



**Rainforest Alliance Global Indicators:
First Results from the Forestry Program
(June 2007 – August 2008)**

Final Report
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Executive Summary

In an effort to better understand how its certification programs are helping the Rainforest Alliance meet its social, environmental and economic goals, the organization developed a set of 20 indicators. During annual audits, data for these indicators are collected from every Rainforest Alliance Certified farm and forestry operation, and from every hotel and tour boat implementing the Rainforest Alliance's tourism best management practices. The indicators cover diverse topics ranging from the amount of pesticides used to the number of serious accidents among workers.

Forestry auditors from the Rainforest Alliance's SmartWood program began collecting the indicator data from certified forestry operations in June 2007 (all operations are certified to the standards of the Forest Stewardship Council, or FSC). In August 2008 we entered all indicator data that had been received to date and set out to complete a pilot project that would involve 1) summarizing the indicator results and testing various analyses, and 2) assessing response rates and data quality and making recommendations for improving both. This report presents the results of part 1 of the pilot project.

We determined that all operations were audited during the study period, and that 57% of these (209 out of 364 operations) had a finalized audit report on file by the end of this period (this lower percentage reflects the inevitable time lag between the field audit and report writing and approval). We included in this analysis all 209 operations with an finalized audit report.

The vast majority of forestry operations provided the indicator data to the best of their ability and supported the goals of the indicator pilot project. Throughout the process, companies helped us identify those indicators that were worded poorly or were difficult to answer, and we have summarized those results in a separate report. We appreciate the strong effort made by our clients and auditors to provide high quality, complete data.

Analysis of the indicator data revealed that:

- On average, certified forestry operations designate 16% of their total forest area as strict reserves. The combined strict reserve area of the 150 operations that reported on this variable during our study period was nearly 2 million hectares, an area more than twice the size of Yellowstone National Park. In the Rainforest Alliance's SmartWood portfolio, the average reserve size was 13,450 hectares.
- Forestry operations with a higher percentage of plantation area tended to have significantly larger strict reserve areas. This trend may, in part, be due to FSC Principle 10.5, which requires that a proportion of plantation forest area be restored to natural forest cover.
- On average, certified operations designated 22,000 hectares, or 22% of their total area, as High Conservation Value Forests (HCVF). The combined sum of HCVF land for the 118 operations that reported data during our study period was 2.5 million hectares. This area is approximately the size of the state of Vermont.
- The most common types of HCVF forest identified were Type 1 (forests containing significant concentrations of biodiversity values) and Type 2 (forests with a landscape-level significance for species).
- Publicly-owned forests tended to have a significantly larger area designated as HCVF than privately- or community/indigenous-owned operations. Public ownerships tended to designate a relatively large area as HCV Types 1-4, which cover biodiversity, landscape-level issues, threatened and endangered species and ecosystem services. Community/indigenous-owned operations designated a relatively large percentage of their area as HCV Type 5 - forest areas fundamental to meeting basic needs of local communities. Private forest ownerships have often been managed primarily for wood products for generations and may therefore have a lower occurrence of many HCV characteristics.
- Over 50,000 linear km of perennial streams flow through the 61 certified operations that reported on this variable¹ and are therefore subject to the FSC's streamside management standards. If laid end to end, these streams would span the earth's circumference.
- Rainforest Alliance Certified forestry operations employ over 37,000 people, 10% of which are female. The highest percentage of female workers is found in Russia, Eastern Europe and Scandinavia (26%), in Canada (19.4%), and in the United States (16.7%). The lowest representation by female workers was seen in Brazil (4.7%), the rest of South America (6.1%) and Mexico (7.8%).
- On average, 0.4% of workers at certified operations have experienced a serious accident in the past 12 months. For three countries (Argentina, Canada and

¹ The response rate for this variable is particularly low because we asked only those operations with GIS capabilities to report on it.

Estonia), we found comparable accident data from the International Labour Organization (ILO). For these countries the accident rate on certified operations was 0.61%, compared to 0.75% for the forestry sector in general².

- Certified operations, on average, sell 63% of their products with an FSC claim written on their sales and shipping documents³. Nearly one-third of certified operations put no FSC claims on documents from any of their sales; nearly half put an FSC claim on documents from all of their sales. The percentage of products sold with an FSC claim on the paperwork was not related to the amount of area under plantation management, operation size, ownership type, or forest type, and does not mean that the buyer of the products was FSC certified.
- 119 operations (one-third of all FSC/Rainforest Alliance Certified forestry operations) reported on the dollar value of their total sales and the dollar value of their sales with an FSC claim on the sales and shipping documents. Combined, these operations had US \$1.1 billion in total sales and US \$865 million in sales with an FSC claim. We estimate these values for all FSC/Rainforest Alliance Certified forestry operations to be US \$3.5 billion and US \$2.7 billion, respectively.
- We found that around one-quarter of operations received permission, or a 'derogation', from the FSC to use highly hazardous pesticides. Those operations with derogations used an average of 1.3 highly hazardous pesticides. On average the volume of pesticides that operations with derogations used was 4,843 L, and the area treated was 7,563 ha. The most commonly used pesticides were Sulfluramide, Fipronil and Fastac.

Our efforts will be greatly enhanced by discrete research projects that bolster the connection between our indicators and measurable, on-the-ground impacts; however, overall we are satisfied with our ability to use the indicator data to draw a thumbnail sketch of progress toward our goals. We look forward to having data from 100% of FSC/Rainforest Alliance Certified operations and creating a rigorous baseline against which future impacts will be measured.

² ILO data provided a combined accident rate for forestry, hunting and agriculture.

³ This claim is part of the chain of custody and allows the buyer to subsequently sell his or her products as FSC certified.

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Introduction

The growth of sustainability certification as a mechanism to encourage sustainable business practices has increased dramatically in past years, with the Rainforest Alliance currently certifying more than 2,750 forestry operations and 32,000 farms in 66 countries, and providing technical assistance on tourism Best Management Practices to nearly 300 tourism operations⁴. Along with this momentum has come a call – both from within the Rainforest Alliance and from proponents and critics observing from the outside – to examine whether compliance with sustainability standards does, in fact, lead to measurable, on-the-ground changes.

The Rainforest Alliance has responded by developing a set of ‘global indicators’ – indicators that measure an operation’s performance in environmental topics such as wastewater treatment and the creation of reserve areas, social aspects such as worker safety and support for local schools, and economic aspects such as the level of engagement in certified markets. Even though evidence from case studies shows that compliance with certification standards creates positive change, with the global indicators we would like to make specific, quantitative statements about the impacts of certification that are based on measurements from *all* of our certified clients and that go beyond simple tallies of the number of hectares or operations certified. Additional data on the impacts of certification in specific circumstances or regions will continue to be collected using specific research projects or case studies.

FSC/Rainforest Alliance Certified forestry operations began submitting data on the global indicators during their annual audits beginning in mid-2007. In this report we perform the first analysis of this data. Specifically, we would like to quantify the impacts of the Rainforest Alliance forestry portfolio on various measures of biodiversity conservation, sustainable livelihoods, and participation in sustainable markets. The results of these analyses are the subject of this report; recommendations for improving the response rate and improving the wording of indicators are found in a separate report.

