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Does landscape diversity reduce the risk of catastrophic tipping points?

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Most studies about tipping points are based on computer simulations. These simulations, based on first principles of vegetation growth and competition, are not only able to explain a surprising number of vegetation patterns occurring in natural ecosystems, but they also predict shifts between multiple stable states that may be catastrophic. Initially, such studies were performed on simplistic 'non-landscapes' - flats or straight slopes. Recently, we have been able to resolve geomorphic redistribution processes more accurately, so that vegetation patterning can be simulated in more complex landscapes. Here, we present a first look into how such 'real landscapes' affect the risk of catastrophic shifts. We test the hypothesis that increasing complexity and organisation in a landscape reduce the risk of catastrophic shifts by effectively creating mini-refugia where vegetation persists over a wider range of boundary conditions such as precipitation. Depending on the extent of a study area, large complexity could even change the system from one with multiple stable states into one with only one stable state.