

CCWF Part 4
Cabin Clean Water Filter
Comparison to Other
Household Water Filters
for use in the developing world
(disadvantaged communities)

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There are several water filters promoted for use in the households of disadvantaged communities world wide. Table 1 compares these technologies. Most of the filters considered are high quality and have been used throughout the world for many years. Unfortunately, there are many filter products that have been missed; but I am sure that the one's considered are representative of the technologies available. A list of a few of the major Indian and Mexican manufactured ceramic candle filters are listed.

The Cabin Clean Water Filter stands out because of its ability to treat much more water. Except for the Cabin Clean Water Filter, it is uncertain if sufficient filtered water is produced for personal hygiene (bathing) or sufficient filtered water for household hygiene or laundry. Filtered water should be used whenever the activity results in human contact to avoid skin penetrating organisms (bilharzia and Guinea worm).

Table 2 identifies how the different household treatment technologies can be used for purposes other than for in the household. Some of the assessments might be debated or technologies may be considered better than nothing. The assessments consider what would be preferred. It should be noted that in many emergency situations bottled water distribution is considered a viable option. While this may appear to be a solution, it is very short term without any legacy. Legacy means the beneficiaries are able to continue providing themselves with treated water without further external support. Furthermore, provision of bottled water results in serious plastic pollution problems.

Filters which require replacement of filtering elements are not suitable for use for treating water that has significant suspended solid or for use in disadvantaged or remote communities. Costs might be prohibitive and replaced elements are not recyclable.

Conclusions

- 1. The CWWF is generally very useful the households of disadvantaged communities compared to competing technologies.**
- 2. The CWWF is competitively priced. This would improve if the CWWF was manufactured in countries where the cost of production is lower than Canada.**
- 3. The CWWF has several markets in developing countries other than for use in households.**

Table1. Comparison of the Cabin Clean Water Filter to Filters Other than the BSF for Use in Households of Disadvantaged Communities in Developing Countries.

Filter	Household Applications										
	Cost US D	Rural	Urban	Drinking	Food Preparation	Kitchen Hygiene	Personal Hygiene	Household Hygiene	Laundry	Toilet	Life yrs.
BioSand Water Filters											
Cabin Clean Water Filter	50 – 200 (depending on quantity)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	20+
Ceramic Candle Filters											
Berkey Big Berkey	278	?	Yes	Yes	Yes	Limited	Limited	No	No	No	?
Doulton	364	?	Yes	Yes	Yes	Limited	Limited	No	No	No	?
RainFresh Steel Gravity Filter	200	?	Yes	Yes	Yes	Limited	Limited	No	No	No	?
Brazilian Clay Water Filter	140	?	Yes	Yes	Yes	Limited	Limited	No	No	No	?
Katadyn	400 +	No	Yes	Yes	?	?	?	No	No	No	10+
Fontu (Colombia)	Commercial	No	Yes	Yes	?	?	?	No	No	No	?
Ceramic Pot Filters											
Potters for Peace	Charity	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	2-3 or?
Agualogic (Colombia)	Commercial	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	2-3 or?
Membrane Filters											
Sawyer Mini	1 gal 80	No	Yes	Yes	Yes	Limited	Limited	No	No	No	3-5 (?)
LifeStraw Community	450	?	Yes	Yes	Yes	Yes	Yes	No	No	No	3-5
Other											
JalKalp	Charity	?	Yes	Yes	Yes	Yes	Yes	No	No	No	?
Fontu (Colombia)	Commercial	?	Yes	Yes	Yes	Yes	Yes	No	No	No	?
Tiva	Not recommended at this time.										

BioSand Water Filters

1. Cabin Clean Water Filter (CCWF) <https://cabincleanwaterfilter.com/> . The filter is a type of BioSand Water Filter for use in households in disadvantaged rural and urban communities world wide. The filter overcomes all of the disadvantages of other variations of filters using BSF technology. The CCWF also provides opportunities for enhanced treatment using technologies such as reverse osmosis normally reserved for communities with secure power supplies. The CCWF provides opportunities for automating the treatment process and so removing the need for continuous human attention and substantially increasing daily production of treated water and the possibility of distributing treated water, on demand, to many locations.