Background and Challenges of Rainforest Alliance Indicator Development

The formal process for developing performance indicators began in 2006, when a series of meetings were held by the directors of the three Rainforest Alliance programs (forestry, agriculture and tourism) to discuss potential indicators and a set of recommendations proposed by Rainforest Alliance consultant and monitoring specialist Aimee Russillo.

Choosing indicators is not an easy task. Ultimately we are interested in determining whether certification leads to important goals being met, such as ‘healthy forests’ or ‘good quality of life for forest workers.’ Choosing indicators that actually allow us to measure progress toward these goals – perhaps true impact indicators such as ‘viable wildlife populations’ or ‘worker happiness’ – is the next step.

⁴ Figures as of January 2009

But because such indicators often require large amounts of time and resources to measure in the field, we are often forced to come up with less labor-intensive proxy indicators. Using the examples above, in our case we chose to measure the ‘amount of forest area designated strict reserves’ – reasoning that if most wildlife species are threatened by habitat loss, higher amounts of reserve area will likely have a positive influence on population levels. We also chose to measure ‘the number of serious accidents’ for forestry workers – knowing of course that there is more to worker happiness than a lack of accidents but that it is one important part. Clearly these indicators convey important information, but they are technically not the same as measuring impacts by conducting wildlife surveys in the field or assessing forestry worker satisfaction through interviews. Therefore, we use the term ‘impacts’ throughout this report in a loose way, knowing that in technical monitoring and evaluation language we are actually measuring ‘outcomes’ or ‘outputs.’

With these limitations in mind, Rainforest Alliance directors rated potential indicators in terms of 1) their ability to apply to all three programs (Forestry, Agriculture, Tourism); 2) the burden they would place on the client in terms of reporting; and 3) how meaningful the information was that they conveyed. The final list of indicators was determined and, as the indicators would be applied to operations in all programs, all over the world, they were dubbed the ‘Global Indicators’. A few additional program-specific indicators were added. For forestry, the Forest Stewardship Council (FSC) mandated that all certification bodies collect and report on a set of indicators that the FSC had created. Some of the Rainforest Alliance’s partners in the Sustainable Agriculture Network also requested the addition of two indicators that were important to them. A complete list of indicators can be found in Appendix A.

In June 2007, SmartWood auditors began including the global indicators in their audit and assessment report templates. Typically, auditors sent the data form and an explanatory document to clients before the field visit, and provided clarification or assistance filling out the form during the visit. Our goal is to collect data on these indicators annually as part of the audit process for 100% of the farms and forests certified by the Rainforest Alliance and 100% of the hotels and boats implementing the Rainforest Alliance’s Sustainable Tourism Best Management Practices.

Indicator Analysis Approach

The analysis of the indicator data involves an additional set of challenges. Because we do not collect indicator data from forestry operations before certification, we are not able to make claims about how forestry practices differ ‘before’ and ‘after’ certification. Even if we were able to collect indicator data at the time of an operation’s initial assessment, the extensive preparation typically undertaken by forestry operations in the stages before the certification assessment means that the practices at the time of assessment are most likely not a true baseline – i.e., they do not necessarily reflect true ‘pre-certification’ practices.

An alternative would be to compare indicator data from certified operations to equivalent data from non-certified operations. Ideally we would choose a sample of uncertified forestry operations with roughly the same characteristics as our clients, collect the indicator data from them too, and compare the performance of certified and uncertified

operations. In reality, we do not have resources to collect indicator data from uncertified operations, nor is it clear whether these operations would be willing to participate were such resources to exist⁵.

Given that we cannot use our indicator data to compare individual companies' performance before and after certification, nor to compare the performance of certified operations with a control group of non-certified operations, what *can* we do with the data?

First, in some cases we can compare indicator data from certified operations with data for the forest industry as a whole. For example, national-level data on accident and fatality rates – two of our global indicators – are published by the International Labour Organization. This data provides us with a control group to which we can compare certified operations⁶.

Second, with our data we can show the cumulative impacts of our forestry program and document how that increases or decreases over time. For example, even if it is not compared to pre-certification data or to an uncertified control group, it is still useful for the Rainforest Alliance as an organization to determine, for example, what percentage of our clients' products are sold as certified, and how this figure differs from region to region. This information will help when considering where certified supply chains are functioning well and where more resources should be devoted to improving supply chains.

Third, we can use the data to answer interesting questions about the certification concept in general. Do the managers of certified plantations designate the same area as strict reserves as managers of natural forests? In which regions of the world do certified companies tend to hire more women? We can also create more complex models to determine whether the relationships we see between such variables are statistically significant.

Response Rate

SmartWood auditors began collecting indicator data from all clients during audits starting in June 2007. We included in our analysis all operations that: 1) had been visited by SmartWood auditors after June 2007; and 2) had an approved audit report on file as of August 2008. While all forestry operations were audited during this period, the inevitable time lag between the audit date and the writing and approval of the audit report meant that 60% of clients (209 out of 364) met both of the above criteria. These operations were included in our analysis. Unless otherwise noted, response rates given for individual indicators refer to the percentage of those 209 operations that responded, not the entire

⁵ The Rainforest Alliance is conducting some in-depth case studies comparing certified to non-certified operations through research partners but these are currently focused on specific agricultural crops and/or countries.

⁶ Because certified operations would be included in the national-level statistics this is theoretically not a true control; however, due to the relatively low amount of FSC-certified forest lands in most countries this should not be a significant bias.

portfolio of 364. We anticipate that by the next round of data entry we will have data from 100% of FSC/ Rainforest Alliance Certified operations.

Results: Quantifying Environmental, Social and Economic Impacts

In this section we discuss the data that was reported by our clients for each of the global indicators. We first present the results from all indicators together in Table 1, and then discuss individual indicators separately.

Summary Data

Table 1 provides an overview of the values recorded for our indicators. The first column, 'Response Rate', shows which percentage of the 209 operations included in our analyses reported data for each indicator. Thus we see that, for example, 150 operations, or 72%, provided data on the number of hectares designated as strict reserves. The average response rate for our indicators was 57%.

The column 'Sum for Surveyed Operations' is simply the sum of all reported data. Eventually, when all operations have been audited and response rates reach 100%, this value will provide a baseline from which we can measure future increases or decreases in impacts. However, at the moment this value is an interesting summary of the data gathered to date but is not a complete baseline due to missing data. The column 'Average for Surveyed Operations' is simply the sum divided by the number of operations that provided data, and 'Standard Error' provides a measure of variability around that average.

Table 1. Summary of Global Indicator results.

