

Restoration prioritization must be informed by marginalized people

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ARISING FROM: B. B. N. Strassburg et al. *Nature* <https://doi.org/10.1038/s41586-020-2784-9> (2020)

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The maps and analysis by Strassburg et al.¹ should not be used by policy-makers in their current form, because of the risk of displacing marginalized people, compromising food security and undermining democratic processes. Their analysis was based on normative choices to value (that is, to optimize) relationships among biodiversity potential, carbon storage potential and cost effectiveness, without considering the well-being and rights of people who live in areas identified as restoration priorities, nor the implementation costs of changing land use. Although it may be informative to map the joint distribution of biodiversity, carbon and commodity prices, the absence of important socioeconomic values obscures both the costs and benefits to the Indigenous, forest-dependent and rural people who are directly affected by restoration interventions. We pose three cautionary questions that we believe must be answered before the maps produced by Strassburg et al.¹ are used by decision-makers to motivate and implement restoration-promoting land-use policies.

The first question we pose is to ask who lives in the places identified as restoration priorities. Although restoration requires collaboration with local people as well as compliance with their laws and customs², Strassburg et al.¹ say little about the people living on the land identified as restoration priorities. Many of the areas identified as high priority for restoration are currently used for crops or livestock, and are governed by complicated legal structures that include recognized and unrecognized rights of Indigenous people³. The number of people affected and the impact on agricultural markets is likely to be large: 295 million people live on land previously identified as ‘forest-restoration opportunities’⁴. Many of these people are Indigenous and/or hold insecure land tenure⁴.

When restoration activities do not consider the existing land-use practices or legal rights of people, they risk undermining livelihoods and food security, displacing people from their lands, creating human-rights abuses and compromising long-term conservation benefits^{5,6}. Restoration might have sustained positive effects on conservation and livelihoods when implemented in concert with local interests to restore land that is not used for livelihoods, or when restoration involves approaches such as agroforestry, which can maintain some elements of natural ecosystems while supporting livelihoods⁶. Nonetheless, Strassburg et al.¹ chose to compare the biomass and soil carbon stocks of ‘converted’ lands to a model of ‘old-growth ecosystems’ and ‘pre-settlement conditions’. This modelling choice implies that restoration involves removing people, whereas recent research shows that restoration goals can often be achieved alongside continued

land use by people². For example, Strassburg et al.¹ identified most of the Indian state of Kerala, famous for biodiverse and carbon-rich agroforestry⁷, as a priority area for restoration. It is unlikely, and not necessarily desirable, that Kerala’s 33 million people would abandon highly productive and biodiverse agricultural systems and then wait for centuries for old-growth tropical forests to develop.

The second question we pose is what the costs of restoration are and who pays for it. The model of Strassburg et al.¹ maximized aggregate net benefits of biodiversity and carbon storage globally. Yet it did not consider how to compensate people who live locally and might be displaced, and who could lose food and livelihood security as a result of changes. Most of the priority areas fell in the global south, where there is a long history of holding rural and Indigenous people responsible for environmental degradation, while misinterpreting traditional ecosystem management as ‘degradation’ and ignoring the political and social processes that make people vulnerable^{8,9}. Previous efforts to compensate people displaced by conservation projects have often failed and are associated with large-scale human-rights violations^{10,11}.

Strassburg et al.¹ calculated the opportunity cost of restoration by analysing the commercial value of agricultural commodities. This underestimates the true opportunity costs of restoration for four reasons. First, smallholder farming systems in the global south rely on a diversity of crops and land uses, often for subsistence production that are not accounted for in commodity prices. Second, a focus on commodities obscures the political and economic forces that determine agricultural output: poor farmers who lack access to capital are less likely to produce high yields of commercially valuable crops⁸. Thus, the analysis of Strassburg et al.¹ analysis was likely to find that the land of poor farmers was more cost-effective for restoration than the land of farmers with more capital. Of further concern is that poorer farmers often lack secure land rights or the ability to seek legal recourse, which places them at greater risk of displacement if their livelihoods are threatened by restoration activities⁸. Third, because small farms often have biodiversity and carbon benefits, restoring them to ‘pre-settlement conditions’ and/or imposing land-sparing intensification will bring fewer net benefits than calculated by the model of Strassburg et al.¹. Furthermore, the agricultural intensification required for land sparing has substantial energy costs and a wide variety of negative consequences for people and ecosystems¹². Fourth, implementing policies that shift land use from farming to restoration may displace hundreds of millions of people, will require complicated changes to land rights and food systems that may not be politically

