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Opinion

Overcoming Key Barriers for Secondary Cloud Forest Management in Mexico

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Abstract: Secondary cloud forests (SCFs), those that regenerate naturally following abandonment of human activities in previously deforested land, are of great value as refuges of high species diversity and for their critical role in hydrological regulation. This opinion paper analyzes the main environmental, socio-economic, and regulatory aspects that currently hamper the sustainable use and conservation of SCFs in Mexico for the provision of timber and ecosystem services. The main constraints identified include contradictory norms and policies and the marginalization of smallholders in timber production activities. Developing economic incentives for forest product harvesting and provision of ecosystem services derived from SCFs, while also addressing legal and normative aspects related to their sustainable use, is paramount. Given the high heterogeneity in floristic composition and stand structure of SCFs among localities, technical and social norms for sustainable use should be sufficiently flexible to allow adaptive management approaches. Future research areas should be focused on monitoring the response of SCFs to silvicultural interventions, documenting existing traditional practices as well as conducting socio-economic analyses of timber production and associated ecosystem services. This is essential for developing sound policies and approaches for the sustainable use and long-term management of SCFs in Mexico.

Keywords: natural regeneration; selective logging; stakeholders; succession; tropical montane cloud forest landscape

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1. Introduction

Restoring forest landscapes is critical to recovering biodiversity, mitigating climate change and enhancing the provision of ecosystem services, as emphasized by the Bonn Challenge, the New York Declaration on Forests, and the United Nations Decade on Ecosystem Restoration (2021–2030). To achieve the ambitious goals set out in these initiatives, restoring forest cover through natural regeneration is considered both a cost-effective and environmentally friendly option [1–4]. Under favorable socio-economic and biophysical settings, the process of natural regeneration may proceed uninterrupted (however, see [5]), thus generating "secondary forests", which at present cover millions of hectares globally [3] and across the American tropics and subtropics in particular [6,7].

Secondary forests are important for atmospheric carbon capture, soil erosion reduction, and the recovery of biodiversity and its ecological interactions [8–10]. Their value as sources of timber and non-timber forest products in sustaining local livelihoods has been also been widely documented (reviewed in [11]). Yet despite their environmental and socio-economic benefits, the permanence of secondary forest cover is at times jeopardized due to normative, regulatory and institutional factors. The very fact that secondary forests are an integral

part of agricultural landscapes makes them an ephemeral resource [12,13] either due to re-clearance for crop planting or to indirect factors such as wildfires linked to rural outmigration [14]. Other factors that hamper the upscaling of secondary forests as a viable long-term land use option include the insufficient application of multidisciplinary and locally tailored management approaches, conflicts and/or overlaps across government sectors, and agrarian reform laws [3]. For example, smallholder needs and aspirations are often disregarded when it comes to participating in and benefiting from the harvesting and commercialization of timber from naturally regenerated forests (e.g., [15,16]).

Although secondary forests occur across both lowlands and uplands, recent analyses have pointed out that, as a whole, montane ecosystems have consistently gained more tree cover after long episodes of deforestation at the global [17] and regional levels (tropical and subtropical Andes; [18]). One particular type of vegetation undergoing natural regrowth is Tropical Montane Cloud Forest (TMCF) [7,19,20]. More specifically, in Mexico, about 54% of existing TMCF cover corresponds to secondary vegetation [21] and there is a particular need for targeted interventions to promote sustainable resource use. However, the management potential of Secondary Cloud Forests (SCFs) for the sustainable use of goods and services remains poorly analyzed in Mexico from biophysical, socio-economic and regulatory dimensions. Particularly important in the case of TMCF landscapes is their ability to continue providing multiple ecosystem services at landscape and watershed levels, thanks to their exceptional biodiversity, high levels of endemicity, and critical role in hydrological regulation [22,23].

This opinion paper aims at identifying key biophysical, socio-economic and regulatory constraints hampering SCFs management in Mexico, with the overall goal of fostering dialogue around refining and developing policies and strategies for the sustainable management of SCFs in the country. Our analysis draws from the opinions of a multistakeholder workshop, complemented by an expert literature review.

2. Expert Workshop

In 2019, at the Instituto de Ecología A.C., in Veracruz, Mexico, we organized a two-day expert workshop with the aim of outlining and prioritizing the main constraints for SCFs sustainable use and management, as well as generating proposals to help overcome key challenges identified. The workshop was structured around two components: (1) constraints on the environmental, socio-economic and regulatory aspects of sustainable management of SCFs, and (2) strategies to overcome these constraints.

Our approach, framed within participative research, was based on focus groups that included a diversity of relevant stakeholders with experience on TMCF management. The idea was to obtain individual reflections and views from previous experiences, as well as to gather new insights regarding forest management practices [24]. The focus group is a qualitative method of data collection commonly used to explore and construct knowledge about a specific topic, in which the moderator (or researcher/evaluator) asks a set of targeted questions designed to elicit collective views about the topic [25]. For our workshop, the 18 participants included researchers with experience in forest management certification and regulatory aspects of forest management, as well as forest managers, forest owners, and representatives from local government and civil society. Governmental representatives were invited, however, only one representative of the State environmental agency participated. The forest owners group was also poorly represented, with only two participants. The dominant group consisted of academics, who frequently work as advisors for forest producers organizations. Two groups were formed and at least one representative with specific expertise was selected for each group. On the first day, each group held discussions regarding the main limitations for SCFs management, addressing biophysical and ecological aspects, as well as social, cultural, economic, technical, political, and normative considerations. We also discussed the most important themes, changes, and strategies to advance in this respect. On the second day, the results were presented in plenary, followed by a discussion of the different points brought up by each group in order

to integrate information regarding the main constraints to the sustainable management of SCFs and on the strategies proposed to overcome these constraints.

For the literature review, we searched publications for the following terms: "cloud forest" or "montane forest", in combination with "harvesting", "logging", "management", "natural regeneration", "non-timber forest products", "passive restoration", "regrowth", "secondary forest", "selective logging", "timber", "tropic", in English and with the Spanish equivalents. We also included publications based on our own research experience. Based on opinions gathered from the workshop, we conducted specific literature searches for related topics not restricted to SCFs. While we recognize that agroforestry systems, such as shaded coffee, are very valuable for biodiversity conservation while also representing an important source of income [26], we did not include these land use types in our analysis.

3. Constraints to the Management of SCFs, Proposals to Overcome These Constraints, and Potential Benefits of Management

The information generated in the workshop was complemented with our own expert literature review on SCFs management and conservation in Mexico and elsewhere in the Neotropics. This was organized into an analytical framework that summarizes: (1) the main constraints identified for the sustainable management of SCFs in Mexico, stratified into environmental and silvicultural, socio-economic, and regulatory contexts; (2) key policies and strategies proposed to overcome these constraints; and (3) the potential benefits of SCFs sustainable management (Figure 1).

The components of the analytical framework are discussed in the following sections to exhibit key aspects that are needed for advancing the sustainable management and use of SCFs, as identified in the workshop and literature review. It should be noted that the different categories of constraints and benefits can interact (as denoted by the arrows across components in Figure 1); however, we analyze these separately for clarity.

3.1. Constraints to the Management of SCFs

3.1.1. Environmental and Silvicultural Constraints

The highly dynamic, diverse and heterogeneous nature of SCFs—An important component of the complexity of SCFs management lies in their dynamics. While dominated by the pioneer species that regenerate under high irradiance and display high growth rates and dispersal by wind, shade tolerant species may also be present and can increase in dominance with forest age [27,28]. Many commercially valuable tree species that can become established under the canopy of SCFs in Mexico, such as *Juglans pyriformis*, *Oreomunnea mexicana* and *Quercus* spp., are shade-tolerant and frequently have slow growth rates. Heliophytes, such as *Trema mycrantha* and *Liquidambar styraciflua*, are more dominant, but their economic value is lower. Since stands are diverse (high tree species richness can occur in early successional stands; [27–29]) with trees varying in growth rates and requirements for regeneration, traditional silvicultural systems with only one cutting cycle for all timber species cannot be simultaneously optimal for both slow- and fast-growing species [30,31]. Additionally, a wide variation has been reported in the recovery processes of SCFs via natural regeneration as a result of the influence of multiple factors, including the time elapsed since secondary succession, previous land use history, elevation, and area of forest cover in the landscape [27–29,32–34].

