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The Dilemma of Maintaining Intact Forest Through Certification

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Intact forests are natural and often extensive forests free from apparent anthropogenic degradation. Intact forests have important intrinsic and societal values, making their protection a high conservation priority. They are, however, vulnerable to being lost and degraded due to high opportunity costs and a lack of positive incentives to their preservation. Market-based mechanisms, such as voluntary certification, might provide a means to conserve intact forests while maintaining income through sustainable forest uses. Yet possibilities to ensure strict protection of large areas of intact forests through certification remain limited as long as premiums from certification are bound to the units of forest products that are sold. We explore challenges for incorporating intact forests into certification processes, and of maintaining intact forests within forest management units. To circumvent these challenges, it might be necessary to create a form of compensation payment scheme to overcome the foregone costs of intact forest preservation. Alternatively, certification systems might need to consider permitting some degree of regulated extraction in exchange for recognition and implementation of stringent forest preservation. This will require a re-evaluation of the way intactness is treated within current certification standards and the requirements for forestry within intact forests. Eventually, intact forest conservation and socially and economically viable forest management can only be reconciled on the landscape scale.

Keywords: land sharing land sparing, protected areas, REDD+, forest management, FSC, sustainable intensification, boreal forest, tropical forest

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INTRODUCTION

Global efforts for biodiversity conservation are not sufficient to be distributed equally around the world. In order to target those areas with the highest conservation value, two contrasting concepts have emerged, both prioritizing landscapes that are biodiverse, but one focussing more on hotspots the other more on coldspots of human activities. Hotspots are global centers of biological diversity and endemism that are threatened by human activity, especially from habitat loss (Brooks et al., 2002). Coldspots are extensive and largely intact and undisturbed natural regions where the threat of loss is less immediate, but where the problem of degradation is increasingly important. The maintained integrity of coldspots is important for their large carbon stores and the extensive habitats of many disturbance-sensitive species (Watson et al., 2018). According to recent research, areas that have been identified as global hotspots currently contain an average of only 15% of their natural, intact vegetation (Sloan et al., 2014). Coldspots, in contrast, include the last large intact forests that remain free of human activities. Intact forests tend to be remote from populated areas and urban centers, and often occupy mostly inaccessible and agriculturally marginal regions in both tropical and boreal regions. One commonly used definition defines intact forest landscapes (IFL) as areas of at least 500 km^2 that do not show any sign of remotely detectable human activity or habitat fragmentation (Potapov et al., 2008). Intactness is in itself a valued aspect of conservation quite apart from the biodiversity that such IFL might contain, and therefore preserving intactness is an additional and complementary component of conservation. The expansion of exploitative activities even into some of the most remote corners of the globe is stimulating efforts to maintain these extensive areas of permanent forest cover, especially in countries where pressure to harvest timber or convert forest to agricultural uses is high.

THE ECONOMIC IMPERATIVES OF USING AND NOT USING INTACT FORESTS

Just as avoided deforestation is a cost-effective way for climate mitigation (Griscom et al., 2017), conserving intact forests has been described as a cost-effective way of delivering conservation benefits (Potapov et al., 2008). The underlying assumption is that maintaining an intact forest by avoiding human interventions of any kind has lower direct costs than maintaining, managing, or restoring smaller forested areas located in populated biodiversity hotspots. Large countries, such as Canada and Russia in boreal regions, or Brazil and the Democratic Republic of Congo in the tropics, could potentially maximize conservation outcomes for lower cost by preserving existing intact forests.

Yet, while on global scale the protection of intact forests can be a win to society, locally some people lose their assets. Many intact forests overlap with commercial logging interests (e.g., Courbin et al., 2014; Gaveau et al., 2014; Kleinschroth et al., 2017) and have been or will be exploited for timber under a business as usual scenario. The opportunity costs for avoided exploitation of resources within intact forests can be very high (Nasi et al., 2012). Areas of intact forests often have high commercial value for wood production, due to the age of forest stands, and the prevalence of large old trees. Forest companies have a strong financial interest to access the "primary forest premium," and governments are attracted to the tax revenues generated from commercial logging. If governments do protect intact forest areas to the exclusion of extractive industries, some form of compensation payments (e.g., for ecosystem services) might be demanded by concession holders. Both REDD+ and mitigations for environmental impacts elsewhere could, theoretically, fund this. Yet, such compensation schemes are only viable if the funds are competitive with the expected extractive revenues (Butler et al., 2009). Additionally, in countries with limited statehood, characterized by weak institutional capacity in the periphery, the commitment to preserve forests might weaken over time, or might never materialize, as happened to Ngoyla-Mintom forest, one of the last intact forests outside national parks in Cameroon (Ongolo, 2015).