Ceramic Pot Filters

1. Potters for Peace <https://www.pottersforpeace.org/> . The filter is a ceramic pot constructed from locally obtained clay mixed with colloidal silver and sintered in a kiln. The porosity of the resulting container is carefully controlled. The ceramic pot filter is able to remove 99.98% of water-borne disease-causing agents. Maintenance consists of cleaning the filter surface when it is clogged with sediment. The cleaning process is the only time the ceramic filter may be damaged. Also see commercial version sold by Agualogic <https://www.agualogic.com/> .

Ceramic Candle Filters

1. Berkey (Big Berkey) <https://www.bigberkeywaterfilters.com/big-berkey-water-filter.html> . Manually operated. Gravity operated. This filter combines ceramic filter characteristics with GAC. It is able to remove all pathogens (including viruses, bacteria and parasites), particulates and toxins. Limitations are high sediment water which will quickly plug off the ceramic candle. Performance is unaffected by the presence of chlorine which it will remove.

2. Doulton household filter kit <https://humanitarian.doulton.com/humanitarian-products/household-filter-kit/> . Manually operated. Gravity operated. There are a variety of ceramic candles to chose from depending on what is intended to remove. Selection includes; particulates, pathogens (viruses, bacteria and parasites) and a variety of toxins. Significant limitation is water with high concentration of sediment which will quickly plug off the ceramic candle. Performance is unaffected by the presence of chlorine.

3. RainFresh gravity drinking water system. They produce a steel gravity system and a bucket system. The bucket system is available to aid agencies and NGOs. <https://rainfreshstore.ca/product/gravity-ceramic-water-filter/> . Manually operated. Gravity operated. Will remove almost all bacteria and parasites, particulate matter and chlorine. Limitations are high sediment water which will quickly plug off the ceramic candle.

4. Brazilian Clay Water Filter <https://www.supermarketbrazil.com/products/brazilian-clay-water-filter-terracota-ceramic-sao-joao-stefani> . Manually operated. Gravity operated. Will

remove almost all bacteria and parasites, particulate matter and chlorine. Limitations are high sediment water which will quickly plug off the ceramic candle.

5. Katadyn <https://www.katadyn.com/us/us/products/water-filters#/1/filter?categories=788> . Manually operated by physically pumping water through a membrane filter. Remove particulates, bacteria, viruses, and protozoa. Possible to remove dissolved substances using specialized carbon filter (Combi version). Ceramic filter plugs off quickly if treating water with high concentration of suspended solids. Easily cleaned but frequent cleaning is not convenient.

6. Indian ceramic candle filters: Pooja, Kiran, Sheefal, Terafil PURO, RAMA gravity ECO, Crystal, Pristine, Veeline, Ankur, Ganga, Home-pro, and there are more.

7. Mexican ceramic candle filter: Caminos de agua.

8. Fontu Purificadores <https://www.fontu.com.co/> produces a variety of combination ceramic and carbon filters. The ceramic filters will need to be cleaned or replaced. The carbon elements will remove dissolved substances for as long as they are active. There does not seem to be a way to determine when the carbon element is no longer active. Microorganisms which pass through the ceramic element will colonize the carbon filter which might then become a biological hazard.

Membrane Filters

1. Sawyer (Mini Filter <https://sawyer.com/products/mini-filter/> . Manually operated. Gravity operated. This uses a hollow fibre membrane bundle. It is able to remove all pathogens (including viruses, bacteria and parasites) and particulates. It does not remove toxins. The filter is cleaned using a simple backwash with clean water. This may be frequent if the water has a high concentration of sediment. Performance is unaffected by the presence of chlorine.

