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Financial Analysis of Community-Based Forest Enterprises with the Green Value Tool

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Abstract

The Green Value tool was developed in response to the need for simplified procedures that could be used in the field to conduct financial analysis for community-based forest enterprises (CFEs). Initially our efforts focused on a set of worksheets that could be used by both researchers and CFEs to monitor and analyze costs and income for one production period. The original worksheets were designed and tested for CFEs producing timber in Brazil. Since then, the worksheets have been further developed and incorporated into the Green Value tool, which includes a User's Guide that leads users through a six-step financial analysis process and a facilitator's guide for training workshops. In 2013, the tool was used to train 99 representatives of CFEs and organizations that support CFEs and to analyze a range of CFE products and production scales. The tool helps CFEs monitor and analyze costs by major productive activity as well as administrative activities, and the results provided include the subtotal cost per activity and per type of input (labor, materials, machinery), total cost, average cost per unit sold, net income, and rate of return. These results are useful in helping CFEs to understand their costs, to identify ways to reduce costs or improve efficiencies, to evaluate scenarios, to provide transparent financial reporting to communities and donors, and to potentially secure finance. In addition, the results help inform policy makers and others working to support CFEs on the financial challenges CFEs face as well as the financial benefits they provide local communities through wages and purchases of materials and services.

KeywordsCommunity-based forest management Community forestry Community forest enterprise Financial analysis Cost-benefit analysis Timber Amazon Brazil

Introduction

The management and analysis of financial data can be difficult for any small enterprise but can be especially tough for community-based forest enterprises in developing countries. While these enterprises often learn quickly the technical aspects of forest management, many struggle in the process of becoming viable businesses. Specifically, few have the capacity or tools to monitor and manage their financial data, i.e., costs associated with production and income from sales, let alone to calculate total costs per activity, the depreciation value of machinery, net income, or rate of return. Similarly, rarely do the governmental or nongovernmental organizations that provide assistance to CFEs have this capacity or pertinent tools. Yet this information is critical to ensure the financial viability of these enterprises and the distribution of financial benefits to the communities involved, especially as community forestry becomes an increasingly important component of forest management around the globe.

Some may be surprised to realize that communities in developing countries own or control approximately 31 % of forests (Rights and Resources Initiative *2012*), and in some countries, the percentage of community ownership or control is quite high. For example, in Mexico, an estimated 60 to 70 % of forests are owned by *ejidos* (a form of community land ownership), and in Brazil, indigenous and traditional peoples have long-term use rights to approximately one-third of the Brazilian Amazon (Pereira et al. *2010*). Many communities continue using these forest landscapes in traditional ways, combining small-scale slash and burn agriculture with the collection of forest products for subsistence and income.

Increasingly, however, communities are demanding and being granted the rights and support to develop community-based forest enterprises (CFEs) for the commercial sale of forest products and/or services (Rights and Resources Initiative *2012*). These enterprises may be comprised of individuals, family units, or community organizations that make a concerted effort to produce and/or sell forest products or services together. The products they produce vary greatly and may include timber and other types of forest products and services, such as Brazil nuts, natural rubber, carbon credits, etc. It has been estimated that in many countries up to 80 % or 90 % of forest-based enterprises are small and medium forest enterprises (Mayers *2006*), many of which are assumed to be community-based forest enterprises (Rights and Resources Initiative *2012*). The exact number of CFEs in each country varies and can be difficult to estimate, as not all governments keep or make available good data on the number of CFEs or the products they produce. An exception is Bolivia, for which government data indicate 149 communities have government-approved forest management plans for harvesting and selling timber products (ABT *2013*), two-thirds of which are based in indigenous communities. In Mexico, there are 992 CFEs of different types that sell timber and non-timber forest products (Cubbage et al. *2013a*).

