Surviving in a changing world: key contributions of legacies from abiotic disturbances to the resilience of forest arthropod communities

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Background & objectives

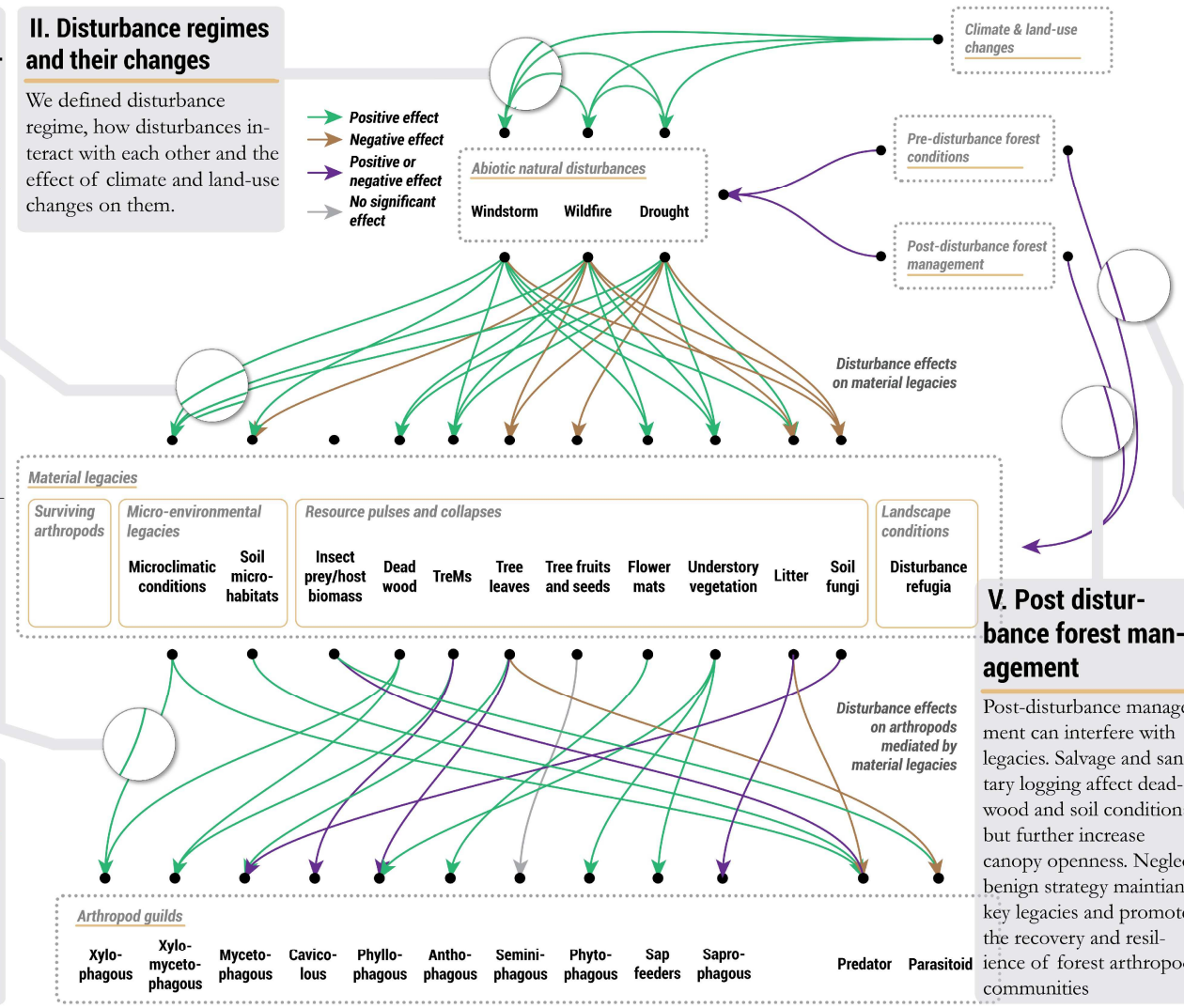
Temperate forests are shaped by major abiotic disturbances such as droughts, windstorms or wildfires. These disturbances affect the composition, abundance and diversity of microhabitats and resources for forest organisms, and select specific behavioural and biological traits in their communities. These disturbance legacies ultimately shape post-disturbance communities by providing refugia for the organisms, from which colonization processes occur, but also novel environmental conditions and resources for survivors and new colonizers. We identified key disturbance legacies for forest arthropod communities and examined (i) how abiotic disturbances affect their diversity and availability, and (ii) how these legacies mediate the response of arthropods guilds to disturbance. We also highlight the contribution of pre-disturbance forest conditions and post-disturbance forest management

I. Key disturbance legacies of main abiotic natural disturbances

Disturbances involve pulses and collapses of critical trophic ressources and changes in soil and microclimatic conditions. These changing are largely mediated by tree death/weakening and a subsequent canopy opening.

II. Disturbance regimes and their changes

We defined disturbance regime, how disturbances interact with each other and the effect of climate and land-use changes on them.



III. Arthropod responses to disturbances through legacies

Arthropod responses are mediated by their ability to resist to effects of disturbances or to escape in refugia, and a later ability to recolonize disturbed areas. How survivors/colonizers thrive in post-disturbance conditions largely depend on their trophic/ecological guild.

IV. Pre-disturbance forest conditions

Management at stand and landscape levels mediate disturbance regimes and shape the mount of legacies and the distribution of disturbance refugia.

V. Post disturbance forest management

Post-disturbance management can interfere with legacies. Salvage and sanitary logging affect deadwood and soil conditions but further increase canopy openness. Neglect benign strategy maintian key legacies and promote the recovery and resilience of forest arthropod communities

Conclusion

Disturbance legacies are important for the post-disturbance development patterns of forest communities and, consequently, for forest resilience. Understanding which legacies are affected and how by ongoing global changes and how they ultimately affect biodiversity is of primary interest in analyzing changes in forest arthropod communities.

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