

## Submitted Abstract

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## Abstract

Forest ecosystems are changing profoundly because of changing climate and disturbance regimes. Theory suggests that change happens in pulses that interrupt phases of relative stability. The reorganization phase is a relatively short window of time after disturbance in which “the deck is reshuffled”, either resulting in the renewal of the system or in a transition to a different trajectory leading to an altered ecosystem. Once the ecosystem has reorganized, the propensity for fundamental change declines rapidly - the system is increasingly locked into its trajectory. This process of reorganization and lock-in is particularly pronounced for ecosystems dominated by sessile, long-lived species, such as trees: individuals that establish in the first years after disturbance often determine forest structure and composition for decades and centuries to come. Thus, the reorganization phase is a critical window determining the occurrence, direction and magnitude of forest change. Here, we present a framework for characterizing forest reorganization along dimensions of forest structure (number, size and spatial arrangement of trees) and composition (identity and diversity of tree species). We propose four major pathways through which forest cover can persist but reorganize following disturbance: resilience (no change in structure and composition), restructuring (structure changes but composition does not), reassembly (composition changes but structure does not), and replacement (structure and composition both change). Regime shifts occur when vegetation structure and composition are altered so profoundly that the emerging trajectory leads to non-forest. We identify fundamental processes underpinning forest reorganization which, if disrupted, deflect ecosystems away from resilience. We illustrate our framework with examples from mountain forests, highlighting the distinct pathways of forest reorganization. We conclude that focusing on the reorganization phase can provide early indications of forest change and give managers and policy makers the opportunity to counteract undesired developments, rather than having to cope with the end points of forest change.