Understanding the potential impacts of REDD+ on the financing and achievement of sustainable forest management

A report prepared for the Secretariat of the United Nations Forum on Forests (UNFFS)

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Table of contents

Summary of key points iv

1. Background 1

2. Comparing and contrasting domains: SFM, REDD+ and their intersection 5

2.1 Defining and deconstructing sustainable forest management (SFM) 5

2.2 Balancing and optimizing SFM elements and the role of co-benefits and trade-offs 7

3. How much REDD+? A question of relative scale 12

3.1 SFM funding needs and gaps 12

3.2 REDD+ and the nature and potential scale of carbon-focused SFM finance 14

3.3 REDD+ and SFM: Comparing the scales 20

4. What kind of REDD+? Impacts of REDD+ on SFM elements 23

4.1 Extent of forest resources 24

4.2 Forest biological diversity 26

4.3 Forest health and vitality 29

4.4 Productive functions of forest resources 32

4.5 Protective functions of forest resources 34

4.6 Socio-economic functions of forests 36

4.7 Legal, policy and institutional framework 38

4.8 Directionality and significance of REDD+ impacts on SFM financing and achievement, by element 41

5. Where will REDD+ happen? REDD+ geographic distribution and its impacts on SFM 42

5.1 Geographic breakdown of REDD+ financial flows to date 43

5.2 Deforestation trends and REDD+ funding 44

5.3 Opportunity costs, cost effectiveness and REDD+ financing 46

5.4 Low carbon and low forest cover issues and REDD+ financing 47

5.5 High forest, low deforestation (HFLD) countries and REDD+ financing 47

5.6 Small Island Developing States (SIDS) and REDD+ financing 48

6. Integrating REDD+ with existing SFM initiatives 49

6.1 Forest Law Enforcement, Governance and Trade (FLEGT) 49

6.2 Community forestry 51

6.3 Reduced impact logging (RIL) 53

6.4 Protected areas management 54

6.5 Integrating REDD-SFM and SFM in land use decision-making 55

7. Next steps 58

Annex 1: References 60

Annex 2: Abbreviations and Acronyms..... 65

List of tables

Table 1: Estimates of Costs for Phases 2 & 3.....16

Table 2: Costs of reducing deforestation / degradation.....21

Table 3: REDD+ SFM cost & benefit overlaps related to biodiversity.....28

Table 4: Global forest area primarily designated for production.....33

Table 5: Global forest area primarily designated for protection.....35

Table 6: Projected direction and scale of REDD+ impact on SFM elements.....41

Table 7: Top recipients of REDD+ financing.....44

Table 8: Annual changes in forest area by region, 1990-2010.....45

Table 9: Amount and share of total forest clearing by country (12-month moving avg, as of Aug, 2011)
.....45

Table 10: REDD+ funding to date compared with deforestation levels for top deforesting countries...46

Table 11: FLEGT and drivers of deforestation.....50

Table 12: SFM criteria and indicators used in assessing alternative land use management options....56

Table 13: Adapted REDD+ criteria.....57

List of boxes

Box 1: Seven thematic elements of sustainable forest management (SFM).....6

Box 2: PES in Costa Rica.....15

Box 3: Cost internalization, the green economy and the potential scale of REDD+.....19

Box 4: Extent of Forest Resources.....24

Box 5: Biodiversity and SFM.....26

Box 6: Forest Health and Vitality.....29

Box 7: GEF support for maintaining forest carbon by reducing forest fires in Turkey.....32

Box 8: Productive Functions of Forests.....33

Box 9: Protective Functions of Forests 35

Box 10: Socio-economic Functions 37

Box 11: Legal, Policy, and Institutional 40

List of figures

Figure 1: Indicative financial coverage of SFM elements 23

Figure 2: REDD+ contribution to strengthening of community forestry systems 53

Summary of key points

- Governments and the private sector have systematically under-invested in forest management, conservation, enhancement and restoration, i.e. SFM.
- REDD+, as a nascent financial mechanism covering emissions from deforestation and forest degradation, conservation, sustainable management of forests, and enhancement of forest carbon stocks, represents an important and rapidly developing component of the SFM finance equation in developing countries.
- A useful way to analyze the impact of REDD+ on SFM is through the seven thematic elements of sustainable forest management listed in the Non-legally binding agreement (NLBI). These elements offer a set of factors by which financing and achievement of SFM, and the potential role of REDD+ therein, can be measured.
- Finding an optimal balance among the seven elements depends on understanding their positive and negative correlations, which may be referred to as 'co-benefits' and 'trade-offs'.
- SFM-specific trade-offs and co-benefits related to the primary target benefit of REDD+, i.e. enhanced carbon storage and sequestration, together constitute the *beyond carbon impacts of REDD+ on SFM*.
- The way in which a REDD+ mechanism is designed and implemented — including the nature of safeguards and other measures designed to enhance co-benefits and minimize trade-offs — will have substantial effects on the direction and magnitude of co-benefits and trade-offs.
- Comparing the relative scale of REDD+ and SFM—and thus the former's contribution to the latter—at any geographic level may best be achieved through a bottom-up approach based on analysis of SFM elements and associated REDD+ co-benefits and trade-offs
- Some countries will attract higher levels of REDD+ financing than others. However, it is unlikely that all countries will attract REDD+ financing in direct and equal proportion to their SFM financing needs.
- REDD+ creates the potential in theory for financial leakage related to SFM, i.e. financial flows may be diverted either domestically or internationally from SFM to REDD+ in a zero-sum sense.
- SFM financing needs have proven somewhat difficult to quantify, with the latest estimates from the AGF (2012) indicating total needs at $70 – 160 billion per year.
- Estimates of the annual costs of halving deforestation through REDD+ range from US$ 10 billion to US$ 37.5 billion, with the variation depending in part on the target date of achievement.
- The ultimate scale of REDD+, i.e., whether it is able to deliver carbon benefits equivalent to 25%, 50%, 100% or some other percentage of current forest sector emissions, will depend on the availability / mobilization and delivery of climate mitigation funding and the broader financial and environmental economic logic and political calculus facing countries and economic actors, including opportunities for green economy reforms.
- REDD+ overlaps closely with SFM element #1, extent of forest resources. However, it offers highly significant opportunities for generating co-benefits with other SFM elements, as well as some apparent trade-offs. The final SFM element – legal, policy and institutional framework – is of special significance.
- The potential impacts of REDD+ on SFM financing and achievement will vary substantially by country and country type. The most significant sources of variation will be ongoing trends in deforestation by country, together with opportunity cost differentials. Differences in unit-based co-benefit generation may also be significant. Finally, some countries may be affected by deleveraging of SFM finance due to financial leakage. Quantifying all of the above effects will require additional study.
- Key next steps are: (i) better financial and other data needs to be identified and/or generated; (ii) conclusions of the study should be operationalized as a tool for SFM financial planning, particularly in countries facing potentially significant influxes of REDD+ finance, and; (iii) the kinds of issues raised in this paper need to be integrated actively and holistically within international discussions related to REDD+ and SFM financing.

- The international community needs to continue its efforts to mobilize finance for the broad range of SFM issues. Combined with a careful and balanced integration of SFM co-benefit issues into REDD+ itself, such an effort is essential to ensuring the long-term financing and achievement of SFM.

1. Background

The world's forests constitute a vast storehouse of natural capital of both intrinsic value and value to human societies. These values have been substantially eroded in recent decades, due to widespread deforestation and degradation of remaining forests. As a result, both forest natural capital stocks and associated flows of ecosystem services such as biodiversity, water-related services, micro-climate regulation, social values and carbon sequestration, along with more commonly 'valued' goods such as timber and non-wood forest products (NWFPs), are diminishing worldwide (UNEP 2011; van Paddenburg et al. 2012).

One of the underlying causes of forest natural capital erosion has been the widespread failure to assign value to services arising from forest ecosystems. While timber extraction and the products of alternative land uses made possible by forest clearance both have financial value and can be exchanged in markets, many of the other values generated by forest ecosystems have no comparable path to monetization.

In the absence of adequate price signals either from national accounting systems or from markets, national governments, the private sector and the international community have systematically under-invested in forest management, conservation, enhancement and restoration (TEEB 2010; van Paddenburg et al, 2012). In this context, sustainable forest management (SFM) has been put forward as a goal towards which forest management efforts at all levels should aim. While a precise definition remains elusive, the agreed goal of SFM is "…to maintain and enhance the economic, social and environmental *value* of all types of forests, for the benefit of present and future generations" (United Nations GA 2008, emphasis supplied). SFM has been accepted by the international community as a framework for global forest management efforts under the Non-Legally Binding Instrument on all Types of Forests (NLBI), which was adopted at the seventh session of the UN Forum on Forests (UNFF) in 2007 (see E/2007/42-E/CN.18/2007/8).

Despite the advent of the NLBI, persisting worldwide trends in deforestation and forest degradation (FAO 2010) mean that forest ecosystem values have continued to erode and that the NLBI's central goal of 'maintaining and enhancing' forest values remains unfulfilled. A lack of finance has been identified as a persisting barrier to reversing this situation and achieving SFM (Boscolo et al, 2008).

International negotiations aimed at addressing the challenge of SFM financing have been ongoing for a number of years under various umbrellas. Discussions have taken place under the United Nations Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Forum on Forests (UNFF) and, most prominently of late, the United Nations Framework Convention on Climate Change (UNFCCC), where the focus has been on ways to enhance forests' role in climate change mitigation efforts.

The financing issue came into sharper focus in 2007, as the UNFF adopted the NLBI (United Nations GA 2008). The NLBI included four global objectives on forests (GOFs); the first three GOFs represented substantive objectives while the fourth objective called for the mobilization and deployment of financial resources sufficient to tackle the other three.

Since approval of the NLBI and GoFs, work has accelerated at international level to define more precisely the scope of the SFM financing challenge. In December 2007, the Collaborative Partnership on Forests (CPF) launched an Advisory Group on Finance (AGF), which conducted three initial analyses:

- An analysis of financial flows, needs and gaps related to implementation of the NLBI (also referred to as a 'mapping exercise') (CPF 2008), which revealed thematic and geographic gaps in Overseas Development Assistance (ODA) and external private sector financial flows, while pointing out the need to fill such gaps in order to implement the NLBI;

- An update of the CPF Sourcebook on funding for SFM along the lines of the NLBI, which shed light on the large number of sources of funding for which consolidated quantitative information was not yet available. The updated *Sourcebook* identifies more than 700 financing sources, while outlining differences in scale, focus, and geographic region among them; and

- An update of the CPF 2008 study (AGF 2012), which identified new financing sources, as well as providing future estimates and goals.

An important and rapidly developing component of the SFM finance equation has been the emergence of Reducing Emissions from Deforestation and Degradation (REDD+), a nascent financial mechanism covering emissions from deforestation and forest degradation, together with conservation, sustainable management of forests and enhancement of forest carbon stocks. REDD+ has already received substantial investments and is currently moving forward in numerous developing countries.

The potential implications of REDD+ for broader SFM financing and implementation were highlighted in a 2010 note prepared by the Secretariat of the United Nations Forum on Forests (UNFFS), which pointed out "the substantive link between forest-based climate change mitigation and adaptation measures, and the implementation of sustainable forest management, the non-legally binding instrument and the achievement of the global objectives on forests" (UNFFS 2010:10). While pointing out this "link", the Note cautioned against overestimating its strength, noting that "the carbon potential of forests and related financing is only a partial reflection of the benefits forests provide [and that] in spite of their huge potential, REDD-plus financing flows are highly unlikely to address all the gaps and constraints of financing for the implementation of the non-legally binding instrument" (UNFFS 2010:13). The clear message being sent here was that REDD+ should not be seen as a panacea for the wide range of substantive and financing challenges involved in achieving SFM.

In 2010, the UNFF Secretariat highlighted the need to address gaps in understanding of the relationship between REDD+ and SFM financing:

> Greater clarity is needed to understand the implications of REDD and REDD-Plus on forest financing for Member States, and the extent to which REDD-plus financing would cover the broader needs for forest financing: how financing is spread across countries and sectors, what are the potential gaps, obstacles and opportunities, and the additionality of REDD-plus funding…." (UNFFS 2010)

To help address these questions, the first meeting of the Open-ended Intergovernmental Ad-Hoc Expert Group on Sustainable Forest Management Financing (AHEG)[2]:

> Request[ed] the UNFF Secretariat, in close cooperation with CPF and other key actors, to undertake work on REDD-plus and forest financing including the implications of REDD-plus funding on broader forest financing be undertaken within the Facilitative Process (UNFFS 2011).

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The present report has been commissioned by the UNFF Secretariat in response to, *inter alia*, the above-mentioned concerns, including the AHEG request. The study aims to strengthen understanding of: (i) the extent to which REDD+ financing may be expected to fill persisting gaps in SFM financing; and (ii) the implications of REDD+ financing for SFM financing within Member States, including impacts on thematic and geographic distribution of financing.

Given the uncertainties involved, including those related to the nature and scope of any internationally agreed REDD+ mechanism, as well as shortcomings in data, the report does not attempt to provide quantitative projections concerning the impacts of REDD+ financing on SFM or its potential to satisfy SFM financing needs at global, national or sub-national levels. Instead, it aims to provide an analytical framework for assessing the issue while demonstrating how this approach may be applied to currently available information about REDD+. It is hoped that the framework presented here may prove useful at different levels — including sub-national, national, regional and global — and to different stakeholders — such as national-level stakeholders whose interests in REDD+ extend beyond carbon, as well as to those involved with further developing the REDD+ mechanism.

The remainder of the report is organized as follows:

- Section 2 deconstructs SFM into its seven constituent 'elements', before considering the challenge of balancing or optimizing among these elements in light of apparent 'co-benefits' and 'trade-offs'. It then presents a framework for projecting and assessing the potential contribution of REDD+ to SFM financing and achievement. This framework is subsequently applied in sections 3-5.
- Section 3 compares the actual and potential scale of REDD+ with the scale of financial needs posed by SFM, while considering some of the factors that will ultimately determine how extensive REDD+ may become. It concludes with a preliminary quantitative comparison between REDD+ and SFM in terms of relative scale / magnitude.
- Section 4 considers SFM's seven thematic elements, along with the impact that REDD+ may have on the financing, implementation and achievement of each.
- Section 5 considers likely regional, national and country-type differences in REDD+ implementation and their implications for achieving SFM at these levels. Differences relate both to varying REDD+ financial flows, different patterns of SFM-related impacts and other factors.

[2] AHEG had been established on 30 October 2009 at the special session of UNFF's ninth session to propose strategies for mobilizing resources to support the implementation of SFM, the achievement of the global objectives on forests (GOFs) and the Non-legally Binding Initiative (NLBI) (see E/2009/118-E/CN.18/SS/2009/2, para. 3).

- Section 6 considers how to make REDD+ work in a synergistic and integrated way with baseline SFM initiatives, including FLEGT, community-based forest management and reduced impact logging. It also reviews an exercise undertaken in Zambia, in which REDD+ and SFM criteria were considered jointly in prioritizing possible REDD+ sites.
- Finally, section 7 presents next steps arising from the study.

Overall, the report aims to contribute to the goal of establishing a strong and equitable REDD+ mechanism that makes the greatest possible contribution to the achievement of SFM, while also drawing attention to issues and areas that will remain relatively untouched by even the most effective REDD+ design.

2. Comparing and contrasting domains: SFM, REDD+ and their intersection

This section describes a relatively simple conceptual framework for assessing the substantive and financial impacts of REDD+ on SFM. The approach is scalable, i.e. it can be applied — with minor modification — at multiple scales from global to local and in between. It consists of three sub-sections. Section 2.1 considers the concept of SFM, including alternative approaches to deconstructing and making it more analytically tractable. Section 2.2 discusses important issues that arise once SFM has been broken down, in particular the concepts of co-benefits and trade-offs. Finally, section 2.3 employs the foundation developed in the preceding sections to present a framework through which the overall impacts of REDD+ on SFM financing and achievement can be assessed. Remaining sections 3-5 of the paper will present a preliminary attempt to employ the approach described here.

2.1 Defining and deconstructing sustainable forest management (SFM)

Despite being an agreed upon goal at the international level, SFM has proven somewhat difficult to define precisely. For present purposes, the following is taken as a working definition of the goal of SFM:

> Sustainable forest management, as a dynamic and evolving concept, is intended to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations. (United Nations GA 2008)

The present study uses the above definition as a point of departure for its analysis. Looking at the problem from the perspective of logical framework analysis (LFA), the study treats SFM, and more specifically the "maintenance and enhancement" of "economic, social and environmental value", as an agreed upon 'goal' at the apex of the analysis. This goal of 'SFM achievement' can be broken down according to the NLBI's four Global Objectives on Forests (GoFs):

- Global forest objective 1: Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;
- Global forest objective 2: Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest dependent people;
- Global forest objective 3: Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests; and
- Global forest objective 4: Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased new and additional financial resources from all sources for the implementation of sustainable forest management.

The NLBI also provides two sets of activities or actions needed to achieve its objectives. These are the 24 "National policies and measures" which Member States "should" take in order to "…achieve the purpose of the present instrument", as well as 19 elements of "International cooperation and means of implementation". The implicit assumption here is that if both of these sets of actions could be implemented successfully, then the four GoFs — and thence the goal of SFM — would be achieved.

Thus, applying an LFA approach, either or both sets of activities could be grouped under the four objectives to create a three-tiered structure for the 'SFM project.' This approach would have merit for assessing the meaning and operationalization of SFM, as well as for monitoring progress towards that goal and is attractive from an LFM perspective, given its cascading and numerically expanding levels, i.e. one goal, four objectives and 43 activities. As such, it may be worth considering at some point as a framework for evaluating the achievement of SFM.

