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Forest livelihoods and a “green recovery” from the COVID-19 pandemic: Insights and emerging research priorities from India

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A B S T R A C T

For those concerned with the future of forests, the COVID-19 pandemic has simultaneously offered cause for great concern, and renewed hope. On one hand, the pandemic is occurring at a time when forests are already under unprecedented pressures from climate change, amplifying concerns about unsustainable forest extraction in the name of economic recovery. On the other hand, however, the crisis has helped to gather momentum around the notion of a “green recovery,” including setting aside additional land for forest conservation. Drawing insights from past and ongoing research in India, we highlight an issue that exemplifies the tension between these two poles: the role of forests as social safety nets for rural communities in developing countries. It is well established that forests can provide critical resources for rural livelihoods, especially in times of crisis, and preliminary reports suggest that these resources have become even more important in the context of India’s COVID lockdowns, and mass return migration from urban to rural areas. As the second wave of the pandemic continues to unfold in India, we highlight some key research priorities, including: 1) understanding how and to what extent forest-dependent communities and industries are changing their use of wood- and non-wood resources in the context of return migration and economic stress; 2) tracking shifts in forest cover, structure, and composition that may result from increased extractive pressures; 3) assessing the role of institutions, whether local, national, or international, in mediating these outcomes. Drawing on these observations, we suggest some key principles for integrating forest-based livelihoods into “green recovery,” founded on principles that articulate forests as complex and integrated social-ecological systems, prioritize equity, and build on past learnings of community-based forest management.

1. COVID-19, forests, and a “green” recovery

More than a year after the emergence of the Novel Coronavirus, the COVID-19 pandemic has upended lives and livelihoods globally. While public health measures promise to decrease the effects of the disease within the coming year, the far-reaching economic, social, and environmental disruptions caused by the pandemic will be felt for years into the future (Di Gennaro et al., 2020; Irfan et al., 2021; Ramakumar and Kanitkar, 2021; Workie et al., 2020). These circumstances have disproportionately affected those who are poorest and most vulnerable, through both the economic impacts of government-mandated lockdowns, as well as direct health threats (Ahmed et al., 2020; Nichols et al., 2020; Kansiime et al., 2021). The slowdown of economic activities due to the pandemic was projected to push 88 million people into extreme poverty in 2020 alone (World Bank, 2020). Emerging at a time when international efforts were already focused on responding to crises of environmental and social unsustainability, the pandemic and its side effects have stalled progress toward achieving several of the UN’s Sustainable Development Goals (SDGs) by 2030 (Sachs et al., 2020). The convergence of these circumstances has led to calls for a “green recovery,” (Sen, 2020), prioritizing sustainability and conservation alongside economic wellbeing (Gusheva and de Gooyert, 2021; Kothari, 2021; Sandbrook et al., 2020, and Taherzadeh, 2021).

The COVID-19 pandemic has brought to the fore the dynamic
In the wake of the pandemic, there has been significant migration in many parts of the world, especially from densely populated urban areas to rural locations. While in many developed countries, exodus from the cities has been an elective decision of higher-income salaried workers, who can continue their work remotely (Bernard et al., 2020), for low-income wage workers, particularly in informal sectors, reverse migration from urban to rural areas has been driven largely by economic necessity (Bhagat et al., 2020; Khanna, 2020). The ILO (2020) highlights that across low and middle-income developing countries, the sectors that are the hardest hit are also the ones that have the largest informal employment. In India, millions of migrant laborers lost their jobs as industries and street operations were shut during lockdowns, beginning in April 2020 (Suresh et al., 2020). The loss of livelihoods led to mass return migration, with rough estimates suggesting that close to 6.3 million people travelled via trains to rural areas in May–June 2020 (Singh et al., 2020). This number does not account for those who walked or used other modes of transportation. Similar trends were reported between the United States and Mexico; within Indonesia, Kenya, and Peru; and in many parts of sub-Saharan and Eastern Africa (Chirisa et al., 2020; Boillat and Zähringer, 2020).

The coupling of pandemic-driven economic disruption with increased return migration to rural areas has important implications for forested landscapes and forest-based livelihoods. Forests can serve as social safety nets, supporting livelihood security (Delacote, 2007; Paumgarten, 2005; Rasmussen et al., 2017; Shackleton and Shackleton, 2004). However, there is significant uncertainty in terms of the nature of migration (temporary vs permanent) (Awasthi and Mehta, 2020; Paumgarten, 2005; Rasmussen et al., 2017; Shackleton and Shackleton, 2004). According to recent surveys carried out across several districts in India, it is revealed that migrants had either returned back to the cities or were intending to do so (Paliath, 2021).

