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Quantitative Assessment with Watershed Model on Drinking Water Protection Areas, The Taiwanese Case.

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Extended Abstract

In this study, a comprehensive investigation on drinking water protection areas in Taiwan were implemented. Eighteen major drinking water intakes which supplies almost 80% population in Taiwan were reviewed. It found that all water qualities met Drinking Water Source Quality Standard, but some failed to Surface Water Quality Standard. This implies advanced watershed management are needed. In this study, an effective watershed management process was built, which focused on determination of high pollution potential areas, called hot spots. The hot spots were regarded as the priority areas to initiate pollution reduction measures and were expected to have efficient water quality improvement. To decide the hot spots, field investigation, collection of water quality monitoring data, water quality model, and selective assessment factors were applied.

The Yuanshanyan water intake in Taoyuan city, Taiwan, was presented as the case study to show the whole process. The results showed that BOD pollution loads in Yuanshanyan water intake watershed were 57% from point pollution sources and 43% from nonpoint pollution sources. Ammonia pollution loads had similar pollution sources distributions. In this watershed, two hot spots from 18 subwatersheds were identified. The validated Stormwater management model (SWMM) showed that if 50% BOD pollution loads from the 2 hot spots can be reduced, the water quality achievement rate could be increases from 21% to 90%. Considering the planning sewage system in the hot spots, which could reduce 1,150kg/yr of BOD, and the remaining 380 kg/yr needs further reduction policy to achieve the water quality target. Onsite pollution treatment facilities, such as constructed wetlands and gravel contact oxidation method, were suggested. In addition, the possible pollution sources of emerging contaminants were also surveyed, and 6 industrial effluents were sampled. The data showed that the leachate from landfill site contained Perfluorinated compounds (PFC) and gallium (Ga). The other 2 industrial effluents contained Bis(2-ethylhexyl) phthalate (DEHP). Although there is no associated water quality standard for these emerging contaminants in Taiwan, it should be noted and continuously monitor the impacts of industrial effluent on drinking water.

Keywords: Drinking water, watershed management, Stormwater Management Model (SWMM), pollution hot spots, emerging contaminants.