

Household Water Treatment and Safe Storage Implementation Case Study: Biosand Filters

EDES (EQUIDAD Y DESARROLLO)

Introduction

EDES (Equidad y Desarrollo) is a local organization based in Lima, Peru. EDES was founded in 2005 by a group of eleven people with different backgrounds and aims, but with the common interest of reducing poverty in Peru.

EDES's vision is a sustainable world free of poverty and injustice where equity and development benefit everyone. They want to be able to work to strengthen the capacity of authorities, service operators and people with fewer resources to achieve sustainable social and economic development.

Its objectives are to promote and support environmental preservation, gender equity and the fight against poverty. EDES works towards these objectives through increased awareness and participation of local communities, and through public and private organizations.

EDES began a biosand filter (BSF) pilot project in 2008, in a peri-urban area outside Lima, the capital city of Peru. This first small scale project distributed 65 filters among the families in the community "27 de junio". The pilot project enabled EDES to develop their implementation model, and to document a project success. They then had a successful project which they could use to increase awareness about biosand filters in Peru, and to secure funds for further projects. Since the initial project they have scaled up their operations. By 2010 they had installed more than 750 biosand filters in several communities in the Lima area, benefitting more than 3750 people. EDES is now thinking about extending their BSF projects into other regions of the country as well as adding latrine construction projects.

Creating Demand

Before EDES arrives in each community, there is usually little to no knowledge about household water treatment options. Some

people use traditional methods, such as cloth filtering or natural coagulants (which help contaminants settle out of water). The most common coagulant in the region is *penca de tuna* (cactus stalk). People normally get this knowledge from the older generations, but they only know that these procedures make the water "better" – they don't know why or how. In these peri-urban areas, the water situation at most homes and public buildings, such as schools and hospitals, is not very good. The water is not usually treated; people usually drink the water directly from shallow wells or tanker trucks. The Ministry of Health recommends the use of chlorine, although this is not commonly practiced.



A man draws water from a well in Peru
(credit: EDES)

EDES also relies on people talking about the filters to create demand among communities. One woman from the 27 de junio community, Maria, comes to every workshop EDES offers, to talk about her experience with the filters. The projects also have high visibility in the communities, as the filters are built there and workshops are held in the community. This also leads to

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people talking about the projects, which creates demand.

When starting a project, the first thing that EDES does is to contact the leaders of the community and arrange a meeting to explain what the project is. Other members of the community also attend the meeting, such as mothers. During this meeting, an EDES staff member explains how the BSF works, how the filters will reduce diarrheal illness among their children and the requirements for participating in the program. There are five conditions the community must agree to before being selected for the program:

- users must sign a contract where they agree to use and maintain the filter properly;
- users are responsible for getting a safe storage container for the filtered water, which needs to have a lid and a tap;
- users agree to attend a general workshop where the BSF operation and maintenance will be discussed in depth;
- the community has to provide a work area where the filters can be manufactured; and
- the community has to provide staff to manufacture the filters (these workers will receive a salary in exchange).

EDES and the community leaders usually meet two to three times before the community makes a decision. If the members of the community agree with the conditions and are interested in implementing a filter project, EDES sets up a meeting with the mothers of the community, some of whom become Community Health Promoters (CHPs).

The CHPs play a key role engaging the rest of the community to accept this new technology. EDES focuses its attention on the CHPs, and they meet weekly to talk about the program and its evolution.

Supplying Products and Services

Most of the labour for manufacturing the biosand filters is done by the local community, overseen by an EDES staff

member. Generally at each project site there are 3 people from within the community working on filter construction: one master builder and two assistants. If the project is big, there may be even 5 or 6 men working on the construction. All workers receive a salary: the master receives 48 soles/day (US\$19) and the assistants 35 soles/day (US\$14). EDES provides the builders with all the tools and assistance they require for construction.

