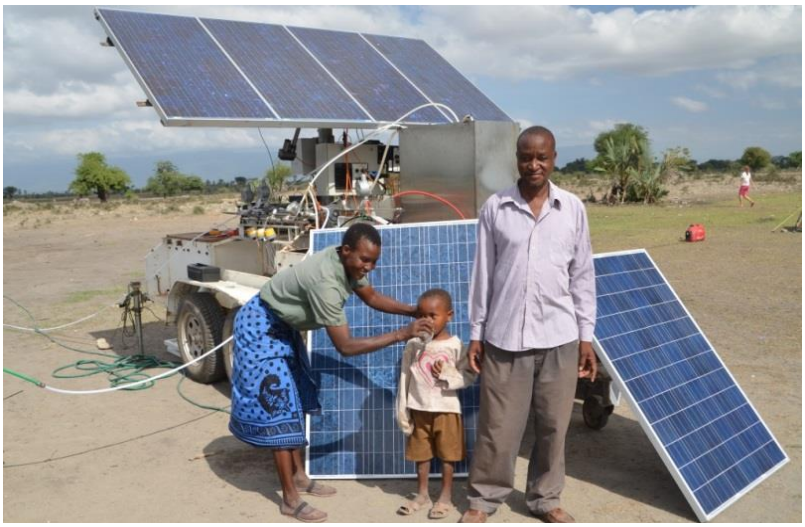
Safe Water for the People in Tanzania

Mobile Solar Filter System Removes Microorganisms and Pollutants



Inhabitants of the village of Mdori in the region of Manyara taste the freshly filtered water. (Photo: Andrea Schäfer)

Monika Landgraf
Chief Press Officer

Kaiserstraße 12
76131 Karlsruhe, Germany
Phone: +49 721 608-47414
Fax: +49 721 608-43658
E-mail: presse@kit.edu

For further information, please contact:

Margarete Lehné
Press Officer
Phone: +49 721 608-48121
Fax: +49 721 608-43658
E-mail:
margarete.lehne@kit.edu

Hydraulic engineer Andrea Schäfer and photovoltaics expert Bryce Richards have developed a solar filtration system to produce high-quality drinking water from polluted brackish water and tested it successfully in Tanzania. The test results are currently being analyzed at the KIT. The filter effectively separates undesired substances, bacteria, and viruses. Fluoride concentration that often is extremely high in Tanzania is reduced below the limit given by the World Health Organization (WHO). The system combines two membrane techniques for the separation of smallest particles and dissolved contaminants. As it is robust and autonomously mobile, it is suited well for water supply in poor and rural areas.

Outside of the rainy season, the area of Mdori which is located in the north of Tanzania in the region of Manyara is extremely hot and dry. Water is scarce, the lake located nearby has an extremely high salt concentration. A well drilled to extract water from a natural spring supplies water with a high salt concentration and 60 µg of fluoride per liter – 40 times the concentration limit given by the WHO –. This

water is not potable. At this spring, Professor Andrea Schäfer and Professor Bryce Richards, who are now working at the KIT, tested their water filtration system ROSI (Reverse Osmosis Solar Installation). The system can be operated with solar and/or wind power. It combines ultrafiltration membranes of about 50 nm in pore size to retain macromolecular substances, particles, bacteria, and viruses with membranes for nanofiltration and reverse osmosis with pore sizes below 1 nm to remove dissolved molecules from the water. Andrea Schäfer and Bryce Richards conceived ROSI in Australia and developed it further in Scotland before they started to plan their field tests at the Nelson Mandela African Institution of Science and Technology in Tanzania. In February and March this year, they tested the system at places like Mdori. Presently, Schäfer and Richards are evaluating the test results at the KIT. In the next phase, the systems will be installed at the locations selected.

As the system is run directly by solar power without batteries, the behavior of the filter changes as a function of the light conditions: Under full solar irradiation, the filtration system reduces the fluoride concentration of the water below the WHO limit of 1.5 mg/l. As a result of the change between day and night and strong temporary cloud formation in the region of Mdori, however, energy supply varies considerably. It is interrupted, if solar irradiation is insufficient. Influence of such fluctuations on water quality was one of the aspects covered by the tests of the researchers. “If less power is available, pressure decreases. As a result, less water passes the membranes. The fluoride concentration increases for a short term,” Professor Andrea Schäfer explains. She heads the Membrane Technology Division of the Institute of Functional Interfaces (IFG) of KIT. “The concentration of fluoride and other pollutants, however, is balanced as soon as more water passes the filter again. Hence, the water is completely safe.”

Andrea Schäfer and Bryce Richards, Professor of Nanophotonics for Energy at the KIT, are now looking for companies to support system manufacture and installation and operation in rural regions of Tanzania. One system can supply about 50 people with high-quality drinking water and water for household use. “At the moment, no other system removes pollutants, such as fluoride, as reliably and sustainably as ours,” Schäfer says. High fluoride concentrations may cause tooth discolorations and severe skeletal deformities in children. It is also important to remove bacteria and viruses from the water. In many areas of Africa, diseases that actually can be treated well, such as diarrheal diseases, are often fatal especially for children due to malnutrition and lacking medical care. Supply with safe

drinking water will play a key role for the future of the people in Africa.

Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. Research activities focus on energy, the natural and built environment as well as on society and technology and cover the whole range extending from fundamental aspects to application. With about 9400 employees, including more than 6000 staff members in the science and education sector, and 24500 students, KIT is one of the biggest research and education institutions in Europe. Work of KIT is based on the knowledge triangle of research, teaching, and innovation.

This press release is available on the internet at www.kit.edu.

The photo of printing quality may be downloaded under www.kit.edu or requested by mail to presse@kit.edu or phone +49 721 608-4 7414. The photo may be used in the context given above exclusively.