

# Proposal for HAP Study in Ethiopia Acqua per la vita

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## 1. Background

High levels of fluoride in drinking water affect several million people living in the Ethiopian Rift Valley. The preferred mitigation strategy is to supply low-fluoride water from alternative water sources, however in some locations it is unlikely that such alternative water supply will be made available within the next couple of years. Therefore, the use of defluoridation technologies needs to be considered as an intermediate solution to provide safe water to the affected communities.

Hydroxyapatite (HAP) is the most promising fluoride removal technology. It is manufactured locally by the Fluoride Removal Technology Centre (FRTC), has a high fluoride uptake capacity and can be regenerated several times. However, up-to-date only limited field data is available to proof the suitability of HAP as preferred treatment option.

Acqua per la Vita supported the construction of a deep borehole in Tuchi Dembel, implemented by the Meki Catholic Secretariat. The water has a fluoride concentration of 12 mg/L and is therefore not safe for direct consumption. Acqua per la Vita requested a proposal from FRTC for the construction of a HAP community filter. As the type of intervention is new to Acqua per la Vita, Lars Osterwalder was approached to oversee the implementation and monitoring of the fluoride removal unit.

## 2. Technical proposal

It is proposed to conduct a two-year study including the Tuchi Dembel community filter and four additional HAP community filters installed by other organizations.

Following activities are planned during the study period:

- 1) Quarterly monitoring visits to all five community filters
- 2) Recording of any maintenance work and filter material replacement at all five filters
- 3) Household visits to 50 randomly selected households during each quarterly monitoring visit
- 4) Installation of Aquatabs Flo at all five community filters (after one year)
- 5) Results dissemination

Goals of the study:

- A. Generate improved data on HAP community filter performance in the field
- B. Strengthen monitoring systems to trigger innovation to ensure sustainability
- C. Test innovative chlorination technology to ensure provision of safe water

Monitoring will start when the construction of the Tuchi Dembel community filter has been completed. Inauguration of the filter is expected to take place in the **second half of 2020**. The overall costs of the study are **USD 14,364**.

### 3. Detailed Activities & Roles/Responsibilities

#### (1) Quarterly monitoring visits

The quarterly monitoring visits to all five community filters will be conducted by Fikadu Taye, a young and motivated entrepreneur offering water quality testing services in Ethiopia.<sup>1</sup> In total eight monitoring visits will take place over the duration of two years.

**Activities** during each visit at every community filter:

- Record water meter readings
- Test fluoride level at point of delivery
- Test microbial quality (*E. coli*) at point of delivery
- Check financial records of the water committee

**Role and responsibilities** of Lars Osterwalder:

- Provide guidance to Acqua per la vita during community filter construction
- Develop monitoring protocol and tools
- Train Fikadu Taye and join first monitoring visit
- Summarize results and prepare short factsheet after each monitoring visit

**Role and responsibilities** of Meki Catholic Secretariat:

- Provide transport from/to Addis and in the field during each monitoring visit (ca. 7 days)
- Keep informed relevant government bodies at district and village level, and other relevant project partners (e.g. NGOs that constructed other community filters included in the study)

#### (2) Recording of relevant events

On quarterly basis any relevant events related to the five community filters will be recorded. Such events include e.g. maintenance work, filter material replacements, promotion campaigns, trainings.

**Activities:**

- Keep updated records about events that might impact the performance and use of the filters

**Role and responsibilities** of Lars Osterwalder:

- Prepare reporting template for Meki Catholic Secretariat

**Role and responsibilities** of Meki Catholic Secretariat:

- Share updates based on reporting template prior to each monitoring visit

#### (3) Household survey

To establish adoption rate and general water quality situation at point-of-use in the target communities, a total of 50 randomly selected households will be visited during each monitoring visit (i.e. 10 households per community filter). The sample size is sufficient to draw conclusions regarding seasonality in usage, and on annual basis the 5 filters can be compared with each other.

**Activities** during each visit at every community filter:

- Test fluoride level at point of use (50 households per monitoring visit)
- Test microbial quality (*E. coli*) at point of use (50 households per monitoring visit)
- Conduct short household interview about use and performance of filter

**Role and responsibilities** of Lars Osterwalder:

- Same as under (1) quarterly monitoring visits

**Role and responsibilities** of Meki Catholic Secretariat:

- Same as under (1) quarterly monitoring visits

**(4) Installation of Aquatabs Flo**

As a potential option to improve microbiologically quality of the supplied water, an innovative inline chlorination technology will be tested.<sup>2</sup> Installation will take place after one year (i.e. after four monitoring visits) so that water quality before and after installation can be compared.

**Activities:**

- Install Aquatabs Flo at all five community filters
- Provide training to water committee and community

**Role and responsibilities** of Lars Osterwalder:

- Procure Aquatabs Flo and replacement NaDCC tablets
- Provide guidance to Meki Catholic Secretariat for installation

**Role and responsibilities** of Meki Catholic Secretariat:

- Install the Aquatabs Flo at all community filters
- Provide training to water committees and communities
- Follow-up with water committees to make sure NaDCC tablets are regularly replaced

**(5) Results dissemination**

Lars Osterwalder will summarize the results of the two year study and submit a paper for presentation to an international conference of his choice. If paper is accepted, Lars Osterwalder will attend the conference and present the paper on behalf of Acqua per la vita and Meki Catholic Secretariat.

**Activities:**

- Prepare and submit paper for international conference
- Attend and present at international conference

**Role and responsibilities** of Lars Osterwalder:

- Prepare and submit paper for international conference
- Attend and present at international conference

**4. Financial Proposal****Overall Budget**

Table 1: Overall budget for the field study (in USD, 29 ETB/USD)

Item	ETB	USD	Sub-Total
Monitoring visits	8 x 35,750	8 x 1,233	9,864
International consultant	-	4,000	4,000
Installations	-	500	500
<b>Total (excl. VAT)</b>			<b>14,364</b>

## Budget Breakdowns

Table 2: Budget **per monitoring visit** by Fikadu Taye (in ETB)

Item	Units	Price/Unit	Sub-Total
Salary (Fikadu Taye)	7 days	2,000	14,000
Per diem (Fikadu Taye)	7 days	750	5,250
Transport	7 days	to be provided by Meki Catholic Secretariat	
Fluoride tests	60 tests	50	3,000
<i>E. coli</i> tests	60 tests	200	12,000
TCR tests	30 tests*	50	1500
<b>Total</b>			<b>35,750</b>

\* On average 30 tests (no tests during the first year, 60 tests during the second year)

Table 3: Budget for consultancy services by Lars Osterwalder (in USD)

Item	Units	Price/Unit	Sub-Total
Consultancy days	ca. 15 – 20 days		pro bono
Daily per diem	10 day	50	500
International conference	1	3,500	3,500
<b>Total</b>			<b>4,000</b>

Table 4: Tentative budget for initial installations (in USD)

Item	Units	Price/Unit	Sub-Total
AquatabsFlo	5	100	500
Community trainings	5	to be conducted by Meki Catholic Secretariat	
<b>Total</b>			<b>500</b>