Geophysical Research Abstracts
Vol. 16, EGU2014-2151, 2014
EGU General Assembly 2014

Sensitivity of stream flow droughts, water shortage and water stress events to ENSO driven inter-annual climate variability at the global scale

Ted I.E. Veldkamp, Jeroen C.J.H. Aerts, and Philip J. Ward
Institute for Environmental Studies, VU University Amsterdam, Netherlands (ted.veldkamp@vu.nl)

Governments and institutions managing water resources have to adapt constantly to regional drought, water shortage and water stress conditions, being caused by climate change, socio-economic developments and/or climate variability. Taking into account the impact of climate variability is important as in some regions it may outweigh long-term climate change or socio-economic developments, especially on a time scale of a few years up to a few decades. As governments and water management institutions apply planning horizons up to a decade with respect to management of adaptation strategies, inter-annual climate variability is especially relevant. A number of studies have estimated the impacts of climate variability on stream flow droughts on a local, continental or global scale. Others have focused on the role of long term climate change and socio-economic trends on blue water availability, shortage and stress. However, a global assessment of the influence of inter-annual climate variability on stream flow droughts, blue water availability, shortage and stress together has not yet been carried out, despite its importance for adaptation planning.

To address this issue, we assessed the influence of ENSO-driven climate variability on stream flow droughts, blue water availability, and shortage and stress events at the global scale. Within this contribution we focused on El Nino Southern Oscillation's (ENSO) impact as ENSO is the most dominant source of inter-annual climate variability, impacting climate and society. We carried out this assessment through the following steps: (1) used daily discharge and run-off time-series (0.5º x 0.5º) of three WATCH forced global hydrological models (WaterGAP, PCR-GLOBWB, and STREAM); (2) in combination with time-series of population counts and monthly water demands we calculated monthly and yearly stream flow drought, water availability, water shortage and water stress per Food Producing Unit (FPU) for the period 1960-2000; and (3) identified statistical relationships between stream flow droughts, blue water availability, shortage and stress events and indices of ENSO in order to determine its sensitivity.