Kabilash, Nepal Water Project

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Introduction: The existing drinking water system in the village of Kabilash, Nepal was destroyed in the 2015 earthquake. We received a signed letter from the villagers asking for help, pledging labor and support to build and maintain a drinking water system. The majority of the villagers are subsistence farmers and 400 children attend school in the village from the surrounding area.

Methods: We spent 10-days in Nepal, working with suppliers and the local villagers negotiating the purchase and delivery of the needed supplies, organizing the project and testing water. We worked closely with people from the village who then installed the system. We used the portable lab and test strips to test the water in the village and in the region.

Results: We tested water from 6 locations. We constructed a springbox, installed 1,500 meters of HDPE pipe and delivered clean drinking water to over 400 people in the village. We left funds to construct a water storage tank which was completed 2 weeks after we returned to the USA. Additional funds were sent to the village 7 months later to expand the system, installing an additional 2,200 meters of pipe and water meters delivering drinking water to 6 locations in the lower village.

Access to clean drinking water is at the core of the mission for Water For Small Villages (WFSV). On 28 July 2010, through Resolution 64/292, the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights. The greatest waterborne risk to health is the transmission of bacterial contamination. Both the World Health Organization (WHO) guidelines and the Nepal National Standards for Drinking-Water use *E. coli* as the main indicator of microbiological contamination of drinking-water.

After the April 25, 2015, 7.8 magnitude earthquake that struck near the city of Kathmandu, international relief organizations poured into Nepal. Recovery efforts were focused in Kathmandu. Destruction of historic landmarks in the crowded city was seen around the world but the remote areas 100km outside Kathmandu, where there was also massive destruction and loss of life, were largely ignored and received no assistance. No assistance was given to the village of Kabilash in the Nuwakot District.

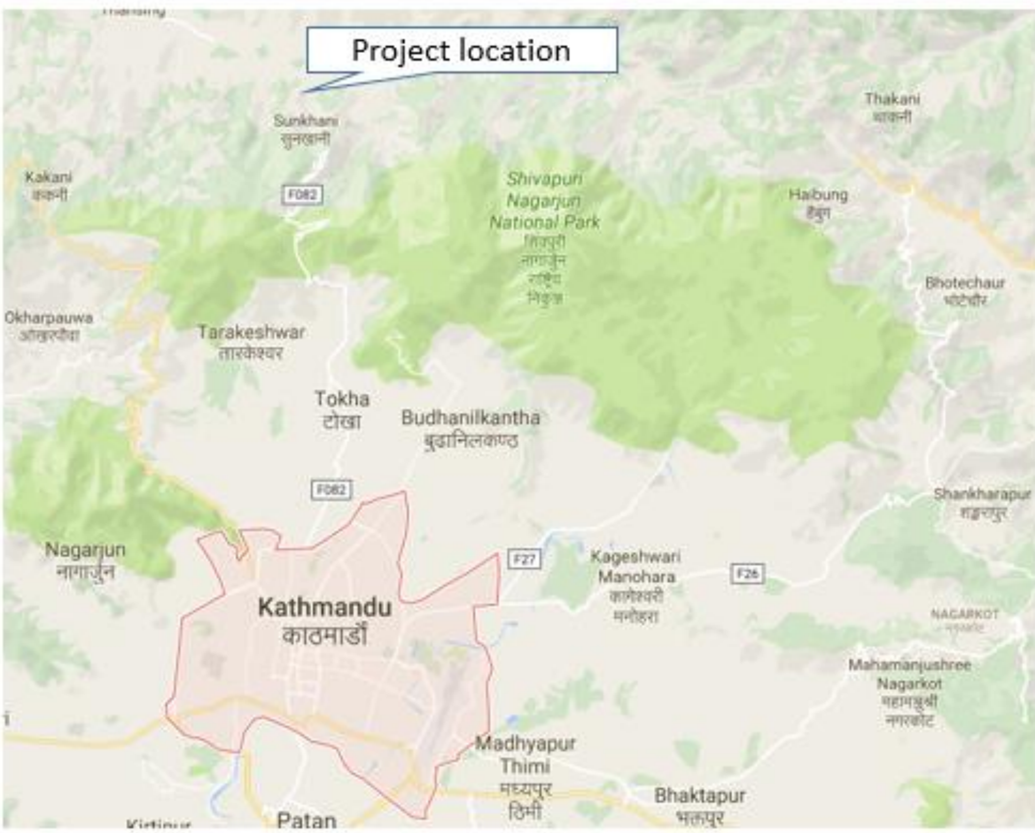
In June 2015, Water For Small Villages received a letter from the village leaders in Kabilash, requesting help repairing their drinking water system. Prior to the earthquake, the 200 residents of the village relied on water from a spring near the village. The spring was on private property and was piped to a storage tank. The tank was controlled by the landowner who periodically opened a valve sending water to a second water storage tank at the school in the center of the village. Private control of the water often put the village at odds with the landowner. This undesirable situation was made worse when the earthquake destroyed the water line. Villagers were reduced to fetching water by 5gallon bucket carrying the water back to the school and their homes.

