

# **PROJECT SUMMARY:**

The WSCSD-African Initiative was conceived in 2008 to stimulate and support development of social enterprises among students and recent graduates by empowering them with necessary resources, technical skills, and networks to provide sustainable solutions to povertyrelated issues in Africa. Its flagship water and sanitation project in Kenya is managed by spin-off student-led NGO—Safe Water and LED Lighting Operatives Worldwide (SWALLOW) and is aimed at providing simple, sustainable access to safe drinking water and basic sanitation.

After 18 months of planning, the project was started in December 2009 by student volunteers from the Universities of Nairobi (Kenya) and Regina (Canada) with training, manufacture and the installation of 12 Filters to an impoverished HIV/AIDS support group in Nyakongo.

Since then, the project has delivered 48 filters and expanded in scope to incorporate a holistic approach to the development of Nyakongo community by building capacity of individuals and supporting group initiatives targeting bore-hole drilling, rain water harvesting and construction of VIP latrines, improved agriculture and rural energy alternatives.

#### **PROJECT INITIATION**

Identify areas of need; local partners/person; place to build filters (i.e. Nyakongo Dispensary)

- Identify means to transport filters to homes and centers (filters are very heavy!)
- Identify families/institutions to receive filters
- Identify partner/person to provide continued support after we leave (follow-up, help, etc.)
- Identify source of local materials
- Identify place for the visiting team (approx. 4 people) to stay
- Identify people to help with labour (if possible)
- Preferably identify local community health leader to work with

#### **PROJECT IMPLEMENTATION:**

- Supplying casing materials in advance of building filters.
- Work with local personnel to provide training

# WHAT THE COMMUNITY PROVIDES:

- Help in building filters if possible.
- Local knowledge of materials (concrete, sand, gravel because materials can vary depending on location)

- Plans are underway to register a regional branch of SWALLOW in Kenya so as to fast track scaling up of the project to other African countries.
- Further information is can be accessed at the websites : www.swallowinc.org and http:// ecyg.wikispaces.com/SfGS-UoN

# **PROJECT LOCATION:**

Nyakongo Village, Wawidhi Location, Nyando District, Kenya. SCOPE—Household and Institutional Water Treatment

Water filters are for families and/or community institutions such as schools and churches

### **PROBLEM ADDRESSED:**

Access to safe and clean drinking water and improved sanitation among vulnerable children and families like People Living With AHIV/AIDS. The project addresses health and development challenges resulting from poor water and sanitation supply (in terms of its availability, proximity, quality and quantity) and in Nyakongo.

- 51% of Kenya's rural population lack access to improved water sources
  - $\Rightarrow$  Nyando is the second Kenyan district worst hit by annual floods. Most water sources dry up during dry seasons forcing residents to trek over long distances in such of water
- 52% of Kenya's rural population lack access to improved sanitation
  - ⇒ 70% of Nyakongo households (about 700) lack any basic toilet structure

# **OBJECTIVES/ACTIVITIES:**

- Provide Simple, Cheap, Effective and Long-lasting water treatment/filtration systems
- Provide basic sanitation and hygiene education and training
- Provide training in water filter use and maintenance
- Provide technology transfer to build, distribute and train others in water filtration
- Provide vocational training in water-focused and energy-related businesses.

# **IMPACT**:

- + 200 community members (120 women, 40 men, 40 youths including 8 university students) have been trained in BSF construction, installation, operation and maintenance.
- 48 families, of which 20 are HIV-positive, have been provided with biosand purifiers.
- Reduced water-related morbidity and mortality among the beneficiaries.
- Stigma associated with AIDS is reduced because of mutual understanding developed as the infected, affected and non-infected worked together to acquire the filters. Filter owners have formed Nyakongo Self-Help Group and established a Village Saving and Loaning program that is already attracting many residents whom refused to commit their labour in

- Work with local expertise in construction, concrete mixing, etc.
- We go house-to-house to install filters.
- Project takes 2 -4 weeks to launch.
- Preferably, we can train someone to continue the work. As such, more families can receive filters, the technology can be shared with other villages, and it is also a potential source of income or micro-business, thus boosting the local economy.

