The Global Impacts of SmartWood Certification

FINAL REPORT

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Summary of Results

This report examines the changes that 129 SmartWood-certified operations in 21 countries were required to make during their certification assessments, as a means of describing the impacts of forest certification.

The main findings of the analysis were:

- SmartWood certification does change the way that certified forestry operations address environmental, social, economic, forest management and systems issues, and does not simply give a rubber stamp of approval to the "good players" and industry leaders. On average, certified operations were required to make changes affecting fifteen different forestry issues as a result of the certification assessment.

- The impacts of SmartWood certification are not disproportionately focused in any one area, but cover a broad array of forest management issues. The ten issues that certified operations were required to address most often included three social issues (worker safety, training, and communication and conflict resolution with stakeholders), three environmental issues (aquatic and riparian areas, sensitive sites and high conservation value forests, and threatened and endangered species), and four systems issues (management plans, monitoring, chain of custody and inventory).

- The most prevalent environmental impacts of SmartWood certification were improved riparian and aquatic management (required of 63% of operations), improved treatment of sensitive sites and high conservation value forests (62%) and improved treatment of threatened and endangered species (62%).

- The most prevalent social impacts of SmartWood certification were improved communication and conflict resolution with stakeholders, neighbors and communities

(required of 75% of operations), improved worker training (64%) and improved worker safety (56%).

- The most prevalent economic and legal impacts of SmartWood certification were increased understanding of operation profitability and efficiency (required of 50% of operations), improved compliance with laws (40%), and improved treatment of illegal activities and trespassing (25%).

- The most prevalent forest management impacts of SmartWood certification were improved roads and skid trails (required of 60% of operations), improved regeneration and reforestation activities (55%) and improved use of chemicals (48%).

- The most prevalent systems impacts of SmartWood certification were improved management planning (required of 93% of operations), improved monitoring (86%), and improved chain of custody practices (required of 64% of operations).

- Tropical forestry operations, often located in regions with weaker workers' rights laws and operating on slimmer economic margins than their temperate counterparts, experienced significantly higher social impacts than temperate operations. Environmental, economic, legal, forest management and systems impacts were, however, roughly equal.

- The specific wording of over half of SmartWood conditions required substantive, on-the-ground change to occur (versus changes in procedures and processes). When conditions involving environmental and forest management issue were examined alone, the percentage of conditions requiring on-the-ground change increased to 76%.

This project uses data from assessment reports to show that SmartWood-certified operations are making on-the-ground changes to diverse aspects of their forest management as a result of certification. We found this approach to be more systematic than case studies of impacts in a few

regions, and more specific than "checklist"-based approaches that compare certification programs

based on standards alone and are unable to examine how those standards are applied at the

operational level. The next step in a thorough analysis of certification's impacts is to conduct

research that connects the actions described in this report to positive field-level outcomes for

biodiversity, communities and businesses.

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1   Introduction[1]

Since pioneering the concept of sustainable forestry certification 15 years ago, the SmartWood program of the Rainforest Alliance has certified over 15 million hectares of forest in 52 countries. As forest certification gains prominence as a conservation tool, it is worthwhile to step back and examine the impacts of certification on forest communities, ecosystems and businesses. This study does so by examining the changes that certified forestry operations were required to make to become certified – in other words, the improvements that candidate operations had to make to come into compliance with the Forest Stewardship Council's principles and criteria.

Looking at these changes allows us to determine whether certification simply gives a stamp of approval to those forestry operations that are *already* conducting good forestry, or if it creates meaningful change and impacts on the ground. It also allows us to determine the degree to which specific aspects of sustainable forest management, such as high conservation value forests or worker safety, are being improved upon through certification.

This study examines the preconditions and conditions given during the certification assessment process to 129 SmartWood-certified operations in 21 countries. We use this quantitative information not only to investigate impacts, but also to answer questions about potential differences in the application of forest certification in more developed and less developed countries. For example, does certification in less developed countries tend to focus more heavily on social issues than it does in more developed ones, as some observers claim? And if so, does

this social focus come at the expense of environmental impacts, which were one of the main drivers of forest certification in the first place?

This report proceeds as follows. First, we discuss our methodological approach, outlining our system of categorizing impacts and assessing the degree of on-the-ground change, as well as our sampling design and analysis. Next we discuss the results, first presenting an overview of broad-scale impacts, and then discussing specific environmental, social, economic/legal, forest management and systems impacts separately. Finally, we conclude with a discussion of what these results say about the ability of certification to bring about the diverse impacts it was designed to have, and future avenues of research.

2   Approach

2.1   Categorizing conditions by issue

We examined the changes that SmartWood assessors required candidate operations to make as a precondition or condition of becoming certified. A precondition is a change that must be made before a certificate is granted, while a condition is a change that must be made within a given time period after the certificate is granted, usually one or two years (SmartWood 2003). These changes – both referred to as "conditions" hereafter for simplicity - are listed in each certified operation's public summary report, available on the Rainforest Alliance web site. We felt that this conditions-based approach was a more direct way to assess impact than "checkmark" approaches that compare the content of standards alone (e.g. CEPI 2001, Meridian Institute 2001, FERN 2004).

For each condition, we determined which of a predetermined set of 25 environmental, social, economic/legal, forest management and systems issues was being addressed (Table 1 shows a complete list of issues). Our categorization system took into account that a single condition often

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addresses multiple issues, and allowed us to assign as many issues to each condition as appropriate. For example, the condition "Provide employees with safety equipment and ensure they are trained in emergency first aid" would have been classified as addressing the two issues of worker safety and training. We tried to ensure that the classification of each condition was done consistently by performing calibrations where multiple people categorized the same set of conditions and results were compared and discussed.

In the analyses presented in this report, an operation was deemed to have addressed an issue from Table 1 if it was given at least one condition relating to that issue.

Table 1. Environmental, social, economic, forest management and systems themes examined in conditions analysis.

	Aquatic and riparian areas
	Sensitive sites and high conservation value forests
Environmental Issues	Threatened and endangered species
	Landscape-level considerations
	Woody debris, snags and legacy trees
	Soil and erosion
	Communication and conflict resolution with stakeholders, neighbors and communities
	Training
Social issues	Worker safety
	Non-timber forest products
	Worker wages and living conditions
	Special cultural sites
	Profitability of operation
Economic and legal issues	Compliance with state, federal and international laws
	Illegal activities and trespassing
	Long term tenure
	Roads and skid trails
	Regeneration and reforestation
Forest management issues	Chemical use and disposal
	Exotic species and pests
	Conversion to non-forest uses
	Management plan
Systems issues	Monitoring
	Inventory
	Chain of custody

The issues shown in Table 1 were chosen through consultation with SmartWood staff, with the aim of covering a broad array of aspects relevant to sustainable forestry. We grouped the issues into environmental, social, economic/legal, forest management and systems categories for convenience; the placement of some issues could likely be debated.

