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Community Forestry and the Sustainable Development Goals: A Two Way Street

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Abstract: This paper analyses the contributions of community and smallholder forestry (CSF) to achieving the sustainable development goals (SDGs). A CSF-SDG positive feedback model is proposed; a model that holds that successful CSF positively contributes to 13 SDGs and 31 SDG targets. Recent CSF meta-studies have scrutinized factors leading to CSF success and found some 10 factors and conditions that contribute to that objective. If efforts towards reaching the SDGs support or enhance these factors leading to the greater success of CSF, this in turn would boost CSF contributions to the SDGs and their targets. As a result, CSF or active support for CSF, focusing on the 10 CSF factors that favor success, can be linked to 48 unique SDG targets. The analysis suggests that there is a significant opportunity to explore win-win options for efforts to support CSF and contribute to SDGs, but also for efforts to pursue the SDGs and targets that favor CSF, which will in turn boost the contribution of CSF to the SDGs. The case of CSF and its feedback links with the SDGs suggests that it may be relevant to identify interactions between the SDGs and other socio-ecological realities and related research.

Keywords: community forestry; smallholder forestry; enabling conditions; community forestry success; positive feedback loop

1. Introduction

In 2015, 193 Member States of the United Nations adopted the Sustainable Development Goals (SDGs). Together, the 17 SDGs and the 169 specific targets are meant to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. In March 2017, the United Nations (UN) Assembly adopted a global framework of 232 indicators to track progress towards achieving the SDGs [1]. Since the early debates, the importance of forests for achieving the SDGs has been acknowledged [2,3], recognizing that forests provide a wide range of goods and services crucial to both human wellbeing and the ecological stability of the planet. Forests, for instance, store and capture carbon and play a vital role in the world's carbon flux. Forests influence water flows in watersheds' hydrological cycles, crucial for downstream water supply. They are the most important habitat of the world's terrestrial biodiversity. Furthermore, forests can be linked to the SDGs because over one billion people in the world depend on forests as a contribution to meeting livelihood needs [4]. Forests serve as a source of food of both plant and animal origin, medicines, fuel, construction materials, fodder for animals, and fibre and dyes for various purposes [5,6]. Wood is considered a key resource that

can contribute to multiple goals, including climate change mitigation and the improvement of rural wellbeing, among others [7]. Angelsen et al. [5] estimate that the average contribution of forests among forest communities is 21.8% of the equivalent annual income. The value of the flow of the forests biome ecosystem services has been estimated to be nearly USD 5 trillion annually [8].

The SDGs have received considerable academic attention across different disciplines such as sustainability science and development economics, and also within fields like the science of international relations, international or global governance, and public administration. It even can be argued that taken together, the SDGs constitute a discussion on a global socio-ecological system. While many academic publications that address the SDGs do not explicitly make reference to these or other disciplines, the majority of the SDGs, if not all, can be linked to one or several of these academic disciplines. Our paper can be placed within sustainability science, which, according to Saito [9], " ... probes interactions between global, social, and human systems, the complex degradation mechanisms of these systems, and the concomitant risks to human well-being".

Forests and how human societies interact with them have been associated with specific SDGs [10,11]. Considering the wider contribution to livelihoods, forest exploitation has been reported to contribute to SDG 1, Reducing Poverty. The opportunity to obtain food from forests links them to SDG 2, Reducing Hunger. The health contribution of medicinal plants found in forests, but also other therapeutic qualities, contribute to SDG 3, Improving Health. Forests are also the source of fuel for cooking and boiling water within a large segment of the global population, thus further contributing to SDG 3, but also to SDG 7, Energy for All. The capacity of forests to store and capture carbon links them to SDG 13, Climate Change Mitigation, while their water regulating attributes makes them relevant for SDG 6, Clean Water. Forest biodiversity is crucial for SDG 15, Life on Land. When forest cover is disturbed or removed entirely, sedimentation will increase and water regulation functions will be disturbed. Hence, reducing deforestation will help to reduce sedimentation which is beneficial for hydro plants (SDG 7), reduce landslides which is relevant for infrastructure (SDG 9), and improve the condition of coastal waters, thereby benefiting aquatic ecosystems (SDG 14) [10,11].

The importance of forests in the pursuance of the SDGs has thus been widely recognized. Consequently, it is relevant to further explore the linkages and deepen the understanding of how the contributions of forests or forest-based activities can be enhanced to achieve the SDGs. The general narrative of the link between forests and SDGs can be nuanced in several ways. Forests vary considerably in different hemispheres. Within a given hemisphere, forests vary depending on where they are located along the planted forests—pristine old growth forests gradient. Different types of natural forests or planted forests provide quite distinct forest ecosystem services. Forest-based activities, with the objective to capture, produce, enhance, or sustain forest ecosystem services, can be differentiated according to the intervening actor. Actors engaged in forestry activities include forest companies that exploit timber or manage large tree plantations, governments, and autonomous conservation organizations that seek to generate conservation services or other supporting or regulating ecosystem services. One important major group of forest actors comprises rural communities or rural smallholders who live in or near forests and who engage in forestry activities as part of their livelihood strategies.

