

When is a 'forest' a savanna, and why does it matter?

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ABSTRACT

Savannas are defined based on vegetation structure, the central concept being a discontinuous tree cover in a continuous grass understorey. However, at the high-rainfall end of the tropical savanna biome, where heavily wooded mesic savannas begin to structurally resemble forests, or where tropical forests are degraded such that they open out to structurally resemble savannas, vegetation structure alone may be inadequate to distinguish mesic savanna from forest. Additional knowledge of the functional differences between these ecosystems which contrast sharply in their evolutionary and ecological history is required. Specifically, we suggest that tropical mesic savannas are predominantly mixed tree–C₄ grass systems defined by fire tolerance and shade intolerance of their species, while forests, from which C₄ grasses are largely absent, have species that are mostly fire intolerant and shade tolerant. Using this framework, we identify a suite of morphological, physiological and life-history traits that are likely to differ between tropical mesic savanna and forest species. We suggest that these traits can be used to distinguish between these ecosystems and thereby aid their appropriate management and conservation. We also suggest that many areas in South Asia classified as tropical dry forests, but characterized by fire-resistant tree species in a C₄ grass-dominated understorey, would be better classified as mesic savannas requiring fire and light to maintain the unique mix of species that characterize them.

Keywords:

- Degraded forests;
- fire tolerance;
- functional traits;
- mesic savannas;

- shade intolerance;
- South Asia;
- tropical dry forests;
- tropical savannas