

Accepted Manuscript

Spatial and Temporal Variability of Groundwater Recharge in Geba Basin,
Northern Ethiopia

Alemu Yenehun, Kristine Walraevens, Okke Batelaan



PII: S1464-343X(17)30262-5
DOI: 10.1016/j.jafrearsci.2017.06.006
Reference: AES 2929
To appear in: *Journal of African Earth Sciences*
Received Date: 06 December 2016
Revised Date: 17 June 2017
Accepted Date: 19 June 2017

Please cite this article as: Alemu Yenehun, Kristine Walraevens, Okke Batelaan, Spatial and Temporal Variability of Groundwater Recharge in Geba Basin, Northern Ethiopia, *Journal of African Earth Sciences* (2017), doi: 10.1016/j.jafrearsci.2017.06.006

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Spatial and Temporal Variability of Groundwater Recharge in Geba Basin, Northern Ethiopia

Alemu Yenehun^{a,b}, Kristine Walraevens^c, Okke Batelaan^d

^aDepartment of Hydrology and Hydraulic Engineering, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

^bDepartment of Earth Science, Bahir Dar University, P.O. Box 79, Bahir Dar, Ethiopia

^cLaboratory for Applied Geology and Hydrogeology, Department of Geology, Ghent University, Krijgslaan 281-S8, 9000 Gent, Belgium

^dSchool of the Environment, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia

Abstract

WetSpa, a physically based, spatially distributed watershed model, has been used to study the spatial and temporal variation of recharge in the Geba basin, Northern Ethiopia. The model covers an area of about 4,249 km² and integrates elevation, soil and land-use data, hydrometeorological and river discharge data. The Geba basin has a highly variable topography ranging from 1000 to 3,280 m with an average slope of 12.9%. The area is characterized by a distinct wet and long dry season with a mean annual precipitation of 681 mm and temperatures ranging between 6.5°C and 32°C. The model was simulated on daily basis for nearly four years (January 1, 2000 to December 18, 2003). It resulted in a good agreement between measured and simulated streamflow hydrographs with Nash-Sutcliffe efficiency of almost 70% and 85% for, respectively, the calibration and validation. The water balance terms show very strong spatial and temporal variability, about 3.8% of the total precipitation is intercepted by the plant canopy; 87.5% infiltrates into the soil (of which 13% percolates, 2.7% flows laterally off and 84.2% evapotranspired from the root zone), and 7.2% is surface runoff. The mean annual recharge

Download English Version:

<https://daneshyari.com/en/article/5785551>

Download Persian Version:

<https://daneshyari.com/article/5785551>

[Daneshyari.com](https://daneshyari.com)