However, for the present purpose of analyzing the impact of REDD+ on SFM, a simpler and potentially more useful organizing structure is based on the seven 'thematic elements of sustainable forest management' listed in the NLBI (see Box 1). One reason that this structure is more easily utilized in an SFM: REDD+ comparison is the availability of analyses of several of the individual bilateral relationships, e.g. Biodiversity : REDD+, Socio-economic functions : REDD+, etc.

BOX 1: SEVEN THEMATIC ELEMENTS OF SUSTAINABLE FOREST MANAGEMENT (SFM)

1. Extent of forest resources,
2. Forest biological diversity,
3. Forest health and vitality,
4. Productive functions of forest resources,
5. Protective functions of forest resources,
6. Socio-economic functions of forests, and
7. Legal, policy and institutional framework

Source: United Nations GA 2008

One difficulty, however, is that the elements are not stated as objectives, nor do they have targets associated with them, such as the desired extent of forest resources or of forest biodiversity, etc. This absence of agreed objectives makes it difficult to assess definitively either the degree to which an element is being 'achieved' at global level or the quantity of financing needed to do so.[3]

Despite this constraint, thematic elements offer a productive way in which to deconstruct SFM for the purpose of relating it to REDD+. Before considering how the seven elements might be affected by REDD+, it is helpful to take a closer look at the elements themselves; such an exercise reveals important characteristics about their nature and inter-relationships. On the whole, it may be said that the first thematic element is spatial in nature, the last refers to the enabling environment and the middle elements are functional and may be said to embody value.

The first element, 'extent of forest resources,' serves as the quantity side of any calculation of forest values, whether at national, regional or global level and represents a multiplier in such calculations. It is worth noting that a key indicator of forest extent —one that is substantially more precise than area — is forest carbon stock in living biomass. Thus, conservation and enhancement of forest carbon — the target concern of REDD+ — is itself a key element and measure of SFM. This point is sometimes lost in discussions about whether REDD+ focuses 'only' on carbon.

[3] The situation is somewhat different at the national level in some countries, where efforts to develop SFM criteria, indicators and related targets are being developed, agreed and implemented.

The second and third SFM elements — forest biological diversity and forest health and vitality — are determining factors both of forest quality / productivity and, in some cases, of forest quantity / extent. In terms of quality, these elements help to determine the effectiveness and amount of ecosystem functions performed — and services provided — by a given area of forest. Thus, a healthy and resilient forest which maintains its full complement of biodiversity will have a higher capacity to deliver protective, socio-economic and productive functions — and related ecosystem services — than a forest lacking in those qualities. These same elements can also have important impacts on the first element, i.e. forest quantity / extent. For example, anthropogenically-induced levels of forest fire can permanently reduce forest area; uncontrolled pest outbreaks linked to exotic invasive species can lead to forest degradation and reduced carbon content, and; biodiversity loss, by reducing forest resilience, can ultimately contribute to forest degradation and loss, particularly in the context of a changing climate. These elements are therefore closely linked to others on the list.

Elements 4-6 — consisting of productive, protective and socio-economic functions of forests and forest resources — in theory represent the full range of forest functions. As such, they underpin the direct values generated by forests for human society, as mediated through ecosystem goods and services. As noted, the overall magnitude of these values depends both on forest quality, i.e. biodiversity, health and vitality, as well as forest quantity / extent.

A seventh and final element consists of the enabling environment for forest management, including a wide range of relevant laws, policies and institutional frameworks, including fiscal, market and other incentives and instruments. This element impacts directly on each of the other six. For example, it has a critical impact on forest extent by affecting land use decisions; it affects forest quality and levels of degradation and deforestation through factors such as management of forest concessions; and it impacts on biodiversity through, among others, the effectiveness of protected area management. A critically important and cross-cutting aspect of the enabling environment is its impact on incentives facing economic actors, i.e. producers, consumers and investors, as well as landholders and resource users.

Together, the seven elements represent a set of characteristics according to which achievement of SFM can be measured.[4] Indeed, a number of indicators and targets have been developed for this purpose.[5] One such indicator described in FAO's 2010 Global Forest Resource Assessment (GFRA) is carbon content — the primary target issue for REDD+ and REDD+ finance (FAO 2010).

2.2 Balancing and optimizing SFM elements and the role of co-benefits and trade-offs

At initial glance, it might seem as if policy should aim to 'maximize' each of the above elements: more forest resources, more forest biodiversity, more productive functions, etc. However, such an approach would ignore certain realities. One is the fact that there are opportunity costs associated with

[4] See Global Forest Resource Assessment 2010, Chapter 9, for an attempt to do this.
[5] See GFRA page xxviii, Table 1

maintaining forests as opposed, for example, to converting them to agriculture or other uses. This 'beyond SFM' factor serves to set limits on the first SFM element — extent of forest resources — and its closely related indicator — forest carbon — and will ultimately be a critical factor in determining global levels of forest carbon storage as well as the impacts of a REDD+ financing mechanism on SFM. In situations where opportunity costs are high, financial transfers associated with REDD+[6] may be inadequate to affect many land use decisions, thereby limiting potential REDD+ impacts on forest loss, degradation and the associated SFM elements described above.

A more logical SFM policy objective may therefore be to identify and seek out an optimal balance among the seven elements from the perspective of social value while ensuring that the combined value derived from this balance is sufficient at the margin (net of transaction costs) to outweigh opportunity costs associated with alternate land uses. In short, this implies *an optimal set of uses and value generation within an optimal area of forest*.[7] Seen from this perspective, policy at all levels — including national, regional and global — should aim to find and achieve this optimal level of benefits and values.

One complicating factor here is that the seven elements are inter-related in sometimes complex ways. Finding the above optimal balance among them therefore depends to a significant degree on understanding the positive and negative correlations among them.

This report will use the terms *'co-benefits'* and *'trade-offs'* to refer to the positive and negative correlations among the elements of SFM. For example, where biodiversity may be enhanced by increased extent of forest resources, this would be referred to as a co-benefit. Where an expansion of productive functions may lead to a long-term reduction in the extent of forest resources, this would imply the need to reach a trade-off in balancing competing goals or forest services. The relationship between pairs of elements may involve a combination of co-benefits and trade-offs. Finally, it is important to recognize that the concept of co-benefits in particular only makes sense conceptually in relation to a primary *target* element; this is implicit in the 'co-' of 'co-benefit'.

Given the objective of the present paper, the focus below is on SFM-specific trade-offs and co-benefits related to the primary target benefit of REDD+, i.e. enhanced carbon storage and sequestration. Taken together, these will be said to constitute the projected *beyond carbon impacts of REDD+ on SFM*. Importantly, given the SFM finance-related topic of this paper, these impacts are expected to have significant repercussions on the need, or demand, for SFM finance. For example, the greater the level of net[8] biodiversity co-benefits that can be generated due to REDD+, the less will be the remaining need for additional finance directly targeting biodiversity. In this case, REDD+ would to be said to have *satisfied* a portion of the demand, or need, for forest biodiversity finance. Potential trade-offs and co-benefits between each of the seven SFM elements and a carbon-focused REDD+ approach will be discussed in Section 4 below.

[6] The per tonne value of such transfers are sure to be linked, whether directly or indirectly, to carbon prices.

[7] A modeling approach to identifying an optimal set of land uses for value generation at forest landscape level is described in Polasky et al, (2008). It is also worth noting here that what can be considered 'optimal' will vary according to what goal is being set, and who is setting it. In the context of a carbon-focused REDD mechanism, carbon storage/avoided release is what is being optimised for; a broader, SFM-based approach to REDD+ would allow a broader range of objectives to be optimized for.

[8] After deducting possible trade-offs.

In a recent report looking at lessons for REDD that can be drawn from previous experience with payment for ecosystem services (PES) schemes, Cassin (2012) provides a useful characterization of the kinds of 'trade-offs' and 'synergies' within which implementation of REDD+ will inevitably be embedded:

> PES schemes…form part of a complex web of interrelated social and environmental goals, policies, programs and tools and their associated land use implications. Considering the context will be especially important…within the context of REDD+, as the potential scale of funding and land use interventions under REDD+ financing could provide significant opportunities to realize synergies, but also involve significant risks of negative trade-offs.

Finally, it should be noted that the co-benefit / trade-off relationships among SFM elements — in this case between forest carbon and other elements — are in no sense predetermined or fixed in nature. Factors such as production methods, spatial distribution of economic activity, stakeholder engagement and, in particular, policy mechanisms, will help substantially to determine the precise relationship among the elements in practice and may help to determine which ones should be targeted directly. In the case of REDD+, the way in which a REDD+ mechanism is designed and implemented — including the nature of safeguards and other measures designed to enhance co-benefits and minimize trade-offs — will have substantial effects on their direction and magnitude.[9]

2.3 Assessing the impacts of REDD+ on SFM financing and achievement

Sections 2.1 and 2.2 above lay the groundwork for an important part of the subsequent analysis. Together, they argue that an understanding of the REDD+ : SFM nexus can best be approached by analyzing the seven elements of SFM, and in particular the co-benefits and trade-offs between each of these, on one hand, and the carbon-focused emphasis presented by REDD+ on the other. Such an analysis can be useful for gaining an understanding of the relationship between REDD+ and SFM. The approach may be thought of as a unit-based one, i.e. it involves identifying the net benefits that a unit of REDD+ finance may have in terms of various SFM elements.[10]

However, this conclusion will not in itself be sufficient to understand the potential impacts of REDD+ on SFM. Two additional steps are needed to gauge the potential global impacts of REDD+ on SFM. The first is to estimate the likely overall quantity of REDD+ funding that may be mobilized. Combined with the unit-based discussion described above, this would provide an indication of the overall impact of REDD+ on SFM as a whole and on individual SFM elements, on satisfaction of associated financing needs and, importantly, on SFM-related returns from REDD+ investments.

Second, the resulting estimates would need to be viewed within the context of overall SFM financing needs and gaps. This involves comparing projected REDD+ financing flows — and resulting SFM co-benefits – with estimates of SFM financing flows, needs and implied gaps. It might then be said, for example, that REDD+, under certain assumptions, could satisfy x% of unmet global SFM financing needs.

[9] See UNFCCC Decision 1/CP.16, Appendix I, for a list of safeguards agreed upon as part of the Cancun agreements.
[10] As noted, the value of the corresponding SFM unit will depend importantly on REDD+ design, safeguards, etc. and will also vary by location, etc.

Shifting the analysis from global to 'sub-global', i.e. regional, national or local levels, requires several additions to the conceptual framework. Clearly, some countries will attract higher levels of REDD+ financing than others. However, it is also the case that not all countries will attract REDD+ financing in direct proportion to their SFM financing needs. For example, country x may have outstanding opportunities for low-cost generation of carbon credits compared with country y, but if country y is nevertheless facing relatively significant challenges relates to financing SFM, then REDD+ will be proportionally less helpful to it in resolving those challenges. National-level divergences between SFM financing challenges and REDD+ opportunities, as well as the very different costs of generating SFM and REDD+ benefits in different countries, will thus contribute to differences in national-level impacts of REDD+ on SFM financing and achievement. In this light, it becomes important to understand where extensive REDD+ efforts and associated financing are most likely to emerge and how this geographic breakdown compares with that of unmet SFM financing needs.

A second factor that must be considered involves the potential for what will be referred to here as *financial leakage* created by REDD+. For the purposes of this paper, this relates to the possibility that financial flows could be diverted from SFM to REDD+ in a zero-sum sense.[11] This may happen in one of two ways. In the case of *within-country financial leakage*, this would consist mainly of a targeting shift, e.g. from biodiversity or another SFM element to carbon. *International financial leakage*, on the other hand, would in theory involve a shift in financing flows from one country to another, as funding that might otherwise have targeted SFM in country A shift to targeting carbon in country B. It should be noted that the financial leakage/substitution effect can easily be factored into the unit-based model described above. This requires that information about changes in, or substitution between, SFM and REDD+ financial flows is collected, and compared with actual or potential benefits. It is then possible to state that, for example, the substitution of y amount of SFM funding with z amount of REDD+ funding could still attain x% of the SFM benefits that would have been generated if that funding had not been diverted to REDD+.

The potential problem of within-country leakage in theory is linked to REDD+'s focus on generating global, as opposed to local and national, benefits. In the global case discussed above, benefits such as reduced emissions, enhanced sequestration and co-benefits such as biodiversity conservation naturally remain within the systems boundary, i.e. the planet as a whole. However, when analyzed from a national perspective, only a relatively small portion of the carbon and biodiversity benefits are captured, with the majority of such benefits shared globally. Indeed, it is these global benefits, familiar within the context of international mechanisms such as the Global Environmental Facility (GEF), that REDD+ is designed to capture and monetize.

The problem arises in cases where REDD+ financing is not fully additional to baseline SFM financing flows. In a case where non-REDD+ SFM financing flows are actually decreasing at country level, even though the decrease is being matched by an increase in REDD+ funds, the country could experience a net loss as compared with the baseline situation, as what had been a flow of primarily national benefits was transformed into a mix of global and national benefits. This is why the concept of 'additionality' is

[11] This possibility should be distinguished from a situation where REDD+ financing is fully 'additional' to SFM finance. In some sense, this discussion is analogous to a discussion of free-trade areas, where possible trade-offs between trade *creation* and trade *diversion* are typically weighed.

such an important one, to ensure that developing countries do not indirectly end up footing the bill for climate change through reduced flows of nationally focused aid and investment.

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The following three sections of this paper present a preliminary attempt to follow the logic presented immediately above in order to begin to approach an understanding of the actual quantities that may be involved. Thus, section 3 discusses the scale of the SFM financing challenge and how this compares with the likely overall scale of REDD+.

Section 4 reviews the possible impacts of co-benefits and trade-offs on satisfaction of the range of SFM elements. A large part of these thematic impacts — while *beyond carbon* — are nevertheless squarely *within* the scope and definition of SFM.[12] Although nearly all observers agree that REDD+ will likely have important implications for financing and achieving SFM, various and disparate views have been expressed as to the nature, extent, directionality (positive or negative) and geographic distribution of these impacts.

Section 5 moves the discussion to sub-global levels to consider possible differential impacts of REDD+, through likely patterns of REDD+ financial flows and possible leakage.

[12] Others go *beyond SFM*, and may have important economy-wide implications. Such impacts unfortunately remain *beyond* the scope of the present paper.

3. How much REDD+? A question of relative scale

As discussed in sub-section 2.3 above, a first step in understanding the potential contribution of REDD+ to the challenge of SFM is to compare the relative magnitude, or scale, of REDD+ to the challenge of financing and implementing SFM as a whole. Even if REDD+ is successfully implemented at national levels in some countries, failure to scale up such successes to cover broad swathes of the world's tropical forests will limit the scheme's contribution to achieving SFM and to addressing global SFM financing challenges. Scale is therefore a fundamental factor determining the potential overall impacts of REDD+ and its contribution to achieving not only emissions reduction targets, but broader SFM targets as well.

Given the above, a number of questions arise related to the scale of REDD+. How comprehensive and extensive could REDD+ become and what are the major factors likely to determine its ultimate scale and, in a sense, its *weight*? To what extent does REDD+ have the potential to become a kind of large-scale panacea for SFM challenges and associated financing needs? What risks would be created by relying on REDD+ financing to solve SFM and SFM financing challenges, given potential roadblocks to demonstrating and scaling up the former? What impacts will the choice of delivery mechanism have on the scale, e.g., market-driven vs. fund-driven, project-based vs. national vs. nested (Parker et al, 2008; Chigas et al, 2011; Angelsen et al, 2008)?

This section provides a global-level overview of the REDD-plus / SFM relative scale issue, leaving regional and other geographic distinctions for section 5 below. It includes three sub-sections. Section 3.1 reviews estimates of the current scale of SFM financing and SFM financing gaps. Section 3.2 discusses trends to date and projections for REDD+ finance, together with factors that will determine the scale of REDD+ going forward. Section 3.3 builds on the preceding sections to compare the overall scale of SFM and REDD+.

3.1 SFM funding needs and gaps

As noted above, the challenge of 'financing SFM' may be defined as that of mobilizing and channeling financial resources in order to 'maintain and enhance the economic, social and environmental value' of forests, as broken down by the seven elements. In this sense, SFM financing may be thought of as a set of investments, 'returns' from which come in the form of a stream of economic, social and environmental benefits associated with various combinations of the seven elements. Both investments and returns include a combination of public and private elements.

Tomaselli (2006) raises three "critical aspects of financing SFM":

> The three main challenges are: (a) how to increase financing to meet the requirements of transition to SFM; (b) how to channel the existing financing from unsustainable practices to sustainable one; and (c) how to make SFM profitable and lessen the need for additional external financing.

The above characterization is helpful in first reaching an understanding of the meaning of the term 'SFM financing' and how it may need to be distinguished from 'forest financing' *per se*. Tomaselli is implying here that: (a) additional funding is needed, with initial investment requirements during a 'transitional' phase being somewhat higher than would be needed subsequently; (b) existing (baseline) funding needs to be *transformed* in the direction of sustainability; and (c) such a transformation can be facilitated by policies and incentives designed to enhance the profitability of sustainable management practices as compared with business-as-usual ones.

In short, not all forest financing is created equal and investments in unsustainable management practices, while adding to GDP, are not a long-term solution. Consider, for example, a country where logging concessionaires are investing US$ 100 million annually in management and production, yet are engaged in unsustainable production practices, with a variety of resulting long-term damages to forest values. Transforming such practices through regulatory and/or incentive-based measures so that the original $100 million investment is now being made in certified production, reduced impact logging (RIL), etc., would *transform* the investment in question. In accounting terms, this would add US$ 100 million to total SFM financing without actually requiring increased overall forest sector funding. In such cases, it is not necessary to mobilize additional funds, but simply to stimulate a different kind of investment.