Indicator	Response Rate (%) ¹	Sum for Surveyed Operations	Average for Surveyed Operations	Standard Error
Biodiversity Conservation				
Area of forest designated as strict reserves (hectares)	72	1,990,604	13,450	2,533
Area of forest designated as High Conservation Value Forest (hectares)	57	2,596,130	22,001	3,965
Length of streams protected (linear km)	30	51,506	844	167
Sustainable Livelihoods				
Number of people employed in certified companies	73	37,361	249	48
Number of sites conserved of importance to indigenous peoples and communities	38	1,558	21.6	15.7
Number of serious accidents per 100 workers	62	-	0.4	0.09
Number of fatalities per 100 workers	61	-	0.006	0.004
Participation in Certified Markets				
Total sales/turnover (US\$)	57	1,139,232,873	9,573,385	2,390,380
Volume of certified products (cubic meter)	61	43,287,519	346,300	121,442
Dollar value of total certified sales (US\$)	56	865,743,820	7,528,207	2,302,430

Indicator	Response Rate (%) ¹	Sum for Surveyed Operations	Average for Surveyed Operations	Standard Error
Percentage of total sales sold with FSC label	56	-	63	4.1

¹ The percentage of operations audited during our study period that provided data on the indicator.

Biodiversity Conservation

The three global indicators related to biodiversity conservation are: 1) forest area designated as strict reserve; 2) forest area designated as High Conservation Value Forest; and 3) the length of streams flowing through certified lands.

Area of forest designated as strict reserves

We define strict reserves as forests that are essentially protected, with trees allowed to grow to their natural age and regenerate naturally, no thinning, harvesting or sanitary cutting. Maintaining strict forest reserves can help an operation demonstrate compliance with FSC Criterion 6.4, which requires that ‘representative samples of existing ecosystems within the landscape shall be protected in their natural state...’

We found that, on average, operations designated 13,450 hectares, or 16% of their total operation area, as strict reserves. The combined strict reserve area of those operations reporting during our study period was nearly 2 million hectares, an area twice the size of Yellowstone National Park.

We were also interested in determining whether the percentage of forest area designated as strict reserve was influenced by any of the following variables:

- forest type (boreal, temperate, subtropical or tropical)
- ownership type⁷ (government, private or community/indigenous)
- percent of operation area under plantation management
- operation size

We conducted a regression tree analysis (see Appendix B for methods) to determine the causes of variability in the percentage of forest lands designated as strict reserves. Our regression tree model showed that the four variables above accounted for a total of 18.4% of the variability in percentage of strict reserve area. We found that 14.5% of the variability could be attributed to plantation area; that is, operations with a relatively high amount of plantation forest area had higher reserve area than those with low or no forest plantations. Auditors familiar with certified plantation operations state that this finding is

⁷ In addition to ‘ownership type’, we collected data on ‘management type’, which could also have been used as a potential independent variable in our analysis. However, this FSC-mandated variable asked operations to choose between the categories ‘public’, ‘private’, ‘community’, and ‘concession’. The inclusion of ‘concession’ as a possible management type was problematic, as an examination of the data revealed that many privately and community-managed operations were designating themselves as concessions. We therefore did not consider this data to be reliable and excluded it from our analyses. The ‘concession’ option has since been removed by the FSC.

consistent with the requirement of FSC Criterion 10.5, which states that, for plantation forests, ‘A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover.’ The relatively high amount of strict reserve area that we found on plantation forests may be seen as a sign that forest companies are implementing and auditors are evaluating Criterion 10.5 in a meaningful way.

The only other variable that was related to differences in reserve area was operations size, which accounted for only 4.1 percent of variability. We deemed this percentage too low to make meaningful statements about effects of operation size.

Area of forest designated as High Conservation Value Forest (HCVF)

As implied by its name, High Conservation Value Forests (HCVF) are those areas with environmental and social values that are considered to be of outstanding or exceptional importance. An HCVF can be a small part of a larger forest, such as an archeological site, or can be an entire forest unit, as is sometimes the case when the forest is habitat for a threatened or endangered species. Definitions of the sub-types of High Conservation Values are shown in Table 2. As outlined throughout FSC Principle 9, certified forest owners must identify HCVFs and manage them to protect, maintain or enhance the identified values. HCVF areas typically overlap to some degree with strict reserve area.

We found that, on average, certified operations designated 22,000 hectares, or 22% of their total area, as HCVF. The combined sum of HCVF land for the operations that reported data for this indicator was 2.5 million hectares, an area the size of the state of Vermont. Table 2 shows the breakdown of area falling into each HCV type, revealing that the most common type of High Conservation Value in Rainforest Alliance Certified operations are Types 1 (forests containing significant concentrations of biodiversity values) and 2 (forests with a landscape-level significance for species).

Table 2. Area falling into each type of High Conservation Value Forest, presented as a sum for all operations reporting on this indicator, and as a per-operation mean and standard error. N=117. Note that the sum of all HCVF categories is larger than the total HCVF area reported in Table 1 because some forests fell into multiple HCVF categories.

High Conservation Value Type and Definition	Sum for Surveyed Operations ¹	Mean	Standard Error
HCV1 - Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).	1,179,657	10,083	2,583
HCV2 - Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.	1,233,423	10,633	2,424
HCV3 - Forest areas that are in or contain rare, threatened or endangered ecosystems.	523,933	4,517	1,686

High Conservation Value Type and Definition	Sum for Surveyed Operations ¹	Mean	Standard Error
HCV4 - Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control).	802,984	6,922	1,893
HCV5 - Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).	299,693	2,584	1,105
HCV6 - Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).	111,718	963	604

¹ The sum of the areas reported for HCVF sub-types is greater than the total amount of HCVF reported because some HCVFs fall into multiple sub-types.

Our regression tree analysis examined whether the percentage of an operation's land base designated as HCVF was influenced by forest type (boreal, temperate, subtropical or tropical), ownership type (government, private or community/indigenous), the percent of the operation area under plantation management or the operation size.

We found that the only variable that could explain the variability in HCVF area was ownership type, which accounted for 15% of the variability. Figure 1 shows that publicly owned forests designated, on average, 41.7% of their lands as HCVF, compared to 9.9% of privately-owned lands and 16.9% of community/indigenous-owned lands.

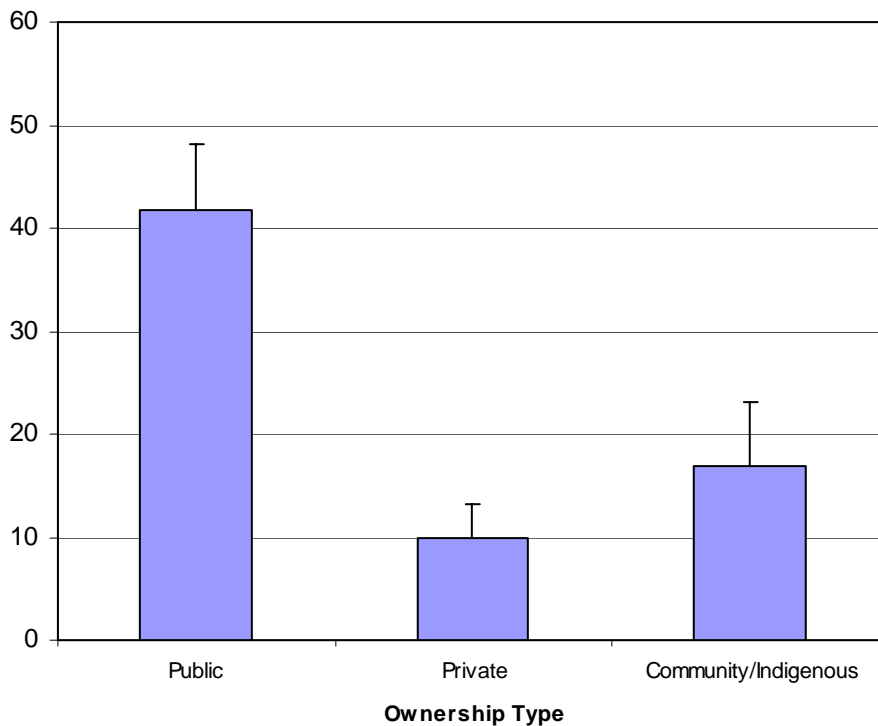


Figure 1. Percentage of forest area designated as HCVF, broken down by ownership type. Standard error bars are also shown.