In January 2016 Water For Small Villages initiated a project to repair the water system in Kabilash.

Project Team & Location

After 3 months of planning the Kabilash village water project, a team of (4) volunteers arrived in Kathmandu, Nepal. The team was composed of Project Manager Rick Miessau, Engineer Jeff Needle, Nepali Project Coordinator Madhav Pandey and Geographer Cordella Miessau. The team assembled in Kathmandu at the Kaze Darbar Hotel. They met with local vendors and arranged for purchase and delivery of the supplies to Kabilash in the Nuwakot District.

Kabilash is a 3 hour drive North outside Kathmandu, following Tokha Rd to route [F082]. The team hired a local driver with a 4x4 vehicle to drive the team and haul supplies to the village. The road is paved from Kathmandu over the mountains to the next valley of Nuwakot. After crossing the bridge in Thansing, the road then changed to soft dirt leading up a 1,700ft climb to the village.



The center of the village of Kabilash is located at 27°53'20.33"N, 85°17'4.16"E, 3,757ft. above sea level. There are approximately 200 residents in the village. There is a centrally located school compound consisting of 4 main buildings. The village is surrounded by a terraced landscape with rice and vegetable farms tended to by the villagers. Approximately 50 dwellings are located above and below the center of the village in clusters of 3 to 6, radiating out 300 meters from the school.

Project Details

The first field visit included a welcome ceremony held at the school. A crowd of students, parents, teachers, local residents was estimated at 600 people. The village greeted the team with flowers, singing, music and prepared presentations. Teachers and students presented desperate pleas for help fixing their water system as well as rebuilding their school. The entire village stated their appreciation for our arrival and pledged to support and maintain the project. Nepali culture is very pride much steeped on keeping your promise - your word is your bond. Both in personal relations and in business it is customary to share 3 cups of tea, share a blessing and you are then considered family. For this reason we were very careful not to over promise and to focus on our project plan.

Following the welcome presentation, the team was lead to a vertical spring, located 1,500 meters east of the village. The farmer, whose property the spring was located on, pledged free access to the village. The spring was 50 meters below the peak of the hill and there were no sources of contamination observed in the area. The water fell from a vertical rocky surface covered with ferns, to a small rocky dirt lined pool. The immediate area around the water source was a dormant terraced rice farm with traditional ledges and irrigation piping. A small stream directed the water flow down the hill. A 1” pipe was laid in the pool and flow was measured to be 1 gallon per minute by measuring time it took to fill a 1 liter bottle. The spring was measured to be at 3,955ft, 200 ft above the points taken at the center of the village.

The water was tested using the portable test lab and test strips.

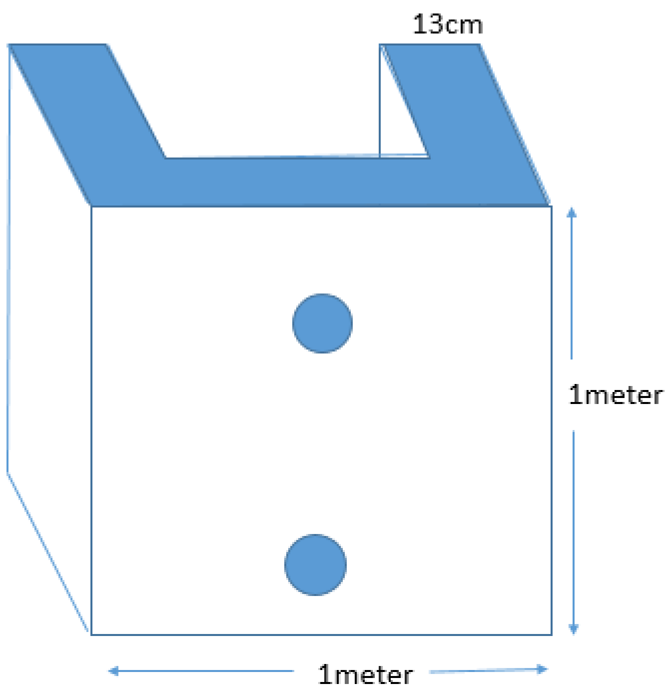
Test	Result	Observations
Date	5.10.2016	1:17PM, overcast sky
Elev.	3,865	
Temp	26.7deg C	Water was clear
DO	5.34	
DO	98.97%	
Flow	1 GPM	Measured timing fill rate using 1 liter bottle
T Cl	0	
F Cl	0	
Hardness	80	
Alkalinity	45	
pH	6.8	
Nitrate	0.5	
Nitrite	0	
Pathogens	negative	Incubated in pants pocket for 30 minutes