This paper focuses on community and smallholder forestry (CSF) and how it can be linked to the SDGs. An important number of communities and smallholders who engage in forestry activities are rural dwellers located in the fringes of modern societies and in countries that are in the lower tier of per capita gross domestic product (GDP) countries. Large tracts of the natural or semi-natural forests are formally owned by communities and smallholders or managed on the basis of customary rights [12]. In addition, a large number of community members and smallholders grow trees in plantations or in agroforestry systems. Since the 1950s, supporting or enhancing forestry activities among these rural dwellers has been considered an important opportunity to enhance livelihood outcomes, while attaining positive environmental externalities [10,13–15]. CSF, i.e., community and smallholder forestry that specifically focuses on the productive management of natural forests and efforts to support such CSF, therefore, are highly relevant in the global pursuit of the SDGs.

An analysis of the manner and degree to which CSF can contribute to the SDGs is important. Objective evidence illustrating the role of CSF in achieving the SDGs should lead to greater support for CSF, since, in many contexts, boosting CSF may constitute an efficient and effective approach to achieving the SDGs. Another reason to explore the linkages between CSF and SDGs is that as Katila et al. [10] have argued, and this paper will demonstrate below, efforts to support or enhance CSF in and of themselves contribute to the SDGs. The logic of this argument is that improving successful outcomes of CSF can only be achieved by addressing what multiple authors have referred to as factors or conditions that enhance CSF [13,16–19]. Efforts that focus on the factors or conditions that enhance successful outcomes of CSF correspond to a number SDGs and their targets.

This paper has three main objectives. The first is to show how successful CSF contributes to achieving the SDGs. The second objective is to illustrate how efforts to support CSF, in order to favor desired outcomes, often align with the pursuance of a number of the SDGs. By achieving these two objectives, the paper also hopes to forge stronger linkages between the discussion on SDGs with ongoing debates on sustainable forest management and forest-based development, e.g., [10,13,15].

Following this introduction, Section 2 of the paper introduces CSF and describes the methods we used in our analysis. Section 3 then presents the results of the analysis of CSF contributions to the SDGs and their targets, and also how efforts to bolster factors and conditions that favor the success of CSF align with or correspond to a number of SDG targets. Section 4, drawing on the evidence of the previous sections, discusses how the contributions of CSF to the SDGs can be enhanced, including measures taken to support factors and conditions that favor successful CSF. Ultimately, this section sheds light on a positive feedback loop inherent in the SDG agenda, in relation to CSF. The final section concludes the paper.

2. Materials and Methods

2.1. Community and Smallholder Forestry

With community forestry and smallholder forestry, we refer to forestry activities carried out by persons who reside in rural communities in or near forests, or persons who reside on their own estates over which they hold some kind of exclusive rights. We focus this paper on community or smallholder operators who engage in the management of natural forests, whether they be mature natural forests or areas of intervened natural forests and secondary forests, like, for instance, those found in swidden fallows. We recognize that this only covers a part of the millions of rural dwellers who engage in forestry activities as many also engage in agroforestry production and the growing of trees in plantations. While it would be highly relevant to assess the contribution of those local forestry practitioners and practices to the SDGs, that should be the focus of a separate paper.

In recent years, CSF initiatives, i.e., efforts to promote, initiate, or support CSF, have focused on natural forests and their management by communities and smallholders, as a strategy to enhance livelihood outcomes while sustaining forest cover and the provision of ecosystem services. This is an important reason why the contribution of CSF, but also of community and smallholder forests, can be recognized separately for their contribution to the SDGs. While community and smallholder forests may include mature natural forests that have experienced only limited perturbations, they are often forests that have undergone different degrees of intervention. Collectively, they constitute an array of unique socio-ecological systems.

In tropical America, CSF tends to focus on high value forest resources, often timber, but also non-timber forest products, for example, Brazil nuts (*Bertholletia excelsa* Bonpl.) in Bolivia, Brazil, and Peru. In Southeast Asia, high value forest products include rattan and gaharu incense wood in Indonesia (mostly *Aquilaria malaccensis* Lam.), and also timber [20,21]. While this is the case, in many locations, efforts to engage communities in official forestry programs only began once forests had been heavily depleted, for instance, as a result of excessive timber extraction [22]. CSF often seeks to foster the creation and functioning of supply and value chains linked to forest ecosystem

services, as defined by the Millennium Ecosystem Assessment [23], i.e., including the provision of cultural and supporting services, often with a focus on non-local markets as a means to improve local economies. Increasingly, in addition to the provision of ecosystem services, CSF has been recognized for its potential to contribute to regulating ecosystem services such as forest carbon or water.

CSF is a concept that gradually entered the natural resource development and forest conservation debates, around the second half of the 20th century. The practices that CSF refers to are diverse and wide-ranging. Even within organizations like Food and Agriculture Organization of the United Nations (FAO), the understanding of what community forestry refers to has changed since the concept emerged and began to be adopted by experts and practitioners [24]. Recent studies, however, do converge on the overall goals of CSF. For instance, Arts and de Koning [19] define it as forest condition improvement and livelihood enhancement. Baynes et al. [16] view CSF as efforts to improve forest management, social cohesion, and rural incomes. Pelletier et al. [17] argue that CSF aims to achieve forest conservation, income, security, and empowerment, while Pagdee et al. [18] understand CSF objectives as a way to achieve ecological sustainability, social equity, and economic efficiency.