Community-based forest management for revenue generating purposes provides a very different economic paradigm from the traditional model of the firm as a private enterprise (Antinori *2005*). While traditional microeconomic theory of the firm is built on a foundation of profit maximization for business owners (entrepreneurs), the goals of CFM are more likely to hinge on expanding the set of economic opportunities for community members, with a greater emphasis on job and income creation for families than on profits. However, despite a difference in the objectives associated with traditional versus community-based business enterprises, it has become apparent that fundamental concepts underlying the traditional analysis of financial and economic data, such as tabulation of costs and revenues, are equally useful for understanding the short-run and long-run financial viability of CFEs (e.g., Humphries et al. *2012*). In particular, financial analyses of CFEs can be used to evaluate the current and potential future financial viability of a community forest enterprise, identify which activities are most costly or inefficient, and track changes in key variables over time.

Some studies have evaluated the costs and financial benefits of CFEs. These studies have highlighted that CFEs can be financially viable (Medina and Pokorny *2008*; Humphries et al. *2012*), at least in the

short run, and in some cases, they are able to earn substantial rates of return (Torres-Rojo et al. *2005*; Medina and Pokorny *2008*). However, one limitation of previous studies of CFE financial viability is that they frequently excluded costs that are subsidized, especially technical assistance and machinery costs (Pinho de Sa and de Assis Correa Silva *2004*). Inconsistent methodologies within studies also make it difficult to compare study results. While it is too early to make broad generalizations about the financial viability of CFEs under alternative circumstances, there is evidence that economies of scale in production and cost-sharing among neighboring CFEs improve the likelihood of CFE financial viability (Humphries et al. *2012*). These studies highlight the importance of applying standardized methods of financial and economic analysis so that research results can be compared across studies using tools such as meta-analysis.

Objective

Our goal was to develop a tool, which we have named Green Value, to allow CFEs and their partner organizations to manage and analyze CFE cost and income data, as well as to provide a methodology and tool to help researchers generate data and information about CFEs to inform forest policy decision-making and CFE support efforts. We found three other tools or resources for financial analysis that have been developed specifically for CFEs. One was developed for financial analysis of community forestry concessions in Guatemala (Gómez and Ramírez *1998*), another was developed for financial and economic analysis of CFEs in Mexico and Latin America (Cubbage et al. *2013b*), and the third is a handbook for several kinds of economic and financial analyses for "participatory forest management" developed for a broad set of users (Richards et al. *2003*). We are also familiar with the Reduced-Impact Logging Simulator (RILSIM), which is designed for larger, industrial timber companies and involves a highly automated user interface (*Blue Ox Forestry no date*).
What separates our Green Value tool from these other tools is that it focuses on financial analysis for one production period, strongly encourages the inclusion of all costs (even ones normally subsidized), includes a facilitator's guide, and comes with illustrated step-by-step instructions with examples for how to use a series of preformatted spreadsheets to monitor and analyze financial data. It is also purposefully not highly automated so that users can double-check data and better understand and verify results. This chapter presents background information on the process of developing Green Value: a tool for simplified financial analysis of forest-based initiatives, an overview of the tool, the application of the tool to date, lessons learned, a case study on the use of the tool, and conclusions regarding how it could be used in the future both by CFEs and by others. We developed this tool with the input of many of the forestry professionals and staff working with CFEs in the Amazon basin from 2006 to the present.

Development of a Financial Analysis Tool

In 2006, with the end of an extensive project (ProManejo) to fund pilot forest management projects for timber production in the Brazilian Amazon a few years away, there was interest on the part of researchers and government agencies in the future of the fledgling community-based forest enterprises (CFEs) that had been heavily supported. We identified two pilot projects interested in collaborating on CFE financial viability analysis. It was determined that the studies should include all of the costs and income for one harvest season, and costs that were subsidized for the enterprises would also be included in order to determine if the income generated through product sales would be sufficient to

cover all of the CFEs' operational costs. Subsidized items included machinery and equipment used in timber harvesting (e.g., chainsaws) and administrative activities (e.g., computers), technical staff support, infrastructure, training courses, and supplies (e.g., gasoline, office paper). The inclusion of all of these costs would enable the estimation and comparison of the true cost per unit of production (e.g., for a cubic meter of log) and price(s) received per unit.