The issue of transforming existing investment flows is particularly relevant to the productive functions element of SFM, while the required 'stimulation' depends heavily on the enabling environment (element #7).[13] Through interventions in fiscal policies, e.g. tax deductions for certified businesses, financial penalties to unsustainable businesses and financial incentives to local governments for encouraging certified businesses in their districts.

With respect to the scale of the remaining SFM financing challenge, this is in the first instance tied to the scale of forests and the forest sector itself. According to FAO (2009), forests are responsible for approximately US$ 468 billion, or 1% of global gross value added.

At global level, estimating both existing financial flows as well as 'gaps' therein have proven to be rather difficult problems. A number of reports have made attempts, but the overall conclusions remain unclear. The estimates include the following:

- Tomaselli (2006) calculates annual global forest sector investment at approximately US$ 64 billion, of which some US$ 18 billion, or 28%, is spent on 'upstream forests and sustainable forest management', while the remaining US$ 46 billion goes to 'downstream forest-based industry and trade.' He estimates the financial needs for 'forestry and SFM' at between US$ 33 billion and US$ 70 billion, with the variation between low and high-end estimates depending on "whether environmental externalities (e.g. compensation for deforestation and forest degradation) are included or not." Together, these figures suggest the need for a doubling or tripling of current levels of 'upstream' and SFM funding.
- UNFCCC (2007) presents an overview of current investment and financial flows to 'forestry,' noting that the "OECD ENV-Linkages model" put total new investment in forestry at about US$

[13] See section 4.4 below.

23 billion for 2005. Noting that the Tomaselli estimate is roughly three times this amount, the report questions whether the latter may include "investments to purchase existing assets, such as forest land, and investments in wood products industries." In addition, these figures do not seem to distinguish between business-as-usual and SFM investments.

- AGF (2012) states that "it has been estimated that globally the required funding for sustainable forest management is between US$ 70 to 160 billion per year."

Thus, despite recent initiatives to increase SFM funding, it seems clear that considerable gaps remain. Such gaps are linked to countries' difficulties in quantifying the economic values and potential of their forests. The problem of finance gaps is particularly predominant in developing countries, where limiting factors related to institutional capacity, low levels of socio-economic development, and unstable political and economic environments make the estimation and mobilization of SFM finance a challenge (AGF 2012). There has also been a failure to make an adequate environmental economic case in favor of SFM; there remains a need to clearly demonstrate the links between SFM and enhanced ecosystem services, as well as to estimate the economic value of the latter, e.g. for poverty alleviation. This may be especially true for elements of SFM such as biodiversity conservation and land degradation.

The scale of the ongoing SFM financing challenge is clearly evidenced by the continuing tide of forest disappearance and associated natural capital decline. Indeed, it is precisely the unsustainability of current baseline trends that both reflects and defines the scale of the persisting financing challenge. Perhaps the easiest way to get an initial hold on the scope of the financing gap is to focus directly on the problem of reducing deforestation and forest degradation. Stated in another way, in order to compare the relative scales of REDD+ and SFM, it may be helpful to consider the potential for REDD+ to address element #1 of SFM, namely the maintenance of forest area.[14] This is, of course, a primary target of REDD+ and is considered in the following sub-section.

3.2 REDD+ and the nature and potential scale of carbon-focused SFM finance

As noted above, one of the main underlying causes of deforestation and forest degradation has been the widespread failure to assign value to services arising from forest ecosystems. The shortage of finance for SFM therefore appears to be linked to a failure to recognize, and assign value to, forest natural capital. As a result, both governments as well as the private sector have systematically under-invested in forest management, conservation, enhancement and restoration (TEEB 2010; van Paddenburg et al, 2012). Market failure combined with policy failure — defined herein as the failure by governments to correct market failures through regulatory or incentive mechanisms — stand as twin underlying causes of underinvestment in SFM.

[14] It is worth noting that neither global nor regional targets in terms of forest area maintenance have been agreed to in either SFM or REDD+ discussions. Indeed, the issue of targets for reducing deforestation—which by definition would constitute an area target—have been a contentious issue in REDD+ negotiations.

Recently, progress has been made in the development of innovative mechanisms aimed at correcting some of the above market failures and thereby addressing some of the challenges of SFM implementation and financing. One type of market-based mechanism is payment for ecosystem services (PES), which can be applied to many types of ecosystems and not simply forests. PES schemes are designed to provide appropriate incentives for conservation and sustainable management by charging beneficiaries for services delivered by forested and other ecosystems and rewarding the land and resource managers which provide these services (Simula 2008). Box 2 below presents an example from Costa Rica, which has been among the leaders in applying PES.

Box 2: PES in Costa Rica

Amongst developing countries, PES schemes were pioneered by Costa Rica starting with the passing of Forest Law 7575 in 1996. The law focused on such environmental factors as the mitigation of greenhouse gas emissions, the maintenance of hydrologic services, the conservation of biodiversity, and the protection of scenic beauty for recreation and ecotourism, but went further by a establishing a regulatory framework for contracting landowners to provide these services and a semi-autonomous national forest fund to manage the scheme. Under this scheme, landowners submit a sustainable forest plan, prepared by a licenced forester, which when approved and successfully implemented, would receive funding per hectare of conserved forest area. Initially, payments were set at US US$ 46 per hectare, with subsequently higher payments for forests in strategic watersheds. Overall, this was, essentially, a sustainable forest management project, as deforestation was legally prohibited at that time and had already leveled off. Partly due to this, it is difficult to assess how successful it was in terms of forest conservation. It was, however, highly innovative in creating incentives for parties involved to go further than just obeying the law and successfully pioneered PES in developing countries by serving as an example (Angelsen et al., 2009).

In recent years, increasing attention has been given to payment for one ecosystem service in particular provided by, among other ecosystems, forests — carbon storage and sequestration. The focus of REDD+ is on maintaining and strengthening the role of forests in storing carbon. This increased attention to forest carbon is due to a variety of factors, including increasing alarm over climate change in general as well as the fact that deforestation and forest degradation have been estimated to be responsible for up to 18% of global CO_2 emissions (Holloway 2009).

Given the scale of the climate change problem, the only economic limit to demand for forest-based emissions reductions appears to be the ability to deliver such reductions in a way that can compete in terms of cost effectiveness with those being delivered by other sectors such as transport, energy efficiency, etc. Indeed, initial interest in REDD+ was sparked by the argument that reducing forest sector emissions is equivalent to picking the 'low-hanging fruit' in the emissions reductions orchard (Rights and Resources 2010); according to this argument, REDD+ can achieve emissions reductions and increased carbon sequestration more easily and cost effectively than investments in other sectors such as transport or energy efficiency. However, this point of view has recently been disputed (Dyer and Counsell 2010).

Three distinct phases of REDD+ development have been defined as follows (UNFCCC 2010):

- Phase 1: Development of national strategies or action plans, policies and measures, and capacity building.
- Phase 2: Implementation of national policies and measures and national strategies or action plans that could involve further capacity building, technology, development and transfer, and results-based demonstration activities.
- Phase 3: Results-based actions that should be fully measured, reported and verified.

REDD+ financing has started quickly and moved rapidly to a position of significance, particularly within certain countries (see Section 5 below). In project terms, REDD+ projects accounted for 62, or 8.5% of the 723 forest project commitments identified by OECD in 2010. In value terms, funding for REDD+ *related* activities accounted for 40.6% of the total funds to forests, or US$ 416.34 million out of total funding of US$ 1.2 billion. Norway leads all other donor countries in funding REDD+ readiness activities, with 43 project commitments totaling US$ 355.6 million. Japan has also contributed significantly (AGF 2008). Approximately US$ 4 billion has been pledged for the period 2010–2012 (Simula 2010).

In addition to donor sources of funds, REDD projects comprised US$ 76 million in forward sales from the voluntary carbon market as of 2011 (Diaz et al, 2011).

Table 1: Estimates of costs for REDD+ phases 2 & 3

Target	Timeline	Scale (US$ billion/yr)	Source
25% reduction in deforestation	2015	4-7	IWG-IFR (2009)
50% reduction in deforestation	2030	10.4	Blaser & Robledo (2007)
	2030	17-33	Eliasch Review (2008)
	2030	17.2-28	Kindermann et al (2008)
	2030	22.5-37.5	EC (2008)
	2030	33.5	Obersteiner et al (2007)
100% reduction in deforestation in 8 countries		5-10	Greig-Gran (2008)
	2030	12.2	Blaser & Robledo (2007)
In top 20 countries (95% reduced)		30	Strassburg et al. (2008)
	2100	25-185	Sathaye et al. (2007)

Source: Parker et al, (2009), as reported in AGF (2012).

While significant, the above represents just the beginning — a substantial down payment on completion of Phase 1, which is generally referred to as achieving 'REDD readiness.' Table 1 above summarizes cost estimates for the follow up phases, i.e. phases 2 and 3, of REDD+ implementation. As seen in the table, estimates of the annual costs of halving deforestation through REDD+ range from US$ 10 billion to US$ 37.5 billion, with the variation depending in part on the target date of achievement.

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As noted, and for the foreseeable future, there will be no inherent limit to the world's demand for the ecological services of carbon storage and sequestration. Forest-related emissions have been estimated

at some 17% of total global emissions. The Intergovernmental Panel on Climate Change (IPCC) has called for a reduction of global emissions of least 40% below the 1990 level by 2020 in order to have a chance of limiting average global temperature rise to two degrees Celsius (WWF 2009). The notion of making global forests 'carbon neutral' does not appear to be either an unrealistic or uneconomic objective. This could involve, for example, an 80-90% reduction in deforestation combined with a sufficiently high level of afforestation (Eliasch 2008).

Various estimates have been made of the costs of achieving alternative levels of reductions in deforestation. For example, in 2009, the Informal Working Group on Interim Finance for REDD+ (IWG/IFR) estimated that a 25% reduction in annual deforestation rates could be achieved by 2015 through financing of US$ 23-38 billion during the period 2010-2015. This estimate was based on an annual reduction in deforestation of three million hectares and a resulting total emissions reduction of seven billion tons of CO_2eq (IWG/IFR 2009).

The assumed breakdown of costs was US$ 3 billion for 'REDD readiness' and US$ 20-35 billion in payment for performance, i.e., emissions reductions of seven billion tonnes — with the uncertainty in the latter cost figure due to variable assumptions regarding the possible price of carbon. Unfortunately, REDD+ has not moved forward in the last three years with the speed foreseen by this estimate; nevertheless, the figures do give an idea of the potential scale which the process could achieve.

Nevertheless, the above offers no guarantee that REDD+ will be implemented on the vast, game-changing scale that its proponents envisage. The ultimate scale of REDD+, i.e., whether it is able to deliver carbon benefits equivalent to 25%, 50%, 100% or some other percentage of current forest sector emissions, will depend to an important degree on the following factors:

- *The availability / mobilization and delivery of climate mitigation funding*: Finance, whether market-based or fund-based, represents the essential demand for REDD+ emissions credits and sufficient volume thereof is an essential prerequisite to achieving large-scale implementation of REDD+. As discussed in A&E (2012), voluntary markets will likely continue to create limited additional demand for REDD+ credits. As a result, national or international compliance schemes with offset provisions, combined with official funding / ODA, offer the most realistic route to creating sufficient demand for a robust REDD+ scheme. The actual scale of finance required to meet various forest sector emissions reduction targets will depend on the per unit price to be paid for emissions reductions.
- *The broader financial logic facing supplying countries and economic actors*: Countries and economic actors will in most cases not agree to participate in REDD+ unless they expect to benefit (profit) from such participation. The relative levels of the following prices will be critical to determining the quantity/scale of such participation, i.e., where supply meets demand:
    i. Carbon prices - These need to be sufficiently high in comparison with the cost items below.
    ii. Opportunity costs of alternative land uses - Where land use decisions are being made in a market-based context, decisions as to whether to engage in REDD+ will depend on the profitability of the exercise.

iii. Transaction costs: Importantly, these include the costs of changing policies, and institutions and building capacities associated with 'REDD readiness' along with implementing specialized systems such as monitoring, reporting and verification (MRV).

- *The broader environmental economic logic and prospects for green economy policy reforms*: As noted elsewhere in this report, carbon is but one of the non-monetized values associated with forest capital and its attendant ecosystem services. REDD+ will flourish in situations where broader policy reforms further raise the value of standing forests facing economic actors (see Box 3 below). Overall, REDD+ may have difficulty ensuring maintenance of 'adequate' (see below) levels of forest cover in countries where it faces strong economic and political pressures for forest conversion combined with weak regulatory environments for cost internalization.

Box 3: Cost internalization, the green economy and the potential scale of REDD+

As noted in section 2.1 above, the first element of SFM, as defined within the NLBI, is 'extent of forest resources.' However, the NLBI does not specify any targets or goals related to just how 'extensive' forest resources should be. FAO's Global Forest Resources Assessment (GFRA; FAO, 2010) goes somewhat further than the NLBI, describing the element as being "relate(d) to the goal of maintaining *adequate* forest resources…to support the social, economic and environmental objectives related to forests and forestry within a country or region" (GFRA, 2010; emphasis supplied).

The answer to the adequacy question depends in part on the perspective taken. From a purely *financial* perspective, for example, the answer in the case of deforestation depends on expected financial returns from existing forest stocks and related forest investments, compared with returns from conversion to alternative land uses.

From an *environmental economic* perspective, however, the answer is quite different. From this perspective, all forest values and benefits –as per my previous comment on values and benefits, including non-financial ones, need to be taken into account. Crucially, this incorporates benefits or values that do not currently have a market price, although are of economic significance (examples include subsistence-level use, watershed protection or cultural values). Given the relative importance of ecosystem services and other non-financial values – not clear what you mean with 'other non financial values outside ES, such a perspective has an important impact on the question of what extent of forest is 'adequate'; in short, the definition of adequacy depends on a full accounting of the range of values provided by forests. It is , however, of course important to bear in mind that many of the costs of SFM, and the opportunity costs of avoided deforestation, are financial and are incurred as real cash costs and losses. Indeed, this is one of the classic problems of market failure: that many conservation values are not monetized or expressed in the market, and accrue more broadly to society, while conservation-related costs tend to be felt as real losses to the individual. The contrary also holds: while the benefits of forest conversion and unsustainable use tend to be captured at the individual level, the costs of forest degradation and loss often are felt as "externalities" to other groups or to society as a whole. The challenge is to "internalise" and balance these costs and benefits to as to ensure an efficient, equitable and sustainable supply of forest services.

As governments account for these broader values, and policies and regulations aimed at addressing associated externalities are put in place, the calculus shifts. For example, governments may establish schemes that put a financial value on carbon, such as REDD+. In this case, standing forest acquires an increased value and incentives to deforest are reduced.

However, valuing carbon only—as opposed to other ecosystems services—may have an inadequate impact on outcomes related to forest extent. It has been suggested, for example, that the long-term potential of REDD+ to achieve emissions reductions and reduce deforestation in Southeast Asia may be sharply limited by cost advantages enjoyed by the palm oil sector (CBO 2012). In other words, REDD+ payments may simply be unable to compete with the potential profits to be gained from conversion of forest to oil palm. However, it is important to weigh not just the financial costs and benefits of conversion but also the social costs and benefits thereof. For example, forested ecosystems provide a wide range of currently unpriced ecosystem services beyond carbon, such as sediment retention, water supply regulation, microclimate regulation, etc., not to mention a range of social benefits. Due to combined market and policy failure—where the policy environment fails to correct obvious market failures—these values have long been ignored and left out of both national and private accounting, as the external costs created by conversion and subsequent degradation remain unaccounted for.

The above is one reason that many have argued (UNEP 2011) for REDD+ to be put in place within a context of a green economy—an economy in which such costs are internalized and the natural capital embodied within primary forest is fully valued. In terms of natural capital, a green economy approach simply implies that the full range of values generated by ecosystem services including and beyond carbon are included in the economic calculus and associated policy framework. If REDD+ can provide an impetus to broader policy change in this direction, then its ultimate impact will be substantially increased.

3.3 REDD+ and SFM: Comparing the scales

As described in the previous sub-sections, there remains a considerable amount of uncertainty regarding key elements of the quantities being compared here. All of the key variables, including current levels of SFM financing, overall demand for SFM financing and the scale of REDD+ financing, remain subject to varying, in some cases substantial, degrees of uncertainty. Given this situation, the following comparisons are presented mainly as an illustration of how such a comparison should be made rather than as careful estimates.

Two approaches to comparing the scale of REDD+ and SFM financing are presented below. These are: (i) top-down global estimates and (ii) bottom-up, element based estimates. An attempt is made to provide very preliminary estimates of the former; the latter is described in theoretical outline only.

Top-down global estimates

As noted above, UNFCCC has prepared what is perhaps the most detailed set of calculations regarding the scale of REDD+ opportunity costs. Table 2 below presents details of the UNFCCC calculations, which are based on analysis of major drivers of deforestation and degradation.

As shown in the table, an estimated US$12.2 billion per year is needed to "compensate the opportunity costs" associated with the various listed drivers. According to the estimate, an estimated 5.8 billion Gt in carbon benefits would be generated in 2030, at a bargain cost of $2.10 per tonne.

The above cost represents some 17.4% of Tomaselli's (2006) upper bound estimate of $70 billion per year to achieve SFM. Assuming that both of these estimates are accurate, a first order estimate would therefore be that some $57.8 billion in non-REDD+ funding would still be needed for SFM. Given the estimated level of baseline investments of $ 20.4 billion[15], this would leave an outstanding financial gap of $37.4 billion.

In parallel to the above, UNFCCC (2007) assumes that an additional US$7.6 billion is invested annually in forest management for REDD+, including afforestation and reforestation.[16] This would include investment in areas such as reduced impact logging (RIL), silviculture, conservation of existing forest stocks, etc. These investments may also be considered to fall under the definition of SFM. Subtracting these investments from the above gap would reduce the latter to some US$29.8 billion per year.