2.2. Research Methods

We applied what can be understood as an expert elicitation method, e.g., [25], to generate the evidence for the analysis of this paper, utilizing the following four step procedure. First, we posed the question for each of the 17 SDGs and for each of the 169 targets under the 17 SDGs: When CSF is successfully achieved, will it contribute to the achievement of the SDG in general, or to specific targets under each SDG in particular? Second, to illustrate more clearly the prospective contributions of CSF to SDG targets, we identified specific indicators of CSF contribution to each target. In this step, we posed the question, if CSF contribution to the specific goal or target is realized, what would be the evidence of this contribution?

As a third step we qualitatively judged the strength of the linkage between CSF and each of the 17 SDGs, as well as to individual targets. We considered the SDGs and their targets as global goals and targets. For instance, in the case of SDG 1, we assumed the global goal of eliminating poverty in all its forms everywhere, and assessed how much the successful implementation of CSF would contribute to this goal. Due to the lack of credible information or data on how much CSF contributes to each SDG or the SDG targets, it is only possible to undertake a qualitative evaluation, entirely based on the expert assessment of the authors of the paper.

In steps 1–3, we relied on our shared understanding of what constitutes CSF, which is based on a profound understanding of the literature on CSF, including literature to which all of the five authors of this paper have made significant contributions, e.g., [10,13–15,26–28]. We reviewed each SDG and target, and assessed to what extent CSF, if undertaken successfully, would make a contribution and how. Using this collective expert assessment, Table 1 was completed.

In step four, we summarized 10 factors or conditions that positively influence CSF success, and analysed how they link or coincide to SDGs and targets. In recent years, an important number of CSF meta-studies have appeared, each of which analysed a large number of case studies [13,16–19]. These meta-studies derived general insights into the factors or conditions that contribute to the success of CSF. Based on the meta-studies, we derived the following 10 factors and conditions (see also Table 2): Short and long term benefits are assured; land and tree tenure is secured and land use competition regulated; appropriate institutional design and arrangements are in place and are durable; participation by all stakeholders in relevant decision making is guaranteed; rulemaking that affects CSF is autonomous, i.e., undertaken without external political pressure, and rules and laws are adequately enforced; good networking, bonding, and social capital is established; careful planning and monitoring is undertaken; adequate and appropriate public administration is put in place; security is guaranteed and conflicts are adequately managed; adequate training, social learning, and co-production of knowledge is pursued [10,13].

Table 1. SDGs. Targets and their links with community and smallholder forestry.

	Qualitative Link	- Narrative of CSF contribution to the goals - Indicators (for targets)
Goal 1		
End poverty in all its forms everywhere	Weak	The potential overall contribution of CSF to ending poverty is relatively low, mostly because the majority of communities and smallholders are not among the poorest. The potential contribution is most likely when actual poor people can engage in CSF
Target 1.4		
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, and appropriate new technology and financial services, including microfinance	Medium	Area of forestland with legal property status held by communities and smallholders
Goal 2		
End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	Medium	CSF can improve incomes through selling forest products or by generating employment for the poorest, increased income can be used to buy food Forests also provide food, which improves food security and nutrition Forests provide support ecosystem services that are crucial for agriculture, such as pollination and water regulation
Target 2.3		
By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition, and non-farm employment	Strong	Monetary income from CSF and measurable provision of services crucial for agricultural productivity
Target 2.4		
By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding, and other disasters, and that progressively improve land and soil quality	Strong	Non-monetary income from CSF and provision of services that enhance the functioning and resilience of agricultural production systems (i.e., water, pollination vectors)
Target 2.5		
By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional, and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	Strong	Area and genetic diversity of forests conserved through CSF
Goal 3		
Ensure healthy lives and promote well-being for all at all ages	Medium	CSF supply medicinal plants, and contribute to emotional and spiritual wellbeing

Table 1. *Cont.*

Target 3.8		
Achieve universal health coverage, including financial risk protection, access to quality essential health-care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all	Weak	Use of medicinal plants from CSF
Target 3.9		
By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination	Weak	Air and water pollution reducing effects of CSF
Goal 6		
Ensure availability and sustainable management of water and sanitation for all	Medium	Forests have important role in regulating downstream water flows and thus can contribute both to regulate water supply, but also to water purification
Target 6.6		
By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes	Strong	Area and condition of CSF that affects water flows and water quality
Goal 7		
Ensure access to affordable, reliable, sustainable, and modern energy for all	Weak	CSF are an important source of fuelwood, for consumption of forest owners, but also for sale in local markets, as fuelwood or charcoal.
Target 7.2		
By 2030, increase substantially the share of renewable energy in the global energy mix	Medium	Energy derived from CSF, mostly fuel wood
Goal 8		
Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all	Low to medium	CSF can provide modest contributions to economic growth and employment
Target 8.4		
Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead	Medium	Natural resources use, especially timber, derived from CSF that contributes to economic growth and replaces environmentally destructive resource use
Target 8.9		
By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	Weak	Tourism that targets CSF communities
Goal 9		
Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation	Weak	CSF can have modest contributions to industrialization, mostly through expanding small and medium forest-related enterprises CSF related infrastructure

