

# Perspectives on prescribed burning

Fire – both natural and anthropogenic – is an inevitable and often essential component of ecosystem processes and landscape management in many parts of the world. The deliberate and accidental use of fire defines us as a species and has helped shape our evolutionary path. Today, the prescribed use of landscape fire is not without controversy and while debates rage in many densely populated fire-prone regional settings, we are also coming to appreciate the global significance of interactions between fire regimes in fire-prone biomes (eg boreal, Mediterranean, and modified tropical forests; savanna woodlands and grasslands) and the Earth–climate system.

Long-standing debates beset the complex world of prescribed fire management: what is the natural or historical fire regime (ie the combination of frequency, seasonality, intensity, and type of fire) for a region or ecosystem, and what relevance, if any, may that have for contemporary land uses? How do we reconcile often competing management demands for ensuring public safety with maintaining ecosystem services and cultural and biodiversity values? How do we operationally deliver effective fire management in increasingly densely populated, fragmented landscapes and increasingly risk-averse, regulated, and litigious societal settings? How do we know if such practices are delivering against multiple desired objectives? Is there any capacity to be adaptive, especially with changing land-use, climatic, and biotic (eg invasive flammable plants) conditions?

The seven papers in this online special issue of *Frontiers* explore this complex management environment in two parts. First, we look at the development and challenges associated with prescribed burning as practiced in fire-prone southern Europe (Fernandes *et al.*), North America (Ryan *et al.*), southwestern Australia (Burrows and McCaw), and South Africa (van Wilgen). The latter two papers, in particular, also address fire management in spectacularly biodiverse systems. Contemporary prescribed burning practices in all four regions have evolved, only since the mid-20th century, from northern European-influenced fire suppression policies, providing a legacy of enhanced fuel accumulation and increased density of woody vegetation that has amplified the fire hazard in fire-prone systems. Today, despite inter- and intraregional differences, common challenges to the wider application of prescribed burning relate more to societal risk aversion and misunderstanding, a lack of supportive policies, and inadequate funding (especially for adaptive management systems) than to a deficiency in fundamental and applied fire-ecology knowledge. To summarize the findings of these respective papers, it seems that the status of prescribed burning is still in its infancy in southern Europe, technically well-informed but lacking broader community acceptance in North America, well-advanced and mostly publicly supported in southwestern Australia, and technically well-informed but operationally ineffective in South Africa's biodiverse shrublands. Common to all is the need to inform and engage with local and regional communities, especially given that prescribed fire management ultimately involves numerous (often unpalatable) trade-offs and decisions.

The second part of the issue presents three case studies illustrating innovative prescribed burning approaches to a few seemingly intransigent management problems – conspicuously, two of those studies draw heavily on traditional knowledge systems. The first (Nigh and Diemont) challenges the stereotypical view that all swidden (or “slash-and-burn”, “shifting cultivation”) agricultural or agroforestry practices result in highly degraded ecosystems. No one can deny that unregulated burning associated with much contemporary agricultural or forest plantation practice in tropical and subtropical systems is unsustainable, but it is important to remember that many societies have developed highly sustainable practices over many generations. This paper examines the Maya milpa agroforestry system that, in one form or another, was once widespread throughout Mesoamerica. The second paper (Russell-Smith *et al.*) describes the application of traditional Aboriginal burning practices in north Australian savannas to the successful implementation of a commercial “savanna burning” carbon emissions mitigation program that also provides local employment and biodiversity benefits. Savanna fires contribute as much as 10% of annual total global carbon emissions and, although intentional burning is officially prohibited in most countries containing savanna systems, fire is a requisite management tool in many local livelihood applications. The third paper (Twidwell *et al.*) describes an important, and still developing, fire management initiative in the US Great Plains, specifically the formation of community-based prescribed burning cooperatives that are charged with reclaiming grasslands from invading shrubs. The program resonates with other community-based fire management initiatives around the world, with the aim of empowering and giving responsibility back to local communities.

We are not suggesting that these seven examples adequately cover the field of prescribed burning – far from it – but we trust that they provide an informed overview of the complex challenges associated with contemporary prescribed fire management.



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