We were interested in whether this relationship between ownership type and HCVF area held true for all types of HCVFs, or only certain subtypes. We therefore graphed the percentage of forest area designated as each HCV subtype, shown in Figure 2.

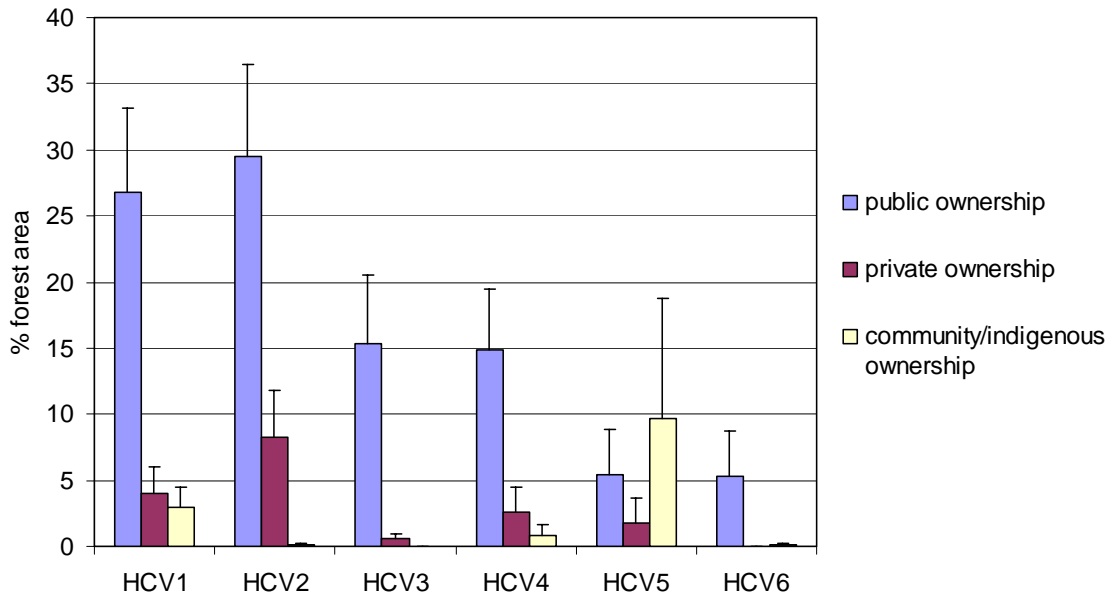


Figure 2. Percentage of forest area designated as high conservation value subtypes, broken down by ownership type (n=106).

Figure 2 indicates that some of the HCVF designation trends might be aligned with the management goals of the ownership type. For example, community/indigenous-owned operations designate a relatively high percentage of their area as HCV5, defined as forest areas fundamental to meeting basic needs of local communities. Publicly-owned operations tend to designate a relatively high area as HCV1-4, which cover biodiversity, landscape-level issues, threatened and endangered species, and ecosystem services. It is possible that many of the unique characteristics that public forest owners designated as HCVFs no longer exist on privately-owned forest lands, which in many cases have been managed for wood products for generations. It might also be that private forest owners are hesitant to attach labels such as ‘HCVF’ to their lands for fear of public restrictions on their use; this could change in the future as increasing numbers of private forest owners seek income through payments for ecosystem services.

Finally, the differences observed in the amount of forest area designated HCVF may also be a remnant of confusion within the FSC system regarding the processes required for identifying HCVFs, as well as confusion about the exact definitions of the HCV subtypes. This has been an issue within the FSC system since the inception of the HCVF concept, and many initiatives and pilot projects to clarify these issues are underway by FSC national initiatives, certification bodies and NGOs.

Length of streams flowing through certified lands.

The effect of certification programs on the quality of fresh water and freshwater species is an important topic that we believe has been understudied. While the Rainforest Alliance and partners are currently conducting research in South and Central America that measures the impacts of agricultural certification on water quality and aquatic invertebrates, the indicator ‘length of streams flowing through certified lands’ is being used here as a very general measure of impacts by measuring the amount of water resources that have to be managed in accordance with FSC’s criteria and indicators on water and streamside management zones. FSC criterion 6.5 requires that written guidelines be ‘prepared and implemented to: control erosion... and protect water resources.’ Virtually all FSC regional standards outline management requirements for streamside management zones.

We asked operations with GIS capabilities to report on the linear length of perennial streams that flow throughout a majority of the year (greater than 90% of the time) and flow in a well-defined channel.

We found that the 61 operations that reported data have a combined total of 51,500 linear km of perennial streams flowing through them. If all of these streams were connected end to end they would span the circumference of the earth. The relatively low response rate for this variable (30%) is likely due to the difficulty of reporting on this variable without GIS capacities.

Sustainable Livelihoods

We examined four indicators in the category Sustainable Livelihoods: the number of people employed in certified companies, number of sites conserved of importance to indigenous peoples and communities, and the numbers of serious accidents and fatalities.

Number of employees

We found that operations employed a total of 37,361 people⁸. Ten percent of employees were female. We examined the percentage of female workers, broken down by SmartWood administrative region, and found that, on average, a higher percentage of the workplace is female in the region that includes Russia, Eastern Europe and Scandinavia (26%), in Canada (19.4%), and in the United States (16.7%). The lowest representation by female workers was seen in Brazil (4.7%), the rest of South America (6.1%) and Mexico (7.8%). Complete results are shown in Figure 3. The sample size was relatively large for this analysis; 136 operations (or 65.1% of those operations in our study) reported gender data.

⁸ This includes both full- and part-time employees.