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feasible, and risk new losses of carbon and biodiversity when people are resettled in other places¹³. These implementation costs will probably highly exceed the opportunity costs of crop production, and may be especially pronounced in the global south¹⁴.

The third question we pose is to ask who gets to decide on the restoration priorities. A just and effective approach to restoration begins by working with the people who live on and make a living from the land to identify their priorities for restoration². Strassburg et al.¹ promoted stakeholder involvement with a brief reference to “the free, prior and informed preferences and knowledge of Indigenous peoples and local communities”. Similar promises were made in the context of Reducing Emissions from Deforestation and Forest Degradation (REDD+), including by institutionalizing ‘social safeguards’, but this has not prevented human-rights abuses and dispossession of Indigenous people¹¹. Strassburg et al.¹ argued that socioeconomic issues should be “appropriately addressed at local and regional scales through culturally inclusive decision-making and implementation”. We agree: apart from concerns about justice, active involvement from local people makes policy more effective¹⁵. However, free, prior and informed consent requires public involvement in shaping not only the local implementation of global plans, but also the global agenda. Postponing local involvement until after priority-mapping exercises places an unnecessary burden on marginalized people to argue against decisions made by powerful actors in global decision-making fora.

Moving forward, land-use priorities could be better identified if scientists and policy-makers work with organizations representing people who live on and manage lands. Top-down approaches to defining global restoration priorities create unrealistic targets and are less likely to succeed in the long-term. At the same time, they risk exacerbating injustice, food insecurity and displacement. Restoration, like any land-management intervention, must ultimately be implemented by people in their distinct social and ecological contexts. Global models that ignore these contexts tell us little about when and where ecological restoration can succeed.

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Reply to: Restoration prioritization must be informed by marginalized people

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It is essential to properly include the rights, preferences, participation and knowledge of people locally affected by restoration in its planning and implementation. Not only is this an ethical imperative, but it is also central to maximizing the social benefits of restoration, minimizing its potential harms and increasing its long-term sustainability and success. We stressed this in our original paper¹ and reinforce this message here in response to the Matters Arising by Fleischman et al.²

We agree with Fleischman et al.² that being informed by marginalized people is crucial for deciding where to implement restoration. Indeed, we agree with most of their messages. We disagree, however, that it is currently possible to include these considerations adequately in a global spatial prioritization, and actually believe that attempting to do so could be detrimental to interest of marginalized people. Fleischman et al.² erroneously interpret that we intended our maps to be used as final products to guide on-the-ground implementation. We clearly highlighted in our concluding section the five ways in which our work might be useful, and none of them related to using our maps to guide local implementation directly. Indeed, in the opening paragraph of our discussion section we stress that to capture social considerations, prioritization exercises have to be performed at finer scales, and that such exercises “must incorporate the free, prior and informed preferences and knowledge” of local people. We also end our discussion section by highlighting that such social aspects could affect the prioritization itself.

Global spatial-prioritization analyses can adequately incorporate only scale-independent variables, such as those for which the values are less affected by finer scale contexts. One tonne of CO₂, one additional habitat unit for a given species and a financial unit of market-related cost do not meaningfully change on basis of the scale at which the analysis is being conducted. The resulting global priority maps can be seen

as a starting point for processes in which these variables have high importance, to then be further refined through the appropriate inclusion of variables and processes at finer scales. Multiple benefits and costs of restoration are highly context-dependent and of a relational nature, and therefore will change (or only exist) on the basis of specific local socioecological contexts, and the individual and collective preferences of the people involved. Moreover, crucial aspects related to the distribution of these benefits and costs across the affected stakeholders can be properly addressed through only inclusive and carefully designed processes. In our understanding, it is currently impossible to include these at spatial prioritization scales at the global level without making very gross assumptions regarding these local contexts and the relational values and preferences of stakeholders, while also disregarding appropriate processes.

