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Chia-Chun Ho

*National Taipei University of Technology, ccho@ntut.edu.tw*

Jen-Yang Lin

*National Taipei University of Technology*

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# A Study of Non-point Source Pollution Reduction of Tea Garden in Taiwan Feitsui Reservoir Watershed

**Chia-Chun Ho, Jen-Yang Lin**

*National Taipei University of Technology (ccho@ntut.edu.tw)*

**Abstract:** The water quality of Feitsui Reservoir, which located in the north of Taiwan, has long been maintained mesotrophic to oligotrophic status. However, the pass rate of total phosphorous (TP) concentration of those three upstream streams, Jingulariao River, Daiyujue River, and Beishi River, have not reached 100% compliance with Class A Standard of water quality from Taiwan EPA. The main source of TP is from agriculture fertilizer, especially from the tea garden. In order to remove the non-point sources pollution, the bioretention was adopted and established at the outlet of the runoff drainage path of tea garden. The tea garden area of Feitsui Reservoir watershed changes from 1,154 ha in 2000 increase to 1,499 ha in 2005 and decrease to 1,180 ha in 2008 as well as decrease to 723 ha in 2014. The bioretention demonstration site in Feitsui Reservoir watershed that built in last three year was monitored in order to understand the performance of water purification. The removal rate of chemical oxygen demand (COD) is 26.8% to 67.6% (average in 44.2%), ammonia nitrogen (NH<sub>3</sub>-N) is removed from 49.7% to 96.7% (average in 68.7%), TP is removed from 55.4% to 76.0% (average in 67.6%), suspended solid (SS) is removed from 36.6% to 82.0% (average in 70.1%), and phosphate phosphorus (PO<sub>4</sub>) is removed from 24.3% to 75.3% (average in 55.2%). Moreover, Hydrological Simulation Program - FORTTRAN (HSPF) was carried out to simulate the impact of TP on river water quality in Jingulariao River, Daiyujue River, and Beishi River under the different land use situation. The simulation result shows that the annual load of TP for Jingulariao River in 2003, 2006, and 2013 is 1,445 kg/year, 1,296 kg/year, and 1,045 kg/year, respectively. For Daiyujue River in 2003, 2006, and 2013 is 3,963 kg/year, 4,617 kg/year, and 2,522 kg/year, respectively. For Beishi River in 2003, 2006, and 2013 is 5,226 kg/year, 5,698 kg/year, and 4,961 k/year, respectively. The results show that the TP from tea garden is declining because the tea garden area is decreasing and the number of bioretention is increasing every year.

**Keywords:** Non-point source pollution; tea garden; bioretention; Hydrological Simulation Program - FORTTRAN (HSPF)