[15] Based on Tomaselli (2006) and adjusted for inflation.
[16] UNFCCC estimates $7.2 billion for SFM and 0.1 - 0.4 billion for 'forestation'. These are combined here with the higher figure used for afforestation/reforestation.

Table 2: Costs of reducing deforestation / degradation

Main direct drivers	Rate of Deforestation/ Degradation (percentage)	Area of Deforestation/ Degradation (million ha per year)	Opportunity cost of forest conversion (USD per ha)	Financial flow required to compensate the opportunity costs (USD million per year)
Commercial agriculture				
Commercial crops	20	2.6	2,247	5,774.18
Cattle ranching (large-scale)	12	1.6	498	801.35
Subsistence farming				
Small scale agriculture/ shifting cultivation	42	5.5	392	2,148.13
Fuel-wood and NTFP gathering	6	0.75	263	196.95
Wood extraction				
Commercial (legal and illegal)	14	1.8	1,751	3,187.4
Fuel- wood/charcoal (traded)	5	0.7	123	85.96
Total	**100**	**12.9**		**12,193.97**

Source: UNFCCC (2007)

One obvious shortcoming of the above preliminary scale comparison is that Tomaselli's (2006) and other SFM cost estimates, e.g. AGF (2012), are for the global costs of SFM, rather than for developing countries only, whereas REDD+ by definition applies to developing countries only. A more careful comparison would therefore need to start with an estimate of SFM costs for developing countries only.

Bottom up, element-based estimation

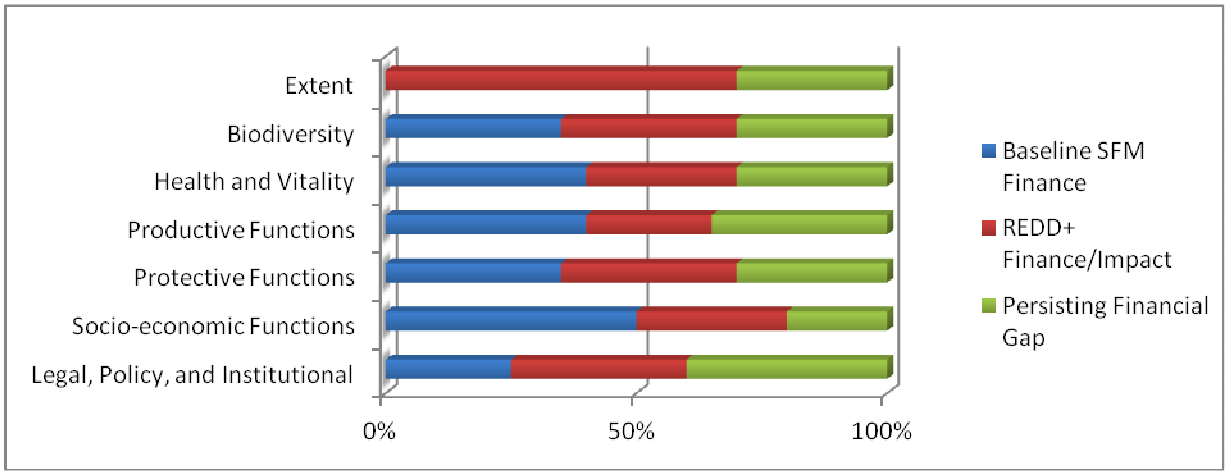
A possible alternative to the above, top-down estimates, which as noted suffers from serious data limitations and uncertainties, is to build estimates from the bottom up. While this approach would also have significant data requirements, it is likely to lead to more interesting and useful long-term results.

The following issues would need to be considered when attempting to create bottom-up, element-based estimates of the likely contribution of REDD+ to the financing and achievement of SFM (regardless of geographic scope of analysis):

- *Quantifying baseline financing levels*: how much financing is currently being provided for SFM? Financing levels should be broken down by SFM programming initiative (see Section 6 below). It is worth noting that these baseline financing levels, working within a baseline enabling environment, are what is generating current SFM outcomes—in REDD+ terms, the business-as-usual (BAU) scenario—not only for carbon for the full range of SFM elements.
- *Breaking down SFM financing by element*: Some programming initiatives will, like REDD+, target a particular SFM element. Others may have multiple elements as direct and/or indirect targets of their assistance. However, nearly all can be expected to generate a range of co-benefits and trade-offs across multiple elements. For example, the EU's FLEGT initiative appears to mainly target governance and productive functions, while producing co-benefits related to protective functions, socio-economic functions, etc. Estimated breakdowns of disbursement allocations and co-benefits should be prepared for individual programming initiatives.
- *Projected REDD+ spending estimates by element*: As discussed above, REDD+ mainly targets forest extent; the magnitude of its impact on this first SFM element depends in part on the REDD+ scenario chosen. In addition, co-benefits and trade-offs related to other SFM elements may be roughly estimated. These would represent element-specific spending increments on top of baseline SFM allocations. Care needs to be taken here and elsewhere to deal with the issue of double counting. Key factors that may affect the extent of co-benefits, as discussed throughout this report, will include:
    - REDD+ mechanism design,
    - Final safeguards, their implementation and associated MRV,
    - Success in coordinating SFM and REDD+ efforts aimed at increasing cost effectiveness by reducing overlaps and enhancing synergies
    - Local variation.
- *Assessing the benefits*: One of the potential advantages of REDD+ is its potential for generating carbon mitigation in a cost effective manner when compared with alternative mitigation options. Cost effectiveness is the basis for, among others, carbon trading / offset schemes. This advantage may be increased substantially once net co-benefits are taken into account. However, even at this stage, there will likely be room on the margin, for additional, (socially) profitable investments.
- *Quantify the gap*: The difference between the REDD+ inclusive level of investments / benefits and the level at which marginal net benefits are zero (or below whatever rate of return is deemed acceptable) represents the persisting financial gap. If estimates have been built up by SFM element, then this gap will also be disaggregated by element, providing a ready-made investment guide. Given that REDD+ payments and benefits will be generated over time and in stages, it should be possible to re-invest early REDD+ payments in ratcheting up towards the final SFM targets.

Figure 1 below presents a graphic interpretation of the potential role of REDD+ in filling SFM financial gaps at the level of individual elements.

Figure 1: Indicative financial coverage of SFM elements



Source: Author. Percentages shown are indicative only and not based on actual quantitative estimates.

4. What kind of REDD+? Impacts of REDD+ on SFM elements

This section evaluates the potential relationship between REDD+ and the individual elements of SFM. These elements were introduced and characterized in section 2.1 above. As noted there, the first element of SFM — extent of forest resources — represents a close analogue to REDD+ itself, as evidenced by the use of a carbon indicator for this element. In this case, it may be said that REDD+ is directly *targeting* this element. To a lesser, partial extent, the readiness phase of REDD+ in particular directly targets another SFM element, namely the legal, policy and institutional framework (element #7). For the remaining five elements of SFM, the dominant characteristic of the REDD+: SFM relationship is one of co-benefits and trade-offs. This is particularly the case for the three 'functional' elements covering productive, protective and socio-economic functions, but is also relevant for the quality-related elements of biodiversity and forest health and vitality.

Deconstructing SFM allows for a more fine-grained assessment of the issues raised herein than would be possible by simply looking at the comparative scale issues discussed in section 3 above. The issues of co-benefits and trade-offs discussed in section 2.2 above can be traced directly to the seven elements, e.g. co-benefits for biodiversity, trade-offs for productive functions, etc. In short, the extent to which REDD+ can deliver net co-benefits associated with these elements will be an important factor in determining its overall contribution to meeting the SFM financing challenge; it is through co-benefits that REDD+ moves beyond financing for carbon storage to broader financing for SFM. As a result, a key element of REDD+ design, from the perspective of SFM, will be trying to ensure that, beyond its carbon impacts, the mechanism maximizes co-benefits and minimizes trade-offs related to the SFM elements.

This section provides a brief overview of each SFM element and its potential 'interactions' with REDD+. It should be noted that some of these issues are fairly complex and space limitations preclude a

thorough examination of each. The section concludes with a summary of the directionality and importance of REDD+ impacts on individual SFM elements.

4.1 Extent of forest resources

In its latest Global Forest Resource Assessment (FAO 2010), FAO discusses six variables designed to characterize the 'extent' of forest resources.[17] These are:

- Area of forest and other wooded land;
- Characteristics (or breakdown) of forests according to three classes: primary forests, other naturally regenerated forests and planted forests;
- Areas of selected forest types (mangroves, bamboo and rubber plantations);
- Standing volume of wood, i.e., growing stock, and its composition;
- Forest biomass; and
- Carbon stock contained in woody biomass, dead wood, litter and forest soils.

Box 4: Extent of forest resources

"The extent of forest resources is the first measure of sustainable forest management. It relates to the overall goal of maintaining adequate forest resources – of various forest types and characteristics, including other wooded land and trees outside forests – to support the social, economic and environmental objectives related to forests and forestry within a country or region".

Source: FAO, 2010.

The most commonly used and well-known indicator of 'extent of forest resources' continues to be that shown in the first indicator above, i.e. area of forest. Reductions in forest area, or deforestation, are particularly widely quoted figures at global, regional and national levels. Globally, according to FAO statistics, gross deforestation was approximately 13.1 million ha/yr. in the 1990s; this pace decreased slightly, to 12.9 million ha/yr, between 2000 and 2005. However, due to afforestation, landscape restoration and natural expansion of forests, the most recent estimate of net forest loss was 7.3 million ha/yr (FAO 2010).

In strictly quantitative terms, accurate measurements of carbon stock, including woody biomass, offer more precise indicators of the extent of forest resources than forest area statistics. This is because, unlike area measurements, measures of carbon stock are designed to reflect factors such as tree density, age classes, degree of degradation, etc. One hundred hectares of old growth California redwoods has substantially more carbon — and contributes significantly more in terms of 'extent' of forest resources, not to mention in terms of other SFM indicators — than a similar area of newly planted or degraded *Eucalyptus*. A carbon measure is therefore a more refined indicator of 'extent of forest resources' than a comparable forest area figure.

[17] While these variables are the primary ones employed at global level, more detailed classifications related to forest or vegetation type, age structure, diameter distribution classes, etc., may also be used at sub-regional, eco-regional and national levels.

GFRA 2010 estimates that the world's forests currently store over 650 billion tonnes of carbon, or more than the entire atmosphere. Of this total, an estimated 45 per cent is stored in the soil, 44 per cent is in biomass and 11 per cent is in dead wood and litter. Globally, forest carbon stocks decreased by an estimated 0.5 Gt annually during the period 2005-2010, mainly due to reduced global forest area.

Besides area of forest and carbon stock, a third indicator worth considering here is the breakdown of forests into three 'classes', namely primary forests, other naturally regenerated forests and planted forests.[18] According to FRA 2010, these categories are designed to group forest types which in reality are distributed along a continuum according to their degree of 'naturalness.' Based on reporting from 200 countries, FRA 2010 found that 57 per cent of forest area consists of forests that are naturally regenerating, 36 per cent are primary forest and seven per cent have been established through planting or seeding. Trend analysis indicates that the overall area of primary and other naturally regenerating forests is decreasing, while the area of planted forests is increasing; primary forest in particular has decreased by over 40 million ha since 2000. This is a worrisome trend given the wide array of benefits produced by natural forests in particular that are not generated by, for example, an equal area of plantation forests. One bright spot, however, is that as planted forest area increases, these areas are expected to supply an increasing proportion of the demand for wood, thereby reducing pressure on primary and other naturally regenerated forests. This self-regulating characteristic should ultimately serve to put a break on the extent of conversion of natural forest to plantation forest.

Based on the above, two main conclusions may be drawn regarding the REDD+ - SFM relationship. First, the fact that carbon storage represents one of the best single indicators of the extent of forest resources suggests a high degree of overlap between the fundamental goal of REDD+ — which is to maximize levels of stored forest carbon — and this particular element of SFM. In other words, large-scale implementation of REDD+ will by definition contribute on a nearly 1:1 basis to achievement of this first element of SFM, given that both are best measured by the same indicator.

Second, and serving as a potential limitation on the first conclusion, is that the design of REDD+ needs to take into account its potential impacts on forest class distribution, as discussed above. Specifically, a REDD+ mechanism should not create new or enhanced incentives for conversion or replacement of natural forest by plantation forest. Thus, given that an equal quantity of carbon stored can have very different implications for other aspects of SFM, REDD+, if poorly designed, can in such cases work against the broader goals of SFM. In terms of the methodology being proposed here, however, such differences will be reflected, and are best measured, in terms of changes in other elements, e.g. biodiversity, protective functions, socio-economic functions, etc. Changes in class distribution, therefore, are best monitored as an indicator that other ecosystem goods and services are likely being affected.

What, therefore, is the expected relationship between levels of REDD+ financing and levels of satisfaction of SFM financing demand related to forest extent? Given the preceding, it may be argued that REDD+ financing will satisfy any such demand on a 1:1 ratio. Whatever mechanism is ultimately developed for REDD+, it will, again by definition, represent the best approach to reducing deforestation

[18] GFRA also gathered information on the proportion of the forest area composed primarily of introduced species.

and forest degradation, and enhancing sequestration, that the international community is able to design and agree upon. If a better and/or more cost effective approach exists in theory than the one that is ultimately agreed to, then the distance between what has been agreed and that optimal approach will represent an efficiency loss. However, by defining our REDD+ target as the best politically feasible option for achieving a given forest carbon target, then we can effectively equate REDD+ and SFM element 1 financing requirements. This conclusion may represent a starting point from which factors related to the remaining six elements can begin to be accounted for.

4.2 Forest biological diversity

Box 5: Biodiversity and SFM

"This theme concerns the conservation and management of biological diversity at ecosystem (landscape), species and genetic levels. Such conservation, including the protection of areas with fragile ecosystems, ensures that diversity of life is maintained, and provides opportunities to develop new products in the future, including medicines. Genetic improvement is also a means of increasing forest productivity, for example to ensure high wood production levels in intensively managed forests"

Source: FAO 2010

The relationship between REDD+ and the financing and achievement of the biodiversity element of SFM (Box 5) has been rather thoroughly analyzed. The overall conclusion of most of those studies is that higher levels of REDD+ financing, in addition to leading to reduced deforestation and climate change mitigation, will generate increasingly important biodiversity co-benefits. The potential significance of this impact can be seen in part by comparing the potential financing from REDD+ with that currently available for conservation. According to Busch et al, (2010), a "partially-funded REDD mechanism" could provide an estimated US$ 15-16 billion annually for reducing deforestation, degradation, etc. This figure is approximately twice that of the estimated US$ 6 billion spent annually on protected areas worldwide (James et al, 1999) and the US$ 1.5 billion in annual spending by international conservation organizations (Halpern et al, 2006). According to Busch et al, (2010), "This level of finance has the potential to dramatically reduce species extinction rates."

Interestingly, biodiversity benefits associated with REDD+ would not be limited to forest biodiversity per se. As noted by Stickler et al, (2009):

> REDD could promote dramatic co-benefits for aquatic biodiversity, especially where it leads to the maintenance or restoration of riparian zone forests and watershed function. Aquatic biodiversity may be the component of tropical biodiversity that is most vulnerable to land cover/land use change. The biodiversity of lower order streams is especially vulnerable due to its dependence on exogenous food sources and on environmental conditions created by the surrounding forest.

REDD+ would create biodiversity benefits mainly by reducing levels of deforestation. Biodiversity would benefit from reduced loss of habitat and enhanced connectivity among remaining biodiversity-rich forest areas. One potentially important tool for reducing deforestation is the expansion of protected area (PA) systems, particularly into areas facing an imminent threat of conversion, etc. While new PAs may not always be located in areas with the highest biodiversity values (see below), habitat

conservation through PA system expansion will nevertheless inevitably bring with it biodiversity benefits.

There is some confusion regarding the extent to which an eventual REDD+ mechanism will reward management of existing protected areas. In theory, these areas are already protected, so the question may be asked as to where the 'additionality' is. However, this would ignore the fact that many existing PAs remain 'paper parks,' with very little if any active management. Many such PAs remain subject to the threat of deforestation and/or degradation, despite their official protected status. Investing in the management effectiveness of such PAs and PA systems — including PAs established in both pre-REDD and post-REDD eras — will thus be an effective way to invest REDD+ payments and generate momentum for the continuation and expansion of both carbon and biodiversity benefits.

Despite the above overall positive picture, several factors merit caution. The first of these is referred to as 'international leakage.' The following describes this impact, with reference to the results of a modeling exercise aimed at gauging the impact of REDD+ on biodiversity:

> "…some countries increased deforestation in response to increased agricultural and timber prices caused by reductions in deforestation elsewhere… [which] resulted in an increase in the extinction rate of forest species in these countries" (Busch et al, 2011)

A second issue relates to what may be termed 'prioritization,' and involves the balance of market-based factors that contribute to decisions concerning *where* REDD+ activities will take place. As explained by Ebeling & Yasue (2008):

> "…carbon markets value carbon not biodiversity and are designed to focus on the lowest cost options for generating emission reductions. They will thus favour areas with low land-use opportunity costs which may not coincide with areas of high conservation priorities. For example, global hot spots for biodiversity conservation have high land-use conversion rates (Myers et al, 2000) and are consequently likely to have high opportunity costs for conservation."

Thus, the geographic divergence, or lack of 'congruence,' between high-biodiversity and high-carbon locations may tend to leave the former under-protected compared to the latter in a situation where carbon values are driving land-use and protection decisions. This factor may operate either within a country or, in the case of international leakage, across national borders. In the latter case, pressures on biodiversity-rich areas may not merely persist but may even increase.

Table 3 below presents a preliminary attempt to break down the costs associated with conserving forest biodiversity into three categories. Two of these categories have the potential to be financed via REDD+. These are: (i) opportunity costs of reducing deforestation and degradation, and (ii) costs associated with habitat restoration. A third column outlines forest biodiversity conservation costs unlikely to be covered by REDD+. Due to space constraints, this type of analysis is presented for this element only; however, it could usefully be applied to remaining elements as well.