Development Process

We implemented a participatory research process in late 2007 and in early 2008 holding two 4-day workshops to train participants in financial analysis methods while also organizing and analyzing data with the staff of the two CFEs. The first day was dedicated to preparation of cost and income data for analysis and an introduction to basic financial concepts and the methodology to be used. The remaining time was spent compiling and entering the production and cost data by major productive activities, as well as compiling and entering all costs related to the administration of the CFE. These administrative costs included all of the infrastructure and services associated with administering the CFE, including technical staff salaries, vehicles, office rent, electricity, communications (i.e., telephone, Internet), etc. The CFE staff was usually a combination of local community members with advanced training and professional foresters or other technical staff brought in specifically to work on the CFE. The staff worked in small groups to enter and analyze the cost data by type of input (i.e., labor, materials and services, machinery and equipment). At the end of the workshop, all participants came together to review and discuss the overall results. These results were also combined with a collaborator's recent study results into one paper and published in the journal *Ecological Economics* (see Humphries et al. *2012*).

In order to facilitate the use of the spreadsheets by CFEs and others, we developed a user's guide to accompany the spreadsheets, as well as detailed instructions at the beginning of each spreadsheet. The guide and spreadsheets were validated at a training workshop in Brazil in late 2011 and then further revised based on feedback from participants. In addition, a facilitator's guide is currently under development to assist users in training others in the Green Value tool. [1]

The Green Value Method and Tool

The Green Value method is comprised of six steps for completing the financial analysis of a forest-based initiative (Table 1). The steps take the user through the following process: development of a plan for monitoring and analyzing the production of a specific product during a specific period of time and for a specific producer (e.g., family, association, cooperative), the collection of the cost and income data in written form, the introduction of the data into preformatted worksheets using a computer, the compilation of the cost information into subtotals, the organization and analysis of all of the data into one summary worksheet and graphics, and discussion of the results (Table 1).**Table 1** Six steps for financial analysis of forest-based initiatives

Steps	Description

Step 1. Plan	Enter general information about the product, the producer, the period of time to be analyzed, the producer's goals, the principal activities to be monitored, and the responsibilities for monitoring. Also note any assumptions used in the financial analysis
Step 2. Collect data	Collect cost and income data and record it in written form using printed worksheets for each type of input (labor, materials and services, and machinery and equipment)
Step 3. Enter data	Enter the collected data in digital form in worksheets using a computer
Step 4. Compile data	Calculate and verify subtotals per type of input and per activity
Step 5. Analyze data	Present the costs per activity and per input type and calculate total income, net income, and rate of return. Illustrate results using graphs and charts
Step 6. Discuss results	Register the main points from the discussion of the results

Source: Green Value: a tool for simplified financial analysis of forest-based initiatives (Humphries and Holmes *2014*)

The Green Value tool is comprised of a user's guide, a series of preformatted worksheets, and a facilitator's guide. There are one or more worksheets for each step. They are designed to help users both collect and record data in written form by hand and to enter the data in digital form using a computer. There are formulas to automatically calculate subtotals within worksheets and links to facilitate the copying of subtotals between worksheets, but most data entry is manual.

The basis for monitoring the costs related to production of the product or service being analyzed (i.e., all activities that did not fit under "Administration") is a list of the principal productive activities. These are usually three to five main activities, each of which contains sub-activities; the number of main activities usually depends on the complexity of the operation. The costs for inputs (i.e., labor, materials, machinery) are organized and recorded by principal activity.

The most complicated aspects of the six steps are related to machinery and equipment. First, machinery and equipment must be depreciated. We present a simplified method for calculating the annual depreciation cost of each item, which consists of dividing its value into equal parts based on its useful life in numbers of productive periods. This useful life, we suggest, should be based on the producers' experience with each piece of machinery or equipment. For example, if a chainsaw costs $3,000 and usually lasts 3 years for a specific CFE, then the annual depreciation cost should be $1,000.