An engineer from EDES is present with the filters manufacturers almost full time. The engineer is there to ensure that everything is being built properly. Once the workers have finished the filter containers, the engineer always tests if the filters have leaks. If there are any small holes or cracks, they may be fixed. Over 85% of the filters have small leaks. Almost all of them are fixed using a product called *chemacil*. If the damage is too great and they can't fix the filter, it is removed. EDES builds two or three extra filters per project to replace the ones that won't pass the quality requirements. The engineer records filter production monitoring data, such as how many filters have leaks, in a database.

The most crucial component in the construction of the biosand filter is the sand to be used inside the container for water filtration. EDES buys its sand at a hardware store in Lima and has it delivered directly to its project site. One cubic metre of sand costs 50 Peruvian Soles (US\$19), and delivery costs an extra 10-20 Peruvian Soles (US\$4-8).

The gravel is also bought from the same hardware store. It is more difficult to get the correct size of gravel and is therefore more expensive: EDES pay 60 Peruvian Soles (US\$23) per cubic metre of gravel. The cost of the cement is 18 Peruvian Soles (US\$7) per 42.5 kg sack.

When they receive the sand and the gravel, the builders start sieving. Once the sand is sieved, it is washed and dried in the sun. The sand and gravel are then packed into sacks and stored until the filter is installed. Each sack contains the quantity of sand or gravel needed to install one filter.

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Currently, EDES has 9 steel molds, 7 of which were paid for with Rotary project funding. The molds were manufactured with assistance from CAWST. EDES is fortunate to work with an experienced welder, and do not have to provide constant supervision during mold fabrication. The cost of a mold for EDES is about US\$490.

Lately EDES has been having problems with some of the molds because they are getting bent as they manually vibrate the concrete in the molds using rubber mallets. They are thinking of buying an electric vibrator to reduce damage to the molds.



Manufacturing biosand filters in a community
Credit: EDES

Once filters have been cured, cleaned and painted, EDES normally rents a truck to transport the filters to each household. The workers and volunteers help move the filters into place in each house.

They also deliver the diffuser and the sacks of sand and gravel to each house at this time. Filter installation in each house is supervised by the technical engineer from EDES. The engineer spends one or two days going to each house installing the filters. After installation, he also tests the filter: to check the flow rate, ensures there is 5 cm (2 in) of standing water above the sand, and check again for leaks.

Monitoring and Improvement

EDES is very concerned about the quality of their filters, so they are always searching for changes that may improve the performance

of the filters. One of the improvement they have made is to change the screen size used during sand sieving to get better quality sand for inside the filters.

EDES has learned several things about filter manufacture since they started implementing projects, including:

- In the beginning, they got a lot of filters with cracks on the bottom. That was because the mixture wasn't dry enough. So, what they do now is add a little more cement to ensure the mixture will be dry.
- Some of the molds get bent due to hammering so hard. They are trying to solve this problem, possibly by using electric vibrators instead of mallets.
- They also noticed that using metal sticks for compacting the concrete in the mold created more bubbles in the final concrete box, so now they are using wooden sticks instead.

Once the filters are installed, EDES also monitors the filter use and quality of the filtered water. They use monitoring forms during household visits to check correct and consistent filter use. They select 5 to 10% of the households and take samples of the water before and after filtration. The samples are sent to a laboratory to test the number of fecal coliforms (bacteria that make humans sick) in the water. They inform the households of the results when they get them. If the results are not good, EDES usually talks to the family to understand if they are doing maintenance and using the filter properly.



EDES biosand filter production

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EDES also does “end of project surveys” in each community. Results are compared with the surveys done in the beginning of the project in that community.

EDES would love to do a more extensive monitoring process but they are not able to due to constraints on available funding.

Building Human Capacity

EDES believes that education is one of the most important aspects of a biosand filter program. They also believe in the importance of engaging the community in their own projects. EDES develops its projects based on these two aspects. They build the capacity of filter users, teachers and students, local builders, and are especially focused on training Community Health Promoters.

All mothers from the community who are interested in the project volunteer to attend the initial project meeting, where different topics are explained: an introduction to the BSF, the manufacturing process, the user training and the role of Community Health Promoters (CHPs). Then, depending on the number of filters that are going to be installed during the project, a certain number of mothers are selected to become CHPs. These mothers will be responsible for finding an appropriate work area where the filters can be manufactured.