Table 3: REDD+ SFM cost & benefit overlaps related to biodiversity

Cost area	REDD+ costs / actions that overlap SFM costs and create biodiversity co-benefits	SFM costs not likely to be covered by REDD+
Readiness (= investment in building capacities)	• REDD+ capacity building and investment costs not directly associated with carbon-related MRV and associated governance	• Capacity building and investment related to biodiversity monitoring, ecotourism, etc. • Development of enabling environment (laws, policies and institutions) for forest biodiversity • Incorporating biodiversity considerations into decisions re. REDD+ and other land use options
Opportunity cost of avoiding deforestation and degradation	• Potential to cover full opportunity costs associated with avoided deforestation	• Limited in situations where unit payment is less than associated opportunity + management costs[19]
Management costs[20] related to reducing deforestation and degradation	• Protected area and landscape management costs related to controlling drivers of deforestation and degradations	• Biodiversity-related management costs not related to controlling drivers • Control of threats affecting biodiversity but not carbon, i.e. not associated with deforestation / degradation (e.g. wildlife management, NTFP management, etc) • Costs covered under BAU scenario (not part of gap)
Costs of forest management	• Changed management practices, e.g. increased silvicultural, restoration and replanting methods • Reducing harvest-related damage through reduced impact logging (RIL)	• Ensuring that SFM is optimized for achieving biodiversity benefits, including identification and prioritization of high conservation value forests.

[19] Stacking together of carbon and biodiversity benefits has the potential to shift this balance in some cases.
[20] UNFCCC (2007) refers to, but does not attempt to estimate, what it calls "Administrative and transaction costs for reducing emissions from deforestation and forest degradation". The term is revised here as 'management costs." This is a critical spending category for present purposes, since it includes a variety of forms of land use management that: (a) may need to be strengthened in order to achieve REDD+ and (b) closely overlap strategies required to achieve SFM.

4.3 Forest health and vitality

Box 6: Forest health and vitality

"Forests need to be managed so that the risks and impacts of unwanted disturbances are minimized, including wildfires, airborne pollution, storm felling, invasive species, pests and diseases. Such disturbances may have an impact on the social and economic, as well as environmental, dimensions of forestry."

Source: FAO 2010

Disturbances to forest ecosystems, such as fires and pests, have implications for carbon storage and some are likely to be targeted under REDD+ initiatives. As a result, REDD+ has the potential to create significant co-benefits related to forest health and vitality. The nature and potential extent of these co-benefits is examined below for the cases of wildfires and pests.

Wildfires

Using satellite data, the FAO has estimated that some 350 million ha of land area—much of it forest and woodland—was affected by fire in 2000 (FAO 2006). In many ecosystems, fire plays an important ecological role, with corresponding implications for ecosystem dynamics, biodiversity and productivity.

Fire is also widely used by people, e.g. in swidden agricultural systems, as a tool for land management. In recent years, wildfires and their associated impacts have been increasing, affecting larger areas and with more severe impacts. Periodic drought and climate change both appear to be contributing to this increase in wildfire prevalence (FAO 2006).

Fire has been a particularly serious issue in the Amazon region. During drought periods there, as in the El Niño episodes of 1997 and 1998, the area of standing forest area burned was at least double the area deforested. These fires generated an estimated 0.7 Pg of CO2 emissions (Alencar et al, 2006). In recent years, several countries, including Thailand and Indonesia, have substantially reduced the area of forest burnt annually (FAO 2010). This is particularly important in the case of Indonesia, given the extensive burning of peat swamp forests with their very high carbon content. Overall, it is estimated that 5,130 million tonnes of vegetation are burned annually, of which some 42% is in Africa.

Unfortunately, there are no reliable estimates of the social, economic and environmental costs of wildfire, but they are likely to be significant. No comprehensive data exists either regarding current levels of spending, e.g. on fire prevention and suppression, particularly in potential REDD+ countries. Nevertheless, the persistence of widespread and costly impacts of wildfire strongly suggest that there remains substantial unmet demand for SFM financing in this area and that additional investments could bring important net benefits in terms of enhanced forest health and vitality. In addition to prevention and suppression costs, additional funds are needed for national and global monitoring and reporting systems and risk analyses.

REDD+ activities have significant potential to address, and provide finance for, forest fire management. This is in part because forest fires are a key source of 'reversibility' of carbon benefits; as such, the potential for losses due to forest fires increases the level of risk facing those who would invest in, or benefit from, REDD+. In addition, reduced losses due to forest fires are not so much a co-benefit as a

direct target result of REDD+, thus there should be little hesitation to pursue this approach, assuming that is proves cost effective.

Until recently, fairly limited international support has been available for strengthening fire management in developing countries. REDD+ appears to be helping to change this, albeit gradually. In 2008, JICA sponsored a series of seminars on integrating fire management into REDD+. By ___, the GEF's newly established SFM/REDD+ funding window had begun to offer funding for fire management as part of an integrated SFM/REDD+ approach. Box 7 below provides an example of how fire management was integrated into a recently approved GEF-funded project for SFM in Turkey's Mediterranean region.

Despite the above, some uncertainty remains regarding the extent to which fire management would be included in any REDD+ mechanism. According to Angelsen et. al (2009):

> Given the carbon consequences of fires in tropical forests, REDD+ funds could be used to improve real-time satellite detection of fires. Training in fire fighting would also translate into carbon savings if trained, motivated crews had the wherewithal to get to fire lines quickly. Not least, there is a need for networks of plots to monitor both immediate carbon losses from fires and to estimate further losses as injured trees die. For these, standardised protocols should be adopted. Unfortunately, adopting fire control as part of REDD+ is currently unlikely because in 2009 – in contrast to 1997–1998 when extensive fires closed airports, shut down businesses and caused huge losses across the tropics – fires have been few. If COP15 were to take place during a fire year, the case for fire control as part of REDD+ would be more compelling.

More recently, Barlow et. al (2012) have noted that "forest fires have been largely overlooked by [the REDD+] negotiations". While emphasizing the importance of integrating forest fires into REDD+, the authors highlight challenges in doing so, such as: (i) the importance of agricultural changes taking place *outside* of remaining forests; (ii) the need to monitor and predict patterns of forest fires across entire biomes, (iii) difficulties in guaranteeing additionality, and (iv) the need to avoid leakage of fire-dependent agriculture.

Despite the above, and while wildfires are not mentioned explicitly in REDD+ decisions, it nevertheless seems clear that fire management will need to be addressed and included in national REDD+ strategies and action plans in countries where wildfires have significant impacts.

Box 7: GEF support for maintaining forest carbon by reducing forest fires in Turkey

About 12 million ha of Turkey's forested lands are subject to the threat of forest fires. Every year, thousands of hectares of forest land are consumed, resulting in millions of dollars in suppression costs and causing great damages in lost timber, real estate and recreational values, and even loss of life. In the last ten years, average annual suppression cost and damages due to fires have been US$173 million and US$40 million, respectively. Fire statistics kept by the General Directorate of Forestry (GDF) since 1937 show that a total of 90,000 fires have burned approximately 1.6 million hectares of forest land (see **Figure below**). This represents 1,200 fires on 22,000 hectares annually, with an average area burned per fire of 18 hectares. Large-scale fires in 2004, 2009, and 2010 destroyed over 10,000 ha of high conservation value forests, including Calabrian pine, which represented a significant loss of habitat of endemic and threatened forest species.

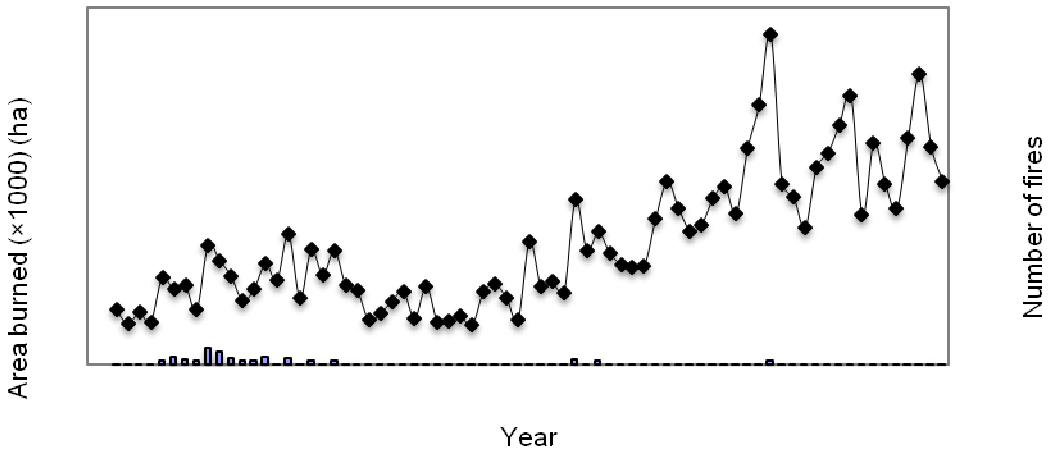


Figure 1: Area burned (bars) and annual numbers of fires (line) since 1937

About 65% of Turkey's forest fires occur along a 160 km-wide belt along the Mediterranean and Aegean regions. It is estimated that 782,000 tCO2-eq is released annually as a result of fire activity in Turkish forests in these regions.

As elsewhere, fire in Turkey has complex social, economic, ecological and cultural roots. Fire management has evolved around an effective fire protection policy with a heavy emphasis on fire control, but with little regard for socio-economic or ecological aspects of fire. Recent fire statistics indicate that the majority of forest fires in Turkey are caused by people. Fires having anthropogenic origins account for 95 to 97 per cent of all fires, while natural causes are responsible for the remaining 3 to 5 per cent. Of the fires caused by people, 13 per cent are classified as arson, 45 per cent as negligence and carelessness and 37 per cent as 'unknown'. Arson fires are set for various reasons. Fires are set to clear land for farming, to release potash into the soil to improve grazing or by honey collectors. Other fires result from personal or ownership conflicts. Unintentional fires are generally caused by sheer inadvertence or accident.

UNDP-GEF support will be provided in four areas. First, *mitigation* will be enhanced through fuel treatment and reduction efforts to be implemented on priority forested lands—the latter identified based on assessed hazard levels. Second, the project will support *prevention*, including burn restrictions, closures and bans linked to fire danger levels. Public awareness campaigns will form an important element of the fire prevention strategy. Third, *preparedness* will be enhanced through support for training of fire management and suppression personnel and through modifications of ignition sources and fuels that act as ignition receptors. Finally, *fire suppression* efforts will be rationalized through enhanced training and coordination, as well as through the development of standard operating procedures and agreed upon policies and responsibilities. Integrated fire management will thus be based on fire danger levels (having identified natural cycles and fuel management targets), values at risk and resources available. In addition to broad-based SFM-related benefits, project activities at pilot sites are expected to generate carbon benefits of 1,646 tCO2/y over baseline and are expected to be widely replicated through a Nationally Appropriate Mitigation Action (NAMA) covering Turkey's Mediterranean forests.

Source: UNDP/GEF. 2012.

Pests

The significant adverse impacts of forest pests are not sufficiently taken into account in planning or management. At global level, there is limited information and analysis on the types of outbreaks, or their scale and impact (FAO FRA 2010). FRA notes a 'reluctance to record severe outbreaks' (FAO FRA 2010), as such reporting may, *inter alia*, have a negative impact on forest product trade.

According to GFRA, approximately 40 million hectares of forest per year were negatively affected by insects and diseases in the period around 2005. Insects alone affected over 34 million hectares annually, or 1.6 per cent of the forest area of the 94 countries reporting on this issue. However, data is poor, in part due to different interpretations of what represents a 'disturbance'. In addition, most surveys of the issue are done for planted forests.

Climate change is expected to increase the frequency of pest establishment in new locations as well as the severity of their impacts (FAO 2010).

It is worth noting that pest outbreaks typically cause forest degradation and associated carbon loss, rather than deforestation per se. As a result, coverage by REDD+ of most pest-related issues will depend on inclusion of the second 'd' in 'REDD', despite methodological challenges in estimating forest degradation and changes therein.

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Overall, given the close association between forest health and vitality and forest carbon issues — particularly forest degradation associated with fire and pest outbreaks — REDD+ has the potential to bring significant co-benefits to this area.

4.4 Productive functions of forest resources

Productive functions of forest resources — together with protective functions and socio-economic functions — represent the key sources of direct value generated by forests for human society. According to the GFRA (FAO 2010), over half of the world's forests are either designated mainly for production of wood and NWFPs or have productive functions among their management objective. Information from 205 countries and areas suggests that close to 1.2 billion hectares, or 30 percent of total forest area globally, had production designated as the main function in 2010 (see Table 4). In addition, a substantial part of the 949 million hectares of forest area designated for multiple uses also has productive functions (FAO 2010).

Box 8: Productive functions and REDD+

"Forests and trees outside forests provide a wide range of wood and non-wood forest products. This theme reflects the importance of maintaining an ample and valuable supply of primary forest products while ensuring that production and harvesting are sustainable and do not compromise the management options of future generations."

Source: FAO 2010

As described in Box 8, forests and trees outside forests provide a range of wood and non-wood products. Depending on how a given forest is managed, the flow of such products may be either sustainable, unsustainable or some gray area in between. The idea behind this element of SFM is therefore not simply to maximize production of wood products in the short term, but rather, through sustainable harvesting, to ensure their availability and continuing supply for future generations as well.

Table 4: Global forest area primarily designated for production

Region	Forest area primarily designated for production	
	Area (1,000 ha)	% of total forest area
Amazon Basin	108,258	14
Congo Basin	58,884	20
Southeast Asia	111,411	46
Rainforest Basins	278,553	21
World	**1,196,168**	**30**

Source: Adapted from FAO (2010).

The relationship between REDD+ and the productive functions of forests should also be understood from this long-term, sustainable use perspective. This is particularly important to recognize in the frequent cases where the advent of REDD+ may lead to reductions in timber production; the question to be asked in this case is how sustainable preceding levels of production may have been. If the answer is "not very", then the opportunity cost of REDD+ is likely to be less than it would otherwise have appeared to be.

The impact of REDD+ on forest management and production may be divided into two main categories:

- the removal of certain forests from timber production entirely, with reduction in attendant impacts, e.g., deforestation in the case of clear cutting followed by conversion, or degradation in the case of damaging logging practices, and
- improved production practices such as reduced impact logging (RIL) and / or forest stewardship council (FSC) certification within production forests.

Large-scale implementation of REDD+ would have significant implications for the timber trade. One important potential effect is to sharply reduce the supply of wood from tropical 'conversion forests.' In the longer term, REDD+ should enable a switch to lower volume but higher value trade in tropical wood products derived from sustainably managed permanent forest estates. Large areas of forest could be completely removed from timber production once an alternative income stream, based on REDD+, became available.

The extent to which REDD+ may induce an outright cessation of logging, as opposed to a shift in logging practices from 'standard' to RIL, will depend on various factors, not least of which will be the relative prices of carbon and timber. The resulting distribution will also affect the extent to which forest production may be reduced.

Beyond the potential impacts on prices and production of forest products, there are various possible synergies between REDD+ and timber supply activities and investments. These are based on the fact that one of the elements of REDD+ is 'sustainable management of forests,' which, in the context of REDD+, refers to management of forest for sustainable timber production. Sasaki and Chheng (2011) estimated the potential for this component of REDD+ as follows:

> By switching from conventional logging to reduced-impact logging practices, International Tropical Timber Organization producer countries could reduce carbon emissions by about 1.2 billion tCO2 year –1 while still producing about 100.4 million m3 of end-use wood for commercial consumption under a 50-year project cycle, results being dependent on the chosen scenario. Study results suggest that a policy of reduced-impact logging combined with a longer cutting cycle and certification scheme is appropriate for SFM projects as a part of the REDD+ scheme. (Sasaki and Chheng, 2011).

One area in which REDD+ is likely to stimulate investment is that of plantation forestry. This is true despite the fact that REDD+ safeguards agreed to at Cancun are designed to ensure that an eventual REDD+ mechanism does not lead to the replacement of natural forests by plantations.

While the above safeguard is a worthy one, it does seem likely that the market response to restricted timber supplies from natural forests would be increases in plantation forestry. This sector is already expanding: according to FAO, tree plantations expanded by about five million ha annually from 2000-2010. Expansion of both large- and small-scale tree plantations is underway across many tropical countries.[21]

4.5 Protective functions of forest resources

Forests provide a wide range of protective functions related to maintenance of ecosystem services. Among these are various watershed services, including provision of clean water, soil quality maintenance, reduced erosion, regulating overland flow, maintaining groundwater and preventing floods. These services regulate the availability and timing of water supplies downstream. Unfortunately, a number of sources (see, e.g., van Paddenburg et, al 2012) have identified a decline in forest ecosystem services, together with significant economic costs, associated with deforestation and forest degradation.

Box 9: Protective functions of forests

"Forests and trees outside forests contribute to moderating soil, hydrological and aquatic systems, maintaining clean water (including healthy fish populations) and reducing the risks and impacts of floods, avalanches, erosion and drought. Protective functions of forest resources also contribute to ecosystem conservation efforts and provide benefits to agriculture and rural livelihoods."

According to the latest GFRA (2010), some 330 million hectares of forests worldwide has been given the primary designation of performing functions like soil and water conservation, avalanche control, sand dune stabilization, desertification control or coastal protection (see Table 5). From 1990 to 2010, the area

[21] http://blog.cifor.org/14298/what-do-people-think-finding-optimism-in-tree-plantations/

thus designated increased by 59 million hectares; it currently accounts for eight percent of the global forest area. Recent increases are mainly due to afforestation and reforestation in China for protective purposes (FAO 2010).

