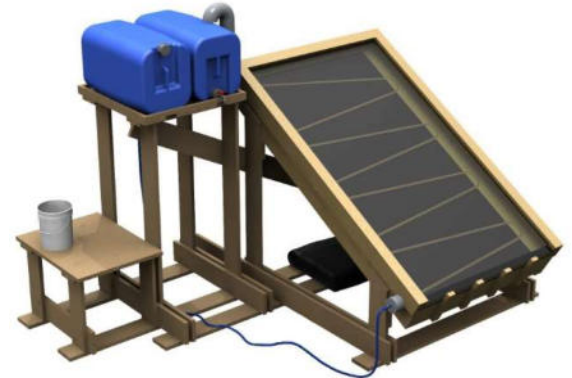




# Research Project

## Solar Thermal Water Disinfection (SoWaDi) Unit

|                     |   |
|---------------------|---|
| <b>Project ID</b>   | DEU-IOG02   |
| <b>Location</b>     | Darmstadt, Deutschland<br>Region Kilimanjaro, Tansania  |
| <b>Target Group</b> | Families, schools and communities with access to microbiologically contaminated water   |
| <b>Partner</b>      | Kilimanjaro Childlight Foundation, Tansania   |
| <b>Details</b>      | <a href="http://www.sowadi.de/en/">www.sowadi.de/en/</a><br><a href="https://www.ingenieure-ohne-grenzen.org/de/unsere-arbeit/projekte/forschungsprojekt-solarthermische-wasserdesinfektionsanlage-sowadi">https://www.ingenieure-ohne-grenzen.org/de/unsere-arbeit/projekte/forschungsprojekt-solarthermische-wasserdesinfektionsanlage-sowadi</a>   |
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Virtual Model of the developed SoWaDi Unit.

Contaminated drinking water is a major problem for the health of the local population in many countries. Especially in large parts of Africa and Southeast Asia, many people do not have access to clean drinking water and are therefore dependent on water treatment measures. Boiling water is the most widespread method of destroying harmful germs and pathogens. However, boiling over a fire is often associated with high energy costs and environmental and health damage due to deforestation and smoke emissions.

### Project Description

Our aim is to give people access to germ-free water and protect them from common diseases caused by microbiologically contaminated water by distributing the SoWaDi unit developed by us. For this purpose, a construction manual was published and is available free of charge. The unit developed by us sterilizes microbiologically contaminated water solely with the help of solar energy. In doing so, no electrical energy or chemical additives are used. The unit is designed in such a way that water to be boiled is continuously heated. Even in the event of a defect, only water that has been sufficiently heated can leave the system. All materials used are resource efficient, locally available and as cheap as possible. The construction of the unit is designed to be as simple as possible so that it can be carried out with a few simple tools using the construction manual. This means that the unit can be constructed by the workers themselves or with the support of local craftsmen.

In the first project phase from 2010 to 2014, three prototypes were initially designed, laid out and built in Germany. On the one hand, various design and production variants were tested and on the other hand, thermal and microbiological tests were carried out. In cooperation with the Darmstadt wastewater treatment plant, the functional principle of the plant was successfully validated in 2014. In the second project phase from 2015 to 2018, a construction manual was developed. Finally, a first practical test



was carried out in Tanzania at the beginning of 2017. In cooperation with the Malage Vocational Training Centre, which is located in the Kilimanjaro region of Tanzania, two systems were set up by students with the help of the construction manual. The comprehensibility of the instructions was tested. Furthermore, our requirement to use only locally available materials was successfully tested. In June 2018, the changes made as a result of the practical test were tested in Darmstadt, with particular attention paid to the comprehensibility of the instructions.

## Current Project Status

During the current project phase we want to ensure that the SoWaDi unit will work in the long term. For this purpose, two test facilities were set up on the experimental field of the TU Darmstadt in April 2021, whose parallel operation enables the direct comparison of design changes. The units will be characterized more precisely by means of a microcontroller-based monitoring system, which was developed in collaboration with the Technical University from spring to summer 2020. The test units in Darmstadt particularly support the acquisition and evaluation of long-term data. Furthermore, they serve the further technical development of the unit and support communication with project partners in Tanzania. Thus, technical improvements can be directly tested and quantified with regard to their efficiency.

Furthermore, at the beginning of 2020 four new units were built in Kidia, District Old-Moshi - Tanzania with the support of four members of our project team from Darmstadt. Two existing units at the Malage - Vocational Training Centre were adapted. A total of six test units are now being operated in Tanzania. In addition to the build of the units, a market analysis was carried out to gather information on possible distribution strategies for the technology. This will now be evaluated and will serve as a basis for the selection of a suitable distribution strategy in the 4th project phase.

The current test phase for long-term operation of the units will continue for several years. In the meantime, constant contact with the users on site will ensure that we receive information about the operation of the units and possible challenges. In cooperation with the state water supply and disposal company of Moshi and the surrounding area (MUWSA), regular checks are carried out on the quality of the water before and after treatment by the SoWaDi Units. The data collected in Tanzania is processed and analyzed. If problems arise, we work with the users and our local project partner, the Kilimanjaro Childlight Foundation, to find solutions together. If the test phase (current, 3rd project phase) is successfully completed, the SoWaDi project will be transferred to the distribution phase (4th project phase).