Low existing commercial timber volume: Low volumes of timber, firewood and charcoal characterize SCFs; an estimated total volume of wood (including all species, not only commercial) of 66 m^3/ha in SCFs is reported in comparison to 143 m^3/ha in mature TMCFs [21]. In SCFs the lower abundance of trees $\geq$ 25 cm of diameter also implies an important limitation, given that trees of these dimensions attain higher timber prices and the timber production cost per m^3 is lower than for smaller trees. In addition, the high diversity of these forests also implies a low density of commercially valuable species.

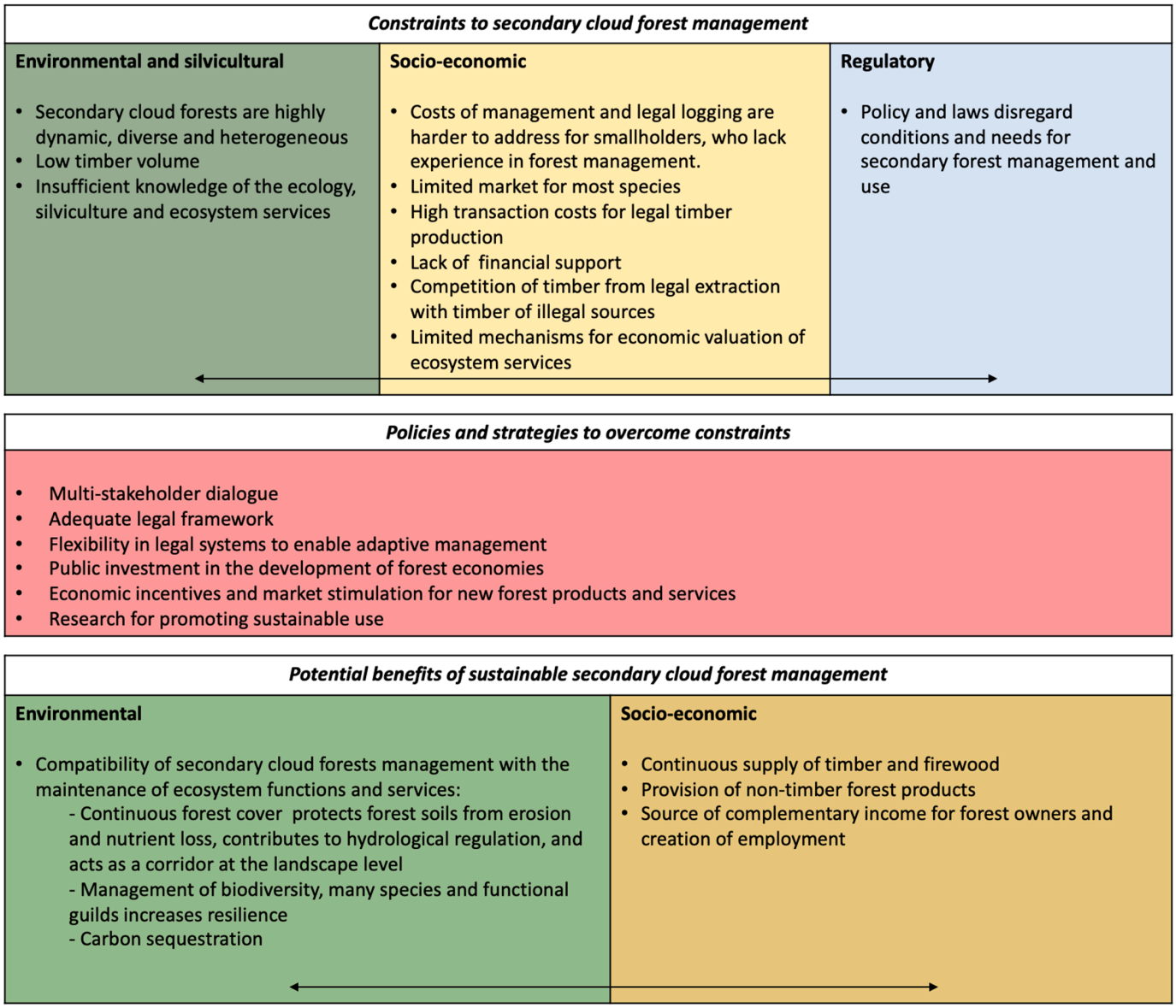

Figure 1. Analytical framework derived from an expert workshop with experience on tropical montane cloud forest, complemented with our own expert literature review, identifying three major groups of constraints to sustainable forest management: environmental and silvicultural, socio-economic, and regulatory or normative. The framework also points to the potential benefits (both environmental and socio-economic) of secondary forest management if these constraints are overcome through specific policies and strategies proposed in the workshop. The arrows across the categories of constraints and benefits denote the potential interactions among various components.

Insufficient knowledge of the ecology, silviculture and ecosystem services: There are limited studies about the impacts of selective logging SCFs on water, soils, nutrient cycles and biodiversity. Most of the available information regarding silviculture in the Neotropics is derived from research projects conducted in old growth tropical montane forests in Costa Rica and Ecuador [31,35–41], and in oak and pine-oak montane forest in Mexico [42,43]. To our knowledge, there is no information available or experiences regarding the effects of silvicultural treatments on SCFs in Mexico and only few data of growth rates have been reported for tree species in SCFs [44]. To increase the growth of future crop trees, repeated improvement felling is recommended, but the risk of dominance by competing vegetation could be exacerbated given that groups with invasive behavior, such as climbers and bracken and bamboos, can expand with canopy openness and suppress tree regeneration

in SCFs [29,34]. For slow-growing species, regeneration control of competing vegetation is required, particularly in more open areas [45]. To maximize growth, a higher frequency of low-impact felling, rather than lower frequencies with higher intensity, could be more appropriate to reduce the risk of dominance of early successional species with invasive behavior [31]. A study of the effects of thinning on trees (≥10 cm dbh) in 30-year-old secondary montane oak forest in Costa Rica showed that the mortality rates were higher in the control than in the stand with thinning (0.58% and 0.19%, respectively); therefore, thinning contributed to higher stability [41]. Limited knowledge of the time required for natural forest regeneration to deliver specific ecological, economic and livelihood outcomes [3] hinders the inclusion of secondary forests in policies and programs that aim to improve people's capacity to benefit from their sustainable use and management.

3.1.2. Socio-Economic Constraints

Costs of management for smallholders: SCFs are constituted by small fragments and are located in contexts where people are living in poverty [46], with forest resources being an important element of their livelihoods [47]. Unplanned logging for timber, firewood and charcoal production is widespread among land owners and rural habitants [46,48,49].

