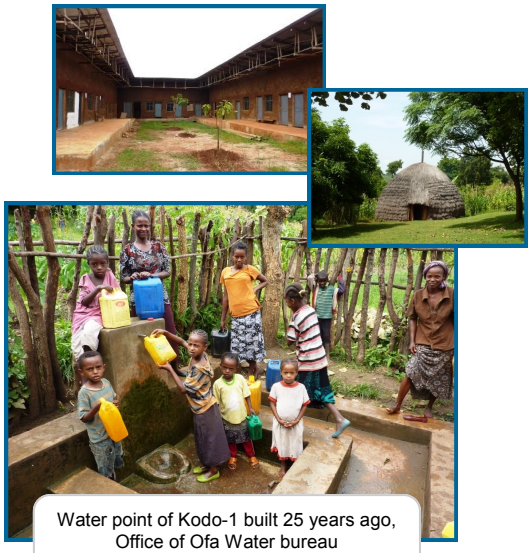
- Logistically, some sites in mountainous areas remain difficult to access. A motorbike is not always available at the Office, and the experts had to walk considerable distances to visit the communities and monitor the maintenance progresses.
- The objective of the WWMEO experts is to promote the idea of preventing the risks of breakdowns, through regular diagnostics, and to provide the technical and organizational support to the Water Associations. However, for some communities, it is difficult to retain the mobilization of the Water Association members from the diagnostic up to the final validation of the maintenance operations. Without regular monitoring visits, the progress is very slow. Also, in some communities, the mobilisation depends only on few leaders and can decrease at the time they leave the area.
- For gravity-flow networks composed of several water points involving different communities, the participation of the Water Associations can be unequal and coordination appears sometimes difficult to facilitate.

PERSPECTIVE…

A new Regional Regulation is now bringing forward ownership of the communities through the legal establishment of Water Associations at water point level and Federations at Kebele level.

Gradually, the responsibility to promote the (preventive) maintenance of the systems and the organization of regular diagnostic visits will belong to Federations. The Federation will work as a cooperative service and will be able to employ local artisans.

In this new frame, the WWMEO experts will provide technical and organizational support to the Federations at Kebele level for the planning, implementation and monitoring of maintenance activities.



Water point of Kodo-1 built 25 years ago, Office of Ofa Water bureau
Traditional tukul in Sere Echo kebele

Ministry of Water & Energy — afd Agence Française de Développement — MAIRIE DE PARIS — inter aide Lancement et suivi de programmes concrets de développement — RCBDI Rural Community Based Development Initiatives