Conditions were determined to be suitable for building a springbox, collecting the water and installing piping to direct the water down to the village. The team returned to Kathmandu.

On the second field visit, the team collected GPS points measuring elevations from the center of the village, along the trail, to the spring. The high point of the trail was found to be 3,993ft. This indicated the pipe could not follow the trail and would need to follow the natural curve of the ridge to avoid pressure loss in the pipe.

A local carpenter was hired to build a wooden form to construct the concrete springbox. A rough diagram was drawn and it was communicated that rebar would need to be embedded in the concrete.

Cement, gravel and tools were collected by the villagers and hauled to the spring. The ground at the bottom of the spring was excavated, rocks were cleared and the ground was leveled. The water was diverted using mud and a small piece of pipe directing the flow away from the site so the ground could dry in preparation for building the springbox. The box was constructed and the villagers were instructed to wet the cement so it would cure slowly.



<u>Spring Box</u>

The spring box was constructed using 8 bags of cement mixed on-site with gravel and sand.

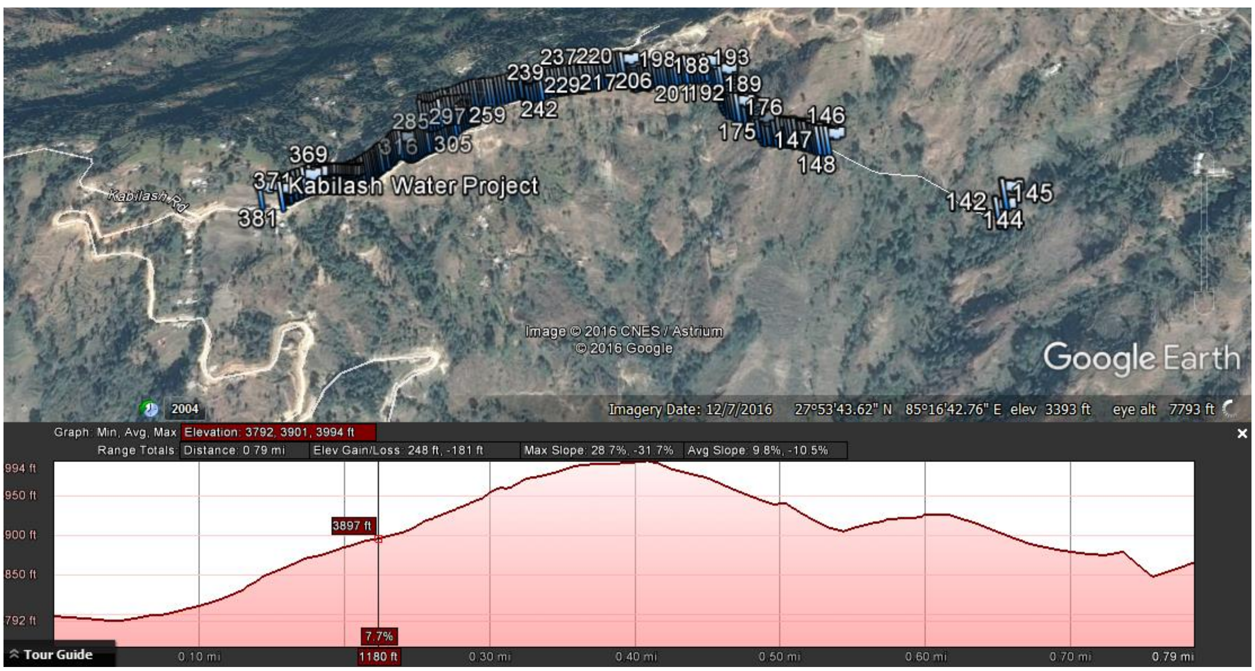
An outflow was created using a piece of 1 inch pipe inserted into the form before the cement was poured. An overflow outlet was created using a 1 inch pipe.

