

**BushProof** SARL

MAXIMUM HUMANITARIAN IMPACT - INNOVATIVE SOLUTIONS FOR DIFFICULT ENVIRONMENTS



**TECHNICAL TRAINING IN WATER  
& SANITATION INFRASTRUCTURE**

*"This training was unquestionably one of the most useful I have ever attended. It combined a very strong theoretical grounding with numerous practical exercises that ensured that participants were able to know how water and sanitation solutions are both developed and implemented. It was intensive, information-rich and supported by extensive documentation including manuals, policies and research findings. The key to the success of the training was the fact that the trainers were both highly experienced in the field, and that they were passionate about the subject."*

- Save the Children participant, September 2013



## OVERVIEW

The BushProof Technical Training in Water & Sanitation Infrastructure is a broad, intense 6-day course with a heavy practical bias, providing a rare opportunity to learn through both theoretical and hands-on practical sessions. The training is invaluable to both those who need more technical input for their work, as well as for those in management who find they have become more and more involved in water and/or sanitation programmes, but lack the basic technical and theoretical background.

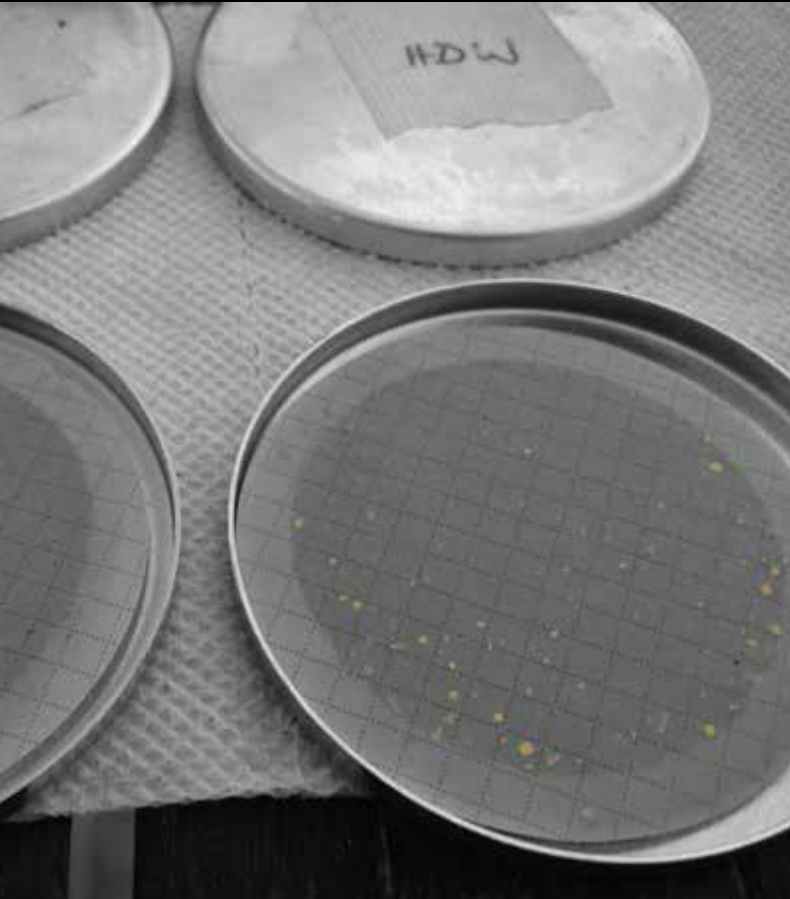


## PRACTICAL SESSIONS

The training is intense and is given through a range of practical and theoretical sessions. While several theoretical courses are available elsewhere, practical, hands-on field experience is difficult to obtain. The BushProof training therefore focuses heavily on these sessions, which include the following:

- Manual drilling using BushProof technique;
- Coagulation & chlorination jar tests;
- Biosand filter construction;
- Latrine dome slab construction;
- Water testing (physio-chem, bacteriological);
- Field topographical surveying;
- Various practical calculations as part of theoretical sessions, including pipe design (pumping & gravity) and rainwater catchment.

Participants are expected to get involved with all practical sessions and should expect to get dirty!



## THEORETICAL SESSIONS

In addition to the practical sessions, the course will provide a broad overview of the theoretical aspects of water and sanitation projects (but will focus on water supply & treatment). Theoretical issues are linked to real life field experiences of the facilitators throughout the course.