Due to the large number of different FSC and SmartWood regional standards that are used globally[2], we chose to categorize conditions using an issue-based approach rather than an approach tailored to specific FSC criteria and indicators. For example, our analysis uses the category "aquatic and riparian areas" rather than specifying the FSC criteria and indicators that deal with different aspects of aquatic and riparian area management. While relating the changes required in the conditions back to specific FSC indicators would have been interesting, it would have been an extremely onerous approach given the large number of FSC regions globally.

2.2   Assessing the degree of on-the-ground change

Just as important as the specific issues that SmartWood certification required operations to address is the degree to which those conditions prompt substantive changes on the ground. Subtle differences in the wording of conditions can have potentially different on the ground repercussions. For example, the two conditions "Increase riparian buffer zone width to 30 meters" and "Implement a process for determining the appropriate riparian buffer zone width" both deal with the issue "aquatic and riparian areas." However, in reality these two conditions may lead to very different buffer zone widths, depending on the outcome of the process required in the second condition. A strong focus on on-the-ground (versus strictly procedural) change is something that FSC supporters claim sets their program apart from competitor programs (FERN 2004). The

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[2] The FSC's principles and criteria are applied in all regions. FSC indicators are region/country specific, and are developed by local working groups or, in the absence of a working group, by an FSC-accredited certifier.

approach taken by SmartWood is to assess the field-level impact of procedural or process-based conditions during annual audits and, if found to be insufficient, require corrective action (Richard Donovan, Rainforest Alliance Chief of Forestry).

To explore the question of on-the-ground impacts, we created an additional classification system whereby each issue addressed in a condition was categorized as having either "procedural" or "substantive" impacts. Included in the procedural category were processes or procedures that *may or may not* have on-the-ground impacts. For example, the example given above – "Implement a process for determining the appropriate riparian buffer zone width" – would have fallen into this category, because its ultimate on-the-ground impacts depend on the outcome of the required process. Likewise, the condition "Conduct an inventory of threatened and endangered species" would have been categorized as procedural. On the other hand, those activities that certainly do have on-the-ground impacts, such as "Increase buffer zone width to 30 meters" or "Surround special cultural sites with a buffer during harvest", were classified as substantive.

2.3   *Sampling design and analysis*

Drawing on an approach first identified in Newsom, Bahn and Cashore (forthcoming), we examined a total of 2099 conditions from 129 forestry operations, stratified by region. Regions were South America; Central America and Mexico; Asia; New Zealand and Australia; US and Canada; and Europe (see Table 2 for regional breakdown of sample; the names and countries of all operations included in the analysis are found in Appendix A). Within each region, operations were chosen randomly. As can be seen in Table 2, the number of operations sampled within the US and Canada was much higher than in other regions due to a related project that examined certification's US impacts in more detail. To avoid bias due to different sampling intensities within regions, when calculating the overall percentage of operations required to address a certain

issue we first calculated regional averages. Then, to account for the fact that some regions make

up a higher proportion of the SmartWood portfolio than others (notably, the US), we weighted

our regional results by the total number of SmartWood-certified operations in that region.

Table 2. Sampling design.

Region	Number of operations sampled	Total number of SmartWood-certified operations*
South America	10	36
Central America and Mexico	10	62
Asia	5	5
New Zealand and Australia	5	5
US and Canada	89	89
Europe	10	36
TOTAL	**129**	**234**

*total number of forest management operations in each region as of October 2003

We examined differences in impacts between operations located in more developed and less

developed countries. We used the United Nations categorization for "more developed" and "less

developed" (see Appendix B). We felt that these categories were useful because they allowed us

to differentiate broadly on ecological as well as socioeconomic levels. Ecologically, less

developed countries tend to have tropical forests and more developed countries tend to have

temperate forests. In our sample operations, this premise held up for all operations except seven

temperate forests located in less developed countries and one tropical forest located in a more

developed country. Socioeconomically, the "more developed" and "less developed" categories

were useful to differentiate broadly between countries with a higher capacity for government

forestry regulation and enforcement and those with a lower capacity.

Statistically, we used Fisher's exact tests to identify significant differences in the percentage of

operations in more and less developed countries that were required to make improvements to each

of the issues we examined (Zar 1996). We reported differences as statistically significant when p

was less than 0.05. Twenty-two operations were classified as more developed and 107 as less developed.

We included in our analysis both certified plantations and certified natural/semi-natural forests. In our random sample, the proportion of plantation forests was higher in less developed countries than more developed ones: 32% and 6%, respectively. This roughly matches the distribution of plantations forests in the entire SmartWood portfolio, which compromise 25% of certified operations in less developed countries and 5% in more developed countries (see Table 3).

Table 3. Percentage of plantations in certified forests sampled in this analysis, compared to the percentage in the entire SmartWood portfolio (as of October 2003).

| | ----------------------- % ----------------------- | |
	Operations sampled in analysis	Entire SmartWood portfolio
Percent plantations, based on number of operations		
Less developed countries	32	25
More developed countries	6	5

The higher proportion of certified plantations in less developed than more developed countries may be a reflection of the difficulties sometimes faced by individuals or groups trying to certify natural forests in less developed countries. These operations are more likely to have unclear tenure over the land they intend to certify, which can derail the certification process. In the results section of this report, we discuss the effects that including plantations in our analysis may have on specific findings.

2.4   Other issues

Due to time constraints, we did not examine each operation's annual audit reports to confirm that the conditions given in the original assessment report were actually met. However, by including in our analysis only those forestry operations that had "active" SmartWood certificates (as of October 1, 2003), we minimized our chances of including conditions that were not met, since

operations with unfulfilled conditions would have been classified as "suspended" or "terminated." Therefore, the chance that we included conditions in the analysis that were not actually complied with is relatively low.[3]

3   Results

In this section, we begin with a broad overview of the most prominent impacts of SmartWood certification, and then move on to the discussion of specific issues.

3.1   Overview

On average, SmartWood assessors gave candidate operations 19 conditions. These conditions required that operations address, on average, 15 of the 25 issues we examined in this project (listed in Table 1). While operations located in less developed countries tended to be given a larger number of conditions than those located in more developed countries (an average of 25 versus 14, respectively), the average number of issues that operations in more and less developed countries were required to address were similar (17 and 14, respectively).

The issues that operations were required to address were not focused disproportionately in any one area, which bolsters the case of those who contend that FSC certification is not just about environmental impacts, as some critics contend. For each broad category shown in Figure 1, such as forest management or social impacts, the graph shows the percentage of operations that were required to address at least one issue in that category. As seen in Figure 1, systems issues were addressed most often (by 98% of operations); however, even the category addressed least frequently – social issues – was addressed by 83% of certified operations.