Second, the annual depreciation cost for an item should be divided among the principal productive activities in which it is used. We suggest using the number of person days worked in each activity as the basis for calculating the relative proportion of the depreciation cost to assign to each activity. Continuing with the chainsaw example, let us assume the chainsaw is used in three activities as follows: activity A for 10 person days, activity B for 20 person days, and activity C for 20 person days. Therefore, the proportion of the depreciation cost ($1,000) assigned to each activity would be as follows: $200 for activity A, $400 for activity B, and $400 for activity C. The calculation is made as

follows for activity A: annual depreciation cost x person days for activity A/total person days in which chainsaw was used for activities A, B, and C, which was $1,000 × 10 days/50 days = $200.

Potential Uses of Results

The results can be used for many purposes by the CFEs and by others involved in discussions of and initiatives to support CFEs. For CFEs, the potential uses of the tool include (but are not limited to):

1.

Clear picture of total costs per activity and type of input (labor, materials and services, machinery and equipment). Many CFE staff and family producers are surprised to see the total cost of production and the distribution of costs by activity and type of input. Often, for example, they had not thought of the value of the labor that goes into production or of the depreciation value for the machinery and equipment they use – it is common for machinery and equipment used by CFEs to have been subsidized completely or partially by donor funds. In addition, many CFEs do not include administrative costs in their own calculations and are surprised to see this activity category among the most expensive; it includes salaries for permanent/semipermanent workers and equipment that is utilized across many different activities (e.g., a truck, a computer).

2.

Improved understanding of the cost per unit of production (e.g., the cost per cubic meter of standing timber or logs or per kilogram for Brazil nuts). This information is necessary to evaluate prices at which products should be sold and can be useful evidence in negotiating with buyers.

3.

Improved transparency in financial analysis and reporting. This clear way of organizing, calculating, and displaying costs in spreadsheets and graphs is useful for communicating the financial aspects of the operation to community members. This can help avoid conflicts and misunderstandings, which are common when large sums of money are involved in collective activities. The clear organization of the data and results may also help CFEs obtain credit or funding from new sources and/or improve their reporting to current lenders or donors.

4.

Financial planning. The results indicate how much capital the CFE needs to save each year to replace aging equipment. The tool can also be used to evaluate scenarios for decreasing costs (e.g., through increased efficiency) or increasing costs (e.g., through investments in additional machinery). Finally, the calculation of net income and rate of return help a CFE evaluate if it is meeting its financial goals.

The results of CFE financial analysis are also of potential interest to CFE partners, donors, banks, politicians, and academics. The financial analysis results can be used as evidence of the financial viability of different types of models of CFEs, operating at different scales and producing different products. This information can help CFE partners, donors, and politicians improve strategies for supporting existing CFEs and replicating successful models. The results can also help identify the different types of benefits of CFEs, such as the number of jobs generated, amount of income that goes to wage laborers (ideally from the same community or region), and how much profit is generated for investment in community initiatives and/or distributed to families. Finally, academics can analyze the results of financial analysis of different CFEs and try to identify factors that affect the results (such as

in the subchapter by Cubbage et al.) in order to explain differences (e.g., size of forest) and/or identify strategies that may improve results (e.g., monitoring, forest certification).

Application of the Green Value Tool to Date

In August 2012, [2] a capacity-building project in financial analysis based on the Green Value tool was launched in Bolivia, Brazil, Colombia, Ecuador, and Peru. The main goal of the project was to train trainers in the use of the tool in order to strengthen financial analysis capacity for CFEs and their partner organizations in the region. Ten trainers were chosen from civil society organizations that worked directly with CFEs in the provision of technical assistance. After an initial training of the trainers, the Green Value tool was utilized in six workshops to train CFE staff in Peru, Bolivia, and Brazil. The workshops spanned 3 days and involved training of 5–10 CFE staff and two to five staff of local civil society and government organizations. Two or three cases of CFE production were analyzed in each workshop, and usually one case of family-level production of a non-timber forest product was analyzed. The initiatives analyzed ranged from family-scale production of non-timber forest products, e.g., Brazil nuts, to larger timber operations managed by a cooperative. After each workshop, the handbook and worksheets were revised to provide more options for data collection and analysis and/or to make the worksheets more user-friendly.