The long-term preservation of intact forests is also threatened by national development agendas. Nations typically seek to improve transport and power infrastructures in order to aid the extraction of natural and mineral resources, and reduce post-harvest losses in the food sector by increasing accessibility to rural lands. Logging is often a first step in this process, as it generates revenue and requires investment in initial infrastructure upon which subsequent development can be based.

FSC AS AN AGENT TO IMPLEMENT INTACT FOREST CONSERVATION

Forest certification is a voluntary, market-based incentive mechanism to validate sustainable forest management for wood production in addition to legal compliance as a form of non-state governance. As such, it relies for its effectiveness on the marketing of forest products from responsibly managed forests. There is a need for market rewards to compensate owners for the cost of certification. The process of forest management certification implicitly follows a "land sharing" approach, based on the assumption that improved management across the whole management unit delivers overall benefit on social, environment and economic grounds.

FSC certification rules require a minimum of 10% of the management unit area to be set aside for conservation purposes (FSC Policy Standards Unit, 2010). In practice, this is complemented by areas designated as High Conservation Value (HCV) and un-operable areas, meaning that the percentage of protected forest within the management unit may be much higher. In 2014, FSC set itself the target to include IFL as an HCV criterion (FSC Policy Standards Unit, 2017), with far-reaching consequences for the implementation of certification in boreal and tropical forests (Kleinschroth et al., 2019). The opportunity costs introduced by the mandatory protection of IFL as part of certification depends on the individual location of a forest management concession and on the economic value of the IFL. The larger the overlap between concession and valuable IFL, the higher the opportunity costs (Karsenty and Ferron, 2017). Intactness, as defined in the IFL concept, can only be maintained through strict protection. Yet, the price premium from certification is bound to the units of wood sold, not to the area protected (**Figure 1**). A company with concessions that include large overlaps with IFL areas will therefore be disadvantaged, unless it is compensated for the opportunity costs in a different way.

The influence of FSC over global IFL is small. In Russia, 1.6% of the 225 Mio ha of IFL area fell into certified concessions (Ptichnikov et al., 2017) and in the Congo Basin 1.2% of the 84 Mio ha of IFL are found within certified concessions of Republic of Congo, Gabon, and Cameroon (based on own calculations for 2016). Other major overlaps between IFL and FSC certified areas occur in Canada and Brazil, where we were unable to find complete spatial data of certified areas. Total certified area in the six main IFL countries has stagnated since 2014 (**Figure 2**). In Africa, for example, the area of FSC certified forest has declined by 9% (from 7,421,322 to 6,784,372 ha) from February

FIGURE 1 | Conceptual comparison between produced yields and income for the same area of forest under conventional and certified management. "Certified +" stands for certification that includes protection of IFL.

2016 to 2019 (https://fsc.org/en/page/facts-figures). This reflects, at least in part, the current atmosphere of uncertainty in the forestry sector regarding FSC certification to which the new IFL policy is contributing (Rotherham, 2016). Obtaining forest certification is a long process, and considerations as to whether to maintain a certificate might last longer than a few years, and such considerations might therefore not yet be reflected in currently reported certified areas. More remarkable is the strong increase of the area under double certification by FSC and the competing scheme Programme for the Endorsement of Forest Certification (PEFC). Data published jointly by FSC and PEFC shows a strong increase of the area under double certification in the three main IFL-countries Brazil, Canada, and Russia, as well as in all other countries from 2017 to 2018 (**Figure 3**). Around 43% of all FSC certified forest in Canada is now also certified by PEFC, with equivalent values being 27% for Russia and 51% for Brazil. This can be interpreted as a signal that the industry is seeking a backstop solution through an alternative certification scheme in the event that FSC is no longer tenable for them.

INCORPORATING IFL WITHIN THE FSC VOLUNTARY FRAMEWORK

The voluntary nature of certification means that the standards can only be as demanding as the marginal value of the certified label to the certified company. If standards become too demanding, certification will be a net cost, rather than a benefit to timber companies, resulting in "flight" from FSC. In order to prevent this, and to remain a viable influence in the timber trade, FSC could take either an "Exclusion Strategy," abrogating responsibility by excluding intact forests from certified areas, or a "Reduced-impact Strategy," allowing timber production in intact forests while attempting to reduce the impact of this activity with additional requirements. For other strategies to become viable, certification would need to move further to a landscape scale, as we propose in the last section of this article.