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[3] A May 2005 follow-up of all operations included in the analysis revealed that only one operation was terminated due to non-compliance with conditions.
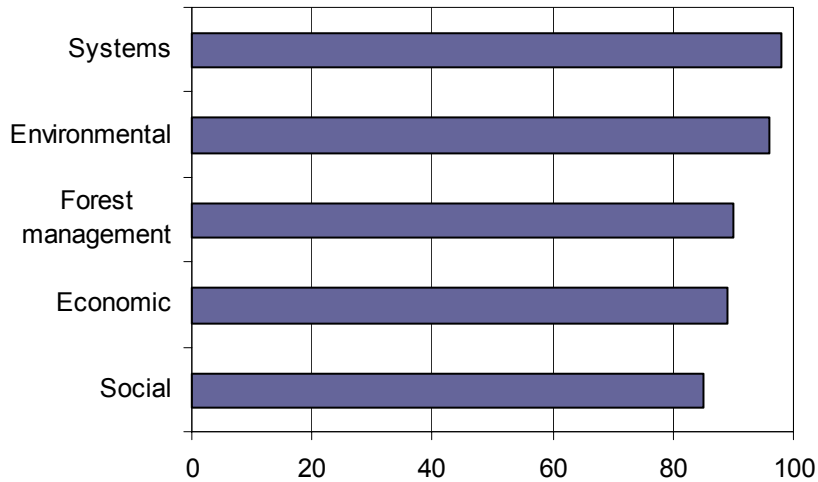
Figure 1. Percentage of SmartWood certified operations given at least one condition related to systems, environmental, forest management, economic/legal and social issues during their certification assessments.

An examination of the top ten issues addressed during certification assessments lends support to the statement that the impacts of certification are very diverse and not skewed in any one direction (Figure 2). The top ten list contains all four systems issues, three social issues, and three environmental issues. The percentages of operations that were required to address these issues range from 56% at the lowest to 93% at the highest. This means, for example, that 93% of certified operation had to either create a management plan or make improvements to their existing plan.
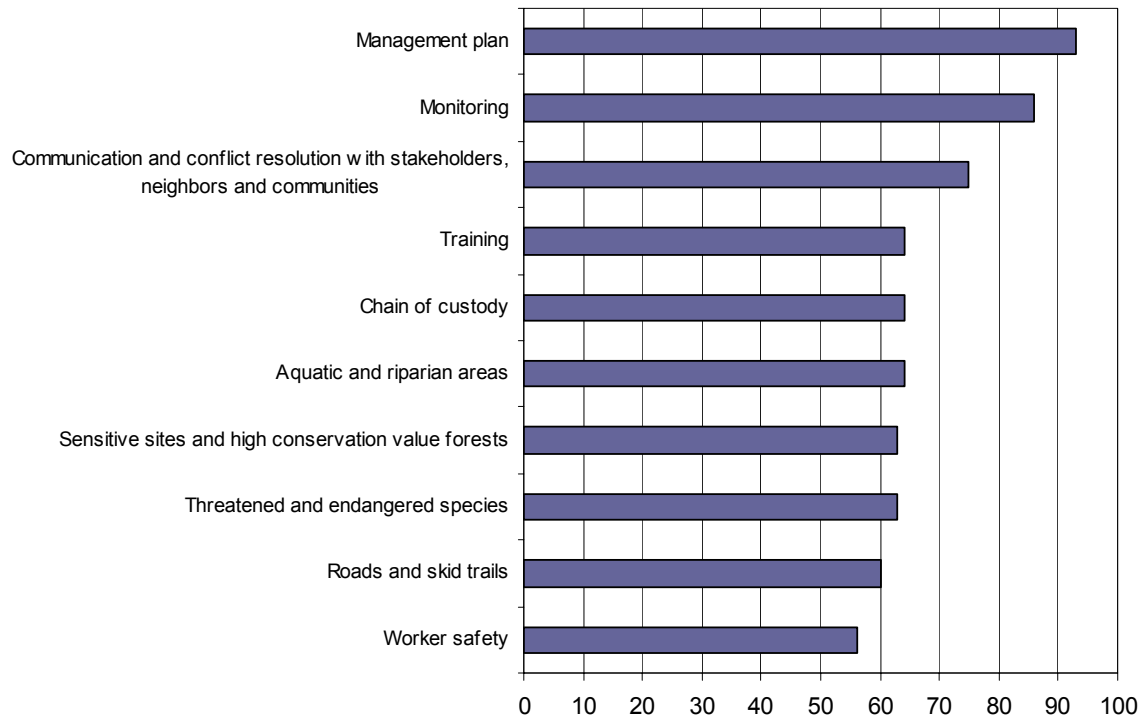
Figure 2. Percentage of SmartWood certified operations required to make changes in the ten issues most frequently addressed in conditions given during the certification assessment.

Over half (55%) of conditions that addressed the issues included in our analysis (outlined in Table 1) contained substantive wording[4]. Interestingly, when the analysis was restricted to only those conditions that dealt with environmental and forest management issues, the percentage of conditions containing substantive wording increased to 76%. These results show that a large majority of the conditions given to operations during the certification process do, indeed, translate into on-the-ground action.

In the sections to follow, we discuss the specific issues most frequently addressed by certified operations during the assessment process, drawing on examples of actual conditions to give a richer account of these impacts. When significant differences exist between operations in less developed and more developed countries, we offer potential explanations.

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[4] Conditions that dealt exclusively with chain-of-custody issues were excluded from this analysis.

3.2   Environmental changes

The environmental issue that SmartWood assessors most often required operations to address was aquatic and riparian areas, with 63% of certified operations receiving conditions requiring improvements in this area (Figure 3). Given the importance of riparian habitat to wildlife species and water quality, it is not suprising that this issue would be prominent during assessments.
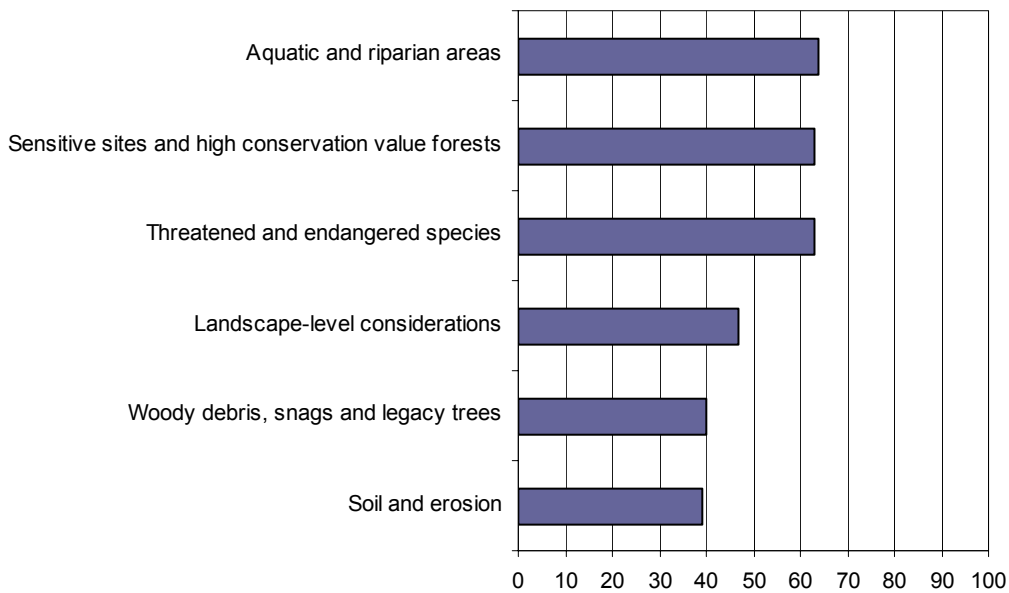
Figure 3. Percentage of SmartWood certified operations given conditions requiring them to address different environmental issues.

