Geophysical Research Abstracts
Vol. 12, EGU2010-6050, 2010
EGU General Assembly 2010

Contour trenching, a contribution to artificial recharge in a semi-arid area in Vietnam

K.E.R. Pramana (1), M.W. Ertsen (1), S. Uhlenbrook (1,2), and N.C. van de Giesen (1)
(1) Delft University of Technology, the Netherlands, (2) UNESCO-IHE, the Netherlands

The long term impact of contour trenching tends to be that more runoff turns into groundwater recharge. In 2008, the contribution of recharge at a contour trench plot was determined as potential and not quite visible. Recharge has not been confirmed, since groundwater level data at the contour trench plot were not available. For further study, 4 new observation wells were installed on 8 hectares contour trench plot to asses the impact of the trenches to the groundwater system. This investigation was conducted during a single rainy season in 2009, shortly after the construction of the new observation wells.

The subsurface conditions seemed to be an important feature controlling recharge processes and groundwater flow. Well logs data indicated granite bedrock at about 25 m below loamy sand and weathered granite layer respectively. The groundwater measurements are showing almost constant and fluctuated groundwater level between 1 to 15 meters deep below the trenches. More important is that data are showing a rising trend because of the infiltration of ponding water in the trenches. Additionally, water logging could be found remaining in weeks after rainfall events at the most downhill of the contour trench plot.

Annual rainfall reached 1303 mm, suggesting a rarely wet year. After 4 heavy rainfall events, runoff from uphill and outside the contour trench plot randomly filled up the trenches, yielded to roughly 4 times filling up the volume of the trenches. Ponding water infiltrated further in different temporal scale. Whilst at the same time, erosion occurred at the uphill area, bringing along fine sediment towards the trenches. It eventually creates a sediment layer at the bottom the trenches which in accordance reduces the infiltration capacity and thus increases the time of ponding of water.

MODHMS from HydroGeologic Inc. (a fully coupled surface water, unsaturated zone and groundwater model) was used to simulate the hydrological condition and measured groundwater fluctuations. The model grid was set up with a length of 615 m times 500 m and is divided into 123 times 20 grids (row and columns). 2 layers were assigned and interpolated based on the well logs data. Assumptions are that the process of erosion and sedimentation was excluded and the soils were considered to be homogeneous and isotropic. The modeling results fairly confirm the groundwater levels increase due to contour trenching. The simulated temporal dynamics, however, are much more pronounced, resulting in over-predictions of groundwater levels during the dry season.