Table 1. *Cont.*

Target 9.2		
Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in the least developed countries	Weak to medium	Employment in CSF and CSF contribution to GDP
Target 9.3		
Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	Medium	Small and medium CSF enterprises increased access to financial services and integration into value chains
Goal 11		
Make cities and human settlements inclusive, safe, resilient, and sustainable	Medium	CSF can become an important supplier of building materials that can contribute to resilient and sustainable settlements Upstream forests influence water supplies to cities
Target 11.4		
Strengthen efforts to protect and safeguard the world's cultural and natural heritage	Weak	Traditional or cultural communal forests achieve formal recognition and protection of cultural sites within forests
Target 11.7		
By 2030, provide universal access to safe, inclusive, and accessible green and public spaces, in particular for women and children, older persons, and persons with disabilities	Weak	Community and smallholder forests have been made accessible to public in general and especially women, children, older persons, and persons with disabilities
Target 11.a		
Support positive economic, social, and environmental links between urban, peri-urban, and rural areas by strengthening national and regional development planning	Medium	Economic, social, and environmental links established between CSF and community forests and urban and peri-urban residents
Target 11.c		
Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials	Medium	Building materials from CSF use in construction of resilient buildings
Goal 12		
Ensure sustainable consumption and production patterns	Medium	CSF generates materials for sustainable production
Target 12.2		
By 2030, achieve the sustainable management and efficient use of natural resources	High	Percentage contribution of CSF to overall natural resource management and use
Goal 13		
Take urgent action to combat climate change and its impacts	Medium	CSF can be managed for carbon storage, as a contribution to reducing emission, but also to enhance forest carbon sinks. CSF can also be mobilized to reduce climate change impact vulnerability and resilience

Table 1. *Cont.*

Target 13.1		
Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Weak	CSF have shown to be resilient systems that can be adapted to changing livelihood strategies
Target 13.2		
Integrate climate change measures into national policies, strategies, and planning	Weak	CSF as part of forest-based climate change mitigation, i.e., REDD+
Goal 14		
Conserve and sustainably use the oceans, seas, and marine resources for sustainable development	Weak	Forests in coastal regions, especially mangroves, can be managed by communities and smallholders. They play an important role in preserving coastal ecosystems
Target 14.2		
By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	Weak	Coastal forest, especially mangroves, contribution to coastal ecosystem conservation or sustainable use
Goal 15		
Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	High	CSF plays a significant role to the extent that SDG 15 relates to forests. It represents sustainable use and management of ecosystems in general and forests specifically. It is an important repository of biodiversity
Target 15.1		
By 2020, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements	High	Area of forests under community and smallholder management and condition of those forests
Target 15.2		
By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally	High	Increase in area under CSF and condition of community and smallholder forests
Target 15.3		
By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation neutral world	Weak	Degraded land and soils and desert areas that have been brought under forests and held by communities and smallholders
Target 15.4		
By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	Medium	Community and smallholder forests located in mountain locations
Target 15.5		
Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	Medium	Area of forests under community and smallholder management and their conditions

Table 1. *Cont.*

Target 15.7		
Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	Medium	Community monitoring of their own forests or forest within communal jurisdiction with protected species, or species that require authorization for harvesting or hunting
Target 15.9		
By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, and poverty reduction strategies and accounts	Medium	Official recognition of CSF and its inclusion in various formal planning, development, and poverty reduction efforts
Target 15.b		
Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	Weak	Financial resources that are mobilized to support CSF and that are actually invested in this approach
Goal 16		
Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels	Weak	CSF is often linked with communal institution building, like establishment of forest user groups, and informal but also formal regulations
Target 16.3		
Promote the rule of law at the national and international levels and ensure equal access to justice for all	Weak	Legislation that regulates CSF and its compliance
Target 16.5		
Substantially reduce corruption and bribery in all their forms	Weak	Reduction of corruption of forest officials, but also others in public administration, when dealing with CSF-related matters
Target 16.6		
Develop effective, accountable, and transparent institutions at all levels	Weak	CSF organizations and self-regulation and the formal recognition thereof
Target 16.7		
Ensure responsive, inclusive, participatory, and representative decision-making at all levels	Medium	Democratic function of forest user groups and recognition of these groups and the decision they take by local and regional authorities

Table 2. Factors facilitating successful CSF outcomes and their linkages with SDGs and targets.

