



## Quantification of nonpoint source pollutants discharged from the combined sewer system in the Nakdong River basin, Korea, using SWMM

Hyun-Suk Shin\*, Jong-Kyung Jang, Young-Su Jang, Mi-Eun Kim

*Department of Civil Engineering, Pusan National University, 63-2 Busandaehak-ro, Guemjung-gu, Busan, 46241, Korea, email: hsshin@pusan.ac.kr*

Received 15 December 2014; Accepted 2 February 2016

---

### ABSTRACT

This study used the United States Environmental Protection Agency's (US EPA) stormwater management model (SWMM) to quantify nonpoint source (NPS) pollutant load from the combined sewer in the Nakdong River basin, Korea. In the simulation using SWMM, the river basin consisted of 39 sub-watersheds with 48 sanitation districts. For each sanitation district, combined sewer overflow (CSO) and bypass flow of the sewer treatment plant (STP) were estimated as NPS discharge. In the simulation, it assumed that a STP can receive up to three times the design peak flow rate of the STP and bypass the remainder of the intercepted stormwater during a storm event. The model was calibrated and validated with the observed water quantity and quality data in 2006 and 2007, respectively. As a result of the simulation, the estimated average load of biochemical oxygen demand (BOD) was 409.5 kg/ha/yr and 62.8 kg/ha/yr for the sanitation coverage (proportion of the area covered by the sewer system in a sanitation district) of above 40% and below 10%. The results showed that different unit loads of NPS can be estimated from each sanitation district depending on the degree of urbanization.

*Keywords:* Nonpoint source; Sewage treatment district; CSOs; SWMM

---

\* Corresponding author.

*Presented at Diffuse Pollution Conference/Asian Regional Conference (DIPCON/ARC 2014) Kyoto University, Japan, 3–4 September 2014.*