A total of 99 people received training, and 15 cases were analyzed. The financial viability results varied among the cases, from some small, family enterprises having negative net income when labor costs were included to larger operations receiving substantial return on investment (i.e., over 50 % rate of return).

A case study was prepared for each case analyzed. The goals of preparing and distributing the case studies are to provide documentation of the studies to the CFEs analyzed, as well as to inform policy makers, academics, resource management professionals, and donors about the range of enterprise scales and products being managed, the financial contributions of CFEs to communities and families through wages and profits, and the challenges some CFEs face regarding expensive bureaucratic processes, financing, and obtaining fair prices.

A second round of trainings will take place in late 2014 and 2015, with a focus on preparing trainers in Green Value. The Green Value tool and the case studies prepared for the initial workshops will also be made available on the Internet free of charge (see www.earthinnovation.org).

Discussion and Conclusions

The Green Value tool is a useful innovation for helping forest-based initiatives analyze their financial information and to make strategic financial decisions. The main benefits that users have reported include the following: it provides a way to tie all of an enterprise's financial information together in one summary sheet; it clearly presents which activities are most expensive; it helps generate awareness of the value of annual depreciation of the enterprises' machinery and equipment and therefore how much the enterprise needs to save each year to replace these items; and the results are transparent and more easily understandable than most legal, accountant-generated financial statements.

At the same time, Green Value is a tool for decision-making and should not be considered a replacement for accounting systems. In fact, the results of financial analysis obtained through the use of the Green Value tool and a cash flow analysis for the same forest-based initiative will not be the

same, for two main reasons: (1) costs that are subsidized are included as if the CFE were paying for them, and (2) the annual depreciation cost is a reflection of what should be saved to cover expenses when they occur and not a reflection of what has actually been spent each year to replace machinery or equipment. Most enterprises will need to work with an accountant to meet legal financial reporting requirements.

Several limitations to the Green Value tool have also been identified. First, users must have a basic understanding of Excel, especially how to use the sum function and links between cells. It is easy for the formulas or links to fail if they are not carefully maintained throughout the data entry and analysis process, and this may lead to exclusion of some costs, double counting of others, or other mistakes. Second, it might take some effort to adjust the CFE′s accounting system data to be able to easily transfer data to the Green Value worksheets or vice versa. Third, administrative costs can be inflated, as the category is a catchall for expenses that are not easily divided among productive activities. Examples include technical staff that handle the day-to-day administration of CFEs, but who also dedicate much of their time to specific productive activities, and food for workers, which is difficult to monitor in terms of specific activities. However, users who would like to take the time to determine how to allocate the costs between activities are welcome to do so.

As mentioned earlier, in addition to the potential benefits for CFEs, the results of financial analysis of CFEs should also be of interest to people outside of the forest-based initiatives and their partner organizations. Specific uses of the results suggested through discussion of results with the people trained with the tool and with others include:

- Reflection by local and national governments on the true costs of compliance for forest-based initiatives with legal requirements (including technical assistance, fees, travel to government offices, etc.)
- Consideration of price supports and/or other incentives for family and CFE-produced forest products in order to support sustainable and legal harvesting and forest-based employment, and to help make these initiatives financially viable
- Justification by government and civil society organizations for providing low- or no-cost technical assistance to forest-based initiatives who want to sustainably and legally harvest and sell forest products but need assistance to do so
- Consideration of financial analysis results by financial institutions in decisions regarding whether to provide access to credit to forest-based initiatives and perhaps create low-cost credit programs for them
- Use of tool by government and civil society organizations and donors considering the development or replication of forest-based initiatives to develop projections for initial investments and annual cash flow needs.