Factor influencing CSF outcomes (Compiled from [16–19])	Targets which when pursued would influence the factors indicated in the adjacent column Non-underlined targets align with factors that favor positive CSF outcomes
Short and long term benefits are assured	Targets 2.3, 2.4, 8.1, 8.2, 8.3, 9.3, 10.1, 12.1
Land and tree tenure is secured and land use competition is absent	Targets 1.4, 2.3, 5.a, 6.6
Appropriate institutional design and institutional arrangements are being made	Targets 16.6, 16.b
Participation in relevant decision making is guaranteed	Targets 5.c, 10.2, 10.3, 16.7
Rulemaking is autonomous and rule and laws are adequately enforced	Targets 6.6, 15.7, 15.c, 16.3, 16.5, 16.b
Good networking, bonding, and social capital	Target 16.10
Careful planning and monitoring	Target 15.9
Adequate and appropriate public administration	Targets 10.4, 16.5, 16.b
Security is guaranteed and conflicts are adequately managed	Target 16.1
Adequate training, social learning, and co-production of knowledge	Target 4.5, 8.6, 9.5, 12.8, 12.a

We used this list of 10 factors and conditions and compared them with the 17 SDGs and associated targets by posing the following question: Does the achievement of the SDG, or of anyone of their 169 targets, positively influence any one of the 10 factors or conditions? If the response is affirmative, it can be concluded that there exists a potentially positive relationship between the SDG and/or target in question and CSF. In other words, achieving specific SDGs and their targets will contribute to strengthening or advancing factors and conditions that are known to favor CSF success.

3. Results

3.1. CSF Contributions to SDGs and Targets

Table 1 presents the linkages between CSF and the SDGs and their associated targets. In the left column, we have listed the SDGs and targets to which successful CSF efforts contribute. The second column provides a qualitative assessment of the strength of the linkage between CSF and SDG or targets. Finally, in the third column, a short narrative describes the nature of the link between each SDG and CSF. For each target in column 1, column 3 provides an indicator related to CSF that could be applied to assess progress for that specific target. These indicators could be tracked and quantified over time.

The analysis shows that CSF is relevant to 13 of the 17 goals. However, the strength of the linkage for six of the 13 goals is considered weak: SDG 1 (End poverty), 7 (Energy), 8 (Economic Growth and Employment), 9 (Infrastructure and Industrialization), 14 (Marine Resources), and 16 (Inclusive Societies and Justice). A total of five goals were assessed to have medium strength linkages with CSF: SDG 2 (End Hunger), 3 (Healthy Lives and Wellbeing), 6 (Water and Sanitation), 11 (Cities), 12 (Sustainable Consumption and Production), and 13 (Climate Change). Only in the case of one SDG (15, Life on Land) is there a strong linkage with CSF.

The finding that CSF is relevant for 13 out of 17 SDGs is probably higher than many would expect. Another unexpected finding is that the linkage between CSF and the 13 SDGs may vary depending on the target considered. For example, target 1.4 is assessed to have a medium strong linkage with CSF, even though the linkage between CSF and SDG 1 is overall assessed to be weak. In a similar fashion, while we concluded that the linkage between CSF and SDG 2 was of medium strength, the linkage with targets 2.3, 2.4, and 2.5 is perceived to be strong. On the other hand, the link between CSF and SDG 3 is assessed to be medium strong, but the linkage between CSF and targets 3.8 and 3.9 is perceived to be weak, and no linkages are seen with other targets under SDG 3. In the case of SDG 11, linkages between all the targets and CSF are perceived to be weak, except for target 11.a, which is medium strong. In the case of SDG 15, which has a strong linkage with CSF, two targets have strong linkages with CSF, four targets have medium strong linkages, and two targets have only weak linkages with CSF. The third column of Table 1 provides a qualitative description of how CSF contributes to each SDG and the evidence that shows the contribution of CSF to each of the targets.

3.2. CSF Success Factors and SDG Targets

Factors and conditions, recognized as important for CSF success, are listed in the left hand column of Table 2 and are summarized here. Taken together, they contribute to what is often termed an enabling environment for CSF [13]. The meta-studies reviewed recognize that to be viable, CSF support efforts must generate both short- and long-term benefits. Increasing short-term benefits lies at the center of any CSF effort, but long-term benefits are also needed for successful CSF. The latter is not commonly guaranteed in CSF efforts, e.g., [26]. A second key factor or condition is that rights over land and forests are guaranteed, which not only implies that clear and secure tenure rights are granted, but also that they are recognized and upheld in practice, i.e., that competing land and forest resource claims will not prevail. In addition to tenure and property rights, institutional design and arrangements in general need to be adequate and appropriate for CSF to be successful. This relates in particular to rules pertaining to forest resource use and management, but also to the way members of communities or

smallholders organize themselves, or how effective their organizations are. The institutional design and arrangements are similar to what Ostrom [29] refers to as natural resource common property design principles.

Two sets of factors that strongly influence CSF outcomes relate to democracy and participation. Meaningful participation in relevant decision making needs to be assured and rule making related to CSF needs to be autonomous, without external political or special interests pressures, without excessive top-down steering of the process, and the rules that have been agreed upon among CSF stakeholders must be abided by. Democratic and participatory factors, as well as CSF in general, hinge on constructive and transparent social relations among CSF stakeholders, especially community members, but also with non-local parties that play a role in CSF implementation. Closely related, CSF efforts will much more likely succeed when both planning and monitoring are done following appropriate methods and according to good standards.