Yet this seems to be the route suggested by Fleischman et al.². They argue that we did not include local and context-specific considerations that could make lands in the global south more costly or riskier, such as insecure land tenure, or the lack of ability of poorer farmers to seek legal recourse. Had we followed this approach and downgraded the priority or altogether blocked areas that include some specific social group or context, we would have restricted or altogether removed—in a top-down manner—the lands of multiple groups of people from consideration as priorities for restoration, effectively curtailing their options whether to engage, or not, in processes further down the planning and implementation chain.

Addressing such local issues on the basis of gross assumptions in a global prioritization analysis can, in fact, do more harm than good. Providing inaccurate information on land tenure, for instance, can have catastrophic effects for local people, intensifying land disputes and expropriation of natural resources. Furthermore, for many of these

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considerations—even if appropriate information were available (such as the spatial distribution of Indigenous lands)—deciding whether a given aspect should have a positive or negative influence on the relative priority of a given area can be arbitrary. For the three variables included in our analysis, the direction they should affect priority is clear—sequestering CO₂ and avoiding species extinctions are positive, whereas restoration costs are negative.

Regarding their first question on who lives in priority areas, we are—as noted in the original paper¹—in full agreement with the imperative to consider local people and their livelihoods through appropriate processes. We also agree that millions of people live in areas that we identified as priority lands³, and that the rights of these people, and in particular those of marginalized groups, are often unrecognized, with potentially disastrous consequences for them and the success of restoration efforts³. However, these studies actually argue that these people could benefit from³ and contribute to^{3,4} restoration efforts if properly empowered. Indeed, the main message of a previous study⁴ is that restoration should be prioritized in places where people are located (as opposed to sparsely populated areas). When properly planned and implemented, restoration can strengthen community bonds, create jobs, generate income and increase the provision of nature's contributions to people⁵.

Fleischman et al.² then argue that—because we did not model local agroecological systems in our global analysis—we adopted the view that restoration involves removing human activity and that we were supportive of a scenario of widespread abandonment of these lands by tens of millions of people. However, we were not and, even if we were unable to model local land-sharing systems at the global scale, we fully recognize that functional agroecological systems can be desirable as such and provide potential approaches to restoration. We also did not model a return to a 'pre-human state', rather we modelled a transition from croplands or pasturelands to one of five broad categories of ecosystems and their associated carbon stocks and species composition. Our methodology describes that for both these variables their values after this transition are derived from their observed values today under these broad natural ecosystem types. Most of the world's Indigenous peoples lands are currently classed as these natural ecosystems (and not as croplands or pasturelands), and therefore our reference ecosystems include conditions in which humans share their lands with the rest of the natural world. In this and in other passages, Fleischman et al.² note that our methods would lead to the displacement of people and to food insecurity, and that we did not address this. In fact, in this aspect we arguably go beyond most global spatial-prioritization exercises^{6–9}. We developed an entire set of scenarios focused on reconciling agricultural production with restoration to provide a first—albeit imperfect—estimate of how such crucial considerations could alter the benefits from multi-criteria spatial planning; these represent 20 of the 50 main scenarios¹ (those included in figure 2 of ref. ¹); and much of the results and discussion of our original paper¹ focused on these scenarios. The scenarios focused on reconciling food production with restoration at very local landscape levels (5 × 5 km). For instance, restoration could, in principle, be achieved without displacing any farmer if the 15% restored area is distributed across all local farms up to their capacity to reconcile restoration with the food production by those farms. This modelled scenario does not, of course, mitigate the real risk of displacing people and, as argued above, we consider it to be crucial to elaborate these considerations at finer scales that consider context-specific considerations through inclusive participatory processes.