The COVID-19 pandemic and its after-effects are likely to exacerbate existing pressures on forests, in some cases resulting in further degradation (Baqué et al., 2021). Research is urgently needed to understand the immediate and long-term implications for forest-based livelihoods and other environmental objectives. In this commentary, we take the case of India, a megadiverse country with a large, rural forest-dependent population, which has been significantly impacted by the pandemic. Drawing from recent scholarly publications, field reports, and our own ongoing fieldwork, we outline emerging priorities for research on the impacts of the COVID-19 pandemic on the forest-livelihood interface. Specifically, we highlight the need to understand: the role of forests in providing safety nets for communities, including buffering reverse migration and economic shocks; the implications of increased reliance on forests for conservation, including changes in the pace of land conversion, biodiversity loss, and degradation of forest health; and the performance of forest governance institutions under increased pressure and uncertainty. We then conclude by considering what lessons from these experiences might have for realizing a more just and sustainable “green recovery” from the pandemic.

2. Research priorities on forests and the COVID-19 pandemic

2.1. Forests and calls for a “green recovery”

In policy debates at the national and international levels, many advocate for treating the pandemic as an opportunity to transition to more sustainable systems through “green recovery,” rebuilding societies and economies to meet the 2030 UN SDG agenda (Elkerbout et al., 2020; Hepburn et al., 2020; IEA, 2020; Steinmeier et al., 2020). As framed in contemporary policy discussions, a green recovery would prioritize environmental sustainability as a critical component of future economic growth and long-term development objectives. The urgency for such an approach is accentuated by the limited time available, as projected by the Intergovernmental Panel on Climate Change, to forestall catastrophic climate change (Masson-Delmotte et al., 2018). Undoubtedly, forests have a central role to play in achieving these goals (Sen, 2020).

Funds are a key resource for climate mitigation and adaptation measures (Millar et al., 2007; Morelli et al., 2016); they provide habitat for 68–80% of the world’s terrestrial vertebrate biodiversity (FAO and UNEP, 2020); and they provide ecosystem services that are critical to human wellbeing. It is estimated that approximately 20% of the global population, or 1.3 billion people, including an estimated 250 million of the world’s extreme poor, relies on products and resources from forests to support some portion of their livelihoods (FAO et al., 2018, p. 20).

Even so, forests continue to be threatened, not only by commercial extraction and land-clearing (Turubanova et al., 2018), but also by the spread of pests and disease through global trade (Roy et al., 2014), and the increasing frequency and extent of large-scale, catastrophic forest fires (Brando et al., 2020; Walker et al., 2019). Approaches currently being outlined under the banner of a green recovery are centered on natural capital investments to increase capacities in the forestry sector, reversing deforestation according to the Convention on Biodiversity’s “transition path” (Secretariat of CBD, C. on B. D, 2020). Natural capital investments are aimed toward job creation in sustainable forest management (FAO and UNEP, 2020; Sen, 2020). While efforts in this regard are promising, the disruptions resulting from the COVID-19 crisis may significantly shift the social-ecological dynamics linking rural communities to forest landscapes. Balancing the demands of social and ecological sustainability in the context of a green recovery requires a better understanding of what has happened during the COVID-19 crisis, and how it has changed rural communities’ use of forests, and how these circumstances have changed the forests themselves.

Social upheaval changes social-ecological relationships, but the outcomes of societal shocks for forest landscapes and forest-based livelihoods are distinct depending on the nature of the shock, as well as the social and historical context. For example, short-term regeneration of forests has been documented following social disruptions that have led to outmigration or population decrease, like the genocide of indigenous peoples of the Americas following European contact (Lewis and Maslin, 2015), the Rwandan civil war and genocide (Ordway, 2015), or large-scale migration due to droughts in Central America (Redo et al., 2012). However, in other cases, the extractive activities underpinning military buildup related to major wars has led to deforestation. The exploitation of Southern Europe’s forest for shipbuilding by the Roman empire (Hughes and Thirgood, 1982), and the deforestation that occurred in British-colonized India during WW II (Guha, 1983; Negi, 1996) are two examples. These examples highlight that predicting on-the-ground impacts of large-scale societal disruptions requires understanding the dynamic interrelationships linking socioeconomic, biophysical, and institutional factors around forest use and management.

