

INTRODUCTION

In 2015 nearly 660 million people around the world remain without sustainable access to safe drinking water. The majority of these live in rural areas with no realistic hope in the foreseeable future of access to distributed treated water systems. Solar water disinfection (SODIS) is a household water treatment that uses freely available solar energy to inactivate pathogens in water stored in transparent containers placed in direct sunlight. SODIS is used by approximately 5 million people in developing countries on a daily basis (Figures 1 & 2).

The Water Sustainable Point of Use Treatment Technologies (WATERSPOUTT) aims to provide safe drinking water to communities who rely on unsafe sources using SODIS technologies. With funding from the European Union, WATERSPOUTT – a consortium of 18 higher education institutes, organisations and small to medium enterprises will carry out a technological development programme to advance three water treatment technologies based on Solar Disinfection (SODIS), by designing, piloting and bringing to market three novel solar based technologies (Solar rainwater reactors - South Africa and Uganda, Solar jerry cans Ethiopia and Solar-ceramic filtration - Malawi. In parallel, a social science programme has been structured to make sure that the technologies are adopted by the target communities in rural Africa, with the support of the local authorities and in an economically sustainable way.

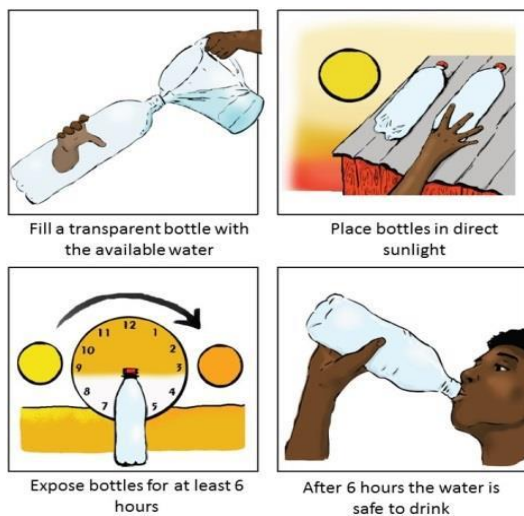


Figure 1: Summary of basic SODIS use to treat unsafe drinking water using transparent bottles

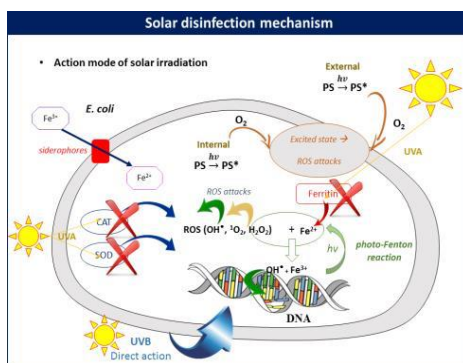


Figure 2: Brief summary of the actions involved in SODIS against E. coli

SOLAR CERAMIC FILTRATION

Led by The Royal College of Surgeons Ireland, Malawi, is participating in WaterSPOUTT through the Centre for Water Sanitation Health and Appropriate Technology Development (WASHTED) at the Polytechnic (University of Malawi), in the design, field-testing and evaluation of solar-ceramic filtration unit for the treatment of drinking water in Chikwawa District. This research started on 1st June 2016 and will be completed in May 2020 (4 years). The system will be designed and tested both in controlled and field settings with a number of partners (Box 1).

Study Design

Rather than the 2L treated volumes (Figure 3) usually provided by the standard batch SODIS process, WATERSPOUTT technology will provide larger volumes ($\geq 20L$) of treated water per day in each household.



Figure 3: 2 litre bottles being used to disinfect drinking water at a school in Uganda

In Malawi we will be developing a combined system of ceramic filtration and solar water disinfection to treat drinking water from unprotected sources. This system will aim to reduce the turbidity of water prior to exposure to the sun, and will be developed from locally produced materials (Figure 5) to increase opportunities for sustainable scale-up.

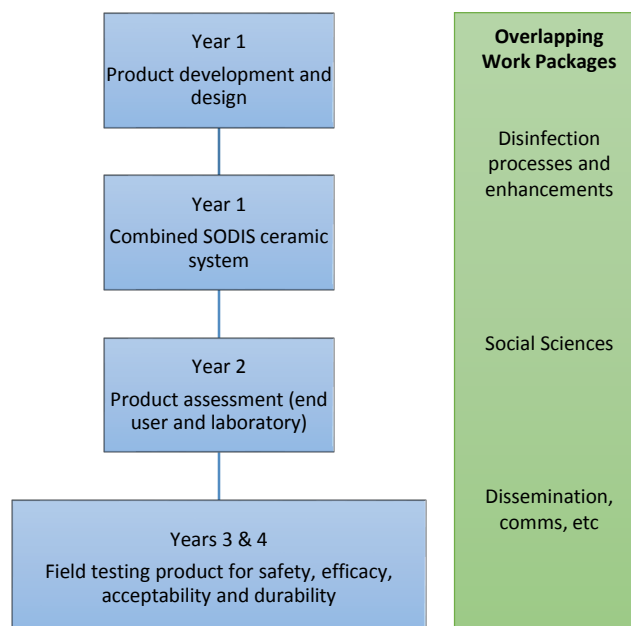


Figure 4: Brief summary of the planned activities for the solar-ceramic filtration system development



Figure 5: Exploring opportunities for ceramics development in Malawi during a recent visit from our partner Lyndon Buck (Bucks University)

The prototype systems will be tested in Chikwawa District using primary schools as an initial testing site. The field testing of the systems will determine not only the safety of the drinking water, and sustainability of the systems, but also the user acceptability and cost effectiveness of the device.

The programme will be supported by parallel work packages which explore the Disinfection processes and enhancements and dissemination and communication of outcomes throughout. Importantly for the team in Malawi, the technology development will also be supported by a strong social science work package which will ensure social design and localised adaptation, operation, and management of integrated solar technologies

Social scientists in Malawi will examine the effect of gender relations and determine the challenges on domestic, local and national governance of water resources, and on local and household decision-making on uptake and adoption of solar water harvesting and SODIS reactors technologies.

The Malawi team will be keeping all stakeholders and interested parties informed of progress through a series of shared dialogue workshops, and via the programme website <http://www.waterspoutt.eu>

Box 1: WATERSPOUTT PARTNERS (Malawi specific)

1. Royal College of Surgeons in Ireland - IRELAND
2. CIEMAT Plataforma Solar de Almería - SPAIN
3. Universidad Rey Juan Carlos - SPAIN
4. University of Strathclyde - UK
5. University of Malawi-The Polytechnic - IRELAND
6. Ecole Polytechnique Fédérale de Lausanne - SWITZERLAND
7. Maynooth University - IRELAND
8. Innova - ITALY
9. Makerere University Kampala - UGANDA
10. University of Stellenbosch - SOUTH AFRICA
11. Ecosystem Environmental Services - SPAIN
12. Mekelle University Tigray - ETHIOPIA
13. New University of Buckinghamshire - UK
14. Bogaziçi University Istanbul - TURKEY
15. HELIOZ GmbH - AUSTRIA
16. Dublin City University - IRELAND
17. Stichting IHE Delft - NETHERLANDS
18. University of Santiago de Compostela - SPAIN