The Exclusion Strategy excludes forest concessions that overlap with intact forests from certification, by not allowing any new certificates in IFL areas or by revoking existing certificates from IFL areas. The FSC has been criticized for certifying logging inside intact forests (Greenpeace, 2017). Removing IFLs from the certified area protects the reputation of the FSC brand at a superficial level, but fails to address the drivers of intact forest degradation. From a conservation perspective, the Exclusion Strategy is only useful if areas excluded from FSC certified forestry operations are also excluded from any other uses and become protected by governments. Yet, protected areas around the world experience strong human pressures (Jones et al., 2018; Schulze et al., 2018) and the effectiveness of strict protected area management is limited (Oldekop et al., 2016). Furthermore, while the wider implementation of REDD+ payments remains deadlocked (see e.g., Nantongo and Vatn, 2019), governments have few if any sources of compensation for the creation of additional protected areas. The likely outcome is that many IFLs would be exploited by companies using conventional (non-certified) harvesting methods, or companies using other certificates that lack IFL considerations (Karsenty and Ferron, 2017).

Alternatively, FSC could follow the Reduced-Impact Strategy, in the expectation that impacts on intact forests would be much less under light and highly regulated extractive management than alternative exploitation scenarios. This approach would allow timber extraction from an agreed portion of IFL areas within certified concessions, on the basis of tighter requirements on timber harvesting practice, post logging controls and increased permanent conservation set asides in critically important areas. This would allow FSC to govern actions

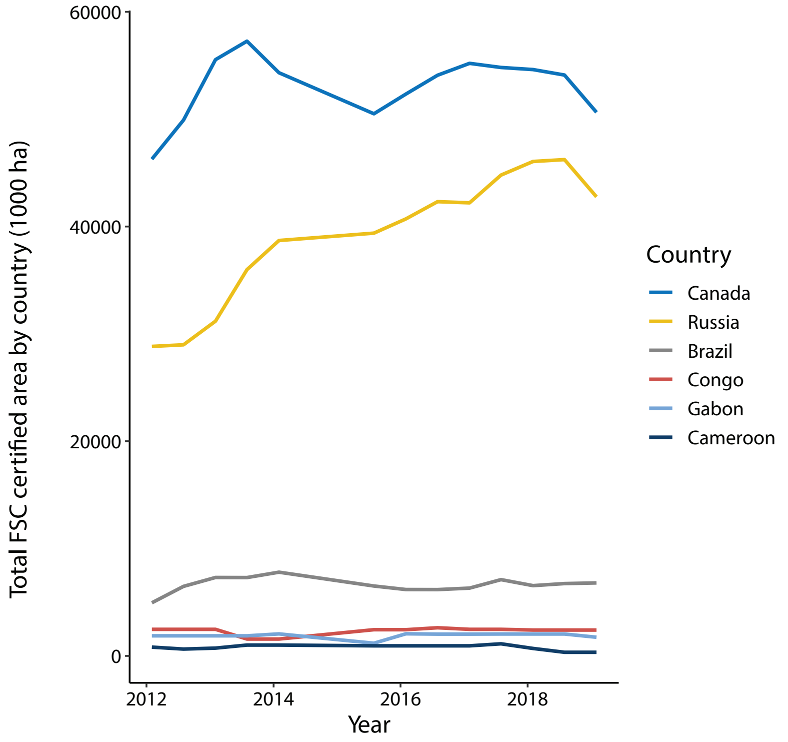

FIGURE 2 | Total FSC certified area between 2012 and 2019 in six countries with large IFL (source: https://fsc.org/en/page/facts-figures).