Various non local institutional administrative conditions need to be in place for CSF to prosper. One overarching requirement is that public administration that directly affects CSF needs to work properly, i.e., it needs to provide the services that are required, without excessive bureaucratic requirements, political biases, or corruption. Closely related to the latter is that CSF participants need to feel secure with regards to their CSF efforts without being subjected to threats by other interests. The latter also requires that conflicts, when they occur, can be adequately managed. The last factor of relevance is that when CSF is being pursued, conditions are in place for shared learning, co-generation of knowledge, and when required, the right kind of training and capacity building.

In Table 2, these factors and conditions crucial for CSF are shown to coincide with specific SDG targets. In this light, it can be reasoned that factors and conditions favoring CSF contribute in a direct way to SDG targets that align or overlap in content and intention. We reflect below on the degree to which these factors and conditions that enable CSF contribute to particular SDGs.

The results of Table 2 suggest again a diverse picture of how or to what degree factors and conditions for CSF factors coincide with SDG targets. The condition that "CSF efforts need to contribute to short- and long-term benefits" can be viewed as a contribution to targets 2.3 and 2.4, both related to enhancing agricultural production (including forestry production as a land use option). Achieving short- and long-term benefits can also be viewed as contributing to targets 8.1, as it contributes to economic growth that benefits those who engage in CSF; 8.2 because of potential contributions to improve productivity, innovation, and value adding; and 8.3 because it can possibly, and likely will, contribute to development policies, entrepreneurship, and innovation. Similarly, this condition for CSF also contributes to target 9.3, which has a similar focus to target 8.2.

The condition that "land and tree tenure is secured and land competition is absent" can be linked to targets 1.4, 2.3, 5.a, and 6.6. Target 1.4 aspires to secure rights to economic resources, like in the case of forest land subjected to CSF. Target 2.3 includes enhancing benefits, but also securing access to land, which is similar to securing land tenure and absence of incompatible land use competition. Target 5.a refers to similar rights presented under target 1.4, but specifically for women. Target 6.6 refers to restoring forest ecosystem services, which would be achieved through successful CSF.

"Appropriate institutional design and institutional arrangements" will contribute to targets 16.6 and 16.b. Target 16.6 aspires precisely to the creation of appropriate institutional arrangements, while target 16.b refers to the legislative dimension of institutional arrangements.

"Adequate participation in decision making" can be linked to targets 5.c, 10.2, 10.3, and 16.7. Target 5.c aims for gender equality and the empowerment of women and girls, and adequate participation in decision making will include improving women's roles in CSF decision making. Target 10.2 and 10.3 have similar intentions, except that they seek the creation of non-discriminatory decision making arrangements and mechanisms for all groups. Target 16.7 specifically refers to responsive, inclusive, participatory decision making, as does this condition for CSF.

The factor "appropriate rule making and enforcement" can be linked to targets 6.6, 15.7, 15.c, 16.3, 16.5, and 16.b. Target 6.6 is the one that seeks to protect ecosystems, to which this factor for CSF clearly

contributes, as does CSF in general. Appropriate rule making helps eliminate unauthorized hunting or extraction, and thus contributes to targets 15.7 and 15.c. Appropriate rulemaking contributes to target 16.3, which aspires to equal justice for all, which will be favored with this condition in place. By increasing accountability, it contributes to target 16.6 and to policies for sustainable development.

The condition for CSF that relates to "good social relationships and building of social capital" will contribute to target 16.10, which aims for equality and fundamental freedom, which shall be the outcome of social harmony in general. "Careful planning and adequate monitoring" can be linked to target 15.9, which specifically relates to the integration of planning at different public administrative levels.

A key condition for CSF relates to a "well-functioning public administration", especially the levels that affect CSF directly, which is often the municipal or district level or similar lower tiers of public administration. This condition can be linked to targets 10.4, 16.5, and 16.b. Target 10.4 calls for good public policies in general, and this condition for CSF will contribute to those if it is supported or enhanced. Corruption is one of the main shortcomings of public administration that affects CSF, so achieving a well-functioning public administration implies that corruption is effectively addressed and that the sustainable development policies referred to in target 16.b are applied.

The CSF factor that "security is guaranteed and conflicts are appropriately managed" relates closely to target 16.1, as it will contribute to the elimination of violence that may result from conflicts, especially over forests and forest territories. Finally, "training social learning and co-generation of knowledge", which is considered a necessary condition for CSF, can be linked to targets 4.5, 8.6, 9.5, 12.8, and 12.a. Targets 4.5 and 8.6 specifically relate to education and this condition for CSF will contribute to those two targets. Target 9.5 calls for boosting scientific research to contribute to sustainable development and this is also included in this condition for CSF. Target 12.8 refers to the availability of information for sustainable development, and social learning and co-generation of knowledge, which directly coincides with this condition for CSF. Finally, this CSF factor contributes to target 12a, which calls for strengthening scientific and technology development capacities.

