

# BushProof

## Training in Household Biosand Filtration



**Machakos, Kenya**

## **Introduction**

Safe drinking water is one of the most important issues of development work, especially among low-income families. Biosand filtration is an appropriate and low-cost method for household water treatment, and is proven to reduce diarrhoeal incidence. The biosand filtration course offered by BushProof is intended for those who want to learn about household level biosand filtration as an effective household water treatment.



The course will provide an overview of the theoretical aspects of sand filtration, but a large part will also involve hands-on practicals. The course also covers critical issues of how to set up local production sustainably.

## **Practical sessions**

The practical elements of the training include:

- Construction of concrete filters
- Installation of filters at household level
- Maintenance of filters at household level

## **Teacher-student ratio**

We will never have more than 20 participants per course, and therefore have a high teacher-student ratio, which we find is essential to allow individual feedback and tuition.

## **Language**

The course will be conducted in English, but since the BushProof course facilitators speak French they can help francophone participants to understand any technical terms.

## **Dates**

See website <http://www.bushproof-madagascar.com/index.php?id=73> for details.

## **Location**

The training is Machakos District, Kenya, which is about 3 hours drive south of Nairobi.

## **Contact details**

Telephone: +44 (7814) 788 846 (UK) or  
+261 (33) 11 997 56 (Madagascar - French)  
+261 (33) 05 244 92 (Madagascar - English)

Email: [madagascar@bushproof.com](mailto:madagascar@bushproof.com), [sales@bushproof.com](mailto:sales@bushproof.com)

## **Venue**

The training will be held at a local hotel in the area. The accommodation and training venue is basic, since there is little available choice in the area - we choose to run the training in an area where the filters have been produced and sold for years, in order to experience actual installation in households and to learn about what worked or did not work regarding setting up local production. So this means that the accommodation, training venue and food is not always first class.



## **How to book**

Go to <http://www.bushproof-madagascar.com/index.php?id=73> and follow the link to the booking page. Here you will find booking procedures and application forms. Please contact us if you experience any difficulties.

## **Course fees & duration**

The duration of the course is 5 days.

The course fee is 1500 Euros.

The course fee includes:

- Tuition, handouts, resource CDs, coffee breaks, lunch on training days, field visits plus transport by van to and from Nairobi.

The course fee does not include the following:

- International & domestic airfares, travel or medical insurance, visa, accommodation, and breakfast / evening meal.

Any organization booking 5 places can get a 6th place for FREE. Please note that we can only guarantee a place for an applicant upon full receipt of course fees. We need a minimum attendance to make the course viable, otherwise we will have to cancel the course. Our cut-off date is 1½ months prior to the course start date – so please confirm with us prior to paying for international flights.

An arrival guide will be sent to all applicants together with the invoice, which includes telephone and email contacts as well as the rendezvous point in Nairobi. Please read this information carefully as it will contain all you need to know. While participants will pay for their own accommodation, we will most likely all stay in one hotel due to lack of choice - however, the cost is likely to be very reasonable. BushProof will book participants into relevant hotels.

Applicants will also be sent a recommended reading list prior to the course.

## Training schedule

Day	No	Time	Main subjects	Details
Monday	1	08.00 – 11.30	Travel to Machakos	
	2	11.30 – 12.30	Introduction to Household Water Treatment	Rationale for promoting household water treatment, review of pros & cons of household vs bulk treatment, overview of selected technologies. Practical: demonstration of ceramic filter, SODIS, household chlorination, PuR/WaterMaker, solar distillation, biosand filter.
	3	14.00 – 15.30	Introduction to biosand filtration	General overview of processes involved in sand filtration: how the filter works, reason for water level, biological layer. Intermittent vs. continuous filtration. Slow vs rapid sand filtration. Different types of sand filters in addition to concrete filter.
	4	16.00 – 17.30	Practical: preparation for making filters on Day Two. Overview of workshop set-up & staffing.	Preparing to cast filter on Day Two. Visit to sand source to get samples for sieve analysis on Day Two. Workshop set-up: how much space and what materials are needed – walk around workshop in Machakos.
Tuesday	5	09.00 – 10.30	Filter processes within the sand	Detail on filtration processes: Physical & mechanical filtration; Biological action - the schmutzdecke defined
	6	11.00 – 12.30	Theory & practical: casting first filter	Theory introduction to the Filter Construction Guidelines and Mould Construction Guidelines & where to download. Introduction to <a href="http://www.biosandfilter.org">www.biosandfilter.org</a> website. Filters cast in teams of 2-3. Discussion of advantage of round mould vs square mould.
	7	14.00 – 15.30	Diffuser plate explanation. Practical: making diffuser plates	Reason for use – what height from the sand, Made from what & reason for material. Practical making diffuser plates. Problems with metal plates in Machakos project. Test quality of different diffuser plates and assess scour.