There are also some important considerations regarding the interpretation of financial analysis results. First, while the finding of a negative net income (or net losses) could be interpreted as indicating that the forest-based initiative is not a viable model and should be discontinued, this is not the intent. The intent of the tool is to help CFEs generate better information for decision-making in order to improve their financial viability CFE as necessary and to reflect on the context in which they operate. The tool may help identify aspects of the initiative that need to be changed; however, it may also help identify areas in which initiatives need more investment from the government or others, such as infrastructure for transporting products (e.g., poor roads can greatly increase costs of getting products to markets and/or reduce prices offered by buyers who receive the product in the community) and technical extension services (which can be among the most expensive administrative costs). Second, the forest-based initiatives that have positive results, and there were many in our cases to date, have typically benefitted from 5 or more years of financial and technical assistance. They have had the opportunity to refine their skills and learn about the business and markets in which they operate and to accumulate

funds for operating capital. As the tool is applied with a greater diversity of initiatives, there will be more examples and lessons to draw from.

In the future, we will continue to modify and improve the Green Value tool, to collaborate with users to distribute the results of the use of the tool, and to investigate how it could be useful to other types of producers and in other parts of the world. Follow-up with previously trained CFE staff and their partner organizations will indicate if and how they are using the tool, the modifications they have made and/or believe would be helpful, if the tool has been useful for continuous monitoring of financial costs and income, and if the use of the tool has been instrumental in any financial or management decisions. In addition, as the tool has been demonstrated to be useful to producers beyond the Brazilian timber CFEs for whom it was originally designed, we will continue to develop and test the tool with different collaborators and for different products and services as opportunities arise.

Case Study: Use of the Green Value Tool with the Mixed Cooperative of the Tapajós National Forest

The Green Value tool has been used to conduct financial analysis of community forest enterprises in the Brazilian Amazon (Humphries et al. *2012*). Here, we summarize findings from the Ambé CFE, an industrial-scale, upland forest (*terra firme*) logging operation in the Tapajós National Forest, located near the city of Santarém, Pará, Brazil, and implemented by the Mixed Cooperative of the Tapajós National Forest (Cooperativa Mista da Flona do Tapajós – Coomflona). The cooperative drew its members from 18 forest communities. The CFE initially received funding from a federal government sponsored program (ProManejo) providing support for sustainable forest management in the Amazon. The enterprise is now largely self-sustaining, though it still benefits from some subsidies from projects managed by nonprofit organizations, and has been certified by the Forest Stewardship Council.

In late 2007, the Green Value tool were used to analyze data collected from the CFE's reduced-impact logging operation in which 300 were harvested in the cooperative's second timber harvest. Roughly 3,651 m^3 of logs were removed at an intensity of 12.2 m^3 per hectare (two to four trees per hectare). Forty temporary workers from local communities were employed in the operation along with seven permanent staff. Several participants had been previously trained in an International Tropical Timber Organization (ITTO) project in reduced-impact logging techniques. Workers received wages ranging from R$ 21 to R$ 30 per day. The overhead costs of the project were relatively high due to the expenses incurred by managing an office in Santarém and a field camp 83 km distant. Transport costs were also relatively expensive due to the costs associated with owning and operating two trucks used to carry staff and workers from the city to the field. Rather than purchase heavy logging equipment, the project hired the services of a local logging company for skidding and loading operations. Logs were sold to a local sawmill.

Following the steps outlined in Green Value, labor, machinery, and material costs for the Ambé CFE were collected and organized by field activity as well as for office-related activities for the 2007–2008 production year and analyzed with the CFE staff during a 4-day workshop (Table 2). This categorization of costs by activity helps the CFE understand which activities are most costly and how the revenues from product sales are distributed among labor and capital (machinery and materials) expenses. In addition, the inclusion of all costs, even those that had been subsidized in 2007 by the ProManejo project, helped estimate the true cost of log production. Figures 1, 2, 3, and 4 show

excerpts of the Green Value worksheets with data for the Ambé project for two of the five main productive activities and for administrative activities. Please note the details of specific costs have been changed; however, the subtotal costs per input and per activity are accurate..**Table 2**
Major productive activities for AmbÕ community forest enterprise

Major productive activities
Inventory and planning
Harvest
Skidding
Product measurement & Loading
Permanent plots

