Mixed forest plantations as natured-based solutions for climate change mitigation and adaptation

Forest plantations globally provide an increasingly large share of the wood products that contribute to a carbon-neutral bioeconomy, while reducing the harvest pressure on native and natural forests. Their importance is likely to increase with the projected rise in the global demand for the provision of multiple forest goods, and the increasing threat to natural forests posed by climate change. Yet, plantations are faced with controversies related to the potential negative impacts of dominating monospecific plantations for the maintenance of biodiversity and ecosystem functions and to the increasing vulnerability of monocultures to biotic and abiotic risks intensified by climate change (CC).

A growing body of evidence suggests that multi-specific mixed forest plantations provide a wider array of ecosystem services and can be more efficient in sequestrating carbon, while better coping with CC-related stress and biotic disturbances. These results can be traced to mechanisms of complementary or facilitated resource use and alleviated competition in mixed plantations, and can result from a "portfolio effect" of diversification that minimizes the risk of a given species or forest function to be drastically affected.

Nevertheless, there is an apparent reluctance among landowners and stakeholders to adopt mixed plantations as a nature-based solution for CC mitigation and adaptation. Among the possible factors preventing the expansion of mixed plantations is an insufficient scientific base for management practices regarding the type of species mixtures that optimize CC mitigation, adaptation and ecosystem functioning across contrasting site conditions.

This session presents recent research that 1) improves the mechanistic understanding behind the potential of mixed-forest plantations to mitigate and adapt to climate change, or 2) identifies trade-offs and synergies among adaptation, mitigation and other objectives in the management of mixed-forest plantations.

This session focuses on findings from tree diversity experiments, silvicultural trials comparing mixtures with monocultures at different temporal and spatial scales, and analyses of the socio-economic contexts of tree-species diverse plantations.

The final aim of this session is to identify the knowledge gaps that prevent progress towards a wider implementation of mixed plantations in adaptive forest management strategies and restoration measures, and to discuss research approaches to fill these gaps.

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