Critically, one of the distinctive features of the current shock driven by COVID-19 is not a rapid decrease in population around forests, but rather a population increase due to urban-rural reverse migration. Whether this increase is temporary or lasting remains to be seen, but there is reason to anticipate that these circumstances will put more pressure on forests. Even so, human activities do not uniformly affect living about forest destruction; people living in forested landscapes may also promote forest biodiversity (Brodth, 2001; Posey, 1985) and forest cover (Fairhead and Leach, 1996), and protect forests from overexploitation (Keck, 1995; Rangan, 1996; Sankhala and Jackson, 1985). These activities are shaped by formal and informal social institutions (i.e. not just government and NGOs, but also family, culture, kinship and faith). Projecting the short- and long-term impacts of the pandemic may hinge on understanding how such institutions absorb and respond to upheaval.
Below, we outline some emerging research priorities around these interrelated issues, drawing conceptually on our own ongoing research in India.

### 2.2. Research priority 1: Forests as safety nets in communities’ responses to the COVID-19 pandemic

It is well established that forests support the livelihoods of the communities that reside in or adjacent to them. Forests may serve as a backup option in times of stress, for example by providing “famine foods” or basic inputs for cooking when other fuels are unavailable (Pierce and Emery, 2005; Pimentel et al., 1997). Forests also support a wide variety of everyday local production practices, from providing fodder for livestock husbandry, to key inputs for cottage industry, to a variety of other non-timber forest products, including foods for consumption or sale (Angelsen et al., 2014; Newton, 2016; Oldekop et al., 2020; Sanderlin et al., 2005). As such, it is widely recognized that forests can play a role in helping rural communities respond to challenges, such as those related to climate change (Pramova et al., 2012). In the present context, emerging reports suggest that communities living near forests responded to the economic, public health, and transport disruptions sparked by the pandemic by leaning more heavily on forest resources. The nationwide lockdown in India in April of 2020 caused major disruptions to the supply chains for food, fuel, and fodder normally reaching rural areas, and in the absence of regular supply, households increased their gathering and extractive activities from common lands and forests (Tripathi, 2020; Gupta et al., 2020).

While forests and trees are important for the wellbeing of rural and natural resource dependent communities, their role as safety nets and as motors of economic growth is under-appreciated and remains to be fully understood (Miller et al., 2020). A study using a large global-comparative dataset (Wunder et al., 2014) found that dependence on forest may be less important in times of hardships and forest served only as a secondary fallback resource. In the COVID context, the seasonal availability and sale of harvestable products in specific ecotypes at the time of lockdown may have constrained their contribution to livelihood buffering. In India, the April 2020 lockdowns coincided with the lean period (April, May and June) prior to the onset of monsoon, when food materials are generally less available (Joshi, 2020). It remains to be understood what extent forest resources - and specifically which kinds of resources - have been available to buffer communities’ livelihood needs during the precise periods of the COVID lockdowns. Answering this question is important for understanding the ecological consequences of increased forest product use, just as it is also potentially important for distinguishing the impacts of livelihood-oriented extractive activity from, for example, deforestation resulting from illegal land clearing or commercial logging in the context of relaxed law enforcement and increased market demand.

Who within a community chose to recur to forest collection and harvesting as a safety-net strategy is also a point of inquiry; while some households may have had the knowledge and skill to fall back on forest-gathering methods, other households may have chosen different crisis management strategies (Liswanti et al., 2011). Still others may have been excluded from forest use as a result of local restrictions (Aditya and Ravkanth, 2020). Saha and Agarwalla (2021) found that dependence and forest resource use of people living in the periphery of protected areas in eastern India was greater than those living in the core areas. Key questions for research are where, when, and for whom forest resources functioned as a safety net in these moments of acute disruption, and how they aid not just in short-term coping strategies, but also longer-term recovery.

The importance of assessing how baseline forest use was altered by the COVID lockdowns is increased by substantial urban-rural reverse migration. In India, where lockdowns led to the shutdown of industries and street operations in major population centers, over 90% of the population works in the informal sector, mainly in urban areas and constituting 85% of the non-agricultural workforce (Mehrotra, 2019, p.1). The fact that much of the job loss took place within informal economies means that, with government and other aid packages aimed primarily at the formal sector, many returning migrants and rural communities have been poorly compensated or left out of these formal safety nets altogether (Awashti and Mehta, 2020; Tripathi, 2020; Sapkal, 2021). The impacts of return migration on rural economies were reflected in the increased demand for work within the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) – a basic social security mechanism that provides rural households access to minimum wage labor – which was 21% higher in June 2020 (Mukherjee, 2020), as compared to the last seven years and increased by 89% compared to April 2020 (SethiSharma, 2021).