STEPS (2, 3) ENTER: LABOR (TIME) **Name of Initiative:** *Coomflona*

Instructions: Use this worksheet for the "Time" option to enter information about temporary workers for each major activity related to the product being analyzed (e.g., Inventory, Harvesting, etc.), as defined in Step 1. The data can first be collected in written form using printed *(2,3) Enter: Labor (Time)* worksheets (Step 2) and then entered into this worksheet using a computer (Step 3). The other option is to enter the data directly in this worksheet using a computer (Step 3). Use one table for each activity. **First,** enter the name of each major activity and the Supervisor for this activity at the beginning of a table provided below; tables may be added if necessary. The "Supervisor" is the person in charge of supervising the completion of the activity. Then enter information in the columns with an arrow (↓). To enter data for "Days Worked", in the columns for each day of the week (Monday to Sunday), enter if each person worked 1 complete day, a half day, or did not work. Continuing in the same line, in the column "Sum", the subtotal of days worked for each worker for the week will be automatically calculated. Next, for each worker, the subtotal of days worked from the column "Sum" should be entered again as follows: if the worker was the leader of the work group (or one of various work groups), enter the same subtotal of days worked in the column "Leader"; if the worker was not the leader of a work group, enter the subtotal of days worked in the column "Other". The columns without an arrow contain formulas that will automatically calculate values when data are entered using a computer.

Reminders: Be sure to use a different table for each major activity. Be sure to also use a different row to record data for each worker that worked and for each week of work. **Data should only be entered in this worksheet for temporary workers, not for permanent workers.**

Example data are provided in *italics* for two days of work below.

* Subtotal of Wages: Subtotal of Days Worked x Daily Wage

Activity: *Inventory & Planning* **Supervisor:** Edivan

General Information				Workers																
First day of the week			Work location	Name of Worker	Position	Days Worked (1 = one complete day, 0.5=half day, 0=did not work)							Subtotal of Days Worked			Daily Wage ($)	* Subtotal of Wages ($)	Observations	Data Entered By (Person)	Data Entered On (Date)
Day	Mo.	Year				M	T	W	Th	F	Sat	Sun	Sum	Leader	Other					
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓		↓	↓	↓
10	6	2011	1	Edivan S.	Compass operator / leader	1.0	0.0	1.0	1.0	1.0	1.0	0.0	5.0	5.0		30.0	150.0	He left on Tues. to work on another activity	Patricia Ruiz	11/06; 13/06, 16/06
10	6	2011	1	Paulo R.	Note taker	1.0	1.0	1.0	0.5	1.0	1.0	0.0	5.5		5.5	24.0	132.0	He got sick on Thurs. in the afternoon.	Patricia Ruiz	11/06; 13/06, 16/06
10	*6*	*2007*	*1*	Joao F.	Note taker 1	1.0	1.0	1.0	1.0	1.0	1.0	0.0	*6.0*		*6.0*	24.0	*144.0*			
10	*6*	*2007*	*1*	Elsa B.	Note taker 2	1.0	1.0	1.0	0.5	1.0	1.0	0.0	*5.5*		*5.5*	24.0	*132.0*			
10	*6*	*2007*	*1*	Oswaldo D.	Helper	1.0	1.0	1.0	1.0	1.0	0.5	0.0	*5.5*		*5.5*	24.0	*132.0*			
…	…	…		…….	…….								..		…		…			
					Subtotals per activity								375.0	81.0	294.0		$ 9,486.00			

Activity: Harvest **Supervisor:** Floriano S.

