IWRM-Indonesia Fact Sheet

Appropriate Water Treatment Concept for Water Quality Assurance: A Ceramic Filter for Point-of-Use Application

General Data

Plant type:	Ceramic household water filter
Location:	Pucanganom Village, Gunung Kidul Regency, Province of Yogyakarta Special Region, Indonesia (110.727399° E / -8.041955° S /)
Operated since:	March 2012
Operator:	Private Household

Technical Data

Technology:	Ceramic filter for household water treatment • Ceramic coated with silver nitrate solution • Flow rate 1.5 – 2.5 L/h • Bacteria reduction up to 99.999 % for *E. coli*
Manufacturer:	Pelita Indonesia, Bandung, Indonesia

1 Objective

In the frame of the IWRM-Indonesia project, water quantity was successfully enhanced using an innovative approach in terms of an underground hydropower driven water supply to deliver water from the 100 m deep karst aquifer without use of external energy. Thus, it was possible to secure the water supply for some 75.000 people. After the foremost problem was solved and water quantity had been enhanced, further questions had to be addressed such as water distribution, waste water treatment and water quality assurance.

Karst aquifers are known to be especially vulnerable to pollutions due to fast and direct infiltration. In Gunung Kidul, sinkholes allow a direct entering of cow dung and solid waste into the underground river system. Furthermore, waste water treatment in the project region is either insufficient or nonexistent. Waste water is also partly discharged directly into the ground or collected in unsealed septic tanks. Considering the low retention capacity for pollutants of the karst setting, this leads to a high contamination of the karst aquifer particularly with fecal bacteria. Moreover, water quality assessment showed that the contamination increased within the water distribution network. Currently, people boil the water, which is barely sustainable. Apart from high consumption of fuel, in-house boiling on traditional fires may promote respiratory diseases. Moreover, boiling is often not done properly. Thus, a more sustainable treatment was needed.

Based on all above investigations and results, a kind of multi-barrier water treatment concept was developed, consisting of a central protecting treatment step prior to the distribution system, a semi-central hygienization where high water volumes need to be treated and a final treatment step at household level. This water treatment concept was implemented exemplarily in form of pilot plants. In the context of household water treatment, a ceramic filter produced by Pelita Indonesia in Bandung, Indonesia was exemplarily tested in the pilot village Pucanganom.