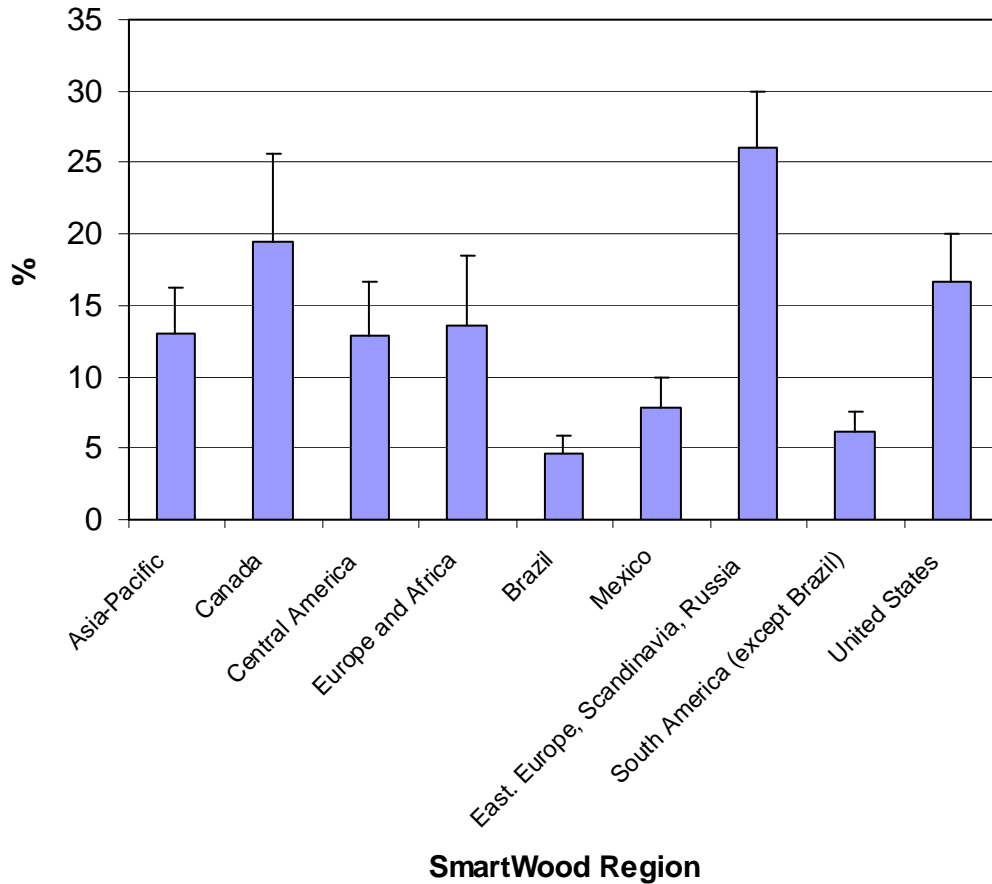


Figure 3. Percent of workforce made up of women, broken down by SmartWood administrative region. Standard error bars are shown.

Number of sites conserved of importance to indigenous peoples and communities

We asked operations to report on the number of sites conserved on their forest lands that are of importance to indigenous peoples and communities. Operations were asked to define ‘important sites’ as those special cultural sites for which explicit protection or access measures are specified in the management plan. A single tree or grove could count as one site; other examples of special sites include ruins or sacred springs.

Operations reported that they conserved a total of 1,558 special sites, which is an average of 21.6 per operation. A look at the data reveals that the majority of operations answering this question reported conserving zero special sites, a handful reported 10 or less special sites, and a very small number of operations reported conserving special sites in the hundreds or even thousands. This extreme variability is reflected in the large standard error for our data (see Table 1).

We also determined that some operations (which were excluded from the summary statistics in Table 1 and the previous paragraph) were actually reporting the number of hectares of forest land used by communities or indigenous groups, rather than the number

of distinct sites. This occurred primarily in regions where broad swaths of forest were conserved for community berry and mushroom picking. In these cases, the operations found it very difficult to report on a discrete number of ‘sites’ that were conserved when in fact the special site in question is a single (but often large) forest tract. Essentially, the information provided by these operations was the same as found in HCVF subcategories 5 and 6 (‘Forest areas fundamental to meeting basic needs of local communities’ and ‘Forest areas critical to local communities’ traditional cultural identity’, respectively). Future versions of the indicator data form will provide operations with more explicit guidance on how to deal with the situation in which the special site is a large forest area rather than a discrete site.

Number of serious accidents and fatalities

The well-being of forest workers is clearly a high priority of the FSC standards, with an entire principle dedicated to Community Relations and Worker Rights. We asked operations to report on the number serious accidents and fatalities occurring in the past 12 months. We defined a serious accident as an incident that cannot be treated with basic first aid and which causes a severe injury requiring professional medical treatment. Examples of these types of injuries include significant strains, other muscle damage, sprains, severe lacerations (requiring stitches), hyper/hypothermia, head/neck trauma, fractures, heart attacks, strokes, anaphylactic shock, or any other injury or illness that required a visit to an emergency room, doctor’s office, or the advance care of emergency medical personnel. Fatalities were defined as deaths of workers attributable to accidents that took place within the forest management unit or related to transport to or from the unit.

On average, 0.4% of workers at certified operations have experienced a serious accident in the past 12 months. The fatality rate was 0.006%.

We again used a regression tree model to determine whether the rate of serious accidents was related to any of the following four variables: forest type (boreal, temperate, subtropical or tropical), ownership type (government, private or community/indigenous), the percent of the operation area under plantation management or the operation size.

Our model accounted for 26.5% of the variability in the rate of serious accidents. A very small percentage (3.1%) was attributable to ownership type, but the majority (23.4%) was explained by operation size. The relationship between number of accidents and five size classes are shown in Figure 4.

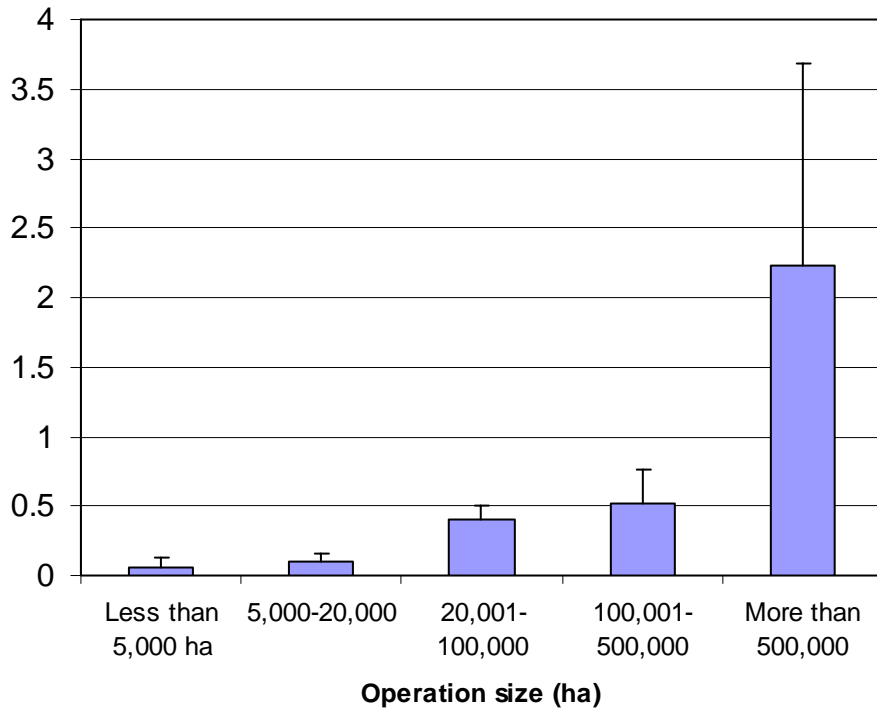


Figure 4. Average number of serious accidents per 100 workers, broken down by ownership size. Standard error bars are shown.