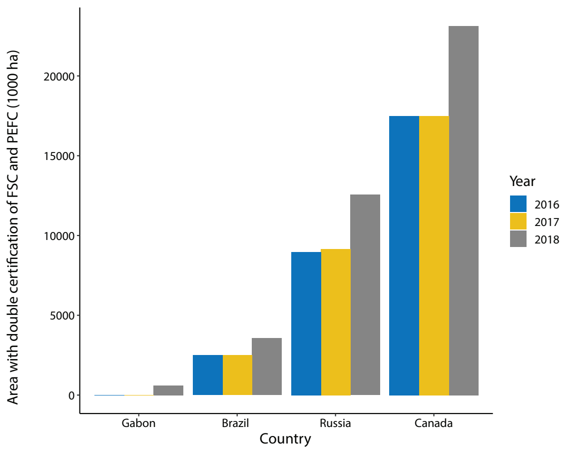

FIGURE 3 | Area (ha) with double certification by FSC and PEFC for countries with large IFL (sources: https://fsc.org/en/page/facts-figures, https://www.atibt.org/en/press-release-of-our-partner-pafc-gabon-the-forest-certification-pacf-gabon-continues-its-development-and-commitment-to-the-gabonese-forests-by-rose-ondo-president-of-pafc-gabon/).

in IFL portions of certified concessions, but will require a reinterpretation of FSC policy toward IFL and the practices allowed within them.

From an ecological point of view, there are two main arguments against logging in intact forests: modification of the forest stand due to tree harvesting (Martin et al., 2015), and provision of access to other land uses due to road building (Kleinschroth and Healey, 2017). Both processes can have severe impacts on plant and animal communities. Forest recovery strategies should, therefore, be an integral part of any forest management considerations. Forest recovery strongly depends on logging intensity (Kleinschroth et al., 2013). Common logging cycles of 30 years are considered too short to sustain yields of commercial species (Karsenty and Gourlet-Fleury, 2006), resulting in the strong contrast in standing value between intact and logged forests. At the same time carbon stocks in managed Amazonian forests have been shown to recover within <21 years at logging intensities below 30 m^3 ha^{-1} (Rutishauser et al., 2015). For disturbance sensitive animal species such as the woodland caribou (*Rangifer tarandus caribou*) in Canada, habitat recovery after clearcutting forestry operations takes at least 50 years (Environment Canada, 2012). In contrast, populations of chimpanzees (*Pan troglodytes troglodytes*) and gorillas (*Gorilla gorilla gorilla*) in tropical managed forests returned to baseline within <10 years after logging (Morgan et al., 2017). Especially in Central Africa, well-managed forests make an important contribution to species conservation (Clark et al., 2009; Stokes et al., 2010; Poulsen et al., 2011; Maisels et al., 2013). Forest and species recovery after logging are highly variable depending on geographical contexts. This highlights the importance of regional assessments of forest intactness to be used in forest management standards implemented on the ground.

The current identification of IFL is based on remote sensing and the most visible traces of industrial logging are the roads that are constructed for access. Definitions of intactness that could work within the FSC system could take into account ecological values on finer scales, and differentiate for the actual impact of different types of disturbance depending on the duration of time they occur, and on how quickly and effectively habitats can be restored afterwards. In such a case, the intact forest is maintained as an extensive forest unit that has not lost the main functions, carbon storage and the provision of habitat to disturbance sensitive species. The only forestry activities allowed would be constrained and regulated by strict adherence to FSC guidelines. Criteria for the definition of intact forests could include the extensiveness (e.g., more than 500 km^2) of continuous cover forest with viable populations of monitored umbrella species such as the above mentioned woodland caribou in boreal regions and primates in the tropics. Further management would need to incorporate ecosystem service outcomes that are accommodated within a carefully managed and certified concession. Human activities would be limited to those permitted by the certifications standards, and any interventions (e.g., logging areas and roads) should no longer be discernible through remote sensing within 5 years of their implementation (Kleinschroth et al., 2015). The Reduced-impact Strategy presupposes that effective monitoring and verification of the efficacy of certification guidelines in maintaining biodiversity and ecosystem services and functions across intact forest areas.

THE CONSEQUENCES FOR FOREST MANAGEMENT IN NON-INTACT AREAS

If FSC requires companies to retain the oversight and management of IFLs, it is likely that timber production from these areas will have to be reduced in line with more stringent operational requirements, even to zero under current IFL standards. This may drive the intensification of timber extraction outside IFL areas to maintain current levels of timber output with implications for the implementation of certification standards and the marketing of certified wood. The potential for companies to do this while remaining within the standards expected of FSC certification remains uncertain, and will no doubt vary on a case by case basis, but the more general point is that we might expect pressure to increase on non-IFL forests within concession areas. Sustainable intensification is an approach to minimize the environmental footprint of productive systems by increasing outputs per area for multiple purposes (Rockström et al., 2017), but the extent to which this can be achieved in natural (i.e., not plantation) tropical or boreal forests has yet to be assessed in detail.