Financing to ensure the continuation of the above important services is made more difficult because of their public goods character. In many countries, costs associated with lost ecosystem services are imposed by private sector actors, such as owners of palm oil plantations or other land uses dependent on forest conversion. Policies to ensure the internalization of such costs are critical to reducing such damages and enhance the flow of ecosystem services. An important category of policy intervention designed to address the above market failures is known as payments for ecosystem services (PES). REDD+, in most formulations, depends on some form of PES mechanism for its operation.

Table 5: Global forest area primarily designated for protection

Region	Forest area primarily designated for protection of soil and water resources in the three rainforest basins, 2010	
	Area (1,000 ha)	% of total forest area
Amazon Basin	53,799	6.7
Congo Basin	645	0.2
Southeast Asia	43,433	17.9
Rainforest Basins	97,877	7.3
World	**329,168**	**8.2**

Source: Adapted from (FAO 2010)

Prior to the adoption of REDD+ safeguards as part of the Cancun agreement in 2010, greater concerns were being raised about various potential trade-offs that could be associated with REDD+. For example, Stickler et al (2009) investigate the co-benefits and trade-offs of REDD+ for non-carbon ecosystem benefits. It identifies several ecological costs (risks) associated with REDD+, which fall within this paper's definition of possible trade-offs. These include the following:

- Potential for leakage of deforestation from high-biomass forests, including rainforests, to low-biomass systems, such as grasslands and savannas;
- Replacement of native ecosystems by tree plantations; and
- Impacts on wildlife that depend on fire, due to increased fire prevention efforts associated with REDD+.

The above and other concerns have been sharply diminished, and in some cases nearly eliminated, by the Cancun safeguards.

Stickler et al (2009) go on to outline the "many more benefits" and the "potential cascade of socio-economic benefits of ecosystems services to local stakeholders who would be unable to afford them," that could be produced by a REDD+mechanism.

> Substantial ecological co-benefits should be conferred under most circumstances, and include the maintenance or restoration of (1) watershed functions, local and regional climate regimes, (3) soils and biogeochemical processes, (4) water quality and aquatic habitat, and (5) terrestrial habitat.

It may be worth noting that many of the above benefits would be generated by altering land use categories from productive uses to protective ones (see Table 5 above). Others would be achieved through more restrained and ecologically sensitive production practices such as reduced impact logging (RIL) (see section 4.4 above).

4.6 Socio-economic functions of forests

Some of the socio-economic functions of forests are closely related to the productive functions discussed in section 4.4 above. For example, employment is associated with harvesting and processing of timber products, etc. The present study will follow the dividing line that seems to be used in the GFRA, which is to assign primary production of timber, among others, to the former element and follow up processing and marketing to the latter (see Box 10). Broader socio-economic impacts, such as those on employment, will also be considered here.

Box 10: Socio-economic functions of forests

"Forest resources contribute to the overall economy in many ways such as through employment, values generated through processing and marketing of forest products, and energy, trade and investment in the forest sector. They also host and protect sites and landscapes of high cultural, spiritual or recreational value. This theme thus includes aspects of land tenure, indigenous and community management systems, and traditional knowledge."

Source: FAO, 2010

Forests are critical to the livelihoods of tens of millions of people around the world. Approximately 10 million people are directly employed in forest management and conservation (GFRA 2010). Millions more benefit from the harvesting and consumption of non-wood forest products (NWFPs). The majority of these revenues generated remains within the informal economy and as a result is not captured in economic statistics.

Beyond the support that they provide to employment and livelihoods, forests offer recreational opportunities to millions. Some 3.7 percent of forests worldwide have been designated for recreation, tourism, education or conservation of cultural and spiritual heritage (GFRA 2010). Such forests embody significant use and non use, including existence values, for human societies locally, nationally and globally.

Another important, though non-marketed socio-economic value of forests is the often centuries-old traditional knowledge associated with the use of forest products and resources. The genetic resources and agro-biodiversity of forests worldwide have been used, cultivated, managed and modified by local people. This rich tradition — codified in language, plant names, local pharmacopeia and recipes — continues to enable the identification of plants and other forest species for food and medicinal

purposes. Traditional knowledge associated with agricultural methods and exploitation of wild plants helps indigenous and local peoples cope with extreme weather conditions and environmental change, and will help guarantee future food security by making agriculture more resilient in the face of climate change. Traditional methods include using local plants to cure diseases, and control pests, as well as choosing and breeding crop varieties which can tolerate extreme conditions such as drought and floods (van Paddenburg et al, 2012).

The values and uses mentioned above are just a few among the many associated with the socio-economic functions provided by forests. Conservation and, where possible, expansion of these functions therefore represent an extremely important element of SFM. As forests disappear or become degraded, their ability to deliver such socio-economic functions decreases. Unfortunately, persisting levels of deforestation and degradation strongly suggest parallel decreases in socio-economic functions and ecosystem services.

Few firm figures are available regarding current levels of SFM finance that target or otherwise benefit socio-economic functions. Such spending could fall within a number of categories and involve domestic and international sources, public and private sectors as well as NGOs. In terms of public sector spending, one such category would involve costs associated with managing areas designated for recreation, tourism, education and cultural and spiritual conservation. Where concession agreements exist, private sector spending will also be evident in managing such areas. The costs of developing infrastructure to enhance socio-economic functions — such as roads and recreational accommodations — would also be included here and borne by public and/or private sectors.

Within the broader forest landscape, a range of public sector social welfare spending exists to support the economic and social well-being of forest-dependent communities, many of whom are among the poorest segments of the population. From the public sector, social spending may include low-interest loans available only for forest-dependent communities, such as are available in Turkey, or technical support for marketing NWFPs. Persisting poverty among indigenous and other forest-dependent groups strongly imply that socio-economic investment falls far short of needs.

REDD+ has the potential to have important impacts on financing of socio-economic functions and, more generally, wide-ranging socio-economic impacts. One area which is not often highlighted is the fact that the expected co-benefit of REDD+ related to its expected positive impacts on forest extent, health and vitality, i.e., forest resources, biodiversity, etc., are likely to correlate with, and feed through to, increased and more sustainable socio-economic 'functionality.'

Second, by putting a value on forest carbon and rewarding those most responsible for the ongoing conservation of forests, namely forest-dependent peoples, REDD+ has the potential to generate important direct improvements in the welfare and standard of living of millions worldwide. These include millions of forest-dependent people who are among the poorest segments of their societies.

> The potential social benefits from carbon finance include new revenue streams flowing to poor communities, particularly in terms of increased, stable and long-term financial and non-financial benefit flows in rural areas, and benefits from the more efficient and sustainable land-use practices it supports (CARE, n.d.; Peskett et al, 2008, referenced in Mohamed 2011)

Indeed, the flow of revenue streams, better known as 'benefit sharing,' is a key element determining the extent of the positive socio-economic impacts of REDD+. This is true for several reasons. First, at local levels, REDD+ incentives need to "…reach both the agents causing the deforestation and degradation and the people who are directly dependent on, and manage, the forest's resources" (Dkamela et al, 2009). Second, equitable benefit-sharing can help "…to build wider national (and international) legitimacy and support behind the REDD+ mechanism" (Peskett et. al 2008). Thus, REDD+ cannot work effectively without this co-benefit.

Weighing against the above projected co-benefits are certain trade-offs and associated risks. One of these is the potential for REDD+ to have impacts upon commodity prices. For example, by reducing land available for agricultural expansion, REDD+ could lead to significant reductions in local food availability along with potentially large price increases (Peskett et. al 2008). There have also been concerns expressed about the possible speculation over forest land arising from expectations of REDD+ income, including elite capture and the alienation of indigenous communities from their means of livelihood as entrepreneurs and middle-men move in. More broadly, a number of issues have been raised, particularly by representatives of indigenous and other forest-dependent peoples, about potential negative impacts (trade-offs) potentially that may be associated with implementation of REDD+. Issues that have the potential to lead to negative impacts, particularly on the poor, include the following (Peskett et al, 2008):

- Effects on food and commodity prices, which have the potential — depending on how the scheme was designed — to rise due to large-scale implementation of REDD+ (Jindal and Kerr 2007);
- Opportunity cost estimates need to be accurate in order to compensate people who would otherwise 'lose out' from REDD+;
- Stability of benefit flows from REDD+ would be particularly important to the poor;
- Overall equity of benefit-sharing arrangements;
- Asymmetric information availability between 'buyers' and 'sellers' of REDD+ credits, leading to benefits capture by elites, etc;
- Definition of carbon rights, with implications for distribution of benefits;
- Design of verification and compliance systems;
- Corruption, accountability and transparency; and
- Effects associated with the choice of policies and measures for implementation.

4.7 Legal, policy and institutional framework

According to GFRA (GFRA 2010:185), at least 156 countries have a specific forest law that regulates forest management. These laws, together with the institutions that uphold them and the policies and regulations that arise from them, play a critical, enabling role in forest management. Together, the legal policy and institutional framework provides an essential underpinning for the six other elements of SFM.

Most analysts would conclude that the current legal, institutional and policy framework — both in its essence and in terms of how it is implemented — exhibits substantial shortcomings in many countries around the world. The reasons for this situation are varied. However, it is perhaps best understood through a political economic lens in which state and non-state actors are seen to have a strong vested interest in a status quo that does not benefit a broader 'public interest.' A recent analysis by Gregersen et al (2010) describes the situation with respect to illegal logging as follows:

> In some cases, the political cost of containing vested interests and corruption that enables illegal logging could be perceived as extremely high for the government decision makers involved, even though it could yield collective net gains for nation as a whole. This is characteristic of the so-called "governments with private agendas" (Laffont, 2000) where prominent positions (including chances of being reelected) and personal enrichment of those in charge of the administration, depend on their capacity to redistribute riches into their networks and to give powerful economic interests access to natural resources. (Gregersen et al, 2010)

The opportunity created by REDD+ is often referred to as a 'game changer'; this may be because REDD+ has the potential to literally change the rules by which the game is played. REDD+ places important demands on the legal, policy and institutional framework. Some of these demands are specific to REDD+ alone. However, many others are of a broader nature. The process of satisfying these broader demands through legal, policy and institutional reform has the potential to create important benefits for other areas of forest governance — therein lies the 'game changer', or 'transformational change' claim.

> Transformational change requires a state that can operate with some autonomy from the sectors driving deforestation and forest degradation and work in the interest of society at large (Karsenty and Ongolo 2012). Autonomy of the state refers to the degree to which state actors can make policy decisions independently from various sectors. The form that autonomy takes is the product of the specific history of nation states. A state must be able to withstand lobbying pressure from sectors that benefit from forest exploitation and land use changes, for transformational change to occur." (Angelsen et al, 2012)

If REDD+ is able to achieve 'transformational change' in forest law, policy and institutions — particularly in heavily forested and rapidly deforesting countries where it is likely to be most extensively applied — then the potential for broad-based 'co-benefits' is substantial. Such co-benefits would extend from the element under consideration here to other areas of SFM such as socio-economic functions and biodiversity where poor governance is currently having negative impacts on sustainability. The creation of new coalitions, representing "broad and inclusive alliances" (Angelsen et al, 2012) will be important in ensuring such transformations.

The likelihood of this occurring in any particular country will of course vary according to country circumstance. According to (Angelsen et al, 2012), four policy-related pre-conditions need to be met in order for REDD+ to overcome political and economic 'hurdles':

Box 11: Legal, policy and institutional

Legal, policy and institutional arrangements – including participatory decision-making, governance and law enforcement, and monitoring and assessment of progress – are necessary to support the above six themes. This theme also encompasses broader societal aspects, including fair and equitable use of forest resources, scientific research and education, infrastructure arrangements to support the forest sector, transfer of technology, capacity-building, and public information and communication."

(GFRA, 2010)

> Achieving emission reductions through REDD+ requires four preconditions for overcoming politico-economic hurdles: i) the relative autonomy of nation states from key interests that drive deforestation and forest degradation; ii) national ownership over REDD+ policy processes; iii) inclusive REDD+ policy processes; and iv) the presence of coalitions that call for transformational change. (Angelsen et al, 2012)

However, one common factor (see Section 3 above) is the scale at which REDD+ takes place. A small-scale effort at global and national levels would be unlikely to reach the kind of 'critical mass' needed to effect transformational change. This is a good illustration of the non-linear relationship between REDD+ and SFM benefits, since there may be a point — at either national or supra-national scale — at which REDD+ acquires a scale and associated momentum necessary to effect major policy, legal and institutional changes, thus dramatically increasing co-benefit-related 'returns'.

One type of institutional reforms that could be stimulated by the need to implement REDD+ but that could have broader co-benefits is the introduction of a landscape perspective. Such reforms would involve the integration of planning and implementation around the conservation, management and use of natural resources across a landscape and would take account of both production and conservation goals and targets. Institutionally, this approach can involve either the consolidation of authority under a single ministry or a high level of coordination among responsible government bodies. As pointed out by (FONAFIFO, CONAFOR and Ministry of Environment 2012), "Inter-sectoral and inter-ministerial coordination are top priorities for REDD+ readiness and implementation, *to reduce trade-offs and take advantage of potential synergies*" (emphasis supplied).

Land tenure reform is a second important area where REDD+ has the potential to have a broader impact on legal and policy SFM baselines. Conflicts relating to the land rights of local and indigenous peoples have been described as "one of the most persistent challenges in forest governance, from well before carbon markets entered the scene (Diaz et al, 2011)" REDD+ has only increased tensions in this regard, from New Zealand (Rights and Resources 2010) to Guyana (Forest Peoples Program 2011) and beyond. Conflicts and uncertainty over land rights are an important source of risk for REDD+ projects and the advent of REDD+ has done nothing if not bring such issues to the fore. Indeed, concerns have been raised that REDD+ would lead to an *erosion* of the rights of local and indigenous peoples, thereby creating a significant, and perhaps unacceptable, trade-off.

Evidence that land rights uncertainty is already having an impact on implementation of REDD+ comes from a review of data by (Diaz et al, 2011), which indicates that most REDD+ projects are taking place on privately owned and managed lands.

> Although 30% of projects from non-profit developers included lands with communal or customary use or ownership rights within the project area, only 17% were exclusively on these types of lands; for for-profit developers, the contrast is more stark, with 25% of projects including communal or customary lands in the project area, but only 2% of projects developed exclusively on these lands. (Diaz et al, 2011)

In one sense, this result is unsurprising, given that project developers are for the most part likely to locate projects in areas where they have the greatest likelihood of success. In the case of land tenure, this implies stable legal environments and sites where land tenure and ownership are relatively clear.

Within this problem, however, lies an opportunity. As REDD+ expands, and developers turn by necessity to more challenging locations, they may find themselves depending increasingly on a friendlier enabling

environment. This may in turn create new pressures for governments to address long-standing tenure issues in order to capture REDD+ benefits:

> Encouraging the resolution and clarification of land rights in areas of conflict holds immediate potential for improving forest governance and conservation, as well as offering expanded opportunities in the forest carbon markets by creating a more stable legal environment that project developers and investors need to bring carbon finance to bear at greater scale." (Diaz et al, 2011)

Finally, REDD+, like forest management as a whole, will require significantly enhanced capacities on the part of national government counterparts in many countries.

4.8 Directionality and significance of REDD+ impacts on SFM financing and achievement, by element

As sub-sections 4.1-4.7 have demonstrated, REDD+ has the potential to have significant impacts on SFM financing and achievement. In addition to country-level variation—to be discussed in Section 5 below—impacts will also vary by SFM element.

Table 6 below summarizes these impacts by SFM element, on a scale from -5 (high degree of trade-offs) to 5 (high level of co-benefits), will 0 indicating a neutral relationship. These scores are shown as a range, indicating that both the final design and manner in which REDD+ is implemented will affect its impact on SFM.

As shown in the table, the projected impacts are nearly all positive, with the exception of productive functions. The latter is based on the probably inescapable conclusion that REDD+ will increase timber production costs.

On important reason for the largely positive scores is the agreement on REDD+ safeguards that made under UNFCCC. From the perspective of co-benefits and trade-offs, safeguards may be thought of an essential mechanism for ensuring the former while minimizing the latter. Of course, regardless of safeguards on paper, REDD+ mechanism design and implementation will be the ultimate determinants of the scale and directionality of element-level impacts.

It is worth noting that a possible impact like "increased agricultural prices" — which may arise due to limitations on forest land conversion — are not captured by this analysis, given that they are not tied to any specific SFM element.

Table 6: Projected direction and scale of REDD+ impact on SFM elements

Element	Potential low-end impact	Potential high-end impact
1 – Extent of forest resources	++	+++++
2 – Forest biological diversity	+	++++
3 – Forest health and vitality	+	++++
4 – Productive functions of forest resources	---	+
5 – Protective functions of forest resources	+	++++
6 – Socio-economic functions	-	+++
7 – Legal, policy and institutional framework	++	+++

Source: Author's qualitative assessment

5. Where will REDD+ happen? REDD+ geographic distribution and its impacts on SFM

Sections 3 and 4 above have presented a global-level overview of the impacts of REDD+ on SFM financing and outcomes. In terms of the global SFM financing challenge, the impacts of REDD+ were found to depend on the scale at which REDD+ is implemented and the per unit SFM co-benefits and trade-offs generated by the mechanism. To the extent that REDD+ produces net co-benefits, these will serve to reduce overall levels of other SFM financing required to meet any given level of sustainability targets.

As outlined in previous sections, the ability to generate reasonably accurate global-level estimates of the contribution of REDD+ to addressing SFM financing needs will depend on availability of the following data: (i) the scale of the SFM financing challenge, as compared with current financial flows, i.e. the financing gap, (ii) the eventual scale of REDD+, possibly one associated with an agreed global deforestation reduction target, and (iii) agreement on the nature of the REDD+ mechanism to be put in place, which is key to understanding its SFM co-benefit generating potential. At present, all of these variables remain poorly understood, unknown and / or 'to be determined'.