## 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.



*“The trainers were really WATSAN experts, very well organized and exceptionally dedicated. The training provided me with the skills I needed to better manage and to provide technical support to our implementing partners.”*

- USAID participant, June 2010

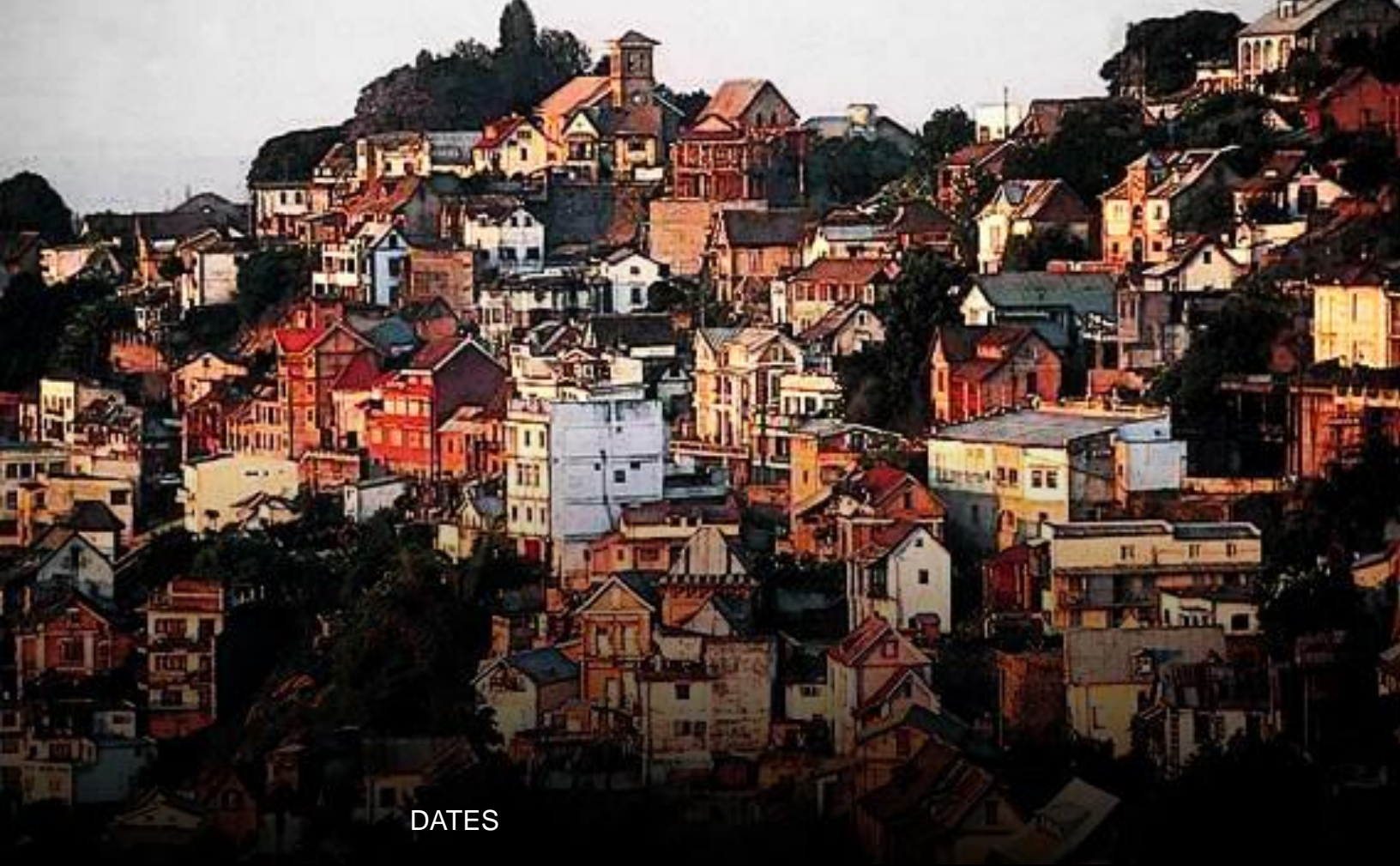




# SCHEDULE

| DAY                    | TIME          | MAIN SUBJECTS  | DETAILS  |
|------------------------|---------------|--|--|
| <b>Day 1 Monday</b>    |               |  |  |
|                        | 08.00 - 09.00 | Introduction & welcome   | Introduction to the course. Book review & technical response services - where to look for information.   |
| 1                      | 09.00 – 10.30 | Field hydrogeology   | How groundwater works – overview of aquifer types, technical terms related to hydrogeology, geology overview.  |
|                        |               | <b>Coffee break</b>  |  |
| 2                      | 11.00 – 12.30 | Shallow groundwater sources                                    | Overview of shallow groundwater sources, including hand-dug wells, riverbed wells, infiltration wells, infiltration galleries, sub-surface dams.   |
|                        |               | <b>Lunch break</b>   |  |
| 3                      | 14.00 – 15.30 | Hand dug wells   | Overview of hand dug well construction using in-situ lining with curved blocks and cutting ring for caissoning.  |
|                        |               | <b>Coffee break</b>  |  |
| 4                      | 16.00 – 17.30 | Spring protection  | Spring protection techniques & construction guidelines.  |
| <b>Day 2 Tuesday</b>   |               |  |  |
| 5                      | 08.00 – 09.30 | Drilling 1: options  | Overview of drilling options, including hand drilling, machine drilling, jetting, sludging.  |
|                        |               | <b>Coffee break</b>  |  |
| 6                      | 10.00 – 12.00 | Drilling 2: borehole design                                    | Overview of technical borehole installation methods used during rotary mud flush drilling, including information on screens & slot size, borehole logs, development, pumping tests, what to supervise in contracted boreholes.                   |
|                        |               | <b>Lunch break</b>   |  |
| 7                      | 13.30 – 17.30 | Drilling 3: manual drilling ( <b>Coffee during practical</b> ) | <b>Practical:</b> manual drilling of shallow borehole including: manufacture of screens, gravel pack sieve analysis, annulus calculation, gravel pack sieving, screen & gravel pack installation, development. Explanation of jetting technique. |
| <b>Day 3 Wednesday</b> |               |  |  |
| 8                      | 08.00 – 09.30 | Water quality testing 1: overview                              | Water quality standards - when to test water, what is most important to test for, core and secondary tests. <b>Practical:</b> showing chemical testing kits.   |
|                        |               | <b>Coffee break</b>  |  |
| 9                      | 10.00 – 12.00 | Water treatment 1: Coagulation, flocculation & sedimentation   | Product types & effectiveness, calculating 1% alum solution. <b>Practicals:</b> making 1% alum solution & doing jar test, natural coagulants ( <i>Moringa</i> ).   |
|                        |               | <b>Lunch break</b>   |  |
| 10                     | 13.30 – 15.30 | Water treatment 2: Chlorination                                | Product types & effectiveness, calculating 1% chlorine solution. <b>Practical:</b> making 1% solution & doing jar test.  |
|                        |               | <b>Coffee break</b>  |  |

|                       |               |   |   |
|-----------------------|---------------|---|---|
