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Modeling the Infiltration Trench Effect on Hydrologic Cycle in Urban Watershed

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In this paper, the authors analyzed the effect on hydrologic cycle in urban watershed by the infiltration trench using distributed hydrologic model. In urban area, the hydrologic cycle is affected by the artificial water cycle including water supply and sewage networks. Most of urban stream in Korea were dried except rainy days. The reason of dry stream was decreasing of infiltration by the impervious area, low leveled groundwater and combined sewage networks. The distributed hydrologic model, WEP (Water and Energy transfer Processes model) is applied to urban watershed, Cheonggye-cheon watershed in Seoul Metropolis in Korea. The Cheonggye-cheon watershed area is 50.96km^2 and located in the downtown of Seoul City. The population of this area is over 1.4 million and the area is highly urbanized (76% of area is developed into residential and commercial regions). So, the hydrologic cycle was severely distorted by the impervious surface, subway lines, artificial water supply and sewage networks. For the analysis, the watershed was divided into grids of 50m size (179x199) and divided again into seventeen sub-watersheds. The land use, soil types and underground aquifer depth are collected and parameters for WEP were selected and calibrated with the observed stream flow. For the improving hydrologic cycle in urban area, infiltration trench is well known structures. Spatial location and length of Infiltration trenches are simulated automatically according to the guidelines: land slope should be lower than 10%, the soil should not be clay, ground water table should be 2m or more below the land surface, the trench density should be less than 450m/ha etc. In the case of Cheonggye-cheon watershed for 2002, the scenario of infiltration trench of 195, 000m was automatically selected and the effect was analyzed. When the infiltration trench was installed, the interflow was increased by 19% and the baseflow was increased by 11%. Compared with no trench condition, the hydrological cycle is much improved with the installation of infiltration trenches.