The socio-economic and cultural contexts in which secondary succession in TMCF landscapes takes place vary greatly among regions [46]. About 60% of TMCF is under communal ownership (*ejido* and indigenous communities are two types of collective land ownership; [50]). In this context, community-managed or locally managed forests in Mexico have a key role to play in maintaining sustainable landscapes [51,52]. For example, in a sample of 106 communities (with >300 ha of forest cover in the states of Oaxaca, Guerrero, Michoacán, Jalisco and Durango), 35% had community protected areas (voluntary conserved areas), most often with the goal of protecting water sources [47,53]. In contrast, the TMCF of the central and northern highlands of Chiapas have experienced decades of serious land tenure conflicts, which represent an important obstacle to sustainable management. The TMCF of this region are highly fragmented, with a predominance of SCFs [54]. Small-scale individual holdings dominate in the central and southern forest regions, in the states of Veracruz, Puebla, Tlaxcala and Hidalgo. These are forests under individual tenure, a condition that pose different challenges. For instance, the costs of management and legal logging are much harder to address for smallholders, and there are no collective rules regarding the application of restrictions or promotion of protection and harvesting practices, as there are in larger collective property holdings such as *ejidos* or indigenous communities engaged in silvicultural practices [47,52,55]. Often there is a sense that individual owners can do as they please with their lands, a view supported by the perception that secondary forests are less valuable than mature ones.

Limited market for most timber species—Added to the low timber volumes, most tree species from SCFs attain lower market prices than *Pinus* spp., the most important genus for timber production in Mexico [56,57]. The small timber per-hectare volume for tree species with commercial value in the established market diminishes the economic profitability of forestry, thereby serving as a disincentive for the management of timber supplies [39]. The cooperative "Las Cañadas" considered the main obstacles to the sustainable management of their SCFs in Veracruz to be the high transaction costs (see Regulatory constraints below) and low profits from SCF timber harvesting, given the low market prices for native species. The alternative they have proposed and implemented is to sell a wide range of forest related products (native bee honey, mushrooms and ornamental plants) and finished timber products (e.g., furniture), rather than sawn wood.

High costs of timber production and lack of financial support—In montane areas, forest harvesting techniques and transportation tend to be more expensive and complex than in lowland forests due to the remoteness and steepness of the terrain. The trees are usually sawn on site and then transported by mules or donkeys. In some cases, more commercially oriented silviculture could require an investment in cable techniques or slipways to avoid ecological damage, particularly in forest stands along steep slopes. These investments

are most likely unaffordable for smallholders and may not always lead to higher profits. In addition, small-scale forest owners are excluded from participating in federal forest development programs in Mexico; because forest policies and the management of public forest investments are highly centralized and defined for the entire country [58], the needs of smallholders are mainly ignored [59].

Competition with illegal wood sources—Illegal logging in Mexico accounts for (at least) 50% of the country's timber production [60,61]. Institutions responsible for forest monitoring and enforcing violations are weak and their budgets are dwindling. Mexican forest law requires that forest producers must conduct forest inventories and produce forest management plans to obtain yearly logging permits. Without these requirements to meet, illegal loggers have lower production costs and can thus sell at lower market prices, creating unfair competition in the marketplace at the disadvantage of forest owners. The informal economy is characterized by unregulated value chains that supply timber and products from SCFs without technical guidelines, thereby altering the floristic composition and structure of successional forests [62–65]. Unsustainable logging could further contribute to forest degradation and the depletion of locally valuable tree species [49,62–64], which in turn could facilitate the conversion of forests to agricultural and urban land uses [66].

Limited mechanisms for the valuation of ecosystem services—Ecosystem services such as carbon sequestration, hydrological services, and soil protection are not fully valued economically by markets and public policies. The Payment for Hydrological Services (PHS) program, which was created to provide incentives to avoid deforestation, is focused on forest conservation goals—not on sustainable management—and the payments are much lower than the estimated opportunity costs of cloud forest transformation into coffee or sugarcane crops [26]. Monitoring of SCFs for their inclusion in carbon sequestration projects is being developed in Central Veracruz. The above-ground net biomass growth for secondary tropical mountain systems $\leq$ 20 years old is much lower (1.8–5.0 tonnes dry matter ha^{-1} y^{-1}) than for tropical rainforest (11 tonnes dry matter ha^{-1} y^{-1}) and tropical moist deciduous forests (7 tonnes dry matter ha^{-1} y^{-1}) for America, according to the Intergovernmental Panel on Climate Change [67]. However, forest owners are attracted to such projects because the payments are higher than for PHS, and timber harvesting is compatible with this type of program (although long-term commitment is a prerequisite). TMCF also provide various non-timber forest products, but they are often commercialized in informal markets by intermediaries at low prices, with small returns for forest owners [35,68,69].

3.1.3. Regulatory Constraints

Disregard in existing policies and laws for the conditions of and needs for SCFs management and use–The opportunities for small-scale forest users to improve their livelihoods through timber and non-timber forest products harvest are very limited in Mexico, due to the lack of a supportive legal framework, a common condition in other Latin American countries [15,16,30]. The complex and excessive regulation and bureaucracy in Mexico represents an obstacle to the development of the forestry sector in general [60,70]. Under the current forest code, TMCF ("bosque mesófilo de montaña" in Mexican law) is considered a conservation priority, and its management is heavily restricted [71]. In the case of secondary tropical forests elsewhere, an important constraint lies in technocratic legal frameworks that restrict local use, especially for smallholders [72], who have difficulty covering the high transaction costs. Discussion regarding the regulation of secondary forest management in Mexico has focused on lowland tropical rain forests (e.g., [72,73]), while the management of other secondary vegetation has remained largely ignored.

Contradictory policies among government sectors regarding natural forest regeneration areas disincentivize the protection and management of SCFs. For example, as part of reforestation programs, forest owners are indirectly subsidized to deforest areas occupied by SCFs and plant pine trees instead [74], because pines are easily commercialized and considered more productive [28]. This trend has further increased with the

program "Sembrando Vida" [75], for which the subsidies to reforest with fruit trees and to establish agroforestry systems is equivalent to 21 times the budget assigned to any forest management program [59]. Given the high costs associated with the development of a management plan for timber harvesting (e.g., for forest inventory and forestry consultant fees), landowners are indirectly led to exploit forests illegally and to avoid forest development via natural succession; instead they choose to practice agriculture or cattle grazing, activities that traditionally have received important financial subsidies [26,76]. The economic and trade policies disregard national forest production and productive capacities in the forestry sector in general. In consequence, when preconditions for sustainable management for timber production are so unfavorable, the probability for illegal logging and conversion into agricultural land often increases [39]. Indeed, the most important drivers of TMCF deforestation in Mexico are cattle grazing, agriculture (both subsistence and commercial) and urban growth [46,65,77]. Even though the destruction of TMCF implies an important economic loss to society in terms of ecosystem services, the higher revenues from land conversion and the high transaction costs involved in legal logging often dictate local decisions.

3.2. Policies and Strategies Needed to Overcome Constraints to SCFs Management

Multi-stakeholder dialogue and social learning—Due to the low volume of commercial timber and the important role of SCFs in the hydrological cycle and in the maintenance of biodiversity, a multiple-use approach to the forested landscape including diversification of forest products and services (e.g., water, honey, mushrooms, resin, ornamental tree ferns) could help to make forest management viable and reduce financial risks [78,79]. To enable the integration of multiple objectives, strengthening the dialogue among multiple stakeholders is crucial [80]. Building respect, trust and collaboration requires collective reflection among different stakeholders on their perceptions of the SCFs and on their rights, needs and knowledge [81]. Civic science programs could also promote the engagement of local communities in forest research, strengthening the perceived value of forests.

Adequate legal framework–The lack of a specific legal definition for secondary forest in the legislation [71,82] has been identified as an important constraint [72]. Such a category has been recently included in the legislation [82], and it is now defined as the forest vegetation that emerges spontaneously during the succession process or that is recuperated in areas with previous natural or anthropogenic impacts. The incorporation of this category into other important legal instruments is pending (e.g., "Reglamento de la LGDFS" [82]). It is also necessary to define categories and use and management criteria based on ecological attributes and land use history, to differentiate between old growth and secondary forests. These definitions should be based on the consideration of regional and local socioecological conditions.