| 11                    | 16.00 – 17.30 | Water treatment 3: Household Water Treatment                  | Rationale for promoting household water treatment, review of pros & cons of household vs bulk treatment, overview of selected technologies. <b>Practical:</b> demonstration of ceramic filter, SODIS, household chlorination, PuR/WaterMaker, solar distillation, biosand filter. |
| <b>Day 4 Thursday</b> |               |   |   |
| 12                    | 08.00 – 10.00 | Water quality testing 2: bacteriological testing              | <b>Practical:</b> collecting samples, carrying out membrane filtration & incubation of samples using Delagua kits (including sample from SODIS demonstration).  |
|                       |               | <b>Coffee break</b>   |   |
| 13                    | 10.30 – 13.00 | Field visit: surveying  | <b>Practical:</b> topographical measurement.  |
|                       |               | <b>Lunch break</b>  |   |
| 14                    | 14.30 – 17.30 | Gravity flow water systems ( <b>coffee during practical</b> ) | <b>Practical calculation:</b> how to design a simple gravity flow system.   |
| <b>Day 5 Friday</b>   |               |   |   |
| 15                    | 08.00 – 08.30 | Water quality testing 3: bacteriological test results         | <b>Practical:</b> reading water test results from previous session.   |
| 16                    | 08.30 – 10.00 | System curves: water flow in pumped pipe systems              | Hydraulic theory, pipe friction tables & system curves. <b>Practical calculation:</b> how much water flow to expect in a pumped system with various elevations and for various pipe types, sizes & lengths.   |
|                       |               | <b>Coffee break</b>   |   |
| 17                    | 10.30 – 12.30 | Motor pump types & pump choice                                | Different pump options. <b>Practical calculation:</b> choose a pump based on pump efficiency and power requirements that fits system curve from practical.  |
|                       |               | <b>Lunch break</b>  |   |
| 18                    | 14.00 – 16.00 | Concreting 1: dome slab, biosand filter & blocks              | <b>Practical:</b> construction of dome latrine slab, biosand filter & porous concrete blocks.   |
|                       |               | <b>Coffee break</b>   |   |
| 19                    | 16.30 – 17.30 | Rainwater collection 1  | Rainwater collection system, guttering & storage tank options.  |
| <b>Day 6 Saturday</b> |               |   |   |
| 20                    | 08.30 – 10.30 | Rainwater collection 2  | <b>Practical:</b> design of rainwater catchment at office.  |
|                       |               | <b>Coffee break</b>   |   |
| 21                    | 11.00 – 11.30 | Concreting 2: removing moulds & curing                        | <b>Practical:</b> removing biosand filter mould, curing of concrete.  |
| 22                    | 11.30 – 13.00 | Group work 1: gravity & pumping design                        | <b>Practical:</b> using topographical data from field visit to design a gravity and/or pumped water system.   |
|                       |               | <b>Lunch break</b>  |   |
| 23                    | 14.30 – 16.00 | Group work 2: gravity & pumping design                        | <b>Practical:</b> using topographical data from field visit to design a gravity and/or pumped water system. Reporting of results.   |
|                       |               | <b>Coffee break</b>   |   |
| 24                    | 16.30 – 17.30 | Review, recap & evaluation                                    | Repeating sessions or practicals as needed, filling evaluation forms, going over contents of USB stick, Sphere Quiz prizes, giving out certificates.  |



## DATES

See website [www.bushproof.com](http://www.bushproof.com) for details.