Although the trends in Figure 4 appear clear, there are important reasons why the apparent relationship between operation size and accident rates might be as strong as it seems. Larger companies might be more likely than smaller ones to have official reporting systems for injuries in place. In addition, the extremely large error bars in the data for the largest size category (operations more than 500,000 ha) reveals that the data here are highly variable and potentially influenced by a small number of outliers. When we put the data into a scatterplot (Figure 5) we see that this is indeed the case; the data are heavily influenced by three large operations with unusually high accident rates. More data is therefore needed (and the accident rates of outliers confirmed) before conclusions can be drawn about the relationship between accident rates and operation size.

The scatterplot below raises an additional red flag. It shows that there are a relatively large number of operations with exactly '1' and '2' accidents per 100 workers. Since most forestry operations will likely not have a number of workers that is an exact multiple of 100 and should therefore be reporting an accident rate with a decimal place, it seems possible that many operations might have misread the indicator and simply put the absolute number of accidents, rather than calculating the number per 100 workers. This indicator has been reworded to avoid this problem in the future.

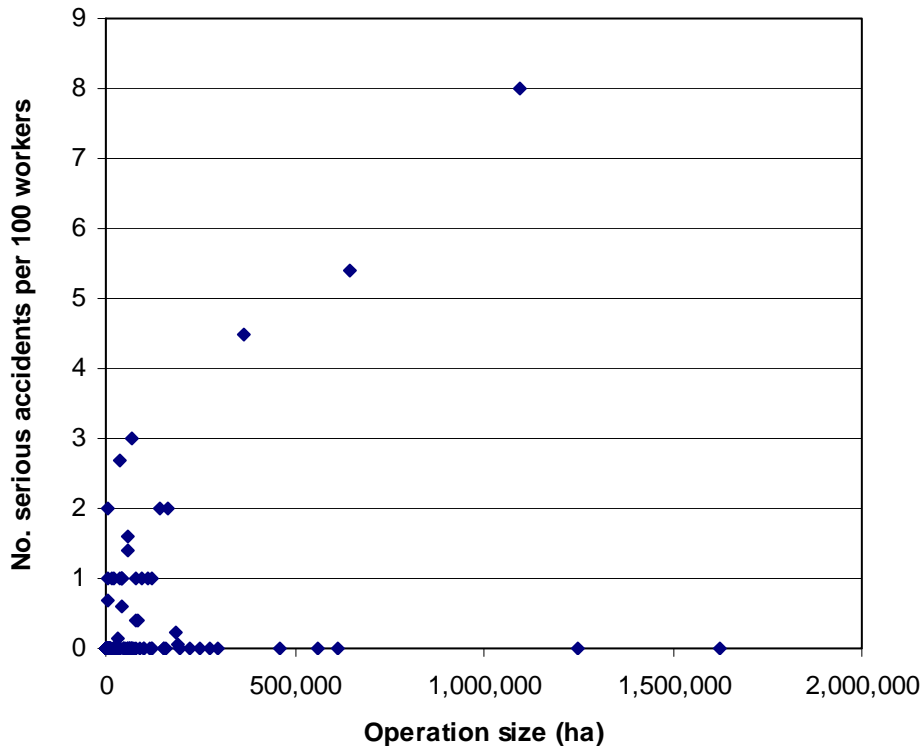


Figure 5. Scatterplot showing the number of serious accidents versus operation size for certified forestry operations.

We searched for published accident and fatality rates from the broader forest sector, to allow us to compare the safety levels at certified operations with those of the forestry industry in general.

The International Labour Organization (ILO) publishes country-level data on fatal and non-fatal accident rates for different industrial sectors on its LABORSTA searchable database. The ILO statistics were ideal because they addressed both injuries and fatalities, as our indicators do, and also because they reported using comparable units to us (they reported rates per 100,000 workers, which was easily convertible to rates per 100 workers. Many other statistics report rates per hours worked). The disadvantage of the ILO database was that its forestry data was combined with that from hunting and agriculture (and sometimes fishing) and rolled into a single number. This will be less of a problem when we complete data collection from Rainforest Alliance-certified agriculture operations and can combine the accident and fatality rates of certified forests and farms.

The second problem with the ILO data was that it provided data from a fairly limited number of countries, which did not always overlap with the countries for which we had data. In fact, we had both ILO and global indicator data on serious accidents in only three countries: Argentina, Canada, and Estonia. For these three countries, the average accident rate reported by ILO was 0.75 accidents per 100 workers, compared with a rate of 0.61 per 100 workers on those certified operations (n=12 certified operations)⁹. It is unlikely that this difference would be statistically significant given the relatively low sample size

⁹ <http://laborsta.ilo.org/>

and the fact that the data is not perfectly comparable data (i.e. the ILO data also includes hunting and agriculture injuries).

ILO data on fatalities overlapped better with our own data; in addition to the three countries mentioned above, we also had both sets of data from Finland, Latvia, Lithuania, Mexico and USA. Here, the average fatality rate per 100 workers reported by the ILO was 0.069, compared to the value for certified operations of 0.067 (n=41 certified operations). Again, most certainly not a statistically significant difference, and also subject to the same caveats as above.

Participation in Certified Markets

The one-third of FSC/Rainforest Alliance Certified forestry operations that reported on financial indicators had combined total sales of US \$1.1 billion. We estimate the value of total sales of all FSC/Rainforest Alliance Certified forestry operations to be approximately US \$3.5 billion.

Product sold with an FSC claim on sales and shipping documents

An important part of building momentum and demand for certified products in the marketplace is ensuring that certified products are actually labeled as such and available for purchase further down the supply chain. We examined indicators that help paint a picture of how engaged forestry operations are in the certified supply chain: the dollar value and volume of product sold with an FSC claim on the invoice or shipping documents. We calculated the 'percentage of total sales sold with an FSC claim' for each forestry operation.

The 'FSC claim' is the statement on the invoice or shipping documents that states that the product complies with FSC standards. Including this claim is optional; however, it is a part of the FSC chain of custody and is therefore necessary if the buyer of the certified products wishes to go on and label his or her own products as FSC certified. On the other hand, selling products with an FSC claim on the documents does not necessarily mean that the buyer is FSC certified.

The 119 operations that reported on the financial indicators had a combined total of US \$865 million in sales with an FSC claim on the invoice or shipping documents. Our estimate for the entire Rainforest Alliance portfolio is approximately US \$2.7 billion in sales with an FSC claim.

We determined that certified operations, on average, sell 63% of their products with an FSC claim on the invoice or shipping documents. We examined the data more closely and found that one-quarter of operations reported selling no products at all with an FSC claim, while 45% of operations reported selling all of their products with an FSC claim. Only 30% of operations sold a subset of their total product with an FSC claim on the paperwork.