Most often, conditions addressing aquatic and riparian areas centered on the definition and delineation of buffer zones and "no management zones" around streams, lakes and vernal pools. The approaches that assessors required certified operations to follow varied: in some cases, operations were required to better enforce their own company-level guidelines; in others they were required to develop policies with input from stakeholders and the scientific community; in yet others, certification assessors made reference to governmental guidelines, such as Forestry Best Management Practices, or specific riparian guidelines created by FSC regional working

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groups. Rarely did assessors include specific buffer zone widths in conditions (e.g. "Appropriate buffers must be set to conform to 25 foot no harvest zones around 3rd order and higher order streams…").

In addition to defining and delineating zones around aquatic and riparian areas, operations undergoing certification were often required to establish or improve upon systems to monitor the effects of forest management activities on aquatic habitats, especially when endangered species or anadromous fish were known to be present.

The treatment of sensitive sites and high conservation value forests (HCVFs) is a prominent topic in the FSC, with many practitioners grappling with how they should be defined and best conserved.[5] Our analysis revealed that 62% of certified operations were required to address sensitive sites and HCVFs. The identification, conservation and protection of these areas was the central focus of the conditions. A typical condition might read "ensure that sensitive, or potentially important sites, and high conservation value forest, are evaluated, considered for protection and described in the property's management plan." Consultation of stakeholders about sensitive sites and HCVFs was required of many operations, as was the expansion of inventory, monitoring and mapping activities to include these features.

The issue of threatened and endangered species was also addressed by 62% of operations. Operations were most often required to identify, conserve and protect endangered species. Often, assessors required that actions be species-specific and also focus on the species' habitat; for example, "expand on existing procedures to include a process for the development of species-

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[5] At the time of analysis, work on the definition and management of HCVFs in the FSC system was in its early stages, which led us to group the issues "sensitive sites" and "high conservation value forests" into a single category. Today, it would likely be more appropriate to examine sensitive sites and HCVFs separately.

specific strategies for the protection, conservation or restoration of critical habitat elements on each tract found to support sensitive or rare, threatened and endangered species."

In general, operations dealing with threatened and endangered species were required to ensure species protection, but details such as particular protection strategies were chosen by the operation and assessed by SmartWood auditors in the annual audit. Operations were often directed to consult local experts and international guidelines for assistance in developing protocols.

Interestingly, our results do not support the claim that certified operations in more developed countries are required to make environmental changes more frequently than those in less developed countries. For the majority of environmental issues we examined, roughly the same percentage of operations in more developed and less developed countries were required to make changes (Table 4).

Table 4. Percentage of SmartWood-certified operations in more developed and less developed countries required to make changes to ecological issues during their certification assessment.

| Issue | ------------------------------ % ------------------------------ | |
	Operations in more developed countries	Operations in less developed countries
Aquatic and riparian areas	59	77
Sensitive sites and high conservation value forests	72	55
Landscape-level considerations	46	55
Threatened and endangered species	62	59
Woody debris, snags and legacy trees*	53	14
Soil and erosion	47	27

* statistically significant difference between operations located in more developed and less developed countries.

The exception was the issue of woody debris, snags and legacy trees (53% of operations in more developed countries required to address this issue versus 14% in less developed countries). One explanation for this difference is that the higher proportion of plantations in our sample from less developed countries made this issue less relevant there. Another possible explanation is that certification indicators in less developed countries tend to focus less on downed wood than those in more developed countries.

3.3   Social changes

A feature that sets the FSC principles and criteria apart from those of many other certification programs is the focus on the social aspects of forest management. Principle 3 is dedicated to the recognition of indigenous rights, while Principle 4 requires the long-term social and economic well-being of forest workers and local communities. This inclusive social focus is also reflected in the FSC's three-chamber governing system, which puts social interests on equal footing with environmental and economic interests when decisions are made.

We found that the social issue most often requiring improvement by forestry operations during their FSC certification assessment was communication and conflict resolution with stakeholders, neighbors and communities, with three-quarters of certified operations given at least one condition in this area (Figure 4). The conditions dealing with this issue sometimes required that a communication or conflict resolution process be put in place, and other times required operations to deal with a specific issue that the assessment team had identified as being important. For example, some operations were required to increase the general level of stakeholder input by providing copies of management plans to interested neighbors; other operations were required to involve specific stakeholders in defining of high conservation value forests. Some operations were required to develop a general dispute resolution policy, while others were required to

resolve a specific conflict. Indigenous peoples' land claims was a specific issue that was sometimes required to be addressed in these conditions.

Figure 4. Percentage of SmartWood certified operations given conditions requiring them to address different social issues.

Staff training was the second most frequently-addressed social issue during certification assessments, with 64% of operations given conditions in this area. Training here usually involved technical forestry issues, ranging from the identification of vernal pools and endangered species to directional felling techniques to database management to basic "civil rights" training. These conditions often required increased attendance at forestry workshops or the creation of booklets and manuals. In one case, a condition existed that required the translation of company policies and procedures from the dominant language into a minority language spoken by contractors and field staff.

Some training activities were also directed toward the local communities, or, in the case of group certification, landowners within a certified group. For example, one group certification operation was required to "educate all members and as many non-members as feasible about the required river buffer zones".

Fifty-six percent of certified companies were required to improve worker safety. This sometimes involved increasing awareness of safety regulations, such as occupational safety and health requirements, the provision of safety equipment (and instruction in its use), or improved accident monitoring for staff and contractors. In places where an existing problem was noted, operations were required to take more direct action; for example, "Implement a system to improve compliance with heath and safety requirements … by employees and contractors. System should consider incentives and penalties (e.g. monetary fines or termination of contracts for repeat non compliances)."