While the short-term impacts of population increase due to return migration may largely be reflected in an increase in household subsistence needs, if migrants stay in rural areas, this process stands to change livelihood patterns over the long-term, impacting forests. A recent study on migration in central India (Baqui et al., 2021) found that there is no significant impact of short term migration on rates of forest degradation, while pointing out that observations over longer-term time-frames might be necessary to better capture these effects. Although rural growth patterns have lead to a decline in subsistence activities in many countries in recent years, the presence of returned migrants and their desire to stay back and re-engage in agriculture allied activities will lead to reinvestment in farm-based production activities (Awashti and Mehta 2020), potentially driving additional forest clearing for agriculture while also increasing farm households’ dependence on agriculture-supporting ecosystem services (Shweta, 2021). Greater demand for livelihood opportunities in rural areas will also lead to shifts in the existing rural employment market (FAO and UNEP, 2020). This can create incentives for people to engage in commercial forest extraction activities, whether small-scale harvesting of NTFPs for cottage industries, or larger-scale extractions such as logging and mining.

### 2.3. Research priority 2: Impacts on forest cover, structure, and health

Just as the pandemic affects livelihoods, so too may changed economic activities around forests affect forest cover, structure, and health. Global annual estimates of stand clearing disturbance from Global Forest Watch based on data from Hansen et al. (2013) indicate that tree cover loss in the tropics increased 2.4% from 2019 to 2020. In the context of prior trends, this suggests that in the tropics as a whole the pandemic did not substantially contribute to tree cover loss. In India, however, the states with the largest remaining areas of forest (Assam, Mizoram, Nagaland, Manipur, Arunachal Pradesh) experienced an average tree cover loss increase of 29% in 2020 after two years of declining tree cover loss likely related to the economic slowdown that started in 2017. Increased tree cover loss occurred in spite of severe economic contraction associated with the lockdown, suggesting indirect impacts of the pandemic through, for example, illegal commercial logging due to decreased law enforcement and patrolling as a result of lockdowns. An increased reliance on forest resources for livelihoods may also have played a role. However, the true contribution of such activities to tree cover loss remains difficult to estimate without verification from the field.

In these situations, near real-time monitoring via remote sensing can help policy makers, conservation groups, community groups, and others in identifying shifts and trends in forest cover and condition as well as to identify their drivers. To date, remote sensing-based early warning systems have been focused on stand replacing disturbance (e.g. GLAD alerts, Hansen et al., 2016). While suitable for monitoring some sources of forest disturbance (e.g. large-scale logging and industrial agriculture), many of the changes expected as a result of return migration may take the form of forest degradation (Branccioni et al., 2020). Degradation can be considered negative impacts to forest structure, composition, or function but where the extent of forest is unchanged. In evergreen
tropical forests, degradation can sometimes be detected, as there are minimal seasonal changes in vegetation. In other tropical forest types such as seasonally dry forest, the signal of degradation can be difficult to distinguish from seasonal or decadal changes in vegetation due to e.g. drought, deciduousness, or La Nina. From a biodiversity or carbon emissions perspective, it is important to quickly identify new deforestation fronts (Finer et al., 2018). From a livelihoods perspective, however, it may be as or more important to monitor forest degradation associated with small-scale extractions by surrounding communities in order to determine if forest resources that communities rely on are stable or deteriorating in response to shocks.

Time series analysis of high temporal resolution imagery can aid in identifying areas of degradation. High resolution imagery stacks such as those recently made available through the Norway’s International Climate and Forest Initiative (NICFI) program may provide opportunities for semi-supervised and automated detection of forest degradation, although the temporal resolution may restrict how frequently updates can be provided. New technologies may also help better characterize baseline forest conditions. For example, the Global Ecosystem Dynamics Investigation (GEDI) lidar instrument on the International Space Station makes detailed measurements of forest vertical structure. Such measurements can be used to quantify forest structure relative to reference conditions in intact forest, allowing for structure-based classifications of forest condition to be applied in land cover mapping efforts.

