



SMART-LERECO SEMINAR

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“Valuing water quality tradeoffs at the farm level: An integrated approach”

Abstract: This study evaluates the tradeoff between agricultural production and water quality for individual producers using an integrated economic-biophysical hybrid genetic algorithm. We apply a multi-input, multi-output profit maximization model to detailed farm-level production data from the Oregon Willamette Valley to predict each producer’s response to a targeted fertilizer tax policy. Their resulting production decisions are included in a biophysical model of basin-level soil and water quality. We use a hybrid genetic algorithm to integrate the economic and biophysical models into one multi-objective optimization problem, the joint maximization of farm profits and minimization of Nitrate runoff resulting from fertilizer usage. We then measure the tradeoffs between maximum profit and Nitrogen loading for individual farms, subject to the fertilizer tax policy. We find considerable variation in tradeoff values across the basin, which could be used to better target incentives for reducing Nitrogen loading to agricultural producers.

Keywords: Agri-Environmental Policy, Integrated Modeling, Tradeoff Analysis, Pollution Tax, Nitrogen Loading, Genetic Algorithm.