The observation that operations undergoing FSC certification in less developed countries require more social improvements than those in more developed countries (Ros-Tonen 2004) is supported by this study (Table 5). Ninety-five percent of operations certified in the less developed countries were required to improve upon their communication and conflict resolution with stakeholders, neighbors and communities, versus 56% of forestry operations in more developed countries. This difference may be attributable to a higher awareness of individual "rights" in more developed countries, and the presence of more laws outlining how a landowner's actions can affect his or her neighbors.

Table 5. Percentage of SmartWood-certified operations in more developed and less developed countries required to make changes to social issues during their certification assessment.

Issue	Operations in more developed countries	Operations in less developed countries
Communication and conflict resolution with stakeholders, neighbors and communities*	56	95
Training*	38	91
Worker safety*	31	82
Non-timber forest products*	25	50
Worker wages and living conditions*	0	64
Special cultural sites	33	9

* statistically significant difference between operations located in more developed and less developed countries.

Our results also showed that ninety-one percent of certified operations in less developed countries were required to improve their worker training, 82% were required to improve safety, and 64% were required to improve worker wages and living conditions (in more developed countries the percentages were 38%, 31% and 0%, respectively). These differences are likely explained by the lower economic margins of operations in less developed countries, which lead to fewer resources to devote to these issues. Also likely playing a role in these differences are the weaker labor and safety laws and enforcement found in many developing countries, a lower awareness of safety issues and differing norms about acceptable levels of risk. The shorter history of forest management in many less developed countries compared to more developed ones may also partially explain the increased need for worker training in these regions.

Even though non-timber forest products are important in both less developed and more developed countries, significantly more operations in less developed countries were given conditions regarding this issue. This difference may again be due to the shorter history of forest management in those regions, which may put forestry operations in conflict with those collecting NTFPs more often than in more developed countries, where NTFP extraction and forest management have

existed side by side for a longer period of time. Research on differences in NTFP dependence in more developed and less developed countries would help clarify whether the difference we observed was simply due to a heavier dependence on NTFPs in less developed countries.

3.4   Economic and legal changes

Half of certified operations were given conditions that required them to address operation profitability and efficiency. Specific changes ranged from more formalized accounting procedures to extending the planning horizon to improved marketing of certified products.
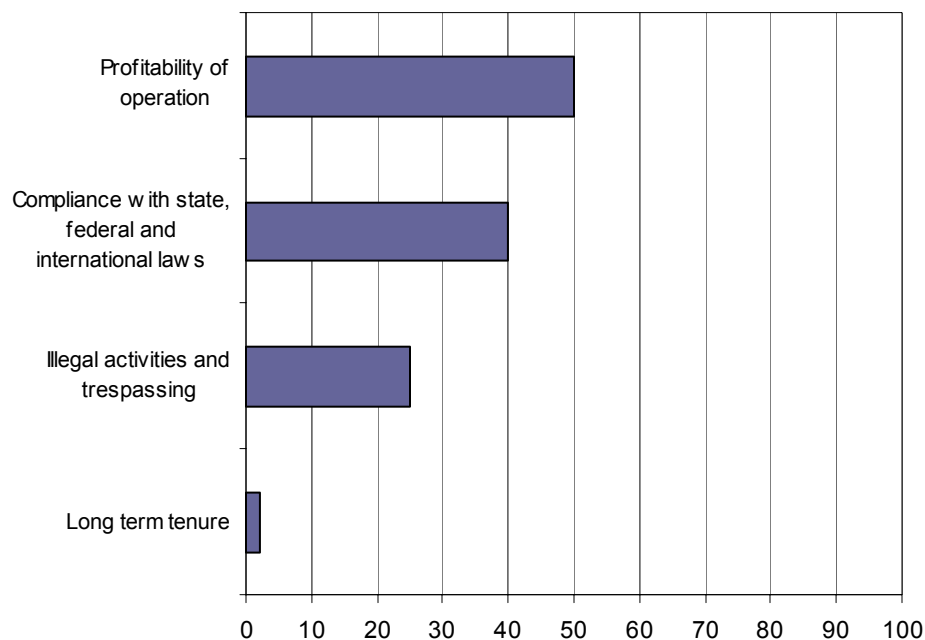
Figure 5. Percentage of SmartWood certified operations given conditions requiring them to address different economic and legal issues.

Forty percent of certified operations were required to address the issue of compliance with local, national and international laws. This rarely involved actual illegal activity – most conditions dealing with compliance required that copies of all relevant laws and regulations be made available to and understood by staff. In the US, conditions often dealt with the application of

forestry Best Management Practices (in states where Best Management Practices are mandatory), while awareness of CITES regulations and species were most common in tropical regions.

Interestingly, operations were not required to address the issue of long term tenure very often (only 2% of operations were given conditions regarding this issue). Although the absence of long-term tenure is often cited as a problem that hinders FSC certification, our findings suggest that it may not be an important issues in practice. Or, alternatively, operations with a lack of long term tenure may simply not be pursuing FSC certification.

Interestingly, operation profitability was the only economic/legal issue that was required to be addressed by a significantly different number of operations in less developed and more developed countries (77% and 32%, respectively; see Table 6). This supports the observation by many certification practitioners that, in tendency, operations in less developed countries are more in need of business plans and analyses than those in more developed countries. Community forestry operations in the tropics, in particular, often conduct planning and base revenue calculations on the entire community enterprise, rather than just its forestry component, making it more difficult to understand specific forestry cost, revenue and efficiency issues. Here, FSC certification has helped many small operations better understand the financial standing of their forestry operations. For example, a condition given to the Sociedad Civil Organizacion, Manejo y Conservacion, Comunidad Uaxactun (OMYC) – a community managed forest concession in the Peten region of Guatemala - required OMYC to report costs and income from forestry activities and develop internal structures for managing forestry operations, finances, and marketing. This condition was a catalyst for internal restructuring and the development of an accounting and management division within the community.

Table 6. Percentage of SmartWood-certified operations in more developed and less developed countries required to make changes to economic and legal issues during their certification assessment.

Issue	Operations in more developed countries	Operations in less developed countries
Profitability of operation*	32	77
Compliance with state, federal and international laws	37	45
Illegal activities and trespassing	20	32
Long term tenure	4	0

* statistically significant difference between operations located in more developed and less developed countries.