In theory, having data on (iii) above would allow for certain global-level conclusions to be drawn regarding average (mean or median) per unit[22] SFM impacts. Together with the other data points mentioned, and rough breakdowns by SFM element, this would help answer questions like: (i) what percentage of the global biodiversity conservation financing challenge could be 'resolved' through a given REDD+ mechanism?; (ii) what overall level of non-carbon benefits associated with which SFM elements could be derived from REDD+?, and; (iii) for which SFM elements would major financing challenges remain?

The above are important questions. They are essential for understanding the overall global cost effectiveness of REDD+, which, given its potential to generate SFM-related co-benefits, will not be based solely on per tonne carbon values. Answers to these questions are thus of equally important for making allocational decisions across the spectrum of potential carbon mitigating sectors.

However, such global-level calculations would be of only partial value to individual countries and sub-national locations trying to assess the potential SFM-related benefits of REDD+. To understand why this is the case, it is helpful to go back to the conceptual framework presented in section 2.3 above. As discussed there, while some countries will attract higher levels of REDD+ financing than others, not all countries will attract REDD+ financing in direct proportion to their SFM financing needs. Nor will all countries have an equal ability to generate SFM co-benefits through REDD+ investments. Countries are thus widely distributed along a multi-directional scale of REDD+ financing potential, SFM financing needs and co-benefit generating capability.

[22] See section 2.3

A variety of factors will determine a country's precise location on this scale. For example, country x may have outstanding opportunities for low-cost generation of carbon credits compared with country y, perhaps due to differences in opportunity costs. However, if country y is nevertheless facing relatively significant challenges relates to financing SFM, then REDD+ will be proportionally less helpful to it in resolving those challenges.

National-level divergences between SFM financing challenges and REDD+ opportunities, as well as the very different costs of generating SFM and REDD+ benefits in different countries, will thus contribute to differences in national-level impacts of REDD+ on SFM financing and achievement. In this light, it becomes important to understand where extensive REDD+ efforts and associated financing are most likely to emerge and how this geographic breakdown compares with that of unmet SFM financing needs.

This section begins with an overview of the geographic breakdown of REDD+ and SFM financing to date. Following this overview, it briefly introduces a range of factors that will affect individual countries' ability to benefit from REDD+ and thereby to address their respective SFM financing challenges. In so doing, it aims to highlight countries and/or country types that may be expected to benefit disproportionately — in either a positive or negative sense — in terms of positive impacts of REDD+ on SFM financing and achievement.

5.1 Geographic breakdown of REDD+ financial flows to date

An analysis of data contained in the Voluntary REDD+ database (VRD) as of 3 July 2012 provides a useful breakdown of REDD+ support to date, by country and region. Data was analyzed for countries receiving over US$ 10 million in support (as reported by funders), which together accounted for 96% of total reported funding.

Based on data reported to the VRD, US$ 5.73 billion had so far been committed to 42 countries in Africa, Asia, and Latin America. In regional terms, approximately US$ 3.04 billion (or 55% of the global total) had been committed to Latin America, US$ 1.83 billion (33%) to Asia and US$ 623 million (11%) to Africa.

At the level of individual countries, Table 7 shows the top 10 recipients of REDD+ support, together with the percentage of the global total. As shown, REDD+ funding to date has been highly concentrated, with US$ 4.67 billion, or over 85% of total funding, directed towards 10 countries, and 51% to the top two — Mexico and Brazil.

Table 7: Top recipients of REDD+ financing

Country	Funding committed (million US$)	% of global total
Mexico	1,424.0	26%
Brazil	1,365.1	25%
India	637.6	12%
China	470.6	9%
Indonesia	392.2	7%
Philippines	88.1	2%
Tanzania	86.7	2%
Guyana	79.5	1%
DR Congo	72.5	1%
Costa Rica	56	1%
Total	4,672.3	85%

Source: Based on data in Voluntary Carbon Database (www.reddplusdatabase.org), accessed on 3 July 2012.

5.2 Deforestation trends and REDD+ funding

The first target of REDD+ is to contribute to climate change mitigation efforts by enhancing carbon storage and sequestration as compared with a baseline scenario. Baseline trends in deforestation and forest degradation are thus the fundamental determinant of a country's potential participation in REDD+. This means that countries with high historic rates of deforestation are also those most likely to benefit from a REDD+ payment mechanism. In SFM terms, this is one of the clearest examples of co-benefits — in this case related to element 1, extent of forest resources. Most countries benefiting from REDD+ will be doing so because they are lowering their historical and/or projected future rate of deforestation. In so doing, they will almost by definition be moving — perhaps dramatically — in the direction of SFM financing and achievement.

Determining where REDD+ implementation and financing will take place is therefore closely related to recent and projected patterns of deforestation. Table 8 below presents data from GFRA (FAO 2010) showing annual area and percentage changes by region from 1990-2000 and from 2000-2010. As shown in the table, Africa and South America show moderate declines in deforestation from the earlier to the later decade. Asia, on the other hand, shows net gains due to extensive afforestation efforts in China. As a result, Latin America and Africa are responsible for over 100% of global net deforestation during the 2000s. It is worth noting that sub-regional breakdowns indicate high ongoing levels of deforestation in Eastern and Southern Africa (-1.8 million ha/yr), Western and Central Africa (-1.5 million ha/yr) and South and Southeast Asia (-677,000 ha/yr).

Table 8: Annual changes in forest area by region, 1990-2010

Region	1990-2000		2000-2010	
	1,000 ha/yr	%	1,000 ha/yr	%
Africa	-4,067	-0.56	-3,414	-0.49
Asia	-595	-0.10	2,235	0.39
Europe	877	0.09	676	0.07
North and Central America	-289	-0.04	-10	-0.0
Oceania	-41	-0.02	-700	-0.36
South America	-4,213	-0.45	-3,997	-0.45
World	**-8,327**	**-0.20**	**-5,211**	**-0.13**

Source: FAO 2010.

A recent report from the Center for Global Development (Wheeler et al, 2011) presents additional country-level details regarding trends in large-scale tropical forest clearing. The report looks at 27 countries which together accounted for 94% of clearing during the period 2000-2005; it assesses the extent of clearing in these countries between December 2005 and August 2011, using a system called Forest Monitoring for Action (FORMA).

Overall, FORMA identifies a recent decline in levels of forest clearing that appears to be linked to the global economic recession. The report presents data for the month of August 2011, showing the share of total forest clearing accounted for by each of the 27 countries in the database. This data indicates a substantially greater concentration of deforestation than was evident from the earlier period.

The analysis indicates a relatively high level of concentration of deforestation, with 89% of the total for the 27 countries concentrated in just three countries and only seven countries having more than 1% of the global total (see Table 9).

Table 9: Amount and share of total forest clearing by country (12-month moving avg, as of Aug, 2011)

Country	Annual forest clearing, ha (Sept 2010-Aug 2011) (ref. Wheeler et al)	Share of total forest clearing, Aug 2011 (%)
Brazil	1,702,606	61.04
Indonesia	385,296	16.45
Malaysia	285,504	12.19
Myanmar	48,396	2.07
Paraguay	44,496	1.90
Peru	35,796	1.53
Venezuela	27,204	1.16

Source: Wheeler et al, 2012. Percentages are based on a sample of 27 countries that accounted for 94% of global clearing during the period 2000-2005. For this reason, as a percentage of total global clearing, these relevant figures would be slightly lower than those shown here.

Table 10 below calculates for top forest clearing countries the amount of REDD+ funding committed to date per ha of forest cleared annually. It shows that, to date, top deforesting countries have received commitments ranging from US$ 80 to US$ 1,182 per annual ha of deforestation, with an average from this group of US$ 735 per ha.

Table 10: REDD+ funding to date compared with deforestation levels for top deforesting countries

Country	Annual forest clearing, ha (Sept 2010-Aug 2011) (ref. Wheeler et. al)	Funding committed (million US$)	Funding committed per ha forest cleared annually (US$)
Brazil	1,702,606	1,365.1	801
Indonesia	385,296	392.2	1,017
Malaysia	285,504	22.7	80
Myanmar	48,396	23.8	492
Paraguay	44,496	7.9	178
Peru	35,796	42.3	1,182
Venezuela	27,204	4.2	154
Total	**2,529,298**	**1,858.2**	**735**

Source: Based on data in Voluntary Carbon Database (www.reddplusdatabase.org), accessed on 3 July 2012. Calculations by author.

Data covering finance channeled through 'dedicated climate funds' from 2004-2011 shows that Latin America received the most REDD+ finance, with US$ 178 million approved and US$ 73 million disbursed to the region. Much of this funding was focused on Brazil and its Amazon Fund, for which US$ 143 million was approved and US$ 49 million disbursed during the period. In the case of Sub-Saharan Africa, US$ 119 million was approved and US$ 47 million disbursed for REDD+. Here, the Democratic Republic of Congo (DRC) has been a major recipient, with US$ 66 million approved and US$ 16 million disbursed. The Congo Basin Forest Fund (CBFF) has also been a key partner here. In the case of Asia, Indonesia has been the biggest recipient of REDD+ finance from these sources, with US$ 42 million approved and US$ 40 million disbursed (Nakhooda and Caravani 2011).

5.3 Opportunity costs, cost effectiveness and REDD+ financing

Deveny et al. (2009) present a *Forest Carbon Index* which describes "the geography of forests in climate solutions". While their estimates of overall scale appear so far to have been overly optimistic — for example, they projected the potential value of forest carbon markets at US$ 18 billion per year between 2013 and 2020 — nevertheless their geographic breakdowns remain of interest. The Forest Carbon Index (FCI) is designed "to compare the ability of individual countries, or even specific locations within countries, to produce forest carbon credits." FCI scores are set on a scale of 0 to 100, with 100 as the best score worldwide. The index is based on profit potential multiplied by a risk factor and considers both afforestation / reforestation (A/R) as well as REDD.

According to the FCI, the best places for low-cost investments in forest carbon are the Congo Basin, the Amazon-Andes, Borneo-New Guinea, the Guyana Shield and Mesoamerica. In terms of scale, they estimate the total quantity of forest carbon stock available for under US$ 10 per ton CO_2eq as almost 157Gt CO_2eq covering more than 7 million km^2. The majority of low-cost forest carbon is to be found in the Congo Basin.

Unlike the deforestation example above, there is on the surface no obvious correlation, positive or negative, between the cost effectiveness of REDD+ credit generation and the generation of SFM co-benefits. Nevertheless, the fact that cost effectiveness will ultimately play an important limiting role in determining REDD+ scale does suggest that SFM financing efforts will be especially needed in countries and areas which combine ongoing high deforestation rates with high opportunity costs. Such areas would benefit disproportionately from efforts to stack, bundle or otherwise incorporate additional ecosystem values into REDD+ payment mechanisms, as well as from broader, 'green economy-style' efforts to internalize biodiversity and ecosystem values through incentive-based mechanisms

5.4 Low carbon and low forest cover issues and REDD+ financing

Low forest cover countries (LFCCs) are defined as those possessing limited forests and generally marginal forest sectors. However, existing forests and trees still provide invaluable services and products to residents of these countries [121;7]. Simula (2008) notes that this group of 49 countries appears to have experienced long term declines in forest sector financial flows. In assessing the LFCCs' REDD potential, the author divided them into three groups: countries with high deforestation, countries with low deforestation and countries with zero deforestation or increasing forest area. Simula concluded that countries with high deforestation rate have high or medium potential for REDD, whereas countries with low or no deforestation have low potential.

As pointed out in the *Strategic Framework for Forests and Climate Change* (2008), a proposal by the Collaborative Partnership on Forests (CPF) for a coordinated forest-sector response to climate change, arid and semi-arid forests have relatively low carbon content, partly because they are in general less productive but also often due to their degraded status. Nevertheless, such forests have important ecological and socio-economic values, including serving as buffers between agricultural lands and more dense forest areas, and providing firewood to local communities. The extent to which they may benefit from REDD+ will depend on REDD+ design, including the extent to which carbon management can be integrated with policy goals such as soil conservation and poverty alleviation for these forest types. To the extent that this is achieved, countries having predominantly or wholly these forest types may yet benefit from REDD+ in terms of SFM.

5.5 High forest, low deforestation (HFLD) countries and REDD+ financing

Concerns have been raised that if REDD+ fails to adequately incentivize conservation of forests within HFLD countries, then deforestation incentives will 'leak' in the direction of these countries. To the extent

that these countries then suffer negative impacts from deforestation — in particular due to loss of biodiversity and ecosystem services — they may end up in net terms worse off than in a pre-REDD+ world.

> …if the REDD+ regime that emerges from negotiations fails to provide incentives for "high forest cover, low deforestation" (da Fonseca et al, 2007) countries to maintain their forests, then it is likely that deforestation that previously occurred in other countries will likely move into these intact forest areas, leading to increased greenhouse gas emissions and biodiversity loss. (Harvey et al, 2009)

Key issues for REDD+ design include the inclusion and rewards for conservation as well as the importance of forward-looking baselines that include potential risks of increased deforestation rates among what are currently HFLD countries. The IWG/IFR Summary describes this situation as follows:

> Enhanced REDD+ partnerships should accommodate developing forest countries through a phased approach, reflecting their different circumstances. All developing forest countries, whether they currently have high or low deforestation rates, should be incentivized to participate to maximize the impact and to minimize the risk of leakage (i.e., so that emissions avoided in one country do not simply reappear in another). (IWG/IFR Summary 2009)

On the whole, however, countries with lower rates of deforestation countries should of course expect substantially less in the way of SFM benefits from REDD+. To the extent that SFM challenges are particularly intense in countries experiencing deforestation, however, the practical importance of this correlation will be lessened.

5.6 Small Island Developing States (SIDS) and REDD+ financing

Five Small Island Developing States (SIDS) have current or committed REDD+ financing. Papua New Guinea, Guyana, Suriname and Vanuatu are all members of the World Bank's FCPF, while Papua New Guinea and the Solomon Islands participate in the UN-REDD Programme. Overall, according to a review of REDD+ and SIDS, only nine of 38 SIDS surveyed had received, or had a commitment to receive, carbon-related forest financing (Indufor, 2010b).

SIDS, like LFCCs, appear to have suffered from long-term declines in forest sector financial flows (Simula 2008). However, it remains unclear the extent to which, if any, this may be due to deleveraging associated with the advent of the REDD+ mechanism.

6. Integrating REDD+ with existing SFM initiatives

This section discusses how to make REDD+ work in a synergistic and integrated way with baseline SFM initiatives. Doing so is an important challenge in ensuring that REDD+ avoids overlaps and makes a maximum contribution to supporting the financing and achievement of SFM. It should be noted that, unlike in much of the literature, the emphasis here is on what REDD+ can contribute to SFM, rather than vice versa.

The section considers the relationship between REDD+ and the following SFM initiatives, each of which generates benefits related to multiple elements of SFM: (i) FLEGT, (ii) community-based forest management, (iii) reduced impact logging (RIL) and (iv) protected areas management. A final sub-section considers an example from Zambia, where a recent attempt was made to work with a combination of REDD+ and SFM criteria in order to prioritize possible REDD+ sites.

6.1 Forest Law Enforcement, Governance and Trade (FLEGT)

The European Union's Forest Law Enforcement, Governance and Trade (FLEGT) initiative is an initiative designed to assist developing countries in preventing illegal logging and in benefiting from timber markets. As a relatively broad initiative, FLEGT targets multiple SFM elements, including governance (#7) and productive functions (#4), while producing co-benefits across a range of remaining elements. In each of these areas, FLEGT has important actual and potential overlaps with REDD+. These overlaps provide significant opportunities for realizing synergies and, in some cases, create risks of overlap. Depending in part on the timing according to which each effort advances in a given country, there are clear opportunities for REDD+ to contribute to FLEGT and vice versa. Specific areas of potential synergy are discussed below.[23]

Addressing drivers of forest loss

One key factor in defining the relationship between the two initiatives is the fact that FLEGT is focused on addressing and reducing some of the key direct drivers of forest loss. A series of Briefing Notes on FLEGT – REDD+ linkages (Proforest, 2011) identifies nine drivers of deforestation and degradation all of which, by definition, are of interest to REDD+. The nine drivers are presented in Table 11 below, together with a summary of how FLEGT may contribute to addressing them.

[23] These are drawn directly from Proforest (2011)

Table 11: FLEGT and drivers of deforestation

Direct driver of deforestation and/or degradation	Extent to which driver is addressed by FLEGT
Commercial logging	Addresses degradation which occurs when commercial activities don't fully implement legal requirements such as those requiring low-impact harvesting. These exist in most REDD+ countries but are not fully enforced.
Illegal logging	Addresses deforestation and degradation from illegal logging which is a major driver of forest degradation and loss in many REDD+ countries
Energy (fuelwood, charcoal, etc.)	May have some impact on illegal collection of wood through better governance and enforcement
Clearance for legal commodity and subsistence agriculture	Not directly
Illegal clearance for agriculture	May address to some extent, as governance is addressed and income from illegally harvested timber (which is often used to cover the costs of clearance) is reduced. Depending on stakeholder interest (?) could seek clarity in legal requirements for land clearance and prevent sale of timber from illegal land clearance.
Land speculation (clearance to secure title)	May impact indirectly if illegally harvested timber is harder to sell and so clearance costs harder to cover
Infrastructure and mining	May impact on illegal or informal mining activities if there is a general improvement in governance and if sale of timber arising from illegal activity is prevented
Fire	May reduce incidence of illegal or accidental fires if there is a general improvement in governance

Source: Proforest (2011).

Addressing Challenges of Governance and illegality

Both FLEGT and REDD+ aim to address the critical issue of poor governance, which underlies the illegal logging and related trade as well as other causes of forest loss. FLEGT supports work in this area through its Voluntary Partnership Agreements (VPAs).

