

INVITATION

Public PhD defense

By: **Adugnaw Birhanu Zegeye**

Hydrological study of Mount Guna, a shield volcano on the Ethiopian Plateau



TIME: Thursday, 29 February 2024,
14:00 (CET)

LOCATION: Lecture room 0.1, Campus
Sterre, Ghent University,
Krijgslaan 281(S8), 9000 Ghent

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Research highlights

This dissertation investigated the hydrology and land cover change of Mount Guna using field data, remote sensing data and modelling approach. The hydrology of Mt. Guna was studied by establishing meteorology, surface and groundwater monitoring stations on Mt. Guna. Runoff generation and water balance of Mt. Guna were investigated using WetSpa hydrological model. Groundwater recharge of Mt. Guna was investigated using WetSpa model, Water Table Fluctuation and Chloride Mass Balance methods. The land cover changes of Mt. Guna over a span of 61 years were thoroughly analyzed using Google Earth imagery and historical aerial photos. Geographically Weighted Regression was used to analyse the spatial relationship between land cover change and its drivers.

Key findings

- The significant shift towards cropland (49%) highlights the profound impact of human activities on land use patterns in mountainous regions.
- GIS-based WetSpa-Python model in simulating sub-daily runoff generation revealed that groundwater flow and interflow is predominant runoff generation processes
- The mean annual recharge estimates obtained through the three methods WetSpa (409 mm), WTF (357 mm), and CMB (417 mm) demonstrate a relatively consistent result, with slight variations
- The average rainfall was partitioned into 46% for evapotranspiration, 34% for groundwater recharge, and 16% for overland flow

About the author

Adugnaw Birhanu Zegeye (°1987) obtained his Bachelor degree in Geography and Environmental Studies from Wollega University (Ethiopia) in 2009; Master of Education in Geography & Environmental Education from Addis Ababa University (Ethiopia) in 2011; Master of Science in Water Resources Management from IHE Delft Institute for Water Education (The Netherlands) in 2017. He also has another Master of Science in Geoinformation from Bahir Dar University (Ethiopia) in 2022. He was a PhD student at Ghent University from 2017 until 2024. His PhD research was sponsored by Ghent University Special Research Fund (BOF). During his PhD research, Adugnaw has published two papers in peer-reviewed journals and participated in national and international conferences.