EDES organizes a workshop to train the CHPs in each community. This workshop is delivered over several weeks. The main points covered are: waterborne diseases, good hygiene practices and how the filter works. EDES uses a variety of educational materials in the workshop. Most of them (60%) are an adaptation of CAWST's materials and the rest are their own materials and new activities to make the workshop as participatory and interesting as possible. After this training period, the CHPs receive a certificate and some CHP materials (t-shirt, notebook, etc.) during a public event.



CHP participants display their levels of knowledge on topics before and after the workshop

The first responsibility of the trained CHPs is to organize a 1-day BSF workshop for the community. Attendance at this workshop is mandatory to obtain a filter. This workshop usually takes place on a Sunday to allow people to come, and there is a play area for the children. Meals are included, usually made by the mothers of the community. Every family is allowed to bring up to 3 members to the workshop. During the workshop, the family members learn more about water, sanitation and hygiene and how to use the filters.

All the education and awareness programs are developed and implemented by EDES. The government also plays a role in promoting water, sanitation and hygiene (WASH) in the region by distributing pamphlets about hygiene or hand washing in schools. EDES is trying to improve their community workshops to make them more dynamic and attractive for the public. They have introduced new ideas to their workshops. Now, the community health promoters have to prepare a presentation about some topic related to water and present it to the rest of the group.

During its first two years of operation, EDES distributed biosand filters among some kindergartens and schools in the area. Normally, one staff member was trained in filter operation and maintenance. The

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problem is that this person is not always at the school due to changes in work shifts, holidays, etc. When this person is not at the school, nobody else is in charge of the filter, so it can create problems with the maintenance. For this reason, EDES is now trying to train all the staff instead of just one person, to make sure that there will always be somebody at the school who can correctly use and maintain the filter.

CAWST has played a critical supporting role throughout EDES's development. EDES has hosted CAWST workshops to further train their staff and improve their projects. EDES and CAWST first made contact in 2008, after a workshop delivered by CAWST at the University of Lima. EDES were not able to attend this workshop, but contacted the hosts of the workshop, and hired them to teach EDES more about the BSF. EDES also got copies of CAWST's training materials on the implementation of the biosand filter. Since then, the relationship between EDES and CAWST has grown. CAWST International Technical Advisors have visited EDES's projects multiple times to provide training, consulting and support, and there has been continuous support via email.



Drinking water quality before and after treatment with the biosand filter

EDES has changed some of their staff during the last years, and have learned that this is something that is not ideal for the

projects because it takes time for the new people to get use to their positions.

Program Financing

EDES runs its programs so that households do not have to pay any money for the filters. All costs are funded by Rotary International and some individual donors within the project budget. If the conditions described above are all met by the community and households, everyone who asks for a filter can receive one. The only cost for the families is that they have to provide a safe water storage container. A new bucket with a lid and tap costs about 20-25 Peruvian soles (US\$8-9), while adapting an old bucket with a tap costs 7 Peruvian soles (US\$3).

The total cost per household receiving a filter is about US\$110. This includes all project costs to get the filter to each user: manufacturing materials, salaries, transportation, bank transfers, education, training and monitoring. The cost of manufacture alone is over US\$40 per filter.

In the beginning, EDES found it difficult to get funds because they were inexperienced, and could not show the evidence of successful projects necessary to get funding from the government or international agencies. It was not until 2008 they got some financial support and implemented a pilot project. Following their pilot project they made contact with Rotary Club La Molina Vieja who funded their next projects. Rotary Club La Molina Vieja then continued to act as a promoter of EDES and their projects, and have since helped get funds from Rotary International for all EDES' subsequent projects.

References

Personal communication with EDES Staff. 2008-2011.

Further Information

Equidad y Desarrollo Peru : www.edesperu.org

EDES presentation at CAWST 2010 AGM: <http://www.cawst.org/about-us/governance-reports/agms/147-2010?lang=fr>

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Wellness through Water.... Empowering People Globally
Last Update: Dec 2012

