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Deterministic and stochastic nutrient-phytoplankton-zooplankton models with periodic toxin producing phytoplankton.

We present deterministic and stochastic models of nutrient-phytoplankton-zooplankton interaction to investigate the impact of periodic toxin producing phytoplankton upon persistence of the populations. The Itô differential equations are used to model variability in the environment. We conclude that the input nutrient concentration along with the toxin liberation rate play critical roles in the dynamics of the plankton interaction. In particular, toxin producing phytoplankton can terminate harmful plankton blooms and the plankton interaction is more stable if either the input nutrient concentration is smaller or if the toxin producing rate is larger. (Received January 17, 2015)