3.5   Changes to forest management activities

Sixty percent of certified operations were require to address the issue of roads and skid trails, the highest percentage of any of the forest management activities we examined (Figure 6). The specific actions that operations were required to make regarding this issue were very diverse, but most often related to minimizing the impact of roads and skid trails on water quality. This was achieved through, for example, reducing the number of stream crossings and ensuring the appropriate use of culverts and bridges. Operations were also required to use the minimum possible number of skid trails and roads, to ensure that they could be used for multiple entries into the stand, and to minimize ground disturbance.
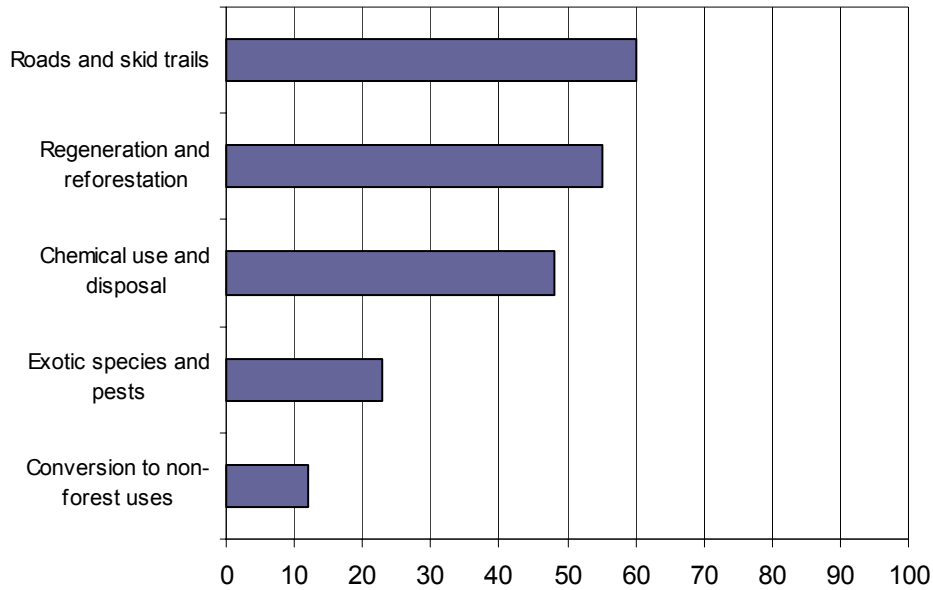
Figure 6. Percentage of SmartWood certified operations given conditions requiring them to address different forest mangement issues.

Formalizing the planning of roads and skid trails also featured prominently in conditions. This involved not only the location of roads and skid trails, but also plans for their maintenance. In some cases, specific "road plans" were required, which included "proposed access road construction or road upgrading/maintenance, proposed water crossing locations, and any bridge construction."

The monitoring and mapping of roads and skid trails were also often required. For example, one condition stated that road monitoring "must evaluate the impacts of road construction and logging on water quality, stream and riparian buffer zones and the adequacy of current guidelines to protect these resources." Often, operations were required to map out the locations of road and skid trails, sometimes being required to identify areas suitable only for dry weather and/or frozen conditions.

Fifty-five percent of certified operations were required to address regeneration and reforestation. Most of these conditions dealt with the creation of post-harvest regeneration strategies, the minimization of regeneration threats, such as residual stand damage during logging, and the monitoring of regeneration success. Only a handful of conditions addressed reforestation of previously-degraded areas, such as pasture lands.

Perhaps even more significant than the specific actions regarding regeneration and reforestation is the frequent requirement that staff of certified operations articulate a vision of the forest's "desired future condition" (this vision would then be achieved through appropriate regeneration and reforestation activities). For example, the following wording was fairly common: "harvesting plans will include stand level objectives (including regeneration and target structure) in relation to the desired future condition of the stand and ownership." SmartWood assessors and forest owners and managers alike agree that creating a vision of the forest's desired future condition is a major benefit of certification, which has positive effects beyond simply reforestation and regeneration strategies.

Chemical use and disposal related conditions were given to 48% of SmartWood-certified operations. While the FSC standards prohibit the use of certain chemicals, the standards do not require outright elimination of all synthetic pesticides and herbicides but do have expectations for their safe use. Therefore, the conditions focused on developing strategies to reduce and minimize the use of chemicals, and to ensure that, when their use is necessary, chemicals are applied appropriately. This involved safety precautions for those workers applying the chemicals, as well as measures to ensure the chemicals do not enter waterways or other sensitive areas. In rare cases, assessors did find evidence that banned chemicals were being used, and specifically prohibited their use by name.

Depending on the approach taken in regional standards, some conditions required operations to research alternatives to chemicals. For example: "Use of any synthetic pesticide, fungicide, and herbicide must be preceded by a plan that identifies and evaluates non-chemical alternatives…" In some cases, specific ideas for alternatives were given. One operation was required to determine the feasibility of using "biodegradable oil for chain saws and as hydraulic oil in machinery working in the forest, and produce a plan for switching to or increasing the use of biodegradable oil."

The issue of exotic species and pests was addressed by significantly more operations in more developed countries than less developed ones (40% and 9%, respectively), while the trend was reversed for conversion to non-forest use: here, significantly more operations in less developed countries were required to make changes (27% versus 3%) (Table 7).

Table 7. Percentage of SmartWood-certified operations in more developed and less developed countries required to make changes to forest management issues during their certification assessment.

| Issue | ---------------------------- % ---------------------------- | |
	Operations in more developed countries	**Operations in less developed countries**
Roads and skid trails	55	73
Regeneration and reforestation	48	64
Chemical use and disposal	40	55
Exotic species and pests*	40	9
Conversion to non-forest uses*	3	27

* statistically significant difference between operations located in more developed and less developed countries

Many conditions regarding exotic species and pests required operations to implement policies that encouraged the use of native species over exotics. Addressing potential insect outbreaks featured prominently in conditions; often, operations were required to document and monitor insect

outbreaks, or to incorporate integrated pest management techniques into their management plans. The higher percentage of operations in more developed countries required to address exotic species and pests may be because temperate forests tend to be less diverse than tropical ones, making them more susceptible to insect outbreaks.

The higher percentage of operations located in less developed countries required to address conversion of forests to non-forest use is likely explained by the high pressure in many of these regions to convert forestlands to agricultural use. Opening of forest areas through roads can provide access for land conversion and is a danger in operations in less developed countries, where property rights enforcement by the state can be very weak.

3.6   Changes to systems

Although the FSC is often touted as having more substantive elements in its standards than alternative programs, it nonetheless has a strong focus on systems. FSC Principles 7 and 8 are devoted to management planning and monitoring, respectively, while inventory activities are found throughout the standards.

