Geophysical Research Abstracts
Vol. 21, EGU2019-8306, 2019
EGU General Assembly 2019

The "health" of a catchment: How to assess the Effective Impervious Area?

Ludovic Oudin, Mohamed Saadi, and Pierre Ribstein
Sorbonne Université, CNRS, EPHE, UMR METIS, F-75005, Paris, France (ludovic.oudin@upmc.fr)

From an environmental standpoint, a hydrological catchment's health is in inverse proportion with its urbanization stage. As mentioned through different studies, urbanization has generally led to higher peak discharge, higher flood volumes flowing during reduced response time, but also to a poorer water quality. To predict (resp. assess) the impact of a future (resp. previous) urbanization of a catchment, one must diagnose the urban state of the catchment. To this end, the Effective Impervious Area (EIA) or Directly Connected Impervious Area (DCIA) measures were conceived as alternative urban metrics to what hydrologists define as the runoff-rainfall ratio (yield) of the catchment. At the catchment scale, it seems to be a very useful measure, since there may be a spatial combination of pervious and impervious areas that can lead to impact mitigation. Yet, it is still difficult to quantify the EIA of a catchment. An "easy" way consists in using empirical relationships to derive EIA from Total Imperviousness Area (TIA), where TIA is estimated from land cover databases. More rigorous approaches require more datasets, such as hydrologic time series and urban databanks, which are not generally available. Using a large sample of 365 French and American urbanized catchments, for which rainfall and runoff hourly time series were prepared, we propose a pragmatic approach to estimate the EIA using land cover databases, hydrographic network and population density. This approach is validated in an event-based framework, by comparing the resulting EIA values with the slope of runoff-rainfall linearly derived relationships for each catchment.