Rebar and wire was inserted into the form before pouring the cement.

The form was placed against the vertical spring and was cemented to the wall. A cement cover was created.

GPS points were collected in the surrounding village capturing elevations to locate a suitable location to build a water storage tank. Elevations were also collected at the school, homes above the school, the road, and homes in the lower area of village. A head of 119 feet was calculated from the source to the proposed water tank location.

Point Number	Elevation(ft)	Desc
382	3,802	School yard
1231	3,826	Tank location
145	3,955	Water source
380	3,757	Center of village (first tee)



GPS points from the village to the water source showing the elevation profile in GoogleEarth.

A third field visit was made to inspect the progress of the pipe installation and to discuss the installation of a water storage tank. $1,500 was given to the mayor to hire a local contractor to build a government approved water storage tank. A suitable site for the tank was located 24 feet above the school yard on common land owned by the village.

Over the next two weeks after the team returned to the USA, the villagers completed installation of the system. They cleared rock, trenched a path following the natural curve of the ridge. 1,500 meters of 1 inch HDPE pipe was installed back to the proposed tank location. Sections of pipe were fused by hand using a propane heated disk. The water tank was constructed as designed. The mayor sent photos showing the completion of the work.

Photos of the phase I water tank and water delivery system.

PHASE II

After 6 months maintaining the water system the villagers requested additional pipe to direct water to the lower village, nearer the homes. $2,200 in funding was wired to Nepal and pipe was ordered and delivered using our existing business contacts we made in Phase I. Pipe was delivered and installed by the villagers to 6 locations where houses are clustered in the lower village. In addition the Napli government donated 16 water meters to help meet a new national standard to measure water consumption.

Photos from water meter installation in the lower village.

Methods & Standards

This project fully implemented and tested the WFSV project standards and methods.

- This was the first effort undertaken by WFSV in Nepal.
- The project utilized new project proposal forms and project cost forms.
- Water samples were taken using standard lab methods including latex gloves, glass sample bottle, test strip and hydrolab.
- The water testing was carried out immediately at the location where the sample was taken.
- The water testing results were recorded in a field journal and later entered into the WFSV database.
- GPS coordinates and photos were taken at every sample site.
- This was the first surface water project undertaken by WFSV and it had the extra challenge of significant slope and water pressure for us “flatlanders”.
- Villagers provided all the labor, tools and some materials for the project.

Results

Results from this project were beyond expectation. We have heard from many The timeframe from arriving in Kathmandu to seeing water being delivered from the installed pipe is truly unbelievable. A new water system was installed delivering clean drinking water to 200 villagers in Kabilash within 2 weeks of starting construction. A village controlled water tank was constructed by the villagers after the WFSV team departed. A reliable water supply is now being delivered to the water tank located at the school. Water is now delivered to 6 community faucets closer to the homes of the villagers. The lower village consisting of people from the former "untouchable" cast now enjoy access to clean drinking water for the first time. A village cooperative was created where each dwelling now pays $1(us) per month to create an account to maintain and repair the water system. News of the Kabilash water project has spread in the region and government and NGOs have visited the village to admire and learn from the results. Pride has increased for the people living in Kabilash knowing they have improved living conditions. Local and national government awareness was raised and water meters were donated and installed to measure water consumption. The village contacts WFSV almost weekly updating giving updates on the status of the water system. The people of Kabilash are interacting with people from a neighboring village, sharing their new skills and methods in hopes to pass on the knowledge. We were acknowledged in the largest national newspaper published in English.

Conclusion

This project demonstrated WFSV can effectively assess needs, evaluate available resources and implement a sustainable water project. The 200 villagers within 300 meters of the center of Kabilash village now have a reliable clean drinking water system. The water testing found no pathogen contamination in any water samples that were taken. Nepal has a 7 wet monsoon season (May – Nov) followed by a 5 month dry season (Dec – April). Our project was undertaken at the very end of the dry season allowing us to measure the lowest expected annual levels at the water sources. With significant slope most water systems are gravity fed surface water systems. Some dwellings are at higher elevations than the water source. This results in requiring either a pump system to lift the water or it requires the people to hand carry water several times daily. Throughout the region of Nepal we visited we observed public drinking faucets which were often crowded with mostly women filling buckets, pots and random plastic containers to fetch water.

Funding
$10,000 – phase I $2,200 – phase II

Acknowledgements
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