Flexibility in legal systems to enable adaptive management—Due to the intrinsic dynamism and heterogeneity of SCFs structure and composition, and to the important socio-economic variation that exists among regions in Mexico, legal requirements for use and management should be flexible enough to address regional conditions, thus enabling adaptive management, and to meet the dynamics of markets. SCFs are transitional, dynamic ecosystems within landscapes and often including shifting cultivation as a land use type [83]. In this context, flexible adaptive management approaches are recommended. Under the prevalent changing climate conditions, adaptive management is also necessary for forest preservation and community well-being [3]. Due to the small sizes of forest fragments and low commercial timber volumes, management plans must be adjusted to stand-specific conditions rather than to rigid national schemes. Such an approach requires flexibility, accompanied by knowledge generated by the monitoring and evaluation of local effects of forest management alternatives on ecosystem functions and services. In this regard, monitoring (including community participation) is a key strategy to improve the viability of adaptive management.

Public investment in the development of forest economies—Policies have proved to be critical strategies for forest conservation and sustainable use in the states of Oaxaca, Guerrero, Michoacán and Durango (e.g., the Program for Conservation and Forest Management, or PROCYMAF, established in 2000 is based on advisory and public investment on local training, governance capacities, small local industries, and diversification of forest uses) [76]. The provision of funding to expand social (strengthening community's governance structures; promoting participatory territorial planning processes; encouraging accountability; enhancing platforms for participation) and human (technical, managerial, marketing, and teaching abilities) capabilities in forest-dependent communities in Mexico has had a significant positive effect on the reduction of poverty [84]. Nevertheless, despite proven positive results in terms of contributions to local development, support for community forestry has been intermittent and limited to a few case studies [76,85]. This type of program should be reinforced and scaled up. Smallholders have been generally excluded from forestry programs and policies targeting local economic development.

A broader strategy of taking a sustainable regional resource management approach could offer more opportunities to communities. The experience of forest communities in Sierra de Juárez in the state of Oaxaca, which has benefited from sustainable forest management and conservation over the last 30 years, shows that regional organization of forest communities/forest owners is an important mechanism to overcome technical advisory costs and to jointly address diverse challenges affecting forest areas, such as illegal logging, illegal hunting, forest fires and industrialization of forest production [86].

Economic incentives and market stimulation for new forest products and services—Incentives might be required to cover the opportunity costs of non-sustainable alternative land uses [3,87]. It is strongly recommended to adjust the levels of compensation in the PHS for TMCF to bring them into line with the opportunity costs of other land uses [26], as well to select forests in strategic watershed locations, i.e., where they are at high risk of deforestation or contribute to high hydrologic recharge [88]. Young secondary forests have the lowest economic value, leading to high risk for reconversion to pasture [10]. According to Naime et al. [10], Payment for Ecosystem Services (PES) for carbon sequestration would increase additionality and mitigation in young (0 to 12 years) and intermediary secondary forests (12 to 25 years old), because they offer the largest carbon sink benefits compared with older successional stages in tropical landscapes in Mexico.

Marketing is also required to promote demand for the diversity of native timber species. For example, the guide to lesser-known tropical timber species by WWF/GFTN (2013) was designed to inform and influence buyers of alternative species. Based on the experience of communities in temperate forest regions in Mexico (such as Sierra de Juárez in the state of Oaxaca and San Juan Nuevo Parangaricutiro in Michoacán) with schemes to promote sustainable forest use and management, the development of markets for ecotourism and non-timber forest products have proved to be important complements of local forest economies [52].

Information research gaps for promoting sustainable use—To support sustainable management and use of SCFs, future research is required in the following areas: (1) Impact of different intensities and types of logging on water, nutrient cycles and biodiversity; (2) Resilience, e.g., evaluations of the time required for forest to recover before a new felling cycle can commence; (3) Species-specific recruitment and growth rates in response to logging and tending operations; (4) Efficiency of restoration with productive goals (e.g., enrichment planting, invasive species control); (5) Economic analysis of timber harvesting; (6) Traditional practices still in use are a valuable source of information regarding the response of forest structure and species composition to such interventions, and there is a need to document and recognize such practices along with the associated local knowledge [89]; (7) Socio-ecological research in collaboration with local communities to design desirable multiple-use landscapes that integrate the use and management of the diversity of SCFs.

3.3. Potential Benefits of the Sustainable Use and Management of SCFs

3.3.1. Environmental Benefits

Compatibility of SCFs management with the provision of ecosystem services—Considering that tropical montane areas are vulnerable to erosion and landslides [90], the protective function of SCFs for soils and their role in the hydrological cycle [91,92] is highly valuable, as is maintaining a permanent forest cover and forest structure. For that to occur, the polycyclic selection system has been proposed as the most adequate logging method [93], in contrast to monocyclic systems. This method requires maintaining the presence of all diameter classes, even in small areas, and allows the maintenance of continuous tree cover, which protects forest soils from erosion and nutrient loss, contributes to hydrological regulation, and supplies corridors at the landscape level as well as habitat for varied species in tropical landscapes [94]. Unevenly-aged stands generally exhibit higher levels of vertical structure (key for many species of birds and mammals) and present high levels of carbon sequestration [9,94]. Selective logging could be possible with careful extraction techniques even in steep areas with high susceptibility to erosion and biodiversity degradation. Coppice harvesting of some oak species is also a common practice for the production of firewood and charcoal [95].

From an ecological perspective, production of timber, charcoal and firewood in SCFs could be complemented by the maintenance of mature forest areas (i.e., without any harvesting), which can allow for the recruitment of affected taxa and function as seed sources of late successional species. Selective logging and coppice harvesting would be more feasible in areas that are threatened by agricultural frontiers to avoid conversion of forests into pastures or alternative land use. However timber production also depends on market demand for native species. Therefore, parallel efforts must be done to establish value chains and/or PES approaches that incorporate sustainable forestry as mentioned above. In this regard, PES and reducing emissions from deforestation and forest degradation, and enhancement of forest carbon stocks (REDD+) have been criticized for neither stimulating nor fostering the entrepreneurship of community members, in contrast with forestry-based initiatives [96]. Efforts to advance the sustainable management of SCFs could contribute to fulfilling national climate change mitigation commitments (such as reaching a zero-net deforestation rate by 2030) and to strengthening environmental policy instruments, as well as to implementing actions to conserve and restore continental ecosystems, increase their ecological connectivity, and promote their resilience as reaffirmed by Mexico's Nationally Determined Contribution.

3.3.2. Socio-Economic Benefits

Continuous supply of timber, firewood and non-timber forest products—SCFs could contribute to the supply of timber and firewood while maintaining essential ecosystem functions, as described above. Alternative sources of timber are very important due to the increasing demand for and deficit of timber production in Mexico; of the annual national estimated consumption between 2011 and 2015, only 32% was produced in the country [97]. An important reason for this is that timber production costs make Mexican timber more expensive than most imported timber, due to high transaction costs created by over-regulation, lack of economies of scale and investment in the forest sector. Imported timber often comes from plantations, and some of it is also from illegal sources [60].

Sustainable sources of firewood are also necessary, given their role in energy provision to local communities; approximately 25 million people depend on fuelwood in Mexico [98]. Given that many of the species used for firewood are of no commercial value and that one of the most important uses of cloud forests in Mexico is firewood harvesting [55,98], the sustained supply of this resource from SCFs represents an important benefit for rural populations.

Source of complementary income for forest owners and creation of employment—The incorporation of SCFs in management schemes could generate employment and training for locals in activities such as tree felling, skidding and loading, as well as silvicultural interventions, and these could act as complementary income sources as local knowledge on

forest dynamics develops. Diversification of land use, which integrates selective logging in SCFs, plantations of *Alnus acuminata* in degraded lands, and agricultural land use, has been assessed as an economically feasible long-term management approach in small farms (30 ha) in Andean Ecuador [78]. As cloud forests are important for environmental protection and are poorly suited to commercial timber production, investment in forestry-based economic growth in rural areas has the potential to deliver promising social benefits.