# FUTURE PLANS

- Locally based small business
- Manufacture and sell filters
- Community water kiosks (vending points),

#### Place to stay/Accomodation

- Means to transport (truck, donkey, etc.)
  - Filters to place of installation
  - Water for washing sand and gravel
  - + Local materials of sand, gravel, cement
- Assistance in getting the materials, getting around, and acquiring what we need
- Meals during filler preparation WHAT WE PROVIDE
- Mould/BSF casing
- Tools (some we bring, some we buy there)
- Filler Materials (we buy within the locality as much as is feasible)
- We provide continuous knowledge and training in:
  - Proper filter use and maintenance so that it is continually used
  - Hygiene/sanitation training
  - Technology transfer

# **Technology – Biosand Filtration**

#### How it works:

 The biosand filter is a point-of-use device used to minimize re-contamination and improvement of Microbial quality of Drinking Water.

A biolayer develops on the surface of the sand. The water slowly passes through the biolayer, sand and gravel. These layers remove the microbes. Filtered water flows out through the tube.

### BSF Contains three main parts:

• The Housing, made of concrete or plastic (conventional plastic tanks)

- The Media, placed inside the housing, which consists of different, specific sizes of sand and gravel in layers (top to bottom).
- The Plastic Tubing (hose) through which the fil-

### Disadvantages:

Heavy - should not be moved after installation

# How to use the filter:

- Place a clean storage container under the filter spout, as close to the spout as possible Remove the lid on the filter
- Ensure that the diffuser plate is in place- do not pour water directly onto the sand layer
- Slowly pour untreated water into the filter fill it full
- Replace the lid
- Allow the water to drain through the filter completely
- Place the storage container up on a block or stand so that the opening is just under the spout.

- the project unless they are paid.
- From this experience we realized that a holistic approach is needed in addressing community problems at the root not at the symptomatic level. HIV/AIDS and health in general, can no longer be treated only within the confines of health. Thus, SWALLOW's integrated project has been conceived to focus on what can be done for Nyakongo's children and youth before they are drastically affected by poverty and HIV/AIDS.

#### **EVALUATION:**

- We receive feedback on the operation of the filters through weekly or monthly community meetings at Nyakongo dispensary (by HIV/AIDS support group and the newly formed Selfhelp group, respectively). Each beneficiary informally updates the Health personnel on the status of their individual filters. Incase of any problem, the staff contacts the trained local support team for inspection and maintenance of the filters. The health workers also assist with tracking cases of water-borne diseases reported. By comparing the incidences reported from the families with the filters and those without, we are able monitor the efficiency of the filters (quality) in a participatory manner.
- Recent door-to-door survey of the first batch of the filters installed has led to improvement of new filter sprout connections.
- By investing in research and development (including regular laboratory tests), we aim to continuously improve quality of solutions for water filtration systems and renewable energy.

tered water comes out

• The diffuser plate helps slow down the water.

#### Advantages:

• Provides both physical and biological treatment:

Removes most microbes (98%)

years

- Removes some sediment No on-going costs: no replacement of parts • Made from local locally available materials; utilizes local labour and artisans Improved odour, colour and taste of filtered water
- if used and maintained properly, last over 20



 If the source water is dirty, use a sedimentation method before pouring it into the filter.

#### Dos:

Use your filter everyday

- Protect the filter from weather
- Use the lid
- · Keep animals away from the filter

#### Don'ts:

- Add chlorine to the biosand filter
- Plug the outlet with a tap or hose Pour dirty water into the filter
- Store food inside the filter box (attracts ants, flies, cockroaches)
- Allow children to play with the filter

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Achieving the Right to Safe Drinking Water and Sanitation through Student Collaboration











APPROXIMATELY 18 LITERS SHOULD BE INPUT INTO THE FILTER TWO TIMES DAILY, FOR A DAILY TOTAL OF APPROXIMATELY 36 LITERS.

WHEN WATER IS POURED IN, CARE MUST BE TAKEN TO DIFFUSE THE POUR SO AS NOT TO DISTURB THE SAND LAYERS ('CHANNELING' MUST BE AVOIDED). USE OF A COLANDER IS ONE METHOD. OTHER METHODS MAY BE DEVISED.