Early-stage or species-level changes driven by increased extraction may not be easily detected by remote sensing. For early detection of the impacts of, for example, overharvesting of particular species, ground-level data is needed. Timely and accurate characterization of landscape scale changes requires coupling field-based research methods with remote sensing which may include a combination of satellite, aircraft, and drone observations. Open-source platforms have been developed to aid in imagery interpretation and in linking field observations to remote sensing data (Saah et al., 2019). As such platforms develop, functionality that decreases lag time between the events of interest and delivery of data products should be emphasized. Critically, these new products and applications significantly reduce the costs of monitoring, and examples already exist of local and civil society institutions that have engaged in monitoring their own forest resources using such tools (Beaubien, 2015; Jobert, 2016).

2.4. Research priority 3: Forest management institutions and the pandemic

It is well known that governance plays a critical role in shaping both human and environmental outcomes derived from forests. Governance entails the mixture of local institutions, norms and conventions, and incentive structures that determine how forests are used and managed, as well as decision-making processes (Lemos and Agrawal, 2006). Research shows that effective local control over management processes, as achieved for example through forestry decentralization policies, can help to promote stronger local collective action for forest management in many contexts (Agrawal, 2007); this, in turn, can lead to gains for rural livelihoods as well as a range of other ecosystem benefits - carbon, biodiversity, reductions in deforestation, and others (Luimet et al., 2018; Oldekop et al., 2019; Persha et al., 2011). However, local control is by itself hardly enough; recent research has become increasingly attentive to the need for external support both from civil society organizations (Barnes et al., 2017; Gupta et al., 2020) as well as supportive interaction with forest bureaucracies in promoting effective resource management outcomes (Anderson and Ostrom, 2008; Wright et al., 2016).

In the context of the social and economic disruptions driven by the COVID-19 pandemic, communities with established forest rights and strong local management systems were better able to utilize available resources to address key challenges, thus enabling them to better cope with shorter-term livelihood shocks (Tripathi, 2020). Likewise, strong existing local management systems may be better able to strike an effective balance between immediate needs and broader sustainability objectives, thus ensuring longer-term resilience in the face of ongoing disruption. Yet, how forest governance influences local responses to shock remains anecdotal and poorly understood (Gentle et al., 2020), as does the potential role for regional, national, or international institutions in helping local management institutions navigate such challenges. Dutta and Fischer (2021) highlight how COVID-19 crises galvanized new cross-sectoral and multi-scalar interactions that link national and regional actions to local realities in India. Research on these topics may provide crucial input to develop policies that are better able to support communities in pursuing sustainable forest management in the face of the present disruption and beyond.

3. Principles for a green recovery

The three research priorities we outline above are not exhaustive, and should be treated as an addition to the existing conversations about knowledge gaps in the context of COVID-19. Addressing these research priorities, however, is essential for integrating forests in an effective and socially equitable manner in the post pandemic green recovery. Research, of course, takes time; and in the presence of uncertainty, it is essential to depend upon principles to guide decision-making (Kriebel et al., 2001; Steele, 2006). In this section we consider ways forward, highlighting key principles that should be used to operationalize forest management decisions under uncertainty.

3.1. Green recovery should be fundamentally different than business as usual

Getting “back to normal” after the COVID-19 pandemic ends should not mean doubling down on the same unsustainable drivers of past economic growth (Kuhn, 2012). These paradigms, systems, and processes have brought about a period of historically unprecedented environmental change, threatening Earth’s livability not only for humans, but also for other species (Steffen et al., 2015). Indeed, landscape-scale changes that increase interactions across human-ecological interfaces may make humans more vulnerable to future pandemics (Austin, 2021; Hassell et al., 2017). Though calls to transition from current paradigms of unsustainable extraction are long-standing (Anderson and Bows, 2012; Gore, 2015; Harangozou et al., 2018), they have often been countered by arguments emphasizing the need for continuity of economic growth, leading policy makers to prioritize small, incremental changes (Borel-Saladin and Turok, 2013; Kates et al., 2012). The large-scale disruptions caused by the pandemic, in this sense, present an opportunity: it may make more ambitious and bolder shifts toward sustainability feasible. The emerging push for a “green recovery” highlights the opportunity not just to recover past practices and systems, but to rethink and re-build for a more sustainable future (IEA, 2020; Leach et al., 2021).

