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**DELIVERING WATER, SANITATION AND HYGIENE SERVICES  
IN AN UNCERTAIN ENVIRONMENT**

**Elevated hand pump installed with reservoir to supply  
water taps in Ethiopian schools**

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*In rural areas around the world many communities and schools rely upon shallow (hand dug) and deep boreholes fitted with hand pumps for their daily water supply. For schools and other institutions where hundreds of children, teachers and staff rely on often only one water point for drinking, hand washing and cleaning this poses many challenges. Queues decrease students' daily consumption of water and time in the classroom, hand washing is difficult to practice and bathing stalls often go unused. In 2006 one of WaterCan's Ethiopian partners Rural Community Water Development Organization (COWDO) developed a new and innovate design for hand dug and borehole water systems to address the specific water and sanitation needs of primary students in Ethiopia. Using an elevated hand pump and attaching a 250-500 litre water storage tank COWDO has addressed the challenges above, and is now a resource for others wishing to use similar designs.*

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**Introduction**

In 2005 WaterCan launched its Clean Water for Schools Program (CWfS) to address the increasing demand for clean water, improved sanitation and hygiene education at primary schools in eastern Africa. To date, over 69,600 students, teachers and staff members have benefited from new water and sanitation facilities, increased knowledge of operation and maintenance of the facilities and improved hygiene behaviour practices.

In 2006 COWDO, one of WaterCan's local partners working in Meskan District, Ethiopia, worked with three primary schools to implement this program. With a strong engineering team, complemented by several social workers and community mobilizers, the various needs of the schools were assessed. Noting that the need for clean water was great, but also that the time spent waiting in queues to access clean water (when accessible) forced students and teachers to miss class time, a design was developed to address this need. With COWDO's new hand pump design, 8 people can use the facility simultaneously to wash hands, drink water and fill water vessels. Since then, additional changes have been made to the original design to better address not only the water needs of the schools, but the sanitation needs as well.

**Innovative design**

With the majority of people lacking access to clean water and improved sanitation, and the aquifers in Meskan District, Ethiopia being extensive, inter-granular and shallow, shallow wells fitted with hand pumps are appropriate solutions for improving access to water in this area (see Table 1). COWDO worked with their technical team and other key stakeholders to develop a design for an elevated well that included the following key elements:

- Shallow well cased by concrete rings or PVC casings;
- Afridev or India Mark II hand pump;
- Elevated masonry slab with stairs and with hand rail for protection of children while pumping on the landing;
- 250-500 litre storage tank;
- Pipeline connecting 4 taps on each side of the base under the reservoir platform;
- Hand washing sink with drainage constructed as part of the base under the reservoir platform;

- Trained community technicians who supply spare parts and repair and maintain the water supply system as required;
- For further design details please refer to cross section drawings in Figures 1 and 2.

Primary school name	Type of well (shallow well/ deep well)*	Depth (M)	Static water level (M)	Pump position (M)	Estimate yield (L/Sec)
Misrak Dida	DW	45	9.1	36	3.0
Weja Bati	DW	56	31	42	5.0
Beche	SW	18.5	6.2	13.6	1.0

\* A shallow well is defined as less than 30 meters in depth and is often referred to as a hand-dug well. A deep well is defined as more than 30 meters in depth and is often referred to as a borehole.

To operate this system the students are encouraged to fill the water storage tank during break times and physical education classes whereby pumping water is incorporated into the various games and activities. A school guard is also responsible for filling the storage tank. On average the estimated yield of the hand pump is 0.4-0.5L/s, thus taking approximately 30 minutes to fill a 250L reservoir and the average distance between the pump and the water point adjacent to the latrines 100m. In order to minimize the waste of water COWDO promotes the use of bib taps for the school WASH facilities (these are low flow taps as the pressure head is as low as 1-1.5m with 6-8 taps per facility) and the School Health Club members are responsible for monitoring the taps to ensure they are not left open. To maintain the system trained community technicians (COTECHS) supply spare parts and repair and maintain the system as needed. The COTECHS are trained by COWDO in operation and maintenance of WASH facilities and are then available for the school to contact by mobile phone when required. COWDO trains community members and the daily monitoring of the facilities is conducted by elected members of the School Health Club. The WatSan (Water and Sanitation) Committee, comprised of members from the Parent Teacher Committee, teaching staff and students, is responsible for creating an operation and maintenance plan as well as an agreement for allocation of a percentage of the school funds to cover the repair and maintenance costs. Each school in this region has land holding rights and thus maintenance fees for the WASH facilities are supplemented by annual income generated from leasing the land when possible and/or from the sales of harvested grass, hay and other agricultural products.