SOURCE (UNTREATED) WATER AND PURIFIED WATER MUST BE HANDLED IN SEPARATE CONTAINERS. WATER SHOULD BE FETCHED AND POURED IN FROM ONE CONTAINER, AND A DIFFERENT CONTAINER SHOULD ALWAYS BE USED TO COLLECT THE OUTFLOW.

#### (Water Output

SHOULD TAKE ABOUT 18 MINUTES TO FILTER AN ENTIRE 18 LITER BUCKET. AS THE FILTER DEVELOPS, THIS WILL SLOW TO ABOUT .7 LITER / MINUTE.

OUTPUT WATER MAY APPEAR CLOUDY AT TIMES; THIS MAY HAPPEN REGARDLESS OF ACTUAL WATER PURITY. THIS DOES NOT AFFECT DRINKABILITY.

**NOTE:** IF FLOWRATE IS VERY SLOW UPON INITIAL CONSTRUCTION, THERE MAY BE AIR BUBBLES TRAPPED WITHIN THE SAND. THESE SHOULD BE REMOVED BY CAREFULLY INSERTING A PVC PIPE SECTION STRAIGHT DOWN INTO THE FILTER LAYERS AND/OR TAPPING THE SIDES OF THE CONTAINER TO 'BURP' OUT THE AIR BUBBLES. REPEAT PROCESS SEVERAL TIMES. IF THIS FAILS, THE PURIFIER MUST BE EMPTIED AND REFILLED.

#### Comparing water

Quality: Raw River water (Left), Filtered Water

#### 2 Pour smaller pea gravel (1.27 cm / 1/2"); a \_\_\_\_ cm layer should result.

3 Pour course sand (.8-1.2 cm / .32-.46"); a \_\_\_\_ cm layer should result.

From this point forward, water should be added occasionally to ensure no air bubbles are trapped. When pouring water, BE CAREFUL TO DISPERSE THE WATER TO NOT FORM CHANNELS IN THE LAYERS.

 Using a colander, plate, upside down bucket, or hand to disperse is recommended. Tap the sides of the container to 'burp' out any possible air bubbles.

4 Evenly mix 135 grams disinfectant (ACX) with fine sand; pour to form a uniform 2 cm layer (do not add water).

5 Pour fine sand, in sections (adding water at least two more times), to form a layer of at least \_\_\_\_\_ cm. This layer must reach exactly the bottom of the PVC elbow.

Now, pour water slowly, diffusing so as to not disturb the sand, until water reaches to top of the PVC pipe neck and water begins to flow from the nozzle.

#### The 'schmutzdecke'

ON TOP OF THE FINE SAND LAYER, A BIOLOGICAL LAYER WILL DEVELOP, TERMED THE 'SCHMUTZDECKE' - GERMAN FOR 'FILTH LAYER'. IT IS THIS LAYER THAT WILL ATTACK AND DESTROY MUCH OF THE WATER'S IMPURITIES.

FOR THIS LAYER TO PROPERLY DEVELOP, THERE MUST BE 1-3 CM OF STANDING WATER AT THE TOP OF THE SAND LAYERS. THIS LAYER MUST NOT BE ALLOWED TO DRY OUT.

This layer will continually thicken until the CBCR flowrate slows to about 1 liter / 3 minutes (or approximately 1 hour for 18 liters) at which time minor maintenance will be required.

(20 day waiting period

FOR A PERIOD OF 20 DAYS, DAILY ADD APPROXIMATELY 18 LITERS OF WATER, FROM THE SOURCE, AND USE THE DISCHARGED WATER AS UNTREATED WATER.

IT

DURING THESE 20 DAYS THE BIOLOGICAL LAYER NECESSARY FOR PROPER WATER FILTRATION WILL DEVELOP.

HOWEVER, EVEN DURING THESE 20 DAYS THE WATER DISCHARGED FROM THE UNIT WILL BE CLEANER THAN THE SOURCE WATER. AFTER THE 20 DAY PERIOD, THE FILTER WILL BE FULLY FUNCTIONAL AND WILL MEET DRINKING WATER PURITY STANDARDS.

#### Disclaimer

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