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Assessment of the role of green infrastructure in sustainable urban water management

Ágnes Gulyás¹ and Ákos Csete²

¹Department of Climatology and Landscape Ecology, University of Szeged, Szeged, Hungary (agulyas@geo.u-szeged.hu)

²Department of Climatology and Landscape Ecology, University of Szeged, Szeged, Hungary (cseteaki@gmail.com)

Due to the climate change caused uncertainty, the urban areas face new challenges. In addition to mitigating the negative effects, it is important the developments need to implemented in a sustainable manner. The problem of urban areas is substantial on account of their growing spatial size and population, furthermore the inadequate infrastructure. Urban districts with inadequate infrastructure can be a major source of water pollution, but also have a significant impact on the well-being of the citizens. In modern urban planning the sustainable urban water management based on the usage of green infrastructure. Green infrastructure is an important tool to make urban water cycle sustainable by linking artificial, engineered elements (gray infrastructure) with the services provided by vegetation. Green infrastructure can help to make the urban water cycle sustainable in many ways. Its primary role is the mitigating effect, such as reducing and retaining surface runoff with the process of interception and evaporation. Due to the complex structure of vegetation, it can also play an important role in infiltration (by root system), thus also reducing surface runoff.

Providing adequate data on the role of green infrastructure – even on a city-wide scale – can help decision makers. To accomplish this, hydrological models can play an important role. If these models (i-Tree Hydro) based on appropriate meteorological and land cover data, they can help to estimate the runoff and infiltration of study areas and the reducing effect of vegetation (interception, evaporation). In our study, we attempted to compare two significantly different urban district based on these aspects and to analyze the differences. Analyzes in the two study areas of Szeged (Hungary) all suggest the vegetation can significantly contribute to the reduction of surface runoff. Differences between these urban districts can be quantified so these data can serve as a basis for decision making in urban planning processes.

As another element of our research, we analyzed the relationship between surface runoff and infiltration in modeling study (SWMM) of rainwater harvesting systems in public institutions (kindergartens). In this part of the research, besides the efficiency of the rainwater harvesting systems, we got data about the extent of surface runoff, evaporation and infiltration on yard of kindergartens.