4. Conclusions

SCFs support important components of biodiversity, contribute to carbon sequestration, protect soils from erosion, and act as corridors in the landscape. Based on the views of experts involved in SCFs management and conservation, we were able to pinpoint and frame relevant issues within the existing body of published knowledge, thereby advancing the understanding of priorities and issues at stake for this important topic. In general, we found that opportunities are very limited in Mexico for small-scale forest users to improve their livelihoods by harvesting timber and non-timber forest products. Contradictory policies among government sectors regarding natural forest regeneration areas and excessive legal requirements imposed on forest management discourage the protection and management of SCFs. SCFs could contribute, via selective logging and coppice harvesting, to the continued provision of timber and firewood, an important energy source for local populations, while maintaining a permanent forest cover. However, there are currently no data available on how selective logging of SCFs can deliver income while supporting biodiversity conservation and protecting nutrient and water fluxes. Due to the characteristic small forest fragment size and low timber volumes of SCFs, subsidies are necessary to promote sustainable use and management, which could be generated from PES policies. Quantitative assessments of SCFs contribution to the provision of timber and non-timber forest products, and analysis of the opportunity costs of timber production in comparison to land use change and PES, could help in the development of adequate compensatory mechanisms.

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References

1. Lewis, S.L.; Wheeler, C.E.; Mitchard, E.T.; Koch, A. Restoring natural forests is the best way to remove atmospheric carbon. *Nature* **2019**, *568*, 25–28. [CrossRef] [PubMed]
2. Di Sacco, A.; Hardwick, K.A.; Blakesley, D.; Brancalion, P.H.; Breman, E.; Cecilio Rebola, L.; Chomba, S.; Dixon, K.; Elliott, S.; Ruyonga, G. Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits. *Glob. Chang. Biol.* **2021**, *27*, 1328–1348. [CrossRef]

3. Chazdon, R.L.; Lindenmayer, D.; Guariguata, M.R.; Crouzeilles, R.; Benayas, J.M.R.; Chavero, E.L. Fostering natural forest regeneration on former agricultural land through economic and policy interventions. *Environ. Res. Lett.* **2020**, *15*, 043002. [CrossRef]
4. Crouzeilles, R.; Beyer, H.L.; Monteiro, L.M.; Feltran-Barbieri, R.; Pessoa, A.C.M.; Barros, F.S.M.; Lindenmayer, D.B.; Lino, E.; Grelle, C.E.V.; Chazdon, R.L.; et al. Achieving cost-effective landscape-scale forest restoration through targeted natural regeneration. *Conserv. Lett.* **2020**, *13*, e12709. [CrossRef]
5. Schwartz, N.B.; Aide, T.M.; Graesser, J.; Grau, H.R.; Uriarte, M. Reversals of Reforestation Across Latin America Limit Climate Mitigation Potential of Tropical Forests. *Front. For. Glob. Chang.* **2020**, *3*, 85. [CrossRef]
6. FAO. *Global Forest Resource Assessment*; FAO: Rome, Italy, 2015.
7. Nanni, A.S.; Sloan, S.; Aide, T.M.; Graesser, J.; Edwards, D.; Grau, H.R. The neotropical reforestation hotspots: A biophysical and socioeconomic typology of contemporary forest expansion. *Glob. Environ. Chang.-Hum. Policy Dimens.* **2019**, *54*, 148–159. [CrossRef]
8. Martin, P.A.; Newton, A.C.; Bullock, J.M. Carbon pools recover more quickly than plant biodiversity in tropical secondary forests. *Proc. R. Soc. B-Biol. Sci.* **2013**, *280*. [CrossRef] [PubMed]
9. Poorter, L.; Bongers, F.; Aide, T.M.; Almeyda Zambrano, A.M.; Balvanera, P.; Becknell, J.M.; Boukili, V.; Brancalion, P.H.S.; Broadbent, E.N.; Chazdon, R.L.; et al. Biomass resilience of Neotropical secondary forests. *Nature* **2016**, *530*, 211–214. [CrossRef] [PubMed]
10. Naime, J.; Mora, F.; Sánchez-Martínez, M.; Arreola, F.; Balvanera, P. Economic valuation of ecosystem services from secondary tropical forests: Trade-offs and implications for policy making. *For. Ecol. Manag.* **2020**, *473*, 118294. [CrossRef]
11. Chazdon, R.L. *Second Growth*; University of Chicago Press: Chicago, IL, USA, 2014.
12. Reid, J.L.; Fagan, M.E.; Lucas, J.; Slaughter, J.; Zahawi, R.A. The ephemerality of secondary forests in southern Costa Rica. *Conserv. Lett.* **2018**, *12*, e12607. [CrossRef]
13. Schwartz, N.B.; Uriarte, M.; DeFries, R.; Gutiérrez-Velez, V.H.; Pinedo-Vásquez, M.A. Land-use dynamics influence estimates of carbon sequestration potential in tropical second-growth forest. *Environ. Res. Lett.* **2017**, *12*, 074023. [CrossRef]
14. Schwartz, N.B.; Uriarte, M.; Gutiérrez-Velez, V.H.; Baethgen, W.; DeFries, R.; Fernandes, K.; Pinedo-Vásquez, M.A. Climate, landowner residency, and land cover predict local scale fire activity in the Western Amazon. *Glob. Environ. Chang.-Hum. Policy Dimens.* **2015**, *31*, 144–153. [CrossRef]
15. Putzel, L.; Cronkleton, P.; Larson, A.; Pinedo-Vásquez, M.; Salazar, O.; Sears, R. Peruvian smallholder production and marketing of bolaina (Guazuma crinita), a fast-growing Amazonian timber species. *Cent. Int. For. Res. Brief* **2013**, *23*, 1–6.
16. Sears, R.R.; Cronkleton, P.; Villanueva, F.P.; Ruíz, M.M.; del Arco, M.P.O. Farm-forestry in the Peruvian Amazon and the feasibility of its regulation through forest policy reform. *For. Policy Econ.* **2018**, *87*, 49–58. [CrossRef]
17. Song, X.P.; Hansen, M.C.; Stehman, S.V.; Potapov, P.V.; Tyukavina, A.; Vermote, E.F.; Townshend, J.R. Global land change from 1982 to 2016. *Nature* **2018**, *560*, 639–643. [CrossRef] [PubMed]
18. Aide, T.M.; Grau, H.R.; Graesser, J.; Andrade-Nuñez, M.J.; Araoz, E.; Barros, A.P.; Campos-Cerqueira, M.; Chacon-Moreno, E.; Cuesta, F.; Espinoza, R.; et al. Woody vegetation dynamics in the tropical and subtropical Andes from 2001 to 2014: Satellite image interpretation and expert validation. *Glob. Chang. Biol.* **2019**, *25*, 2112–2126. [CrossRef] [PubMed]
19. Scatena, F.; Bruijnzeel, L.; Bubb, P.; Das, S. Setting the stage. In *Tropical Montane Cloud Forests: Science for Conservation and Management*; Bruijnzeel, L.A., Scatena, F.N., Hamilton, L.S., Eds.; Cambridge University Press: Cambridge, UK, 2011; pp. 38–63.
20. Mulligan, M. Modeling the tropics-wide extent and distribution of cloud forest and cloud forest loss, with implications for conservation priority. In *Tropical Montane Cloud Forests: Science for Conservation and Management*; Bruijnzeel, L., Scatena, F., Hamilton, L., Eds.; Cambridge University Press: Cambridge, UK, 2011; pp. 16–38.
21. CONAFOR. *Inventario Nacional Forestal y de Suelos Informe de Resultados 2009–2014*; Comisión Nacional Forestal: Jalisco, México, 2017. Available online: https://snigf.cnf.gob.mx/wp-content/uploads/Resultados%20Hist%C3%B3ricos%20INFyS/2009%20-%202014/Informe%20de%20resultados/Informe%20inventario%202009%20-%202014.pdf (accessed on 16 April 2021).
22. Bruijnzeel, L. Tropical montane cloud forest: A unique hydrological case. In *Forests, Water and People in the Humid Tropics*; Bonell, M., Bruijnzeel, L.A., Eds.; Cambridge University Press: Cambridge, UK, 2005; pp. 462–483.
23. FAO. *Forests & Water*; Toledo-Aceves, T., Günter, S., Eds.; FAO: Rome, Italy, 2021; p. 166.
24. Kumer, P.; Urbanc, M. Focus Groups as a Tool for Conducting Participatory Research: A Case Study of Small-Scale Forest Management in Slovenia. In *Participatory Research and Planning in Practice*; Nared, J., Bole, D., Eds.; Springer: Cham, Switzerland, 2020; pp. 207–220.
25. Ryan, K.E.; Gandha, T.; Culbertson, M.J.; Carlson, C. Focus group evidence: Implications for design and analysis. *Am. J. Eval.* **2013**, *35*, 328–345. [CrossRef]
26. Martínez, M.L.; Pérez-Maqueo, O.; Vázquez, G.; Castillo-Campos, G.; García-Franco, J.; Mehltreter, K.; Equihua, M.; Landgrave, R. Effects of land use change on biodiversity and ecosystem services in tropical montane cloud forests of Mexico. *For. Ecol. Manag.* **2009**, *258*, 1856–1863. [CrossRef]
27. del Castillo, R.; Blanco-Macías, A. Secondary succession under a slash-and-burn regime in a tropical montane cloud forest: Soil and vegetation characteristics. In *Biodiversity Loss and Conservation in Fragmented Forest Landscapes. The Forests of Montane Mexico and Temperate South America*; Newton, A.C., Ed.; CABI: Wallingford, UK, 2007; pp. 158–180.