For the operations selling a subset of their product with an FSC claim, we hypothesize that they are, in fact, responding to actual demand for certification and have chosen to

include FSC claims on only the paperwork for those products being sold to buyers who are specifically requesting FSC certified products and/or are willing to pay a premium. When only those operations are included, the average percent sold with an FSC claim drops slightly to 60%.

One would assume that the operations that sell no product with an FSC claim are doing so because no buyers are specifically asking for certified product. For the operations selling all of their products with an FSC claim, it is difficult to know whether this is a response to actual demand for FSC products or simply a broad-brush company policy. It is interesting to note that nearly all operations with a high amount of plantation area sell 100% of their products with an FSC claim. This is consistent with anecdotal evidence that the pulp and paper subsector is one area where demand for FSC-certified products is strong.

However, the suggestion that operations with plantation forests sell a significantly higher proportion of their product with an FSC claim is not supported by our regression tree model. Results show that the percentage of products sold with a claim was not influenced by any of our four potential independent variables: the percent of the operation area under plantation management, forest type (boreal, temperate, subtropical or tropical), ownership type (government, private or community/indigenous), or operation size.

Operation efficiency

FSC criterion 8.2 requires that certified companies monitor their costs, productivity and efficiency. To create a coarse measure of the efficiency of certified operations, we calculated the number of employees per US \$1000 in sales per year. We again graphed this data broken down by SmartWood administrative region; results are shown in Figure 6.

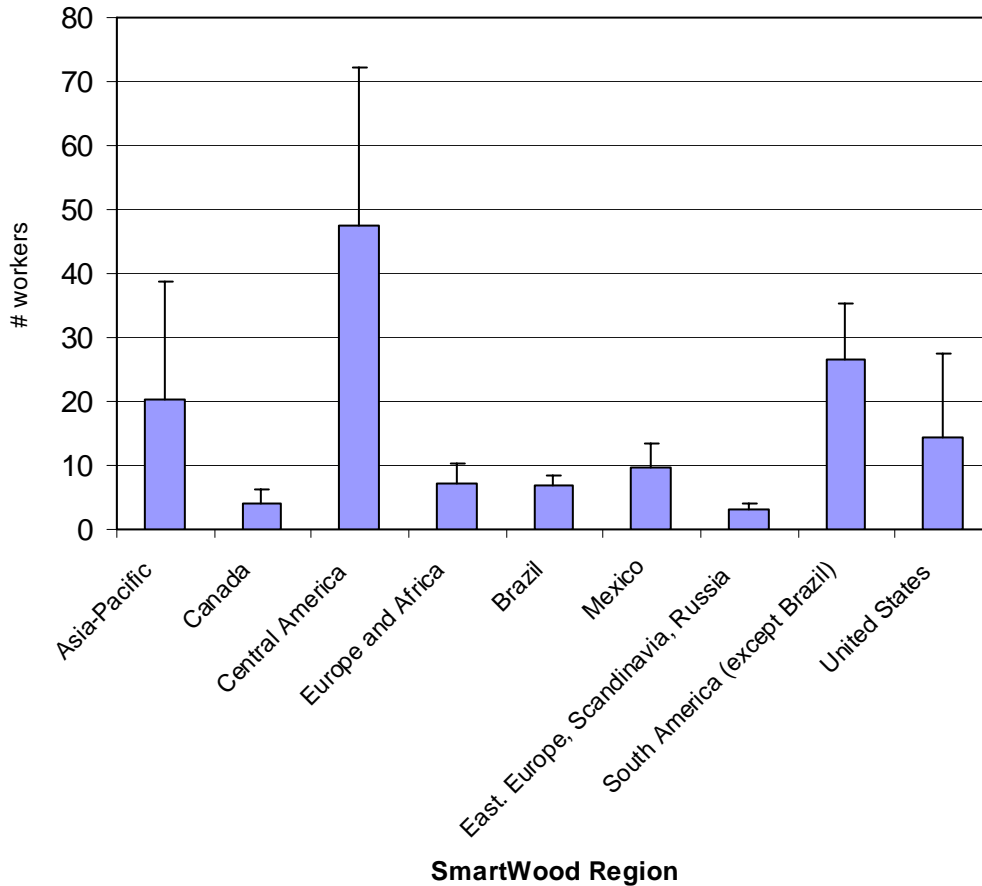


Figure 6. Number of workers per USD \$1000 of sales, broken down by SmartWood administrative region. Standard error bars are shown.

Figure 6 shows that operations in Central America, South America (excluding Brazil) and Asia-Pacific have on average the highest number of workers per US \$1000 produced, while Eastern Europe, Scandinavia and Russia, along with Canada, Brazil, and Europe and Africa have the lowest number of workers. These regional differences could be due to any number of factors: level of mechanization, type of forest terrain, and the density of merchantable tree species, to name a few. Note that this analysis is less robust than others because fewer operations (114, or 54.5 percent of those surveyed) provided data on both the dollar value of sales and total number of employees; we see that standard error bars are relatively large in this graph.

Pesticides

In the FSC system, the use of non-chemical methods of pest control is encouraged and the following types of pesticides are prohibited:

- World Health Organization Type 1A and 1B pesticides;
- chlorinated hydrocarbon pesticides;
- pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; and
- pesticides banned by international agreement.

In certain cases, however, forestry operations can apply for temporary derogation that gives them permission to use pesticides that are normally banned. Derogations are only awarded in certain cases where, among other things, no other option is feasible, environmental and social safeguards are in place, and a stakeholder consultation process has been conducted¹⁰.

We asked operations whether they had received a temporary derogation from the FSC, and, if so, how many highly hazardous pesticides they used, the volume applied, and the total area treated with pesticides. We found that 54 operations out of the 209 operations sampled (25.8%) applied for and received derogations from the FSC. Those operations with derogations used an average of 1.3 different pesticides. On average the volume of pesticides that operations with derogations used was 4,843 L, and the area treated was 7,563 ha. The most commonly reported pesticides were Fastac, Sulfluramide, and Fipronil, all of which are insecticides.

An examination of the types of operations that tended to have derogations from the FSC revealed that half of plantations had a pesticide derogation, compared to less than one-fifth of operations with no plantation area. Thirty-seven percent of operations with some plantation area had a pesticide derogation.

We also examined the geographic location of operations with pesticide derogations. Figure 7 shows the total number of hectares treated with pesticides by operations with derogations. Note that only 24 out of 54 operations with derogations provided data on hectares treated with pesticides, so the dataset on which Figure 7 is based is not yet complete.