3.3. Comparing CSF Impact on SDGs and CSF Success Factors and SDGs

Table 3 provides a synthesis of the information presented, illustrating for each SDG and target the two types of relationships with CSF. CSF-SDG refers to clear instances when outcomes achieved through successful CSF contribute in a direct way to SDGs and associated targets. The column SDG-factors and conditions refers to the alignment between factors and conditions considered essential for effective CSF support and specific SDGs and associated targets that contribute precisely to these factors and conditions. Our analysis suggests that successful CSF would have a positive influence on 31 of the SDG targets. On the other hand, support for or the enhancement of factors and conditions that contribute to CSF success would have positive implications for a total of 28 SDG targets. Looking across both columns, there are 11 targets that are positively influenced by successful outcomes of CSF and by efforts to support or enhance factors and conditions considered essential for CSF success.

Table 3. Linking SDG, SDG targets, CSF, and CSF success factors and conditions.

SDG	Target	CSF-SDG	SDG-Factors and Conditions
1	1.4	x	x
2	2.3	x	x
	2.4	x	x
	2.5	x	
3	3.8	x	
	3.8	x	
4	4.5		x
5	5.c		x

Table 3. *Cont.*

SDG	Target	CSF-SDG	SDG-Factors and Conditions
6	6.6	x	x
7	7.2	x	
8	8.1		x
	8.2		x
	8.3		x
	8.4	x	
	8.6		x
	8.9	x	
9	9.2	x	
	9.3	x	x
	9.5		x
10	10.1		x
	10.2		x
	10.3		x
	10.4		x
11	11.4	x	
	11.7	x	
	11.a	x	
	11.c	x	
12	12.1		x
	12.2	x	
	12.8		x
	12.a		x
13	13.1	x	
	13.2	x	
14	14.2	x	
15	15.1	x	
	15.2	x	
	15.3	x	
	15.4	x	
	15.5	x	
	15.7	x	x
	15.9	x	x
	15.b	x	
16	16.1		x
	16.3	x	x
	16.5	x	x
	16.6	x	x
	16.7	x	x
	16.1		x
	16.b		x
		31	28

SDG: sustainable development goal; CSF: community and smallholder forestry.

The findings above imply that successful CSF and efforts to create an enabling environment for CSF have positive implications for a total of 48 SDG targets. This is just a little less than 30% of all SDG targets.

4. Discussion: Community and Smallholder Forestry and the Pursuance of the Sustainable Development Goals

Forests have been given a prominent place in the pursuance of the SDGs, which are to be achieved by 2030. This is not surprising, since some SDGs specifically relate to forests themselves (SDG 15, Life on Land). Even a superficial assessment, however, confirms the considerable role that forests play in the SDG agenda. Forests are the largest repository of terrestrial carbon, and thus play a considerable role in achieving SDG 13, Climate Action. Over one billion people derive at least some part of their

income from forests. The arguments have adequately been made by multiple authors and summarized in the introduction of this paper [2,3].

As a consequence, more in-depth exploration of the role of forests in achieving the SDGs is needed. As we have mentioned above, there are many different types of forests immersed in a vast array of sociocultural contexts and these socioecological systems have varying potential to contribute to the SDGs. It is clearly necessary to differentiate between forest actors and their engagement with forests to better understand how forests and forestry can contribute to the SDGs. In this paper, we focus on communities and smallholders located in rural areas in countries of low per capita GDP and who rely on mostly natural forests as an important contribution to meet their livelihood needs. Many of these rural dwellers engage in active forestry activities. This is recognized and understood by national forest administrations, but also by international development cooperation and nature conservation professionals, who believe that supporting local forestry activities provides an important opportunity to improve local livelihoods, while also achieving positive environmental conservation outcomes. In this paper, we refer to the complex of local forestry activities and external support for those activities as CSF.

Exploring the links between CSF and the SDGs has multiple benefits. This analysis contributes to a better understanding of the role of forests in pursuance of the SDGs, which is a useful exercise in and of itself. CSF is already receiving significant support because of the potential that it holds to achieve sustainable development. Recognizing how efforts to support CSF can contribute to the SDGs will give more value to these efforts. This, in turn, is an important incentive to increase the support for those efforts.

The analysis of the paper shows that CSF contributes to a total of 13 of the SDGs. While this is a considerable number, a qualitative assessment of how significant CSF is for each of the SDGs suggests that for six of those SDGs, CSF is of relatively low importance (SDGs 1, 7, 8, 9, 14, 16), while it is of medium importance for six SDGs (2, 3, 6, 11, 12, 13) and of high importance for SDG 15. Again, it is recognized that this will vary in different contexts. This assessment, however, should not be considered an overall evaluation of the relative importance of CSF or forests in general for the SDGs, but rather as an indication of the broad scope of the SDGs themselves, including all major global natural resources domains that need to be mobilized to achieve SDGs 1, 7, 8, 9 11, 14, and 16.

A more specific picture of how CSF can contribute to the SDGs is obtained by linking it to the SDG targets, as we do in Table 1. CSF can be linked to 31 SDG targets and for each target, indicators can be formulated that suggest how the contribution is made. The indicators, rather than an instrument for measuring CSF contributions to the SDGs, demonstrate the specifics of the contribution envisioned. The latter may help, for instance, when purposeful efforts are being made to support CSF as an effort to pursue SDG implementation.

