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Phase-sensitive tipping: New mechanism for extinction

Global change is expected to lead to climate changes that include greater amplitudes and longer “periods” in climate variability. Many recent studies have noted that the greater variability associated with global change often has more impact than the change in average behaviour (temperature, precipitation, etc). In this paper we explore how changes in climate variability could interact with a system that is already oscillating, namely, predator-prey systems. We include an Allee effect in the prey equation so that we can determine whether or not extinction is deterministically possible, simply as a result of climatic variability. We find that variability-induced extinction is possible for both the Rosenzweig-MacArthur (RM) and Leslie-Gower-May (LGM) model systems and for realistic parameter values for the Canada lynx and snowshoe hare.

Joint work with Hassan Alkhayoun, and Sebastian Wieczorek