

Conditions for a Successful Water Quality Trading Program: Case Study Jordan Lake, North Carolina

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Abstract. Water quality trading (WQT) programs have been suggested as a cost effective approach to achieve water quality goals for many watersheds, including Jordan Lake watershed, North Carolina. Although economic theory supports the success of WQT programs, in application these programs have experienced a numbers of failures in the United States. In this study, we examined how economic and non-economic factors can undermine an ideal WQT market in Jordan Lake, and in many cases this market infeasible. Then, we constructed a hypothetical ecosystem services market to investigate how stacking of these services can enhance the WQT program in Jordan Lake, NC. The NC WQT program encourages farmers to reduce total nitrogen (TN) and total phosphorous (TP) loads by adopting and maintaining riparian buffers on their farms close to the streams. Then, the TN or TP load reductions will be transferred to water quality credits and be sold to urban developers. In this study, we applied the Soil and Water Assessment Tool (SWAT 2012) model to the Jordan Lake watershed to predict the amount of TN and TP loads from agricultural fields in different scenarios. Also, we used the Jordan Lake Nutrient Loading Accounting Tool to extract the TN and TP loads from urban developments. Our unified WQT model determined that while this program in Jordan Lake watershed shows some potential for reducing pollutant loads, it does not appear to be applicable soon because of a plethora of economic and non-economic hindrances. However, a well-designed ecosystem services stacking market can motivate the WQT entities to participate in this program.

Keywords: Water Quality Trading market, ecosystem services market, Jordan Lake, farmers, urban developers