The suggestion that landscapes should contain 40% of forest cover lacks evidence and is problematic

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Novelty statement: Arroyo-Rodriguez *et al*. 2020 suggestion that forest cover needs to be restored or maintained to at least 40% is unhelpful and potentially dangerous. We advocate for regionally targeted thresholds to inform conservation and restoration.

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Abstract: A recent review suggests that forest cover needs to be restored or maintained to at least 40%. In the absence of empirical evidence to support this threshold, we discuss how this suggestion is unhelpful and potentially dangerous. We advocate for regionally targeted thresholds to inform conservation and restoration.

Main text

Arroyo-Rodriguez *et al*. (2020) suggest that forest cover needs to be restored or maintained to at least 40% in a landscape. While we agree with the importance of preserving and restoring forests worldwide, we find this suggestion problematic for several reasons*:*

Ecological. Arroyo-Rodriguez *et al*. (2020) recommend a rule of thumb when we now have the technical capacity and empirical evidence to determine optimal forest cover for entire regions. These analyses will require more resources than a generic guideline, but ultimately provide stronger evidence for decision-makers. For instance, three new environmental laws were underpinned by empirical evidence that the Brazilian Atlantic Forest requires at least 30% of habitat to preserve biodiversity (Banks-Leite *et al.* 2014). It is unlikely that policy makers would have acted so decisively on a generic guideline, and the suggestion that 40% may be needed instead undermines the confidence that society may place in scientists by creating confusion and dissent. Furthermore, the rule of thumb proposed was based on only two studies which actually suggest the existence of a threshold at 30% of cover and not at 40%.

Implementation. Restoration recommendations should build upon the decades of research into systematic conservation planning that shows problem-specific and regionally-defined ecological thresholds are key to cost-effective interventions. For instance, Strassburg *et al.* (2019) show that by addressing complementarity, irreplaceability and trade-offs between biodiversity and ecosystem services, more efficient results can be obtained and implemented on the ground. Nonetheless, there are still vast difficulties of setting up large restoration projects in the real world. To give a specific example – the work by Strassburg *et al.* (2019) directly informs the Atlantic Forest Restoration Pact, one of the most ambitious restoration projects to ever exist. About 1.3 million hectares of forest were restored between 2011 and 2020, which is an enormous success, but still far from the original goal of restoring 15 Mha by 2030.

Economic. The proposed rule of thumb also needs to consider economic constraints and trade-offs that could make restoration projects unviable. In the case of the Atlantic Forest, using a rule of thumb of 40% would bring additional benefits to biodiversity but at prohibitive economic costs. Banks-Leite *et al.* (2014) calculated that restoring priority areas back to 30% of forest cover would cost US$ 198m, but restoring them back to 40% forest cover would cost five times more. The authors also suggest that restoring biomes back to 40% would bring us closer to preserving half of Earth's natural area; however this "Half-Earth Project aspiration" is highly controversial (Büscher *et al.* 2017; Mehrabi *et al.* 2018) and presents strong trade-offs with global food production (Mehrabi *et al.* 2018).

Social. Unrealistically high restoration targets can lead to large social impacts. Restoring 40% of forest cover in highly populated areas could displace marginalised and vulnerable people to more forested areas, thereby driving deforestation elsewhere. It is not adequate to suggest that loss of access to land-based resources (whether that be for conservation or development) can be offset by an improvement in ecosystem services in the remaining areas (Jones *et al.* 2019). Instead, there are approaches to spatial planning which work with land-users to directly address the trade-offs and synergies between human development and biodiversity conservation in a participatory and respectful way (Heiner *et al.* 2019).

If we are to conserve forests effectively, we need an approach that is feasible and that aligns with the upcoming Global Biodiversity Framework. This requires an understanding of ecological, social and economic contexts, and the realities of situations on the ground. With recent modelling and empirical developments in spatial prioritisation, coupled with advances in technology and interdisciplinary understanding, we should aim to determine optimal forest cover at the appropriate resolution, supporting effective, targeted, restoration programs that reconcile ecological, social and economic needs.

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