## LOCATION

Antananarivo (Tana) is the capital city of Madagascar and the largest city on this big island in the Indian Ocean. The city is situated inland, about 90 miles from the East coast. Tana was founded in the early 1600's and its position on top of a high ridge made it easy to defend against enemy attack. Antananarivo means "the city of a thousand", a reference to the 1000 soldiers that supposedly protected the newly founded city during the reign of King Andrianjaka. In 1895, the French took over and expanded it greatly to include many new buildings and roads. Madagascar gained its independence from the French in 1960 and today the city offers a wonderful panoramic of different cultures and eras.

Tana will surprise you with its rice paddies, intricate canal systems, numerous stairs up steep hills, palaces, narrow cobbled streets, oxcarts and churches. It is not quite Africa or Asia but a curious mixture of both with a touch of French influence. It is the starting place for adventures throughout the island.

## VENUE

The training will be held at (or near) the BushProof office in Antananarivo. The venue is near the airport and is in a pleasant, uncrowded part of town with easy access to a range of hotels and restaurants. The office has a wireless internet connection.







## ● HOW TO BOOK

Go to [www.bushproof-madagascar.com](http://www.bushproof-madagascar.com) and click on Products > Training > Booking a Training. Here you will find booking procedures and application forms. Please contact us if you experience any difficulties.

## ● RESOURCES

Participants will receive several resource CDs with a wealth of expertise in the form of documents and articles. A certificate will be presented to participants on completion of the training.

## ● COURSE FEES AND DURATION

The duration of the course is 6 days (with 5½ days taught). The cost is **1800 Euros\***

The course fee **includes**:

*Tuition, handouts, resource CDs, coffee breaks, lunch on training days and field visits.*

The course fee **does not** include the following:

*International & domestic airfares, travel or medical insurance, visa, accommodation, breakfast / evening meal and taxi cost from the accommodation to the training centre every day.*

An arrival guide to hotels in Antananarivo will be sent to all applicants together with the invoice. This allows participants to choose and organize their own accommodation and includes telephone and email contacts. Please read this information carefully as it will contain all you need to know. However, BushProof will help participants if they are really having difficulties in arranging things, but note that we are primarily a training organization, not a logistical one. Daily expenses (hotel, taxi, etc) will likely be in range of 20 To 50 Euro – further details are in the arrival guide. In addition, there will be some compulsory reading for all participants prior to the training – this is to ensure a basic understanding of some of the more involved topics.”

**\*Any organization booking 5 places can get a 6th place for FREE. A place is only assured upon full receipt of course fees. We require 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.**



## 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, sales@bushproof.com

## HEALTH ADVICE

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

### Special notes:

Make sure you are fully vaccinated. A yellow fever vaccination certificate is sometimes needed when entering the country. Malaria risk, predominantly in the malignant falciparum form, exists all year throughout the country and is highest in coastal areas. Resistance to chloroquine has been reported. Chikungunya, which is a similar virus to Dengue has hit coastal Madagascar around the area of Tamatave (half way up the east coast) in the past. There is no vaccination against it, and the best way to prevent it is by preventing mosquito bites, even during the day (early morning, late afternoon) when the vector mosquito is especially active.

For advice on how to prevent insect bites:

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

Bilharzia (schistosomiasis) is present in fresh water. Although health advice is to avoid swimming and wading in fresh water, during fieldwork it is sometimes unavoidable. Therefore if you have had contact with open fresh water during your visit, you should get an Elisa antibody test together with an antigen test 6 weeks or more after you re- turn home (6 weeks, because if infected, the antibodies need to develop first and won't show on the test otherwise). 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. Rabies is present in Madagascar. Vaccination before arrival should be considered.

## VISAS

Visas are needed by all nationalities and can be obtained at Madagascar consulates prior to travel. Applications can be made to the consulates by post. You can check out this link for further information on visas:

<http://www.madagascar-consulate.org/visainfo.html>

Equally, for most nationalities it is possible to obtain entry visas for 1 month at the airport on arrival, where often the queue is shorter than for those with visas.

## INTERNATIONAL TRAVEL

Getting to Madagascar can be expensive. Please contact us if you are having difficulties, and we can recommend some options for you.