Effective processes

FLEGT and REDD+ have the opportunity at country level to learn practical lessons from one another related to implementation processes. These may include:

- Consultation and multi-stakeholder processes,
- Reaching different stakeholder groups,
- Dealing with external pressures on the process,
- Negotiation to implementation,
- Bilateral negotiations.

Mechanisms for MRV

There are important overlaps / opportunities for synergy between REDD+ and FLEGT in the area of MRV. These include:

- *Monitoring of forest management and condition*: This represents a key component of both REDD+ and FLEGT's Legality Assurance Systems (LAS).
- *Overlapping capacity needs*: These include institutional and technical capacities to monitor deforestation and degradation, particularly where these processes are related to illegal activities. Data and skill sets built for REDD+ -related MRV will be in demand for FLEGT-related responsibilities, and vice versa.
- *Transparency*: Encouraging the public availability of information related to forest sector activities will be an important part of both efforts.

Harmonised aid delivery

FLEGT and REDD+ initiatives need to give importance to the issue of donor coordination. Among other problems, failure to coordinate adequately between donors providing FLEGT VPA funding and those providing REDD+ funding may contribute to friction between departments in beneficiary countries.

6.2 Community forestry

In the past 30 years, communities have become increasingly engaged as forest owners or in the management of state-owned forest resources. It is estimated that some 25% of global forest area is now under community tenure or management. The effectiveness of community-based forest groups (CBFGs) has therefore become an increasingly important determining factor in the goal of achieving SFM. However, as described in Viana et. al. (2012) a number of challenges continue to face community forestry:

i. ensuring long-term financial support for communities, including compensation for all costs they incur when changing forest management practices (mainly different sorts of restrictions on the use of forest resources);

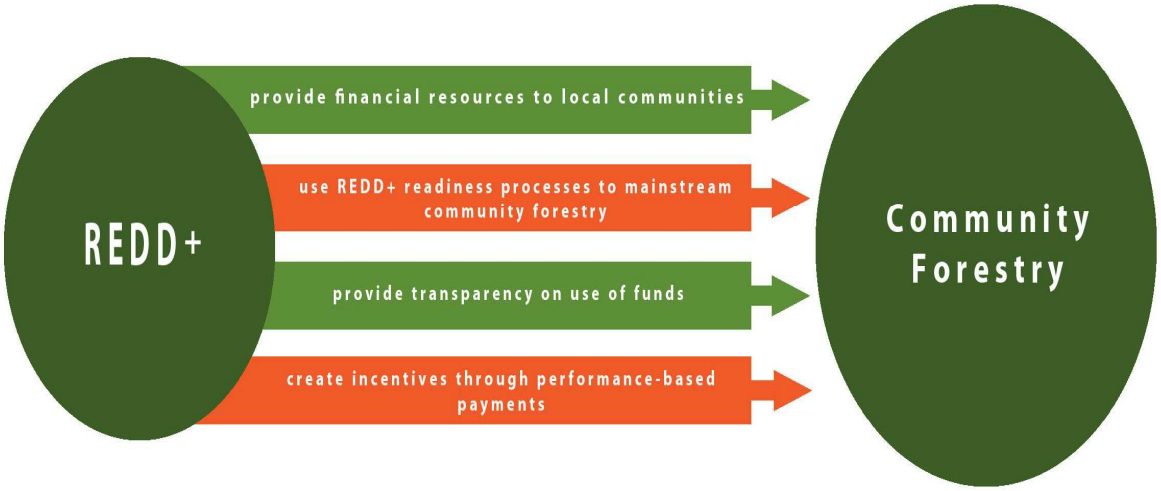
ii. the low level of social and human capacity across many forest communities, as well as the very definition and boundaries of "community" in many cases; and

iii. ensuring fair benefit sharing at the local level.

It seems clear that existing community forestry systems and capacities represent an important foundation upon which REDD+ can build in many cases. These systems can be instrumental in helping to clarify land and forest use rights and ownership; in developing local-level benefit-sharing mechanisms, and; in adding value to forest products and services. All of these are essential aspects of a successful REDD+ strategy.

Given the actual and potential contribution of community forestry to REDD+, the question becomes how REDD+ can help itself by contributing to financing and achieving solutions to the above challenges. In so doing, REDD+ can simultaneously contribute to SFM while ensuring effective functioning of target carbon-related aspects.

Figure 2: REDD+ contribution to strengthening of community forestry systems



Source: Author, based on Viana et. al. (2012).

Viana et. al. (2012) have identified the following specific ways in which REDD+ can foster community forestry (see also Figure 1 above):

(i) providing a long-term, steady flow of financial resources to local communities that are able to demonstrate "verifiable" emission reductions, as a way to pay them for the global-level environmental service being carried out (carbon storage);

(ii) promoting national REDD+ Readiness processes, as various countries are currently seeking cost-efficient options to effectively reduce deforestation so that they can access REDD+ resources, and use this as a "window of opportunity" to mainstream community forestry as an efficient and effective strategy to reach REDD+ goals;

(iii) providing transparency—REDD+ financial resources will be subject to close international scrutiny. Hence, countries have an incentive to develop a transparent mechanism to channel resources to the local level; and

(iv) serving as a "performance-based" type of payment, as REDD+ encourages stakeholders at all levels to continuously improve the actions aimed at reducing deforestation and degradation, in order to ensure uninterrupted payments."

Several Readiness Preparation Proposals (R-PPs) make reference to the importance and potential role of community forestry systems. For example, in Nepal, Community Forestry User Groups represent one third of the country's population. Their Federation, known as FECOFUN (Federation of Community Forest Users of Nepal) will play an important role in facilitating the consultation process to be undertaken during the R-PP. In addition, the R-PP highlights an urgent need to determine and record the boundaries of existing Community Forest User Groups.

In Cameroon, community forests cover an area of some 1.5 million ha. Community forestry there has its origins in the 1994 Forestry Law which defines a community forest as a space – not exceeding 5,000 ha – that is subject to a management agreement between a village community and the authorities. This agreement confers management responsibilities on the community, with the assistance of the authorities. The process includes consultation meetings to delimit the spaces and decide how to manage and exploit forest resources. The mixed results of the acquisition process, community management and the stimulation of local development are useful lessons for the REDD+ process. According to the 'strategy options' described in the R-PP, community and communal forests

> will be given serious consideration and specific actions may be dedicated to them. These actions may include, for example:
>
> - strengthening the management of community forests: implementation of simple plans for management and recycling of environmental products and services);
> - integration of agricultural / forestry / energy-related activities;
> - identification of the conditions (regulatory, social, etc.) in which communal forests could guarantee over time a reduction of deforestation and degradation. (FCPF, 2012).

6.3 Reduced impact logging (RIL)

Reduced Impact Logging (RIL) clearly has the potential to contribute to REDD+. At the same time, REDD+ represents an important added incentive for companies and governments to undertake RIL.

Several studies have examined the potential carbon benefit associated with RIL. Putz et. al (___) reviewed over 100 studies covering all major tropical forest regions and concluded that, on average, following logging of primary forest, an average of 76% of carbon was retained. However, the levels at individual sites varied significantly according to the logging method employed. The study concludes that greater investments in RIL, as well as post-harvest silviculture, had the potential to reduce carbon loss from logging while generating multiple additional benefits.

HoB work found that approximately 115 million additional tonnes of carbon could be stored by implementing RIL in 158 timber concessions across the Heart of Borneo. The report estimated the social value of this level of carbon storage at close to US$4 billion.

6.4 Protected areas management

A major focus of efforts to conserve forest biodiversity in recent years has been the expansion and improved management of national protected area (PA) systems. The Global Environment Facility (GEF) has been a leading donor in this area, with most protected area projects being implemented on its behalf by either UNDP or the World Bank.

Since at least 2007, the GEF has made sustainable financing of protected area systems at national level one of its strategic priorities or areas of focus. Given the large percentage of developing country PAs found within forest ecosystems, the work undertaken under this theme is an important potential source of insight into the challenge of financing the biodiversity element of SFM.

A 2010 UNDP report titled *Financial Sustainability of Protected Areas in Latin America and the Caribbean* (Bovarnick et. al. 2007) provides a detailed look at PA financing availability as well as gaps. The report, which is based on detailed assessments of every country in the region with the exception of Venezuela, estimates the total resources available for PA systems in the region at US$ 402 million per year. This figure represents an estimated shortfall of US$314 million per year to meet basic management needs and approximately US$ 700 million per year to achieve a more rigorous ('optimal') level of management. In percentage terms, the financing gap is 44% to meet basic management needs and 64% to meet the costs of "optimal management." Given that forest ecosystems represent approximately 80% of PAs by area, the above-mentioned percentage gaps are likely to hold true for forest PAs.

Thus, in a 'pre-REDD' world, approximately 2/3 of the costs of optimally managing forest protected areas in Latin America and the Caribbean, or approximately US$560 million are <u>not</u> being covered. This underinvestment is contributing to a variety of sub-optimal outcomes, including persisting deforestation and degradation within inadequately protected forest PAs.

As presented in Table 3 above, REDD+ has the potential to meet specific elements of this financial shortfall, including the costs associated with increased patrolling and other management efforts designed to control persisting drivers of deforestation facing protected areas. This means, of course, that the currently most threatened PAs are likely to benefit most and not necessarily those with the greatest biodiversity resources. However, to the extent that deforestation and degradation acts as a dominant driver of biodiversity loss in PAs, a carbon-based prioritization may not prove overly harmful to biodiversity. On the other hand, the benefits in terms of costs covered and benefits achieved, can be expected to be substantial.

6.5 Integrating REDD-SFM and SFM in land use decision-making

In some respects, there is no reason to maintain much of a distinction between SFM and REDD+. However, there are several reasons why such a distinction should, and almost certainly will, be maintained:

- Existing SFM programmes that do not directly target carbon will maintain their identity, partly for institutional reasons, e.g. different donor agencies and national institutions involved;
- REDD+ has impacts that go well beyond the forest sector, particularly related to agriculture;
- REDD+ has a natural affiliation with national mitigation efforts and low-carbon development strategies, which tend to draw it away from agencies responsible for forest management only;
- REDD+ needs its own identity related to carbon, payments and other aspects of its functionality.

Notwithstanding the above constraints, a great deal can be done to integrate SFM and REDD+ at key decision-making points. Doing so is likely to have significant benefits in terms of the cost effectiveness of both REDD+ and SFM investments, thus contributing further to reducing the SFM financing gap.

Practical integration of REDD+ and SFM depends on a wide range of factors operating at various stages, including the design of the REDD+ mechanism, co-ordination of technical co-operation efforts (see above), etc. This sub-section considers the issue of integration at a specific, but important stage of the process, i.e. identification of target sites for REDD+. In doing so, it draws on work done as part of the UN-REDD National Programme for Zambia.

In Zambia, as in all countries, various forest land management options are in use. As part of its support to REDD Readiness in the country, the UN-REDD Programme has prepared a report on "forest management practices with potential for REDD+ in Zambia" (Kokwe and Kokwe (2012). The report assessed a variety of forest and land management practices in order to compare their potential for REDD+. In order to do so, the authors used two sets of criteria. The first of these is described as "an adapted SFM framework to select and analyse the past and existing forest and land management practices for their potential for REDD+ in the Zambian context." Table 12 below presents the assessment criteria and indicator-related questions used in the comparative assessment, with the carbon-related criterion highlighted. It is worth noting that each criterion here is closely related to the SFM elements discussed throughout this report.

The scoring that emerged from application of the above "adapted SFM criteria" was then "further validated" against REDD+ criteria in order to finalize the prioritization. Table 13 shows the REDD+ criteria and related questions.

The above is just one possible approach to take when integrating REDD+ and SFM strategies and investments. It could be argued that a single set of criteria might be more useful in this respect, in which, for example the REDD+ criteria are simply incorporated into an expanded row of the SFM table (see highlighted row of table 12). Nevertheless, this kind of approach is a step in the right direction.

Table 12: SFM criteria and indicators used in assessing alternative land use management options

Assessment criteria	Indicator related questions
Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/surrounding communities? • What is the practice's contribution to GDP?
Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?
Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?
Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?
Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?
Maintenance and enhancement of social, cultural and spiritual beliefs	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?
Adequacy of policy, legal and institutional framework	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice? • What is the level of investment in research and development?

Source: Kokwe (2012)

Table 13: Adapted REDD+ criteria

Assessment criteria	Indicator-related question
1.1 Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?
1.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?
1.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?
1.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?
1.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable to each other?
1.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place
1.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?
1.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?
1.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?
1.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?

Source: Kokwe (2012)

7. Next steps

The present study has focused on the development and initial application of a conceptual framework within which the implications of REDD+ for SFM and SFM financing could be more clearly examined at multiple geographic levels. To the extent that it may have been successful in doing so, this would represent an important step in embedding the REDD+ concept within the broader panoply of SFM and SFM finance concerns.

While it is would certainly be possible to refine and improve on some aspects of this theoretical framework presented here, nevertheless given the relatively rapid development of REDD+, it is recommended that the existing framework begin to be put to use in practical ways. Three broad steps in doing so are recommended below.

First, better financial and other data needs to be identified and/or generated. Additional data is needed in order to quantify the extent of any deleveraging of SFM finance that may be taking place due to within-country or cross-border 'financial leakage'. This issue also relates closely to the need to ensure that REDD+ funding, with its emphasis on generating global benefits, observes the long-standing principle of additionality.[24] In addition, SFM financing gaps need more careful examination and disaggregation at the level of SFM elements. This effort needs to be combined with a quantitative approach to the co-benefit / trade-off relationship among the elements, in particular the relationship between reduced deforestation and degradation, on one hand, and satisfaction of SFM finance needs related to, *inter alia*, biodiversity and socio-economic functions. Data gathering and analysis should consist of a combination of local- and national-level case studies together with global-level analysis. Careful attention needs to be paid to identifying local and national factors contributing to variance from global means. For example, how different are the impacts on socio-economic functions associated with a given level of REDD+ implementation in the Congo Basin vs. the Amazon and why? Identified differences will help policy makers to understand better the nature of remaining SFM financing gaps, even assuming a robust REDD+ mechanism.

Second, the thinking underlying the framework should begin to be operationalized as a tool for SFM financial planning, particularly in countries facing potentially significant influxes of REDD+ finance. This process could build on co-operation already underway through UNFF and other support and could, for example, involve some type of scorecard approach similar to that used by the GEF to examine the financial sustainability of national protected area systems (Bovarnick, 2007). The bottom up, element-based estimation method outlined in Section 3.3 provides a draft framework for how this could be approached. Importantly, extension of this approach could have a concrete impact in demonstrating the importance of co-benefits. Doing so could incentivize further investments in SFM, particularly of financial resources derived from early REDD+ performance payments. This would also be an important step in further integrating and embedding emerging REDD+ strategies into broader SFM processes and

[24] See section 2.3 above for details.

could be incorporated, for example into Readiness Preparation Proposals (R-PPs)[25] and other REDD+ planning documents.

Third, the kinds of issues raised in this paper need to continue to be integrated actively within international discussions related to REDD+. While such topics have been assessed in various studies at bilateral levels (biodiversity and REDD+, indigenous peoples and REDD+, etc), insufficient work has been done to pull these together in an integrated way or with respect to SFM financial needs. It is important at this level to consider carefully any possible tradeoffs between the goals of maximizing REDD+ scale and optimizing unit-based gains to SFM. For example, imposing 'excessive' SFM-related requirements on REDD+ may depress the overall scale of the effort in terms of deforestation reduction and, in the end, lead to lower overall level of co-benefits; it has even been suggested that an over-emphasis on "biodiversity co-benefits risks making REDD+ participation so burdensome as to become a barrier to entry." (Busch et al, 2011:12) Again, this type of relationship requires a more quantitative examination, based on better data, than was possible in the present framing effort.

Finally, the study should serve to reinforce the conclusion that the international community needs to continue its efforts to mobilize finance for the broad range of SFM issues. Even given the uncertainties due to data gaps, etc., it appears clear that substantial SFM financing gaps will remain, particularly among those countries least likely to benefit from REDD+. Combined with a careful and balanced integration of SFM co-benefit issues into the REDD+ mechanism itself, such an effort will be essential to ensuring the long-term achievement of SFM.

[25] The latest R-PP template (version 6) includes a sub-component (4b) for developing an information system for, *inter alia*, multiple benefits.

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Annex 2: Abbreviations and Acronyms

A/R	Afforestation / Reforestation
AGF	Advisory Group on Finance
AHEG	Open-ended Intergovernmental Ad-Hoc Expert Group on Sustainable Forest Management Financing
CBD	United Nations Convention on Biological Diversity
CBFF	Congo Basin Forest Fund
CONAFOR	The National Forestry Commission of Mexico
CPF	Collaborative Partnership on Forests
FAO	The Food and Agriculture Organization of the United Nations
FCI	Forest Carbon Index
FOFMA	Forest Monitoring for Action
FONAFIFO	The National Forestry Financing Fund
FSC	Forest Stewardship Council
GFRA	Global Forest Resource Assessment
GOF	Global Objectives on Forests
HFLD	High forest cover, Low deforestation
IPCC	Intergovernmental Panel on Climate Change
IWG/IFR	Informal Working Group on Interim Finance for REDD+
LFA	Logic Framework Analysis
LFCC	Low Forest Cover Countries
NLBI	Non-Legally Binding Instrument on All Types of Forests
NWFP	Non-Wood Forest Product
ODA	Overseas Development Assistance
PA	Protected Area
PES	Payments for Ecosystem Services
REDD+	Reducing Emissions from Deforestation and Degradation

RIL	Reduced Impact Logging
SFM	Sustainable Forest Management
SIDS	Small Island Developing States
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNFFS	Secretariat of the United Nations Forum on Forests
UNREDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
VRD	Voluntary REDD+ database