

MODELING STUDIES OF THE IMPACT OF GREEN INFRASTRUCTURE ON THE AMOUNT OF RUNOFF AND POLLUTANTS LOADS FROM A SELECTED URBAN CATCHMENT

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Abstract: Revitalization of urban areas, commonly related to a significant increase in area of impermeable surfaces, combined with climate change, manifested, among the others, by heavy rainfalls, disturbs the natural hydrological cycle of the catchment, leading to an increasing number of flash floods and strong anthropogenic pressure on surface waters. The negative impact on surface waters is mainly related to the discharge of polluted runoff waters. As indicated by literature data, rainwater may contain numerous organic and inorganic pollutants, including suspension, heavy metals, polyunsaturated aromatic hydrocarbons and petroleum derivatives.

Low Impact Development techniques, including rain gardens, allow retention, infiltration and evaporation of rainwater directly in the urbanized basin, thus decrease in the runoff peak flows and volume as well as in the loads of pollutants discharged to rivers are possible.

This paper presents the numerical assessment of the impact revitalization and possible rain gardens installation in revitalized basin on the volume of surface runoff and pollutant loads discharged from a selected urban catchment.

The studies were performed for a 2.92 ha highly sealed urbanized basin located in Lublin, Poland. Three variants of calculations were carried out, taking into account the catchment area: before and after revitalization (current state) and after revitalization based on LID solutions in the form of rain gardens.

The numerical calculations were conducted in SWMM 5.2, EPA, USA modeling software for a real weather data for period of 3 months. The performed qualitative calculations covered TSS buildup and washoff from the catchment. The obtained results allowed assessment of LID installation on runoff hydrographs and loads of pollutants discharged from the selected basin.

Keywords: green infrastructure, rain gardens, pollutants loads, TSS