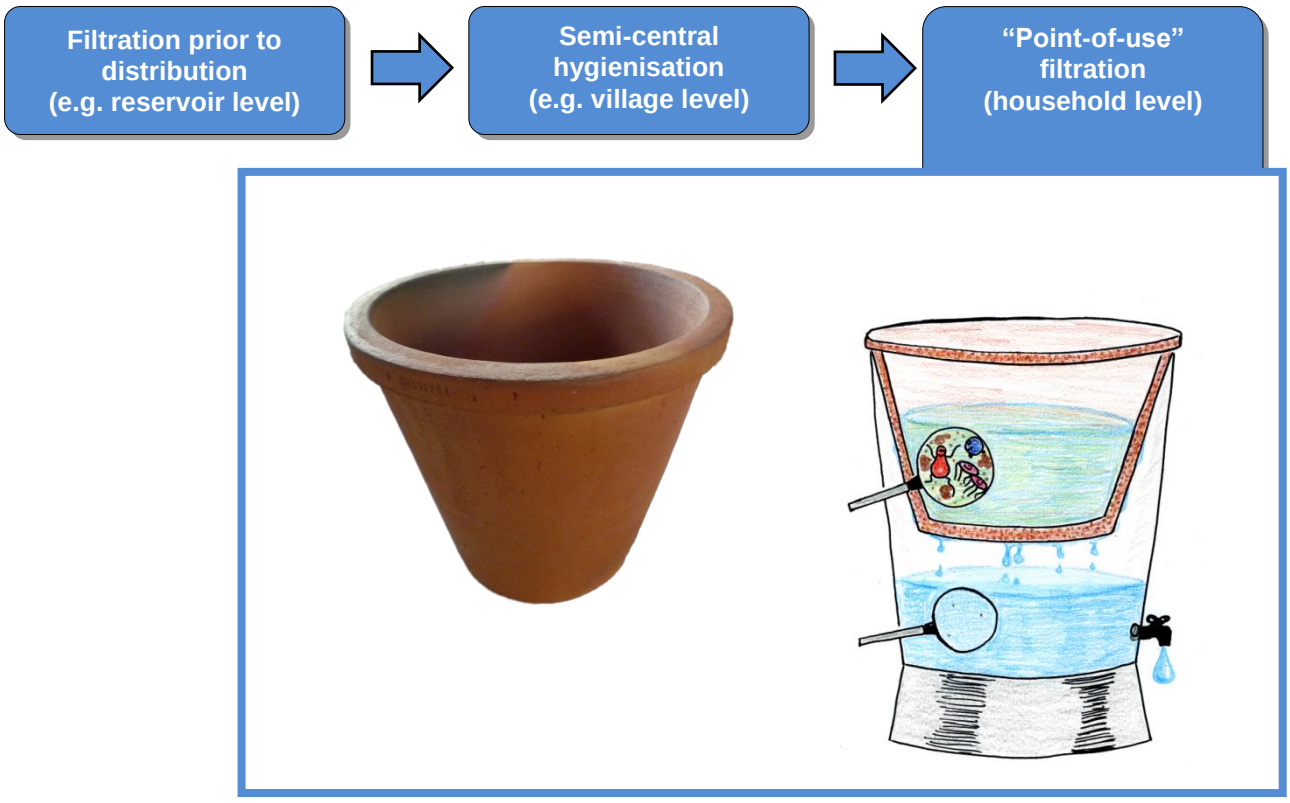


Fig.1. "Point-of-Use" filtration with cemaric filter as part of three-phase water treatment concept (pictures: Kerstin Matthies).

2 Implementation and Results

As a third treatment step, a final water treatment at household level with ceramic filters was chosen. Such filters are already available in many countries and are also produced in Bandung, West Java, Indonesia but mainly promoted in Western Java. As a base for developing a locally produced filter, filters produced by Pelita Indonesia (Bandung) were analyzed in field and lab experiments. The analysis of this commercially available ceramic filter revealed that ceramic filters

are generally well accepted by local people, but intensive training is needed to assure a correct handling of the filters. Even after one year of daily use, the flow rate was sufficient to supply a family of four with safe drinking water. Lab experiments showed that health-relevant bacteria (*E. coli*, *Ent.°faecium* and *P. aeruginosa*) were reduced by 99.9 to 99.999 %.

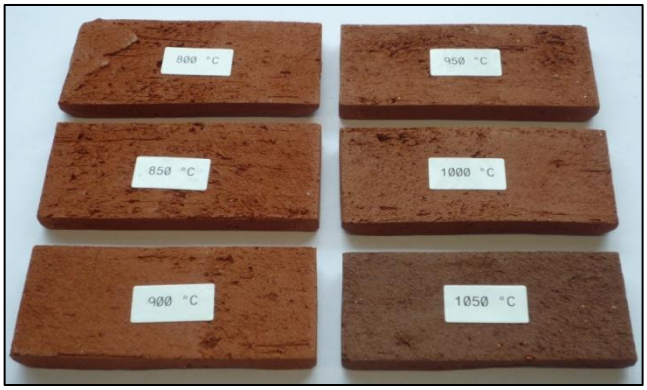
(a) Cleaning of the ceramic water filter

(b) Cooking pot and tea made from raw water (left) and filtered water (right)

Fig. 2. Impressions of the implementation

However, as these filters are not commercially available in Gunung Kidul, and hardly in Yogyakarta, a composition and firing procedure for the local production of ceramic filters was developed. Therefore, locally available raw material and local traditional firing procedures were analyzed.

(a) Analysis of local raw material and firing processes in Kasongan, Yogyakarta



(b) Laboratory experiments: ceramic fired from local clay at varying temperatures

Fig. 3. Analysis of local material and facilities

3 Project Partners

Karlsruhe Institute of Technology

Chemisches Institut Pforzheim GmbH

Ministry of Public Works and Public Housing

Province of Yogyakarta Special Region

National Nuclear Energy Agency

Forschungs-institut für anorganische Werkstoffe – Glas/Keramik - GmbH

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