28. Muñiz-Castro, M.A.; Williams-Linera, G.; Martínez-Ramos, M. Dispersal mode, shade tolerance, and phytogeographical affinity of tree species during secondary succession in tropical montane cloud forest. *Plant Ecol.* **2012**, *213*, 339–353. [CrossRef]
29. Trujillo-Miranda, A.L.; Toledo-Aceves, T.; López-Barrera, F.; Gerez-Fernández, P. Active versus passive restoration: Recovery of cloud forest structure, diversity and soil condition in abandoned pastures. *Ecol. Eng.* **2018**, *117*, 50–61. [CrossRef]
30. Henao Bravo, E.I.; Ordoñez, Y.; Camino Velozo, R.D.; Villalobos Soto, R.; Carrera Gambeta, F. *El Bosque Secundario en Centroamérica: Un Recurso Potencial de uso Limitado por Procedimientos y Normativas Inadecuadas*; CATIE: Turrialba, Costa Rica, 2015.
31. Günter, S.; Cabrera, O.; Weber, M.; Stimm, B.; Zimmermann, M.; Fiedler, K.; Knuth, J.; Boy, J.; Wilcke, W.; Iost, S. Natural forest management in neotropical mountain rain forests—An ecological experiment. In *Gradients in a Tropical Mountain Ecosystem of Ecuador*; Beck, E., Bendix, J., Kottke, I., Makeschin, F., Mosandl, R., Eds.; Springer: Berlin/Heidelberg, Germany, 2008; pp. 347–359.
32. Kappelle, M.; Geuze, T.; Leal, M.E.; Cleef, A.M. Successional age and forest structure in a Costa Rican upper montane Quercus forest. *J. Trop. Ecol.* **1996**, *12*, 681–698. [CrossRef]
33. Jardel-Peláez, E. Sucesión ecológica y restauración de bosques subtropicales de montaña en la Estación Científica Las Joyas, México. In *Restauración de Bosques en América Latina*; González-Espinosa, J., Rey-Benayas, M., Ramírez-Marcial, N., Eds.; Editorial Mundi-Prensa: Mexico City, Mexico, 2008; pp. 77–97.
34. Hölscher, D.; Köhler, L.; Kappelle, M.; Leuschner, C. Ecology and use of old-growth and recovering montane oak forest in the Cordillera de Talamanca, Costa Rica. In *Tropical Montane Cloud Forests: Science for Conservation and Management*; Bruijnzeel, L., Scatena, F.N., Hamilton, L.S., Eds.; Cambridge University Press: Cambridge, UK, 2010; pp. 610–617.
35. Kappelle, M.; Avertin, G.; Juárez, M.E.; Zamora, N. Useful plants within a campesino community in a Costa Rican montane Cloud forest. *Mt. Res. Dev.* **2000**, *20*, 162–171. [CrossRef]
36. Louman, B.; Venegas, G. *Aprovechamiento con Tratamiento Silvicultural de Impacto Reducido en un Bosque Montano de la Cordillera de Talamanca, Costa Rica*; CATIE: Turrialba, Costa Rica, 2001; Volume 325.
37. Saenz, G.P.; Guariguata, M.R. Demographic response of tree juveniles to reduced-impact logging in a Costa Rican montane forest. *For. Ecol. Manag.* **2001**, *140*, 75–84. [CrossRef]
38. Guariguata, M.R.; Saénz, G.P. Post-logging acorn production and oak regeneration in a tropical montane forest, Costa Rica. *For. Ecol. Manag.* **2002**, *167*, 285–293. [CrossRef]
39. Günter, S. Review mangroves and mountains: Silviculture at ecological margins. In *Silviculture in the Tropics*; Günter, S., Weber, M., Stimm, B., Mosandl, R., Eds.; Springer: Berlin/Heidelberg, Germany, 2011; Volume 8, pp. 299–323.
40. Kubler, D.; Hildebrandt, P.; Gunter, S.; Stimm, B.; Weber, M.; Muñoz, J.; Cabrera, O.; Zeilinger, J.; Silva, B.; Mosandl, R. Effects of silvicultural treatments and topography on individual tree growth in a tropical mountain forest in Ecuador. *For. Ecol. Manag.* **2020**, *457*, 117726. [CrossRef]
41. Venegas-Villegas, G.; Camacho-Calvo, M. *Efecto de un Tratamiento Silvicultural sobre la Dinámica de un Bosque Secundario Montano en Villa Mills, Costa Rica*; CATIE: Turrialba, Costa Rica, 2001; Volume 322, p. 27.
42. Olvera-Vargas, M.; Figueroa-Rangel, B.L. Ecology and silviculture of oak and mixed-oak forests in the Sierra de Manantlan Biosphere Reserve, Mexico: Seeking for a sustainable forest management in a biosphere reserve. In Proceedings of the Conference Ecology and Management of Tropical Secondary Forests: Science, People and Policy, Turrialba, Costa Rica, 10–12 November 1997.
43. Martínez-Meléndez, N.; Ramírez-Marcial, N.; Martínez-Zurimendi, P.; Cach-Pérez, M.J.; García-Franco, J.G. How Timber Harvest Affects the Structure and Diversity of a Montane Forest in Southern Mexico. *Forests* **2021**, *12*, 895. [CrossRef]
44. Mendoza-Hernández, M.; Gerez-Fernández, P.; Purata-Velarde, S.; Toledo-Aceves, T. Growth rates of valuable tree species in secondary tropical montane cloud forests in Mexico: Influence of tree size, crown position and competition. *Madera Y Bosques* **2019**, *25*, e2531824. [CrossRef]
45. Weber, M.; Günter, S.; Aguirre, N.; Stimm, B.; Mosandl, R. Reforestation of abandoned pastures: Silvicultural means to accelerate forest recovery and biodiversity. In *Gradients in a Tropical Mountain Ecosystem of Ecuador*; Beck, E., Bendix, J., Kottke, I., Makeschin, F., Mosandl, R., Eds.; Springer: Berlin/Heidelberg, Germany, 2008; pp. 431–441.
46. CONABIO. *El bosque Mesófilo de Montaña en México: Amenazas y Oportunidades para su Conservación y Manejo Sostenible*; Comisión Nacional para el Conocimiento y Uso de la Biodiversidad: Mexico City, Mexico, 2010.
47. Merino, L.; Martínez, A.E. *A vuelo de Pájaro: Las Condiciones de las Comunidades con Bosques Templados en México*; Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO): Mexico City, Mexico, 2014.
48. Haeckel, I. Firewood Use, Supply, and Harvesting Impact in Cloud Forests of Central Veracruz, Mexico. Bachelor's Thesis, Columbia University New York, New York, NY, USA, 2006.
49. Ruger, N.; Williams-Linera, G.; Kissling, W.D.; Huth, A. Long-term impacts of fuelwood extraction on a tropical montane cloud forest. *Ecosystems* **2008**, *11*, 868–881. [CrossRef]
50. Boege, E. El Patrimonio Biocultural de los Pueblos Indígenas de México: Hacia la Conservación In Situ de la Biodiversidad y Agrodiversidad en los Territorios Indígenas. In *The Community Forests of Mexico: Managing for Sustainable Landscapes*; INAH: Juárez, Mexico, 2008; Volume 33. Available online: https://idegeo.centrogeo.org.mx/uploaded/documents/El_patrimonio_biocultural-Eckart_Boege.pdf (accessed on 7 October 2021).
51. Bray, D.B.; Merino-Pérez, L.; Negreros-Castillo, P.; Segura-Warnholtz, G.; Torres-Rojo, J.M.; Vester, H.F.M. Mexico's community-managed forests as a global model for sustainable landscapes. *Conserv. Biol.* **2003**, *17*, 672–677. [CrossRef]
52. Bray, D.B.; Merino-Pérez, L.; Barry, D. *The Community Forests of Mexico: Managing for Sustainable Landscapes*; University of Texas Press: Austin, TX, USA, 2005.