3.2. Manage forests as complex adaptive social-ecological systems

Forever are central to the possibility of a green recovery. Careful tracking of the human, ecological, and institutional consequences of the pandemic, highlighted in our emerging research priorities, has the potential to help build understanding of the conditions under which forests best support resilience of rural and forest dependent communities. Existing research indicates that healthier, more biodiverse forests do more to support a wider range of livelihoods (Kooi and Saunders, 2001; Oldekop et al., 2019; Miller et al., 2020), and testing this hypothesis in the context of return migration and economic stress can guide future action. Reverse migration will be temporary in some places, and lasting in others (Sapkal, 2021), but in either scenario, it highlights the complexity of social ecological dynamics by revealing how similar processes may lead to differing outcomes across forested landscapes.
This underscores the importance of recognizing forests as complex adaptive socio-ecological systems (Messier et al., 2015), which change over time (are dynamic), adapt to stimuli (learn), and generate novel outcomes (that is, demonstrate emergence) (Levin et al., 2013).

3.3. Learn from and respond to cross-scalar social-ecological feedbacks

Managing for “emergence” of healthy, robust forest ecosystems (Ibarra et al., 2020), we suggest, should be a central focus of green recovery as it provides multiple benefits across social and ecological systems (Sen, 2020; Millar et al., 2007; Morelli et al., 2016). Managing for emergence goes beyond managing for multiple uses, in that it accepts (and anticipates) future change and uncertainty, and prepares decision-making processes to deal with novel outcomes (Folke, 2019). A critical element of management for emergence, in this context, is creating and strengthening feedbacks that promote learning across scales and help in self-organization (Levin et al., 2013). This requires interventions that are not only outcome-oriented, but also process-oriented, and durable enough to persist not just through human political cycles, but over the long lag-times of forest growth (Messier et al., 2015).

Feedbacks of information may be strengthened in at least three priority areas: attuning human action to ecological processes; promoting evidence-based learning; and prioritizing social equity. For forest management, this means not only collecting data about how households and individuals are using forest resources, or about how forests themselves are changing in response, but also, critically, about how decisions regarding forest management are being made and enforced. This requires researchers to maintain real-time engagement with collective action around forests, whether this is undertaken through informal community institutions, or more formalized channels. It is for this reason that the research priorities we outline here underscore not only human-ecological data, but also institutional responses to changing conditions.

3.4. Forest management should be informed by social and ecological histories across diverse time-scales

Particularly in the context of forests, which have long life-spans, researchers and policy designers should explicitly seek out evidence that explains socio-ecological processes across multiple timescales. This means not only reading recent scientific literature, but also seeking out works that demonstrate longer time-frames, including works in ethnography, historical ecology, archaeology, or geology. Given the long-term timescales of forest growth, managing forests for the future will require coupling understandings generated by shorter-term research with these longer-term perspectives (Swanson et al., 2021).

3.5. Recovery must enable social equity

Steps toward a green recovery should incorporate equity as a core principle. A common pitfall of urgent action is the use of urgency and efficiency as a justification for re-centralization of resource management and control (Basnyat et al., 2019; Marino and Ribot, 2012; Phelps et al., 2010; Ribot et al., 2006). However, in management of forest landscapes, decentralized solutions have a long history of unintended consequences. Centralized government policies of hard-line forest protection have often led to the further dispossession or inequitable treatment of marginalized groups, while failing to protect forests from predatory extraction by larger economic interests (Adams and Hutton, 2007; West et al., 2006). More generally, top-down policy action risks undermining existing community management systems that are already effective in conserving forests (Sandbrook et al., 2010). While some proponents of green recovery aim to set aside 30% of terrestrial and marine resources for nature to heal and recover, there is also a call for allowing forest landscapes to be accessible to communities in times of distress. Fortress style protection of natural landscapes has driven human rights violations; hence it is important that green recovery must at heart allow for rural and forest dwelling communities to benefit from forested landscapes.

3.6. A “green” recovery should build on past successes in community-based forest management

Humans, and particularly indigenous and local communities, are an integral part of many forest ecosystems; they are not “outside” of forest conservation, and their historically embedded interactions with forests may actually generate forest cover and biodiversity (Fairhead and Leach, 1996; Posey, 1985). Recent research underscores the link between indigenous peoples and biodiversity hotspots (Gorenflo et al., 2012), and these lands hold 36% of the world’s intact forests (Fa et al., 2020). Indigenous communities’ knowledge and use of forests, while “traditional,” is not static; it is shaped and reinforced over time through not only livelihood activities but also ancestral, and sacred forms of interaction with forested landscapes (Berkes, 1999; Sander, 2007). Policy-solutions therefore should build on the many decades of groundwork toward community-based management and governance of ecosystems (Larson and Soto, 2008; Libert-Amico and Larson, 2020), relying on or strengthening the existing capacities of such institutions to shape the fair and sustainable use of forests.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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