Over ninety percent of operations were required to address forest management planning during their certification assessment (Figure 7). Most often, these conditions dealt with the content of management plans, often requiring operations to develop new policies, incorporate new monitoring and inventory data into existing policies, or better articulate management objectives. Sometimes, conditions required operations to better solicit community and stakeholder feedback, incorporate it into the management plan, and make copies of those plans available to the public. Group certification operations were often required to develop a management plan template and ensure that it is used by all members.
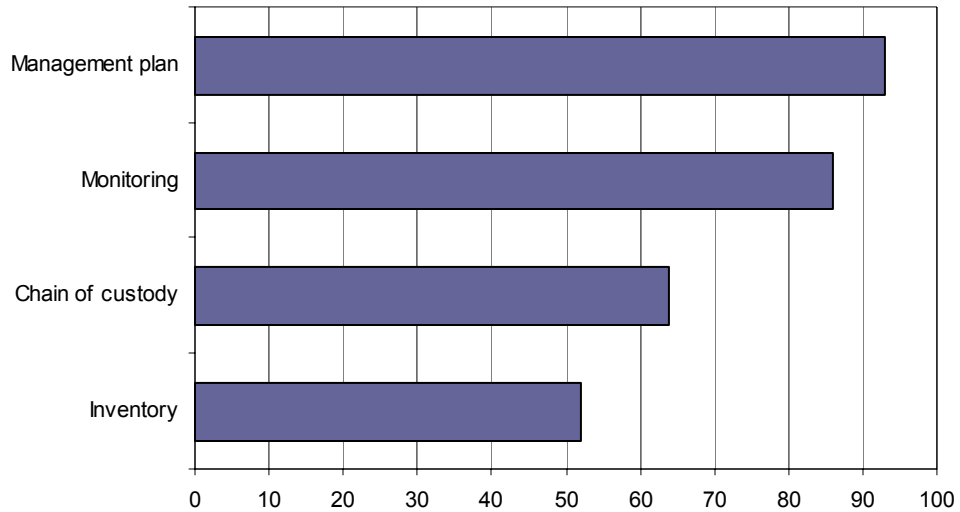
Figure 7. Percentage of SmartWood certified operations given conditions requiring them to address different systems issues.

Eighty-six percent of certified operations were required to address monitoring. Usually, operations were required to develop a monitoring protocol, or formalize their existing informal protocols. The topics that operations were specifically required to monitor ranged from regeneration success to recreational use to insect infestations to riparian buffer condition. Often, operations were required to use post-harvest monitoring checklists; less often, they were required to monitor the social effects of forest management activities.

Sixty-three percent of SmartWood-certified operations were required to address chain of custody issues. Conditions regarding chain of custody often involved technical details such as log marking, keeping better records of certified wood sales, as well as the proper use of FSC and/or SmartWood logos.

Assessors required 52% of certified operations to improve inventory systems. Usually, this involved conducting forest cruises to gain data on timber volumes; for example, "stand inventories must include data on all species and sizes of trees including regeneration size, density

and species." Less often, inventory conditions referred to inventories of biological resources such as wildlife.

Operations in more developed countries were required to improve on their inventory systems significantly more often than those in more developed countries (64% versus 36%, respectively; Table 8).

Table 8. Percentage of SmartWood-certified operations in more developed and less developed countries required to make changes to systems issues during their certification assessment.

Issue	---------------------------- % ----------------------------	
	Operations in more developed countries	**Operations in less developed countries**
Management plan	91	100
Monitoring	81	95
Inventory*	64	36
Chain of custody	64	64

* statistically significant difference between operations located in more developed and less developed countries

There was no significant difference in the percentage of operations in more developed and less developed countries that were required to make changes to management plans, monitoring or chain of custody. While one might expect that operations in less developed countries would need to improve management plans more often than those in more developed countries, this is not the case. Often, operations that are pursuing certification in less developed countries do so with donor funding, and have received assistance with the preparation of management plans prior to the certification assessment. Also, some operations in more developed countries – especially in regions with a predominance of small, family forests and a long history of forest management, such as many in Europe – do not actually have formalized management plans.

4 Conclusion

This study reveals that forest certification is indeed a catalyst for change, rather than a means of rewarding operations that were already conducting excellent forestry before certification. While certification does attract industry leaders, even these operations are required to make important changes to aspects of their operations as a result of the certification process. In fact, the extensive preparation that many operations under before their assessment means that the impacts presented in this report are likely an underestimate of the true impacts of forest certification.

Our results also reveal that the impacts of certification are not skewed in any one direction – for example, there is not a heavier emphasis on environmental changes and impacts than on social, economic, forest management and systems. For each of these categories, at least 85% of certified operations were required to make changes.

And when individual issues were examined, our analysis shows that that the specific actions required of candidate operations were diverse and tailored to the operation under assessment. In the case of the riparian and aquatic areas, for example, operations were sometimes required to improve the management of buffer zones by better complying with government regulations and best management practices, other times they were required to consult with local stakeholders and the scientific community about appropriate buffer zone management, and, in a few cases, were given explicit guidance by SmartWood assessors on how their buffer zone management must change.

Our analysis also supports observations of many certification practitioners that the social impacts of certification are more prevalent in less developed than more developed countries. Interestingly, operations in all countries were required to make ecological, economic, forest management and systems improvements at roughly the same rate, indicating that the increased social focus in less

developed countries does not come at the expense of other aspects of the FSC principles and criteria.

The specific wording of SmartWood conditions indicates that a majority of conditions contain language that requires substantive, on-the-ground change. Conditions that address environmental and forest management issues require an even higher degree of on-the-ground action. Supporters of the FSC have long contended that most other forest certification programs focus too heavily on procedural elements, with questionable on-the-ground requirements. Comparing our findings with the results of a similar analysis of other certification programs' requirements would allow us to test this hypothesis empirically.

Forest degradation is a mounting global problem, and FSC certification is one tool that has been developed to mitigate it. This study shows us that FSC certification does, indeed, require forestry operations to make substantial changes to diverse aspects of their forest management approach. The language used by assessors requires many substantive, on-the-ground changes. The next step is to conduct research that directly examines field-level indicators, and assesses the ability of the changes and impacts that we have documented here to ensure positive outcomes in the forest. We need to better understand, for example, how a condition that requires a landowner to protect and conserve critical habitat elements affects the population densities of threatened and endangered species, and how increased consultation with stakeholders affects indigenous peoples' access to forest land. Such projects will directly link FSC certification to the broader environmental problems that first inspired its creation.

5 References

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Appendix A. Location of SmartWood-certified operations randomly selected for inclusion in analysis.

