

# HENRY

Hydraulic Engineering Repository

Ein Service der Bundesanstalt für Wasserbau

---

Conference Paper, Published Version

**Ayele, Hailu Sheferaw; Li, Ming-Hus; Tung, Ching-Pin; Liu, Tzu-Ming**  
**Hydrological Impact of Climate Change on Runoffs the**  
**Gumara and Gilgel Abbay Watersheds, the Upper Blue Nile**  
**Basin, Ethiopia**

Zur Verfügung gestellt in Kooperation mit/Provided in Cooperation with:  
**Kuratorium für Forschung im Küsteningenieurwesen (KFKI)**

---

Verfügbar unter/Available at: <https://hdl.handle.net/20.500.11970/108506>

Vorgeschlagene Zitierweise/Suggested citation:

Ayele, Hailu Sheferaw; Li, Ming-Hus; Tung, Ching-Pin; Liu, Tzu-Ming (2016): Hydrological Impact of Climate Change on Runoffs the Gumara and Gilgel Abbay Watersheds, the Upper Blue Nile Basin, Ethiopia. In: Yu, Pao-Shan; Lo, Wie-Cheng (Hg.): ICHE 2016. Proceedings of the 12th International Conference on Hydroscience & Engineering, November 6-10, 2016, Tainan, Taiwan. Tainan: NCKU.

**Standardnutzungsbedingungen/Terms of Use:**

Die Dokumente in HENRY stehen unter der Creative Commons Lizenz CC BY 4.0, sofern keine abweichenden Nutzungsbedingungen getroffen wurden. Damit ist sowohl die kommerzielle Nutzung als auch das Teilen, die Weiterbearbeitung und Speicherung erlaubt. Das Verwenden und das Bearbeiten stehen unter der Bedingung der Namensnennung. Im Einzelfall kann eine restriktivere Lizenz gelten; dann gelten abweichend von den obigen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Documents in HENRY are made available under the Creative Commons License CC BY 4.0, if no other license is applicable. Under CC BY 4.0 commercial use and sharing, remixing, transforming, and building upon the material of the work is permitted. In some cases a different, more restrictive license may apply; if applicable the terms of the restrictive license will be binding.

Verwertungsrechte: Alle Rechte vorbehalten



## **Hydrological Impact of Climate Change on Runoffs the Gumara and Gilgel Abbay Watersheds, the Upper Blue Nile Basin, Ethiopia**

*Hailu Sheferaw Ayele<sup>1</sup>, Ming-Hus Li<sup>1</sup>, Ching-Pin Tung<sup>2</sup>, Tzu-Ming Liu<sup>2</sup>*

1. Graduate Hydrological and Oceanic Sciences, National Central University
2. Department of Bioenvironmental Systems Engineering, National Taiwan University  
Taiwan

### **ABSTRACT**

Water is the most climate sensitive sector in changing climate. Hydrological vulnerability assessment is critical to the implementation of adaption measures. In this study, projections of 7 GCMs in association with high (RCP8.5) and medium low (RCP4.5) representative concentration path way from the CMPI5 (fifth phase of the Coupled model Intercomparison Project) for the period 2021-2040 and 2081-2100 were adopted to assess the hydrological impacts of climate change on the runoffs of Gumara and Gilgel Abbay watersheds, the upper Blue Nile basin, in Ethiopia. The GCMs selected were first screened in harmony with baseline climate statistics of study areas. Based on climate projections and statistical characteristics of historical weather data, a weather generator was employed to generate daily temperature and precipitation as inputs for the GWLF hydrological model to simulate runoffs. Changes of projected temperature and precipitation were analyzed to explain variations of evapotranspiration and influences on future runoffs. We found that, despite the fact that the projected magnitude varies among different GCMs, increasing in the wet and a decreasing in dry seasons runoffs were observed in both time windows in Gilgel Abbay and Gumara watersheds. In both watersheds the results observed on the runoff is mainly attributes to the increase of precipitations projected by most of GCMs. In contrast to great increases in runoffs, the increase of evapotranspiration by elevating temperature is less significant. The increasing runoffs in both time windows will provide more water inflow to the Lake Tana. On the other hand, the increase of precipitation in wet season makes the wet season wetter and implies higher possibility of flash floods. This will have deleterious consequences in the local community. Therefore, concerned water organizations in local, state, and federal levels shall be prepared to harness the opportunities with more water resources for utilization and management, as well as flood preventive measures.