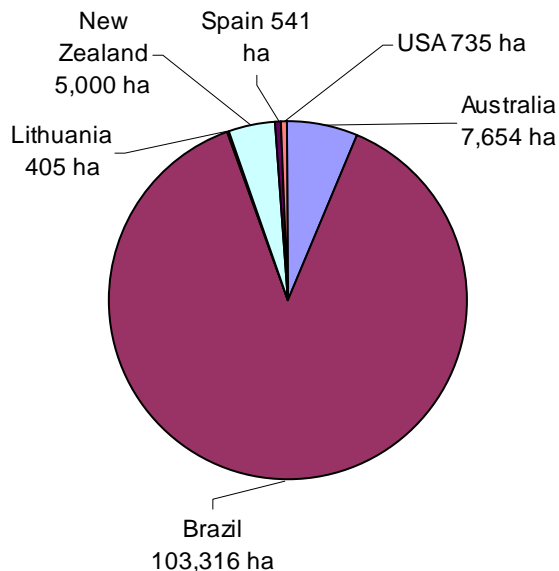


Figure 7. Countries in which operations with derogations for FSC highly hazardous pesticides are found, and the number of hectares treated with pesticides in that country.

¹⁰ Details of derogation requirements can be found in FSC document FSC-PRO-01-004 (Version 2-0), ‘Processing Pesticide Derogation Applications.’

Figure 7 shows that the majority of area treated with pesticides is located in Brazil, perhaps not surprising given the relatively large amount of plantation forest there and the pest control challenges that plantation managers typically face. Nearly all of the Brazilian operations with derogations have plantation forests and use the pesticides Sulfluramide and/or Fipronil, which are typically used to eliminate leaf-cutter ants, a pest that can severely damage pine and eucalyptus plantations. In Brazil, these pesticides are typically applied as a granulated bait that poses a relatively low risk to workers¹¹.

Conclusion

The Rainforest Alliance has auditors and writers on staff who have done an excellent job of chronicling the impacts of certification on the lives of individual people and ecosystems. They have described how certification of the Carmelita Forestry Cooperative in Guatemala has increased profits and allowed the community to invest money in new schools, an emergency medical fund for poor families, and clean water.¹² They have shown how the certification of teak forests in Southwest Sulawesi, Indonesia, has offered villagers an alternative to dangerous illegal logging and connected them with high profile buyers in Europe.¹³

What these stories are not able to relay is the broader magnitude of the Rainforest Alliance's impacts. And until recently, the data to do so has simply not existed. The Rainforest Alliance global indicator pilot project is a first attempt to gather data from all FSC/Rainforest Alliance Certified operations and test out different ways of illustrating how certification is making a difference at a larger scale.

In this report we have identified some interesting trends found in our data. While the dataset is not complete, we think that it still provides a useful thumbnail sketch of impacts and differences among regions. We will soon have indicator data from 100% of Rainforest Alliance Certified operations and will then be able to create a full baseline against which future impacts can be measured.

In addition to the first quantification of impacts presented here, we have learned that the wording of some indicators must be adjusted so that their meaning is clearer and better guidance must be given to auditors and clients. We have also learned that finding comparable 'control' data from the forestry sector is not easy, perhaps underscoring the need for sustainability standard setters and auditors to coordinate and create comparable indicators.

Finally, one of the most important ways our efforts could be enhanced is through research that specifically illustrates the link between our indicators and the Rainforest Alliance's environmental and social goals. For example, a research project that measured species

¹¹ Wilken, Carlos Frederico. 2008. Opinion on the use of sulfluramide for the control of leaf-cutting ants in Brazilian forest plantations. Sao Paulo State University Forest Protection Program. http://chm.pops.int/Portals/0/Repository/addinfo_2008/UNEP-POPS-POPRC-SUB-F08-PFOS-LEAF2.English.pdf

¹² http://www.rainforest-alliance.org/profiles/documents/maya_biosphere.pdf

¹³ <http://www.rainforest-alliance.org/profiles/documents/TeakProfile.pdf>

diversity in the field and found a positive relationship between biodiversity and the presence of untouched set-aside areas would reassure us that our indicator 'Area of forest designated as strict reserve' is indeed a meaningful way to determine the degree to which certification is impacting forest species.

Acknowledgements

The Evaluation and Research program would like to thank the Kendeda Foundation for supporting our efforts to collect and analyze the global indicator data. We would also like to thank the Rainforest Alliance forestry clients, who so diligently provided the indicator data we requested, and Forestry Division staff and auditors for their efforts to ensure the quality of the data and their feedback on the report. Thanks to Dr. Volker Bahn of Wright State University for conducting the statistical analyses.

Appendix A. Rainforest Alliance global indicators for forestry

Indicator	Unit	Also collected by Agriculture and Tourism Programs	FSC requirement
Area of forest designated as strict reserves	Hectares	✓	✓
Area of forest designated High Conservation Value Forest	Hectares	✓	✓
Length of streams and water bodies flowing through forest	Linear Km	✓	
Total number of employees	-	✓	✓
Number of women/men employed in certified companies	-	✓	✓
Number of local/non-local people employed in certified companies	-	✓	✓
Number of full-time/part-time employees of certified companies	-	✓	✓
Do full-time workers earn at least \$2/day?	Yes/no	✓	
Do workers have access to potable water at work site?	Yes/no	✓	
Number of sites significant to indigenous people and communities identified and protected	-		✓
Number of serious accidents	-	✓ Ag only	✓
Number of fatalities	-		✓
Area managed solely for Non Timber Forest Products	Hectares		
Total sales/turnover	\$US		✓
Value of product sold labeled as certified	\$US		
Volume of certified products and services sold labeled as certified	Cubic meters	✓ Ag only	
Amount of highly hazardous pesticides used	Liters		✓
Area treated with highly hazardous pesticides	Hectares	✓ Ag only	✓
Number of highly hazardous pesticides used	-		✓

Appendix B. Methods and results for regression tree analysis

We built regression tree models¹⁴ for each dependent variable: percentage of operation area designated strict reserve, percentage of operation area designated HCVF, rate of serious accidents, and percentage of product sold labeled as FSC-certified. Regression trees are a machine learning technique in which the dependent variable is partitioned recursively by values of independent variables. For each split, the single value of any of the dependent variables is selected that results in the smallest sum of variances in the two resulting groups. This splitting of the data is repeated until a given set of stopping criteria is reached. However, the stopping criteria are selected purposefully so that the tree is overfit, meaning it fits the given data extraordinarily well but will predict poorly onto new data. To come to a more robust size that balances fit with predictive capabilities, we pruned the regression trees to the size of the lowest error determined by 10-fold cross-validation.

We calculated a pseudo-Rsq for each pruned model and for each variable included in each model individually based on deviance explained. These values can be interpreted as the percent of variance in the dependent variable explained by each independent variable or the whole model.

The following table shows the results of the regression tree models (which are discussed in the report text).

Dependent variables	% overall variability explained by model	% variability explained by each independent variable			
		Plantation area	Ownership type	Forest type	Operation size
Percentage forest area designated as reserves	18.6	14.5	4.1	-	-
Percentage forest area designated as HCVF	15.0	-	15.0	-	-
No. serious accidents per 100 workers	26.5	-	3.1	-	23.4
Percentage total sales with FSC claim on sales and shipping documents	-	-	-	-	-

¹⁴ Breiman, L. (1984) *Classification and regression trees*, edn. Wadsworth International Group, Belmont, CA, USA.