Region	Operation Name	Country
South America	CIMAL e IMR Guarayos	Bolivia
	Empresa Agroindustrial La Chonta Ltda; Concesion Lago Rey	Bolivia
	Araupel S.A	Brazil
	Associação Indígena Bep-Noi de Defesa do Povo Xikrin do Catete	Brazil
	Associação Seringueira Porto Dias	Brazil
	Indústrias Pedro N. Pizzatto Ltda.	Brazil
	Klabin Riocell S.A.	Brazil
	Companía Agrícola y Forestal El Alamo Ltda. (CAF El Alamo)	Chile
	Pizano, S.A./Monterrey Forestal, Ltda.	Colombia
	Forestadora y Maderera del Norte S.A. (FYMNSA)	Uruguay
Central America and Mexico	Reforestadora Buen Precio S.A.	Costa Rica
	Asociación Forestal Integral San Andrés	Guatemala
	Gibor S.A.	Guatemala
	Sociedad Civil Organización, manejo y Conservación Concesionaria de la Unidad de Manejo Uaxactun	Guatemala
	Comunidad Ixtlan de Juarez	Mexico
	Cuevecillas y Culebras S.P.R. de R.L.	Mexico
	Ejido El Largo y Anexos	Mexico
	Ejido Noh Bec	Mexico
	Ejido Salto de Camellones	Mexico
	Asociación Familia Padre Fabretto	Nicaragua
Asia	Changhua Forest Farm	China
	Ryujin-mura Forest Owner's Cooperative	Japan
	Yamanashi Prefectural Government (Forestry Division, Forestry and Environment Department)	Japan
	Yusuhara Forest Owners Coop	Japan
	Ngan Panansalan Pagsabangan Forest Resources Development Cooperative (NPPFRDC)	Philippines
New Zealand and Australia	Ernslaw One Limited - North Island Estate	New Zealand
	Evergreen Forests Limited	New Zealand
	Gowan Hills Trust	New Zealand
	PF Olsen and Company	New Zealand
	Selwyn Plantation Board Ltd.	New Zealand
Europe	Estonian State Forest Management Center (RMK)	Estonia
	Lembit Laks' Forest Management Operation	Estonia
	State Stock Company "Latvijas Valsts Meži" (SSC LVM) - West Vidzeme Regions, Latvia	Latvia
	Druskininkai State Forest Enterprise	Lithuania
	Lithuania State Forest Enterprise: Prienai SFE	Lithuania
	Regional Directorate of State Forests in Poznań,	Poland

	Poland and Regional Directorate of State Forests in Piła, Poland	
	STF Strug	Russia
	RTS Scotland	Scotland
	Bosques Naturales S.A.	Spain
	La Gestión Forestal del Cabildo Canaria en los Montes Consorciados Particulares de la Cumbre de Gran Canaria.	Spain
United States and Canada*	Domtar Forest Resources - Trenton	Canada
	Domtar Forest Resources-Cornwall	Canada
	Eastern Ontario Model Forest	Canada
	Ferrucci & Walicki, LLC	Canada
	Groupement forestier de l'est du lac Témiscouata inc	Canada
	Haliburton Forest	Canada
	Iisaak Forest Resources	Canada
	Nagaya Forest Restoration Ltd. - Pictou Landing and Afton First Nation	Canada
	Tembec Inc. – Gordon Cosens Forest	Canada
	York Regional Forest	Canada
	Aitkin County Land Department	United States
	Allan Waelchli, Consulting Forester	United States
	Anderson-Tully Company	United States
	Arcata City Forest	United States
	B&R Woodland Management	United States
	Baxter State Park Authority Scientific Forest Management Area	United States
	Beebe Family Trusts	United States
	Bevan Forestry	United States
	Blencowe and Associates	United States
	Brunkow Hardwood Corporation	United States
	Cass County Land Department	United States
	Chris W. Olson Forestry	United States
	Clark Forestry, Inc.	United States
	Columbia West Virginia Corporation	United States
	Community Forestry Resource Center	United States
	Domtar Industries, Inc.	United States
	Duke University, Duke Forest	United States
	Ecoforestry Institute - Mountain Grove	United States
	Ecoforestry Management Associates	United States
	Ecosystem Management Company	United States
	Edward A. Tunheim Consulting Forester	United States
	Edward F. Kocjancic, Inc.	United States
	Essex Timber Company, LLC	United States
	Evergreen Ecoforestry, LLC	United States
	Finch, Pruyn & Company, Inc. - Forest Lands	United States
	Forest, Soil & Water, Inc.	United States

Forestry Branch, Fort Lewis Military Installation, Department of Defense	United States
Fountain Forestry	United States
Gary Paul Consulting Forester	United States
Hale Forestry Company	United States
Hancock Land Company	United States
Heartwood Forestland Fund, LP	United States
Hickman Timber Management Co.	United States
Hoopa Valley Tribe	United States
Hull Forestlands, LP	United States
Individual Tree Selection Management, Inc.	United States
Integrated Resource Management, Inc. and Forest Restoration Partnership	United States
James L. Able Forestry Consultants, Inc.	United States
Jeffrey Coombs, Consulting Forester	United States
J-Spear Ranch Co.	United States
Kearse Land and Timber Corporation	United States
Keith Horn, Inc.	United States
Keweenaw Land Association, Ltd.	United States
Mark Andre RPF	United States
Masconomo Forestry	United States
Massachusetts Woodlands Cooperative	United States
McClellan Mountain Ranch	United States
McCloud Tree Farm/Hancock Natural Resource Group, Inc.	United States
Mendocino Redwood Company	United States
Merck Forest and Farmland Center	United States
Minnesota Department of Natural Resources - Forestry	United States
National Audubon Society - Silver Bluff Plantation and Francis Beidler Forest	United States
New England Forestry Consultants, Inc.	United States
New England Forestry Foundation	United States
New York State Department of Environmental Conservation	United States
North Carolina Division of Forest Resources	United States
North Carolina State University, Department of Forestry	United States
Olympic Resource Management	United States
O'Neill Pine Company	United States
Paul Smith's College	United States
Perry Gulch Ranch	United States
Pioneer Forest	United States
Redtree Properties, LP	United States
Residents' Committee to Protect the Adirondacks	United States
Restoration Forestry, Inc.	United States
Roseburg Forest Products / Roseburg Resource Company - CA Operations	United States

Roy O. Martin Lumber Company Limited Partnership	United States
Society for the Protection of New Hampshire Forests	United States
St. John's Abbey, Order of St. Benedict	United States
Stockbridge-Munsee Community	United States
T&D Thompson, Inc.	United States
Tennessee Department of Agriculture, Forestry Division	United States
The Nature Conservancy	United States
Tree Shepherd Woods	United States
Two Trees Forestry	United States
Vermont Family Forests	United States
Whiskey Creek Timber Company	United States
Wylatti Timber Management Company, Ltd.	United States
Zena Timber	United States

*Weighting of data in analyses ensures that the large sample of US operations does not skew results (see Methods for description of weighting technique).

Appendix B. United Nations classification of countries' development level. Table includes only those countries with certified operations included in report. Available at http://esa.un.org/unpp/index.asp?panel=5

"More developed" countries	"Less developed" countries
Canada	Bolivia
Estonia	Brazil
Japan	Chile
Latvia	China
Lithuania	Colombia
New Zealand	Costa Rica
Poland	Guatemala
Russia	Mexico
Scotland	Nicaragua
Spain	Philippines
United States	