

AquaViet – Bank filtration masterplan for Vietnam’s drinking water supply

Client II – International partnerships for sustainable innovations

Drinking water treatment in Vietnam is hampered by geogenic and anthropogenic substance discharge into surface waters. This limits the performance of the water treatment processes currently in use. As part of a feasibility study, the German-Vietnamese research and development project “AquaViet” is investigating the possibilities and limitations of the bank filtration process for the drinking water supply, which has hardly been used in Vietnam up to now. The focus is on developing innovative approaches to water treatment through biofiltration and disinfection as well as establishing a monitoring system.

Bank filtration in Vietnam

The drinking water supply in Vietnam is confronted with major challenges: contamination of water by anthropogenic trace substances, pathogenic microorganisms and a high flood risk in many places complicate the treatment of surface water using conventional procedures. The methods of surface water treatment primarily in use are often hampered by turbidity peaks caused by mineral and organic run-off and wastewater pollution. High concentrations of ammonium, iron, manganese and arsenic in groundwater are problematic for groundwater treatment in many places. In addition, the overuse of groundwater resources leads to localized subsidence. The method of bank filtration has been successfully used in Germany for more than 140 years, but is hardly known in Vietnam. It is a cost-effective, environmentally-friendly alternative as a first step in the water treatment process.

“AquaViet” is investigating the advantages and limitations of bank filtration under the difficult conditions in Vietnam by studying two rivers in the greater Hanoi area. The project works to develop solutions for the design and operation of water production and treatment plants. The goal is to develop innovative technologies for the cost-effective treatment of raw water as well as suitable monitoring systems.

Effective raw water treatment

Wells and groundwater measuring points will be installed and sampled at two demonstration sites which will be chosen based on a site survey in North Vietnam and a feasibility study on bank filtration. This will be accompanied by a comprehensive analysis of the properties of ground and surface waters, bank filtrate and sediments with regard to organic and inorganic pollutants. This analysis forms the

basis for the development of an effective raw water treatment process with two main focuses – firstly, there will be a focus on demonstrating an innovative filter system for the removal of ammonium, arsenic and other substances from the bank filtrate, possibly in combination with oxidative processes. Secondly, the project will also focus on the technical implementation of a safe, low-byproduct process for water disinfection, for instance, with chlorination using inline electrolysis or UV.



Water sampling at the Bac Ninh site on the Cau River.

The project utilizes a number of innovative methods. This includes the use of spectroscopic fingerprints, a method for determining the origin of the water sampled. In addition to this, there are also plans to develop a multi-stage filter system for ammonium and manganese removal for the low-price segment. Furthermore, a monitoring plan for online surveillance and control of disinfection will be developed and the use of flood relief wells for bank filtrate extraction will be tested. In order to ensure efficient disinfection based on real-time monitoring of water quality, the project plans to use and test a newly developed multi-parameter probe, to verify and demonstrate new

environmentally-friendly disinfection procedures and to use UV treatment to simultaneously convert existing trace organic substances.



Exploration drilling at Ha Nam on the Red River.

Three German and three Vietnamese research institutions are involved in the joint project, along with eleven small and medium-sized enterprises (SMEs), water utility companies and relevant authorities. The participation of several Vietnamese authorities and water suppliers means it will be possible to secure approval for future plants in Vietnam.

Marketing potential

Recommendations for action and marketing potential
The study sites will benefit considerably from the implementation of bank filtration methods that include the post-treatment and monitoring of raw water. The results of this project can be transferred to other suitable locations. The project aims to produce scientifically sound documentation of the results and proposed solutions for bank filtration in Vietnam. This can then be used to create a suitable regulatory framework and develop a marketing concept for the water treatment modules and monitoring technology that is developed and tested as part of the project. The project also aims to market individual disinfection modules and individual monitoring components (sensors, models, parameters).

Funding initiative

Client II – International partnerships for sustainable innovations

Project title

AquaViet – Bank filtration masterplan for Vietnam's drinking water supply

Duration

01.02.2019–31.01.2022

Funding code

02WCL1472A-I

Funding volume

2,296,332 Euro

Contact

Prof. Dr.-Ing. Thomas Grischek
Hochschule für Technik und Wirtschaft Dresden
Friedrich-List-Platz 1
01069 Dresden, Germany
Phone: +49 351 462-3350
E-mail: thomas.grischek@htw-dresden.de

Project partner

TU Dresden; DVGW-Techn.-zentrum Wasser; Herbst Umwelttechnik; UMEX; AUTARCON; a.p.f. Aqua System; bbe Moldaenke; Arcadis Germany; Thuyloi University; Hanoi Department for Dyke Management, Flood and Storm Control; National Rural Water Supply and Sanitation Centre; Bac Ninh Water Supply and Drainage; Hai Duong Water Supply; Bac Giang Urban Water supply and Sanitation

Internet

bmbf-client.de

Published by

Bundesministerium für Bildung und Forschung/
Federal Ministry of Education and Research (BMBF)
Division Resources, Circular Economy; Geosciences
53170 Bonn, Germany

July 2019

Editing and layout

Project Management Jülich (PtJ), Forschungszentrum Jülich GmbH; adelphi research gGmbH

Photo credits

HTW Dresden, Lisa Weiß