Their second question is related to the restoration costs and the burden of covering them. As Fleischman et al.² note, we did not include the costs that some stakeholders would incur for natural ecosystem restoration, such as the effects on cultural identities associated with agricultural landscapes. Conversely, however, we also did not include restoration benefits, such as relational values that communities may derive from natural areas, nor multiple other local benefits that people

derive from nature the loss of which disproportionately affects local communities¹⁰. These, and other costs and benefits, should be included in finer-scale initiatives that are capable of properly addressing these context-specific aspects. Fleischman et al.² suggest that we only included a small number of 'commodity' crops in our opportunity costs assessment; however, we included 23 different crops, including cassava, fruits and vegetables¹¹. Fleischman et al.² interpret the high priority associated with restoration in lower-income countries as being caused by an underestimation of restoration costs there. In fact, the concentration of global priorities there is mostly because biomass density, species richness and endemism are higher in countries at lower latitudes. This can be seen by a similar geographical distribution of priority areas in the scenarios in which only the biophysical aspects are considered (as shown in figure 1a, b, d of ref. ¹). These biophysical benefits are a lot more pronounced at lower latitudes and only if the restoration costs were lower in northern countries by an unrealistically equivalent margin would the north–south spatial prioritization pattern change in a global-scale analysis that considers these three elements.

We agree that, because global priorities in unconstrained scenarios (as shown in figure 1 of ref. ¹) are mostly in the global south, this raises concerns of a potential uneven distribution of restoration costs. We highlighted this in the original paper¹ and called for international compensatory mechanisms to adequately address this. Funding mechanisms linked to the global benefits that restoration provides (such as climate mitigation and biodiversity conservation) can potentially be implemented to balance these uneven distribution of costs and benefits. We recognize that such mechanisms have a mixed record and that the global north–south power imbalance has to be addressed so that countries and communities only implement restoration where and if they choose to do so. Furthermore, although Fleischman et al.² do not mention it, we also modelled multiple scenarios in which restoration is distributed equally across all countries. These not only provide inputs for an even distribution of restoration activities, but also highlight the potential benefits of global collaboration including international financial, knowledge and technological transfers to enable improved global restoration outcomes that respect environmental and social values. We see our results as constructive contribution to international negotiations on financial burden sharing under the UN Conventions.

Their third question is regarding who gets to decide restoration priorities. Again, we agree with the general message of properly including all relevant stakeholders in shaping the global agenda, and that multiple processes have failed to do so in the past. We believe our maps provide multiple useful inputs to such dialogues at the global scale that incorporate elements that can be appropriately modelled at this scale. Ecosystem restoration can mitigate environmental problems at the planetary scale and such considerations can complement the traditional plot-scale decision-making processes that have characterized restoration projects. However, in contrast to Fleischman et al.², we do not believe it is our place to infer the preferences of specific groups related to elements that can be addressed only through engagement with local people at finer scales.

It is very likely that properly empowered stakeholders will not always opt to conduct restoration in their lands. It is also true that conservation and restoration efforts in the past have failed to implement appropriate processes to empower marginalized groups to express their preferences and have them respected. It is equally true, however, that local groups—in particular Indigenous communities—have benefited from initiatives that helped to conserve or restore their lands. Curtailing their options from the start without consulting them does not seem an appropriate way forward. Although complex and subject to failures, the route of implementing careful processes that empower marginalized groups to engage effectively and at appropriate scales in decision-making processes regarding their lands still seems like the most effective approach. Future research mapping the areas that deserve special attention because of many of the factors highlighted

by Fleischman et al.² would be an important contribution. Our study, in addition to providing key insights unrelated to our maps, offer multiple global starting points on the basis of aspects that are conducive to being analysed at the global level. However, as noted in our original paper¹, these should then be further refined at finer scales where key social considerations can be appropriately understood and addressed through inclusive processes.

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