An important outcome of this paper is the conclusion that the very efforts to support or enhance CSF to make it more successful, constitute an important contribution to the SDGs. To demonstrate this, we reviewed the factors that in recent literature have been identified as key factors and conditions that contribute to successful outcomes of CSF. The logic is that efforts to put into place an enabling environment for CSF will, as shown in Table 2 and the Results section of the paper, contribute to an array of SDG targets.

Furthermore, as is shown, the SDG targets that coincide with successful CSF outcomes and the SDG targets that are positively affected by efforts to put into place factors and conditions that influence CSF success, are highly complementary. In total, 31 SDG targets can be linked to successful CSF outcomes and 28 SDG targets coincide with factors and conditions that favor CSF success. Of these 59 targets, only 11 are positively linked to both CSF outcomes and factors and conditions for CSF success, which implies that a total of 48 unique SDG targets are positively linked to either CSF outcomes, or to factors and conditions that favor CSG outcomes, or to both.

The recognition that (1) successful CSF contributes in a tangible way to a number of SDGs and associated targets and that (2) factors and conditions favoring CSF align with a number of SDGs and

associated targets - that might be termed enablers—provides the elements to develop a simple, but compelling, positive feedback model. Figure 1 provides a graphic illustration of this model, indicating how progress in some SDGs positively influences the outcomes of CSF.

The implications of these findings are several. There are obviously important linkages between CSF and the SDGs. How these linkages compare to other forest subsectors (i.e., corporate or industrial forestry; conservation forestry; smallholder plantation forestry or agroforestry) is not yet known without undertaking a similar analysis of these subsectors. However, it is obvious that the linkages between CSF and SDGs are significant. The findings suggest that CSF should seriously be considered wherever the implementation of SDGs is planned and executed. Successful CSF and support for CSF contributes to 13 SDGs and 48 SDG targets, implying an array of win-win opportunities to engage in CSF support, which at the same time, would enhance CSF contributions to the achievement of the SDGs.

The analysis presented here has value beyond pointing out the synergistic positive feedback between the SDGs and CSF. CSF constitutes an important area of applied academic inquiry and the knowledge that has been generated during past decades, as it turns out, can have significant implications for Agenda 2030. This is likely to be the case for other similar applied academic research fields. Therefore, one overarching insight emerges from this exercise: it would be worthwhile to make a concerted effort to identify critical linkages between the SDGs and Agenda 2030 and other areas of applied research.

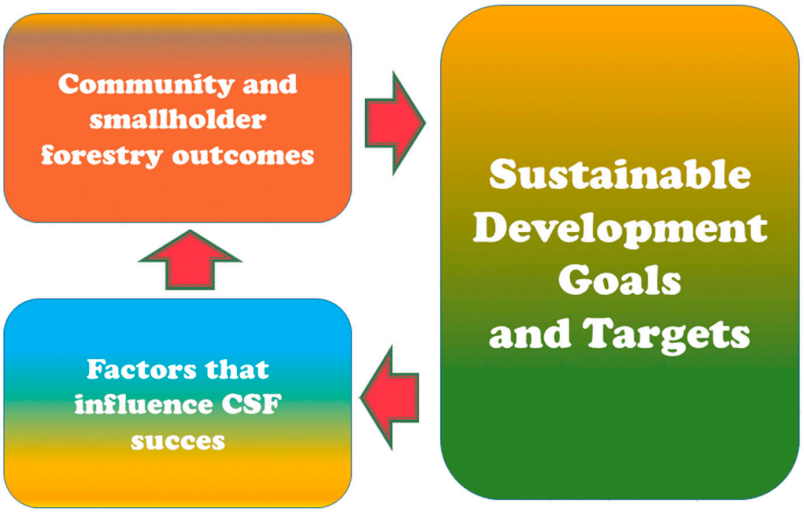

Figure 1. The CSF-SDG positive feedback model.

5. Conclusions

In this paper, we analysed the contributions of community and smallholder forestry (CSF) to achieving the sustainable development goals (SDGs). We propose a CSF-SDG positive feedback model. This model holds that successful CSF positively contributes to a total of 13 SDGs and 31 SDG targets. Recent CSF meta-studies have found that the success of CSF is positively influenced by 10 conditions factors that together contribute to the creation of an enabling environment for CSF. Support or enhancement of these factors, which favors CSF success and boosts CSF contributions to the SDGs and their targets, constitutes contributions to 28 SDG targets. Successful CSF, or active support for CSF focusing on 10 factors and conditions for CSF, can be linked to 48 unique SDG targets. Our analysis suggests there is much opportunity to identify win-win options for efforts to support CSF and contribute to SDGs in a simultaneous fashion. In a similar manner, efforts to pursue SDGs and associated targets that foster positive outcomes of CSF, will in turn boost the contribution of CSF to the SDGs. The case of SDGs and CSF is possibly an example of how experiences within certain fields of applied academic inquiry may be of crucial importance to the implementation of Agenda 2030.

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