Title:	Enhancement of extreme events through the Allee effect and its mitigation through noise in a three species system.
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Abstract:	We consider the dynamics of a three-species system incorporating the Allee Effect, focussing on its influence on the emergence of extreme events in the system. First we find that under Allee effect the regular periodic dynamics changes to chaotic. Further, we find that the system exhibits unbounded growth in the vegetation population after a critical value of the Allee parameter. The most significant finding is the observation of a critical Allee parameter beyond which the probability of obtaining extreme events becomes non-zero for all three population densities. Though the emergence of extreme events in the predator population is not affected much by the Allee effect, the prey population shows a sharp increase in the probability of obtaining extreme events after a threshold value of the Allee parameter, and the vegetation population also yields extreme events for sufficiently strong Allee effect. Lastly we consider the influence of additive noise on extreme events. First, we find that noise tames the unbounded vegetation growth induced by Allee effect. More interestingly, we demonstrate that stochasticity drastically diminishes the probability of extreme events in all three populations. In fact for sufficiently high noise, we do not observe any more extreme events in the system. This suggests that noise can mitigate extreme events, and has potentially important bearing on the observability of extreme events in naturally occurring systems.
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