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Xiaoyang Dong* (xiaoyang.dong@mavs.uta.edu), Department of Mathematics, University of Texas at Arlington, P.O. Box 19408, Arlington, TX 76019, and **Hristo Kojouharov** and **James Grover**. *Mathematical Models of Nutrient Recycling and Toxin Production in a Gradostat*.

We discuss several gradostat models in which a microbial population excretes a biochemical that can get recycled back into the system as a nutrient source. Each mathematical model consists of six ordinary differential equations and represents the dynamics of harmful algal blooms in lakes with fringing coves. We examine three different situations of biochemical production which is based on the algal growth rate, mortality, and nutrient concentration, respectively. Local and global stability analysis of the equilibria predicts that algal abundance and biochemical concentration can be both washed out or persistent under different environmental conditions. All theoretical results are supported by a set of numerical simulations. (Received September 19, 2012)