2. LifeStraw Membrane Microfilter <https://www.lifestraw.com/pages/how-our-products-work#technology> and <https://www.lifestraw.com/products/lifestraw-community> . Manually operated. Gravity operated. This uses a hollow fibre membrane bundle. It is able to remove all pathogens (bacteria and parasites) and particulates. Their Ultrafilter can also remove viruses. Depending on the cartridges that are used it can also remove chlorine and odors and heavy metals such as lead(?). The filter is cleaned using a simple backwash with clean water. This may be frequent if the water has a high concentration of sediment. Performance is unaffected by the presence of chlorine.

Other

1. Tiva https://www.watsan.org/show_detail.php?key=683&sgrp= and <https://www.tivawater.com/> . This is claimed to be a type of BioSand Water Filter yet it has

almost none of the physical features of a BioSand Water Filter. The methods of particulate removal and disinfection are not disclosed.

2. Sehgal Foundation – JaKalp filter <https://www.smsfoundation.org/wp-content/uploads/jalkalp-water-filter.pdf> and <https://www.indiawaterportal.org/articles/jalkalp-water-sands-impurities> . This is claimed to be a type of BioSand water filter; however, the design has a modified standpipe which is within the filter media and it incorporates a copper mesh between the bottom two layers of media. The standpipe modification may be acceptable depending on how vulnerable it is to agitating the media inside the filter when it is jarred. The copper mesh has uncertain disinfection value. The stainless-steel body enhances consumer appeal.

3. Fontu Purificadores <https://www.fontu.com.co/> produces a variety of combination ceramic and carbon filters. The ceramic filters will need to be cleaned or replaced as they will plug off (should be replaced after being cleaned). The carbon elements will remove dissolved substances for as long as they are active. There does not seem to be a way to determine when the carbon element is no longer active. Microorganisms which pass through the ceramic element will colonize the carbon filter which might then become a biological hazard.

Table 2. Other uses for household water filter products in disadvantaged communities.

Filter	School	Small Clinic	Hospital ³	Emergency Relief ¹		Emergency ¹ Preparation	Refugee Camps	Community Development	Corporate Social Responsibility
				Suitable	Legacy ²				
BioSand Water Filters									
Davnor Cabin Clean Water Filter	Yes	Yes	Limited	Yes	Yes	Yes	Yes	Yes	Yes
Manz BSF60	Yes	?	Yes	?	?	?	Yes	Yes	Yes
Other BSF Filters	Yes	Yes	Limited	No	No	No	No	Yes	Yes
Ceramic Candle Filters									
Big Berkey Big Filter	Yes	Yes	Limited	No	No	Limited	No	No	Depends
Doulton	Yes	Yes	Limited	No	No	Limited	No	No	Depends
RainFresh Steel Gravity	Yes	Yes	Limited	No	No	Limited	No	No	Depends
Brazilian Clay Water Filter	Yes	Yes	Limited	No	No	Limited	No	No	Depends
Katadyn	Yes	Yes	Limited	No	No	Limited	No	No	Depends
Ceramic Pot Filters									
Potters for Peace	Yes	Yes	Limited	?	?	?	?	Limited	Depends
Agualogic	Yes	Yes	Limited	?	?	?	?	Limited	No
Membrane Filters									
Sawyer Mini	No	No	No	Yes	No	Yes	No	No	Depends
LifeStraw	Yes	Yes	Limited	Yes	No	Yes	No	No	Depends
Other									
JalKalp	Yes	Yes	No	No	No	No	Yes	Yes	Depends
Fontu Purificadores	Yes	Yes	No	No	No	No	No	No	No

1. The feature limiting the use of other BSF technology is their lack of portability.
2. If a technology is not suitable for emergency relief it cannot become a legacy product. The reverse is not necessarily true – e. g. membrane filters.
3. Hospitals require significant quantities of treated water without continuous attention to water treatment and would prefer the treated water was distributed to several locations.