In clearcutting regimes of boreal forests, sustainable intensification would mean higher investments in silvicultural interventions before and after harvesting, requiring investment from forestry companies in technology, recruitment and training of skilled employees (Naumov et al., 2016). For tropical forests with selective logging regimes, intensification could be achieved through higher extraction regimes in previously disturbed forest to increase light availability for faster regeneration of light-demanding timber species (Fredericksen and Putz, 2003). Other improvements include more careful mapping and planning processes, and using remote sensing and precision forestry before any operations take place. Increased efficiency in timber processing and transformation to reduce waste, and the marketing of a broader range of species, offer additional options for sustainable intensification (Karsenty et al., 2008; Horne, 2013). Current forestry regimes in remote regions with low tenure security may not, however, favor intensification on account of the costs relative to the returns when compared to conventional logging systems (Mathey et al., 2008).

URGENT NEED FOR LANDSCAPE SCALE SOLUTIONS

Land use changes in increasingly remote regions push back the forest frontier through degradation and forest clearance, and increased vulnerability to fire and illegal encroachment (Ahrends et al., 2010). To preserve intact forests, expansion into the forest frontier needs to halt. Buffers of managed natural forests might have an important function in maintaining a stable frontier between intact forests and agricultural land (Gaveau et al., 2013), provided that these activities are genuinely sustainable, and managed in a way that does not facilitate "hidden" encroachment as has been observed in agroforests that expand into natural forests legally or otherwise.

Care should be taken to ensure that "Exclusion Strategies" do not lead to displacement of unsustainable forest uses to other areas or countries with weaker law enforcement (Lambin and Meyfroidt, 2011). Such leakage has been observed in the context of REDD+, where deforestation was avoided where it was been paid for, but this led to forest losses elsewhere (Fisher et al., 2011). FSC provides some leverage to protect more intact forest areas, while ensuring financial benefits flow to forests country governments. Yet, any effort of FSC to protect intact forests will be spatially limited to those areas where certified concessions overlap with intact forests. Intact forests are generally larger than certified forest areas, meaning that measures to afford permanent protection to intact forests still depend on the creation, financing and management of protected areas. If certified forest management is to play a major on-the-ground role in intact forest protection, forest management certification of intact areas should be spatially aligned with protected areas.

Moving certification from the concession to the landscape scale, allows thinking beyond the land sharing—land sparing paradigm. Land use allocations in forested landscapes that strike a balance between productivity and conservation have been proposed. In a case study in Borneo, setting aside two-thirds of the land as protected areas could potentially be compensated by the incomes from certified selective logging and wood fiber plantations on the remaining third of the land (Runting et al., 2019).

Yet the landscape approach demands a coordination process that operates above the concession scale. Coordinated planning that encompass a range of degraded, productive and intact forests in order to direct optimal spatial configurations of forest uses and restoration is not currently possible through management unit based voluntary certification. Moreover, supply chains emanating from regions such as the Congo Basin are structured around specific timber commodities, and a business plan built around plantations, even if only a small proportion of the land, is not necessarily viable. The proposed differential land allocation solution requires action from a range of stakeholders, including governments, and new paradigms for land use planning and conservation finance.

The protection of intact forests is gaining momentum and support from society, but existing certified companies view the IFL issue as a challenge to their continued viability in important timber producing regions (Rotherham, 2016; Karsenty and Ferron, 2017). To protect more intact forest, we need to explore ways of overcoming the concerns of certified companies that are often the most progressive actors in IFL frontier areas. Since these companies agreed to be certified, we can assume that they have some degree of willingness to respect and enforce ecological considerations in response to the demands of their target markets. To bridge this challenge, we might need to compromise on the strict non-intervention IFL approach, while still retaining the core elements of its agenda, including the preservation of extensive forest areas, the biodiversity they contain, and the services they provide. Alternatively, incentives could be provided in the form of compensation payments for non-exploitation, and these can be within the context of landscape-level payments for ecosystem services (Ghazoul et al., 2009). In other words, certification that includes the protection of IFL areas could make a company potentially eligible for REDD+ payments. Making a stronger link between the ecological necessities of intact forest protection and the economic possibilities of certification can eventually strengthen both, for the benefit of livelihoods in production and conservation forests.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: https://fsc.org/en/page/facts-figures.

AUTHOR CONTRIBUTIONS

FK conceived of the paper, wrote the first draft, and coordinated the writing. TR provided important input to content and structure of the text. JG led the research and finalized the writing of the paper.

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