

Reduction on nutrient concentration of Non-Point Source Pollution - an Example in Hu-Shan Reservoir, Taiwan

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Abstract

Two LID (Low Impact Development) demonstration sites were placed in the watershed of Hu-Shan reservoir, a newest reservoir in Taiwan. Named 1-A and 1-B, respectively, are both bio-retention cells. The area of the 1-A sub-catchment is 0.45 hectares, and its design volume should be 6.75m³; the size of the bio-retention 1-A is 3m in length, 2.5m in width and 1m in depth, with a volume of 7.5m³. The area of the 1-B sub-catchment is 0.38 hectares, and its design volume should be 5.7m³; the size of the bio-retention 1-B is 6m long, 1m wide and 1m deep, with a volume of 6m³. The two units of bio-retention cells were built completed by December 2019.

Three events of rainfall were successfully collected, which were May 22, May 26, and July 28 in 2020, respectively, in which the daily rainfall ranging from 39 to 48 mm. Both the inflow and outflow of the bio-retention cells were collected simultaneously. The water quality and discharge quantity were measured. The inflow and outflow of the bio-retention 1-A and 1-B are collected at three time points, which are t=0hr, 0.5hr, and 1.5hr, in order to know the change of the runoff concentration through the time.

The suspended solids (SS) reduction rate from the bio-retention 1-A and 1-B cells were 71.3~99.6%, which was very effective and common for bio-retention units. Considering the factors that maintaining the reservoir storage capacity by not siltation and increasing the item of transparency in the eutrophication index of the reservoir, the bio-retention unit has a direct positive effect. The controlling factor for the inflow concentration of TP in the bio-retention of Hu-Shan reservoir is dominated by soluble phosphorus, and the proportion of phosphorus adsorbed on soil particles should be low. Establishment of bio-retention units in the catchment area of the reservoir has positive effects on enhancing water quality.