### **Upgrades to original design**

In 2008, COWDO worked with WaterCan to launch the second phase of the Clean Water for Schools Program in Meskan District, Ethiopia. During this phase, COWDO worked with five primary schools to support over 3,200 students, teachers and staff members gain access to clean water, sanitation and hygiene education. Based on COWDOs experience during Phase I of this program several key learnings emerged:

- The percentage of people who wash their hands at critical times would be higher if the hand washing facilities were in close proximity to the latrines;
- With large school compounds, the distance to the well was far, and a water point in closer proximity to the classrooms would decrease the amount of time lost by students fetching water;
- It would be easier for the caretakers and school health club members to clean the latrines if they did not have to carry the buckets of water as far;
- Girls would be less embarrassed if they had access to water near the latrine for cleaning during their menstruation period;
- Bathing could increase if water was readily available closer to the bathing stalls.

To address these learnings and gaps, COWDO improved upon the original design and developed another new innovation, whereby a longer network of pipes was connected to the water storage tank to bring water to a second water point adjacent to the latrines. These water points are now used for hand washing and as an alternative water point in the school compound.

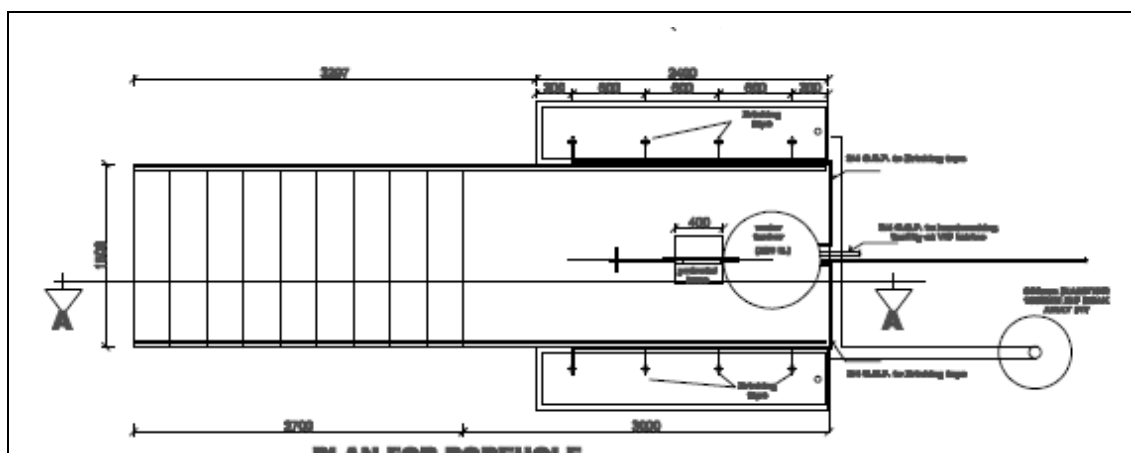
**Impact**

Thousands of students, teachers, and staff members in Meskan District are now benefitting from the innovation of the raised hand pump and well design by COWDO. There is evidence that fewer students are missing classes due to illnesses such as diarrhea, teacher retention in rural schools has improved, girls attend class more frequently and students spend more time in the classroom as they no longer have to leave the compound to fetch water (see Table 2). Younger students also feel less threatened when fetching water at break time as they are no longer bullied by the older students or forced to wait for their turn at the tap. Bullying of younger students by older students has reduced due to the availability of more than one water point and tap and the multi-tap hand washing facility adjacent to the hand pump decreased the wait time for water, especially during break time and during physical education classes.

