

Modeling the Awash River water quality in Ethiopia: impacts of climate change, population growth and pollution control

LI JIN¹, PAUL G WHITEHEAD², GIANBATTISTA BUSSI²,
YOSEF ABEBE³, FEYERA HIRPA², MERON TEFERI
TAYE⁴, KATRINA CHARLES² AND ROBERT HOPE²

¹State University of New York College at Cortland

²University of Oxford

³Federal Basins Development Authority

⁴Addis Ababa University

Presenting Author: li.jin@cortland.edu

River pollution is one of the most pressing environmental and societal issues worldwide and affects human health, food security, and ecosystems. The pollution is both natural and human-induced. In sub-Saharan Africa, the rapid growth of agriculture, industries, and urbanization, as well as population growth and climate change are placing increasing pressure on their limited water resources. The Awash River, located in the Great Rift Valley in Ethiopia, has experienced strong deterioration in the water quality from elevated nutrients, salinity and trace metals levels in recent years. The INtegrated CAtchment (INCA) Models have been used to simulate concentrations of nitrate-nitrogen, phosphorus, chloride and heavy metals by taking both natural and anthropogenic sources of pollutants into consideration and to evaluate the potential impact of climate change, population growth and pollution control measures. The results show while the increasing temperature and decreasing flow due to climate change are expected to result in decreases in elemental concentrations, the significant threat to the water quality of the Awash River is population growth, industrial development and effluent discharges. With improved wastewater treatment options, it is possible to return the water pollution to acceptable levels. The modeling approach is essential for generating long term sustainable management plans and for proper utilization of water resources especially in the region where the resources and the economic capacity to meet the water demand is limited.