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Litigation challenging over-reliance on carbon dioxide removal requires quantitative feasibility assessment

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Carbon dioxide removal (CDR) is an emerging frontier in climate change litigation[1]. CDR must play an important role in achieving global climate targets, by compensating for hard-to-abate emissions (such as from international transport). Yet, over-reliance on CDR in government and corporate decarbonisation plans may serve as a strategy to commit to climate action on paper, whilst making inadequate present-day emissions' reductions. Therefore, litigation may be necessary to highlight where CDR commitments contribute to a credible decarbonisation plan, and where they are primarily employed as a delaying tactic. Hence, litigation arguing that a given level of CDR deployment represents an unacceptable risk to the achievement of legal climate targets must have clarity around plausible levels of real-world delivery.

Land-based CDR methods, such as afforestation and bioenergy with carbon capture and storage, frequently appear in both modelled decarbonisation scenarios and government policies. Here, we argue that quantitative assessment of the feasible potential of land-based CDR is vital to the success of CDR-focused litigation. Firstly, we highlight key land system processes that will constrain real-world CDR delivery to levels well-below the techno-economic assessments presented in the IPCC 6th Assessment Report (AR6). These constraining processes include land tenure and food insecurity, monitoring and verification, and impermanence due to biophysical disturbances and policy change. Quantifying the likely impact of such factors can fast-track successful CDR litigation by demonstrating the scale of the gap between CDR pledges and plausible real-world potentials.

Further, after Perkins et al., [2], we outline research frameworks that can deliver a quantified feasible potential for land-based CDR within the IPCC AR7 process, and highlight emerging trans-disciplinary methods making progress towards this goal. These methods include geospatial coupled socio-ecological model ensembles, which can capture interactions and feedbacks

between socio-economic and biophysical drivers in the land system at global scale. Typically, such ensembles include coupling of spatial agent-based models of land user behaviour with dynamic global vegetation models and non-equilibrium agricultural trade models - which can represent system shocks such as geopolitical instability and extreme weather events. We conclude by arguing that quantitative feasibility assessment must be made a high priority in CDR research to prevent widespread over-reliance on CDR in decarbonisation policies.

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