53. Martin, G.J.; Camacho, B.C.; Del Campo, G.C.; Anta Fonseca, S.; Chapela Mendoza, F.; González Ortíz, M.A. Indigenous and community conserved areas in Oaxaca, Mexico. *Manag. Environ. Qual. Int. J.* **2010**, *22*, 250–266. [CrossRef]
54. Cayuela, L.; Golicher, D.J.; Benayas, J.M.R.; González-Espinosa, M.; Ramírez-Marcial, N. Fragmentation, disturbance and tree diversity conservation in tropical montane forests. *J. Appl. Ecol.* **2006**, *43*, 1172–1181. [CrossRef]
55. Merino-Pérez, L. Conservation and forest communities in Mexico: Experiences, visions, and rights. In *Community Action for Conservation*; Springer: New York, NY, USA, 2013; pp. 25–44.
56. SEMARNAT. *Anuario Estadístico de la Producción Forestal 2018*; Secretaría de Medio Ambiente y Recursos Naturales: Mexico City, Mexico, 2021.
57. Trujillo-Miranda, A.L.; Toledo-Aceves, T.; López-Barrera, F.; Gunter, S. Tree diversity and timber productivity in planted forests: Pinus patula versus mixed cloud forest species. *New For.* **2021**, *52*, 177–195. [CrossRef]
58. Madrid, L.; Núñez, J.M.; Quiroz, G.; Rodríguez, Y. La propiedad social forestal en México. *Investig. Ambient.* **2009**, *1*, 179–196.
59. Madrid, L.; Hernández, K. *¿Hacia Dónde van los Apoyos al Sector Forestal en la nueva Administración?* Consejo Civil Mexicano para la Silvicultura Sostenible (CCMSS): Mexico City, Mexico, 2021.
60. Chapela, G.; Merino, L. Hacia una política forestal sustentable e incluyente. Los bosques de México, problemas y propuestas. In *Crisis Ambiental en México. Ruta para el Cambio*; Merino, L., Ed.; UNAM: Mexico City, Mexico, 2019; pp. 163–189.
61. Del Castillo, R.F.; Gómez, T. Tala Ilegal Inunda el Mercado de la Madera en México. Pie de Página. 2021. Available online: https://piedepagina.mx/tala-ilegal-inunda-el-mercado-de-la-madera-en-mexico/ (accessed on 7 October 2021).
62. González-Espinosa, M.; Quintana-Ascencio, P.F.; Ramirez-Marcial, N.; Gaytán-Guzmán, P. Secondary succession in disturbed Pinus-Quercus forest in the highlands of Chiapas, Mexico. *J. Veg. Sci.* **1991**, *2*, 351–360. [CrossRef]
63. Ramírez-Marcial, N.; González-Espinosa, M.; Williams-Linera, G. Anthropogenic disturbance and tree diversity in Montane Rain Forests in Chiapas, Mexico. *For. Ecol. Manag.* **2001**, *154*, 311–326. [CrossRef]
64. Ortíz-Colín, P.; Toledo-Aceves, T.; López-Barrera, F.; Gerez-Fernandez, P. Can traditional selective logging secure tree regeneration in cloud forest? *iForest-Biogeosci. For.* **2017**, *10*, 369–375. [CrossRef]
65. Williams-Linera, G. Tree species richness complementarity, disturbance and fragmentation in a Mexican tropical montane cloud forest. *Biodivers. Conserv.* **2002**, *11*, 1825–1843. [CrossRef]
66. Asner, G.P.; Broadbent, E.N.; Oliveira, P.J.C.; Keller, M.; Knapp, D.E.; Silva, J.N.M. Condition and fate of logged forests in the Brazilian Amazon. *Proc. Natl. Acad. Sci. USA* **2006**, *103*, 12947–12950. [CrossRef] [PubMed]
67. IPCC. Forest Land. In *Guidelines for National Greenhouse gas Inventories: Agriculture, Forestry and Other Land Use*; Eggleston, H., Buendia, L., Miwa, K., Ngara, T., Tanabe, K., Eds.; IPCC/IGES: Hayama, Japan, 2006; Volume 4, p. 83.
68. Flores-Palacios, A.; Valencia-Díaz, S. Local illegal trade reveals unknown diversity and involves a high species richness of wild vascular epiphytes. *Biol. Conserv.* **2007**, *136*, 372–387. [CrossRef]
69. Newton, A.C.; Marshall, E.; Schreckenberg, K.; Golicher, D.; Velde, D.W.T.; Edouard, F.; Arancibia, E. Use of a Bayesian belief network to predict the impacts of commercializing non-timber forest products on livelihoods. *Ecol. Soc.* **2006**, *11*, 24. [CrossRef]
70. Torres-Rojo, J.M.; Moreno-Sánchez, R.; Mendoza-Briseño, M.A. Sustainable Forest Management in Mexico. *Curr. For. Rep.* **2016**, *2*, 93–105. [CrossRef]
71. RLGDFS. *Reglamento de la Ley General de Desarrollo Forestal Sustentable*; DOF: 09/12/2020; Diario Oficial de la Federación: Mexico City, Mexico, 2020.
72. Román-Danobeytia, F.J.; Levy-Tacher, S.I.; Macario-Mendoza, P.; Zuñiga-Morales, J. Redefining Secondary Forests in the Mexican Forest Code: Implications for Management, Restoration, and Conservation. *Forests* **2014**, *5*, 978–991. [CrossRef]
73. Guibrunet, L.; Gerritsen, P.R.W.; Sierra-Huelsz, J.A.; Flores-Díaz, A.C.; García-Frapolli, E.; García-Serrano, E.; Pascual, U.; Balvanera, P. Beyond participation: How to achieve the recognition of local communities' value-systems in conservation? Some insights from Mexico. *People Nat.* **2021**, *3*, 528–541. [CrossRef]
74. Paré, L.; Gerez Fernández, P. *Al filo del agua: Cogestión de la Subcuenca del río Pixquiac, Veracruz*; SEMARNAT, Instituto Nacional de Ecología (INE). Pablos Editores: Mexico City, Mexico, 2012; p. 344.
75. DOF. Acuerdo por el que se emiten las Reglas de Operación del Programa Sembrando Vida, para el ejercicio fiscal 2021. 28 Diciembre 2020. Available online: https://www.dof.gob.mx/nota_detalle.php?codigo=5608917&fecha=28/12/2020 (accessed on 9 August 2021).
76. Segura-Warnholtz, G. Quince años de políticas públicas en favor de la acción colectiva en comunidades forestales. *Rev. Mex. Sociol.* **2014**, *76*, 105–135.
77. Pineda Jaimes, N.B.; Bosque Sendra, J.; Gómez Delgado, M.; Plata Rocha, W. Análisis de cambio del uso del suelo en el Estado de México mediante sistemas de información geográfica y técnicas de regresión multivariantes: Una aproximación a los procesos de deforestación. *Investig. Geográficas* **2009**, *69*, 33–52.
78. Knoke, T.; Calvas, B.; Aguirre, N.; Roman-Cuesta, R.M.; Gunter, S.; Stimm, B.; Weber, M.; Mosandl, R. Can tropical farmers reconcile subsistence needs with forest conservation? *Front. Ecol. Environ.* **2009**, *7*, 548–554. [CrossRef]
79. Günter, S.; Weber, M.; Stimm, B.; Mosandl, R. Linking tropical silviculture to sustainable forest management. *Bois For. Trop.* **2012**, *314*, 25–39. [CrossRef]
80. Guariguata, M.R.; Sist, P.; Nasi, R. Multiple use management of tropical production forests: How can we move from concept to reality? (Reprinted). *For. Ecol. Manag.* **2012**, *268*, 1–5. [CrossRef]