	8	16.00 – 17.30	Filter media. Practical: sieve analysis. Additions to filter media & alternative media.	What sand type needed & reasons: Effective size and Uniformity Coefficient explained. Why filter media size is important generally. What Effective Size and Uniformity Coefficient needed for slow sand filters. How does sand size and sand bed depth affect water quality. Practical: sieve analysis. Role of gravel in a filter - what size & reason for use.
Wednesday	9	09.00 – 10.30	Field visit to households	Field visit to households that purchased a filter. User satisfaction & problems encountered. View filters in action & measure flow rate. Marketing the filters: how did it work in Machakos. Investigate why people bought their filters: health reasons and non-health reasons. Perceived benefits of the filter by users: firewood, time saving.
	10	11.00 – 12.30	Practical: open moulds from first filters cast on Day Two	Mould from the first filters are removed & repair work carried out. Curing – how to do it by filling with water. Cleaning moulds and preparing everything for second casting session in afternoon.
	11	14.00 – 15.30	Practical: casting second filter	Second filters cast
	12	16.00 – 17.30	Practical: filling a filter with media and starting to run. Operation & maintenance procedures.	Demonstration of how to fill up a concrete filter with gravel and sand. Importance of not getting air pockets when filling with sand and water. Operation & maintenance: how to practically clean the filter – wet harrowing vs. scraping 1-2 cm of sand and replacing. When you need to do one or the other.
Thursday	13	09.00 – 10.30	Flow rate: Darcy's Law & effect on water quality. Water testing.	Flow rates in sand filters: how water travels through sand & Darcy's Law explained. What flow rate to expect in the intermittent filter as opposed to continually-operated filters. Effect of flow rate on: bacteriological water quality, turbidity and colour removal. The need for further research on hydraulic loading. Water testing: when to test water, what is most important to test for – core and secondary tests.
	14	11.00 – 12.30	Effect of biosand filters on water quality: literature review	The effect of biosand filtration on bacteriological, chemical and aesthetic water quality: evidence from continually-operated vs. intermittently-operated systems

	15	14.00 – 15.30	Practical: check leaks from first filters. How to start up a filter project: case study of Machakos & Madagascar. Open moulds from second filters cast on Day Two.	Checking for leaks in first filter. Mould from second filter removed by participants & repair work carried out. How to start up a filter project: principles, budget, staffing. Brainstorm how to replicate workshop in participants' countries. Subsidy vs. full commercial model. Lessons learned from Nairobi slum & Karamoja: what not to do & the importance of being demand-led. The advantages of the commercial approach.
	16	16.00 – 17.30	Machakos evaluation review. Operation and maintenance issues	2003 Machakos evaluation results. Operation and maintenance of the filters & the importance of technical instruction on installation. The importance of follow up to ensure that users know what to do. How long it takes for the biological layer to recover with wet harrowing and scraping.
Friday	17	09.00 – 10.30	Household visit for filter commissioning	Field visit to a household to install a filter in real time.
	18	11.00 – 12.30	Practical: check leaks. Transporting filters.	Check for leaks in second filter. Transporting filters – problems & solutions reviewed.
	19	14.00 – 15.30	Revision & questions. BushProof overview. Open session to expand on certain topics.	Revision and cover questions raised that have not been dealt with during the training. Open session. BushProof: overview of services offered.
	20	16.00 – 19.30	Travel to Nairobi	

## **Health advice**

Prior to travel to Kenya, please ensure that you are properly vaccinated and take relevant precautions. Visit your doctor before travelling.

Special notes:

- Make sure you are fully vaccinated.
- There is some malaria risk so prophylaxis is recommended.

For advice on how to prevent insect bites:

<http://www.nathnac.org/pro/factsheets/iba.htm>

- Dysenteries and diarrhoeal diseases are common. Attention to what you eat, and perhaps more importantly to hygiene (e.g. washing hands) is therefore especially important).

## **Visas**

Visas are needed by most nationalities and can be obtained at Kenyan consulates prior to travel. Equally, it is possible to obtain entry visas at the airport on arrival for some nationalities.

An airport visa for up to 90 days and previously cost \$50 (US Dollars). You will need a passport that is valid for at least 6 months but you don't need passport photos.

## **International travel**

Getting to Kenya is relatively easy and not so expensive. Please contact us if you are having difficulties, and we can recommend some options for you.