**Table 2. Evidence of reduced absenteeism at supported schools based on a decreased incidence of diarrhea and availability of sanitation facilities for females during menstruation cycles**

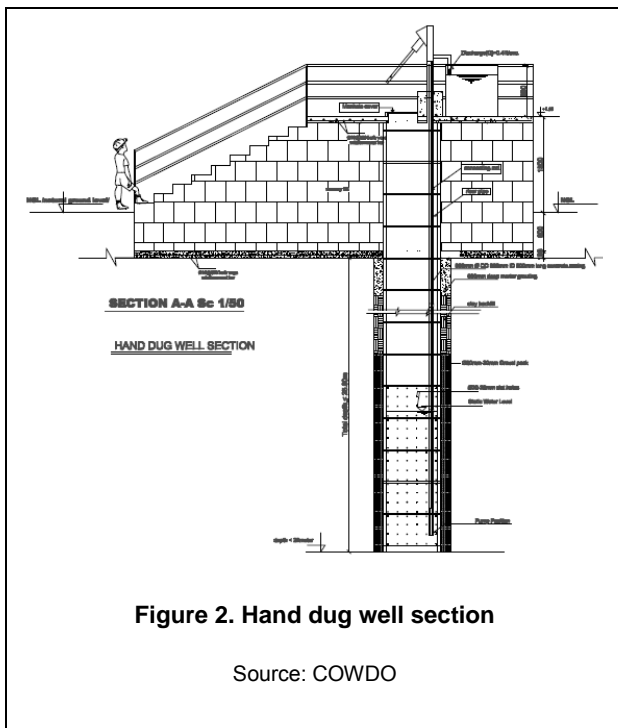
Primary school name	Student population (female and male)	Average number of students missing class/day PRE intervention	Average number of students missing class/day POST intervention	Overall change in rate of absenteeism (%)
Misrak Dida	276	30	14	46.6
Weja Bati	1647	200	82	41
Beche	507	50	25	50

During WaterCan’s annual Regional Meeting in 2008, COWDO shared the design with other partner organizations from Kenya, Tanzania and Uganda. Since then, two other WaterCan partners, Oromo Self Reliance Association (OSRA) and Water Action, have consulted with COWDO and used COWDO’s design with specific adaptations for the schools they work with in Bachoo, Illu and Kalu Districts in Ethiopia. OSRA is also currently piloting the same raised well design in a community-based water supply project in Bachoo District, Ethiopia.



**Figure 1. Top view of elevated hand pump, reservoir and drainage system**

Source: COWDO



**Figure 2. Hand dug well section**

Source: COWDO



**Photograph 1. Elevated hand pump with 250L storage tank and multi-tap hand washing facility at Weja Bati Primary School**

Source: WaterCan / COWDO



**Photograph 2. Gravity fed pipe system, front view**

Source: WaterCan / COWDO



**Photograph 3. A young student washes her hands at the newly installed multi-tap hand washing facility adjacent to the well with elevated hand pump**

Source: WaterCan / OSRA

### The person behind the design

For Mr. Sebsibe Alemneh, co-founder and Executive Director of COWDO, combining his engineering skills with his understanding of the rural environment in Ethiopia, creating an innovative design to address the water crisis was a natural next step. “Formally I was a hydro geologist with the government, during my work and travels I saw the effect that a lack of clean water and extreme poverty had in rural areas. One day I was visiting a community and I asked for water because I was very thirsty. They gave me some water from an unprotected pond water source next to their hut. The water was very turbid and I saw worms in it thus I couldn’t drink it. I knew there was a great need for change, and for clean water, and that I would have to make it a priority.”

### Acknowledgements

The authors would like to extend thanks to the dedicated group of individuals at COWDO for their creative efforts in addressing the water and sanitation challenges in Ethiopia, as well as the dedicated teachers, school staff members, students and community members who make possible the achievements of WaterCan’s Clean Water for Schools Program.

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