81. Ostrom, E. Beyond Markets and States. The Nobel Lecture. Nobel Lecture Prize. Available online: https://www.nobelprize.org/uploads/2018/06/ostrom_lecture.pdf (accessed on 28 June 2021).
82. DOF. *Ley General de Desarrollo Forestal Sustentable*; DOF: 26/04/2021; Diario Oficial de la Federación: Mexico City, Mexico, 2020.
83. Pérez-Garcia, O.; del Castillo, R.F. The decline of the itinerant milpa and the maintenance of traditional agrobiodiversity: Crops and weeds coexistence in a tropical cloud forest area in Oaxaca, Mexico. *Agric. Ecosyst. Environ.* **2016**, *228*, 30–37. [CrossRef]
84. Torres-Rojo, J.M.; Moreno-Sánchez, R.; Amador-Callejas, J. Effect of capacity building in alleviating poverty and improving forest conservation in the communal forests of Mexico. *World Dev.* **2019**, *121*, 108–122. [CrossRef]
85. Merino Pérez, L.; Ortíz, G. *Encuentros y Desencuentros. La Política Forestal en Tiempos de Transición Política en México*; Universidad Nacional Autónoma de México-Instituto de Investigaciones Investigaciones Sociales/Miguel Ángel Porrúa: Mexico City, Mexico, 2013.
86. Bray, D.B.; Merino-Pérez, L. *La Experiencia de las Comunidades Forestales en México: Veinticinco años de Silvicultura y Constucción de Empresas Forestales Comunitarias*; Instituto Nacional de Ecología, Consejo Civil Mexicano para la Silvicultura Sostenible, A.C: Mexico City, Mexico, 2004.
87. Knoke, T.; Bendix, J.; Pohle, P.; Hamer, U.; Hildebrandt, P.; Roos, K.; Gerique, A.; Sandoval, M.L.; Breuer, L.; Tischer, A. Afforestation or intense pasturing improve the ecological and economic value of abandoned tropical farmlands. *Nat. Commun.* **2014**, *5*, 1–12. [CrossRef]
88. Asbjornsen, H.; Manson, R.H.; Scullion, J.J.; Holwerda, F.; Muñoz-Villers, L.E.; Alvarado-Barrientos, M.S.; Geissert, D.; Dawson, T.E.; McDonnell, J.J.; Bruijnzeel, L.A. Interactions between payments for hydrologic services, landowner decisions, and ecohydrological consequences: Synergies and disconnection in the cloud forest zone of central Veracruz, Mexico. *Ecol. Soc.* **2017**, *22*. [CrossRef]
89. Sierra-Huelsz, J.A.; Fernández, P.G.; Binnquist, C.L.; Guibrunet, L.; Ellis, E.A. Traditional ecological knowledge in community forest management: Evolution and limitations in Mexican forest law, policy and practice. *Forests* **2020**, *11*, 403. [CrossRef]
90. Tricart, J. *The Landforms of the Humid Tropics, Forests and Savannas*; St. Martin's Press: New York, NY, USA, 1972.
91. Holwerda, F.; Bruijnzeel, L.A.; Muñoz-Villers, L.E.; Equihua, M.; Asbjornsen, H. Rainfall and cloud water interception in mature and secondary lower montane cloud forests of central Veracruz, Mexico. *J. Hydrol.* **2010**, *384*, 84–96. [CrossRef]
92. Muñoz-Villers, L.E.; Holwerda, F.; Gómez-Cárdenas, M.; Equihua, M.; Asbjornsen, H.; Bruijnzeel, L.A.; Marín-Castro, B.E.; Tobón, C. Water balances of old-growth and regenerating montane cloud forests in central Veracruz, Mexico. *J. Hydrol.* **2012**, *462*, 53–66. [CrossRef]
93. Aus der Beek, R.; Saenz, G.P. *Manejo Forestal Basado en la Regeneración Natural del Bosque: Estudio de caso en los Robledales de Altura del Cordillera de Talamanca, Costa Rica*; CATIE: Turrialba, Costa Rica, 1992; Volume 200.
94. Putz, F.E.; Zuidema, P.A.; Synnott, T.; Peña-Claros, M.; Pinard, M.A.; Sheil, D.; Vanclay, J.K.; Sist, P.; Gourlet-Fleury, S.; Griscom, B.; et al. Sustaining conservation values in selectively logged tropical forests: The attained and the attainable. *Conserv. Lett.* **2012**, *5*, 296–303. [CrossRef]
95. Vega-Ortega, M.A.; Llanderal-Mendoza, J.; Gerez-Fernandez, P.; Binnquist, C.L. Genetic diversity in oak populations under intensive management for fuelwood in the Sierra de Zongolica, México. *Ann. Appl. Biol.* **2021**, *178*, 80–97. [CrossRef]
96. Nambiar, E.K.S. Tamm Review: Re-imagining forestry and wood business: Pathways to rural development, poverty alleviation and climate change mitigation in the tropics. *For. Ecol. Manag.* **2019**, *448*, 160–173. [CrossRef]
97. SEMARNAT. *Anuario Estadístico de la Producción Forestal 2015*; Secretaría de Medio Ambiente y Recursos Naturales: Mexico City, Mexico, 2016.
98. Masera, O.; Guerrero, G.; Ghilardi, A.; Velázquez, A.; Mas, J.; Ordóñez, M.d.J.; Drigo, R.; Trossero, M.A. *Fuelwood hot Spots in Mexico: A Case Study Using WISDOM-Woodfuel Integrated Supply-Demand Overview Mapping*; FAO: Rome, Italy, 2004.