General Information				Workers																
First day of the week			Work location	Name of Worker	Position	Days Worked (1 = one complete day, 0.5=half day, 0=did not work)							Subtotal of Days Worked			Daily Wage ($)	* Subtotal of Wages ($)	Observations	Data Entered By (Person)	Data Entered On (Date)
Day	Mo.	Year				M	T	W	Th	F	Sat	Sun	Sum	Leader	Other					
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓		↓	↓	↓
28	6	2011	1	Floriano S.	Chainsaw operator	1.0	1.0	1.0	1.0	1.0	0.0	0.0	5.0	4.0		30.0	150.0		Joao Sosa	28/06, 30/06, 02/07
28	6	2011	1	Nilson R.	Assistant	1.0	1.0	1.0	1.0	1.0	0.0	0.0	5.0		4.0	24.0	120.0		Joao Sosa	28/06, 30/06, 02/07
28	6	2011	1	Tiago N.	Chainsaw operator	1.0	1.0	1.0	1.0	0.0	0.0	1.0	5.0	4.0		30.0	*150.0*		Joao Sosa	28/06, 30/06, 02/07
28	6	2011	1	Elder O.	Assistant	1.0	1.0	1.0	1.0	0.0	0.0	1.0	5.0		4.0	24.0	*120.0*		Joao Sosa	28/06, 30/06, 02/07
…	..	..	..	…….	…….	..	..	..	..	..	..	..	..	..	..	..	..			
					Subtotals per activity								160.0	80.0	80.0		$ 4,320.00			

Fig. 1
Excerpt from the Green Value Labor worksheet for Ambé (Details have been changed to protect the CFE’s privacy)

STEPS (2,3) ENTER: MAT-SERVICES **Name of Initiative:** *Coomflona*

Instructions: Use this worksheet to enter data for Materials (e.g., aluminum tags, gasoline, oil) and Services (e.g., preparation of Annual Operating Plan, training) for each activity related to forest management (e.g., Inventory, Harvesting, etc.), as defined in Step 1. ****Materials are items that last less than one year or harvest season.**** The data can first be collected in written form using printed (2,3) *Enter: Materials and Services* worksheets (Step 2) and then entered into this worksheet using a computer (Step 3). Another possibility is to enter the data directly in this worksheet using a computer (Step 3). Use a different table for each major activity. **First,** enter the name of each major activity at the beginning of a table provided below; additional tables may be added if necessary. Then enter information in the columns with an arrow (↓). The columns without an arrow contain formulas that automatically calculate values when the data are entered using a computer.

* Subtotal Cost = Quantity x Price / Unit

Activity: Inventory & Planning **Supervisor:** Edivan

Date			Cost Data					Observations	Data entered by (Name)	Data entered on (Date)
Day	Mo.	Year	Item	Unit	Quantity	Price / Unit ($)	* Subtotal Cost ($)			
↓	↓	↓	↓	↓	↓	↓		↓	↓	↓
12	*6*	*2011*	*aluminum tags (.5 m)*	*box*	*1*	*13.00*	*13.00*		*Joao Sosa*	*12.06.2011*
12	*6*	*2011*	*erasers*	*individual*	*3*	*0.30*	*0.90*		*Joao Sosa*	*12.06.2011*
12	*6*	*2011*	*pencils*	*individual*	*3*	*0.50*	*1.50*		*Joao Sosa*	*12.06.2011*
12	*6*	*2011*	*nails*	*kilogram*	*20*	*6.00*	*120.00*		*Joao Sosa*	*12.06.2011*
1	*7*	*2011*	*fuel*	*liter*	*600*	*1.90*	*1,140.00*		*Joao Sosa*	*13.06.2011*
..	..	....	.....	.....	....	....	....		...	....
						Subtotal per activity	**$ 3,150.00**			

Activity: Harvest / Tree Felling **Supervisor:** Floriano

Date			Cost Data					Observations	Data entered by (Name)	Data entered on (Date)
Day	Mo.	Year	Item	Unit	Quantity	Price / Unit ($)	* Subtotal Cost ($)			
↓	↓	↓	↓	↓	↓	↓		↓	↓	↓
16	9	2011	Chainsaw chain 066	Individual	4	63.00	252.00		Joao Sosa	18.09.2011
16	9	2011	Fuel	Liter	229	2.70	618.30		Joao Sosa	18.09.2011
			Filter	Individual	1.00	50.00	50.00			
			Wax pencil	Individual	107	2.00	214.00			
			Knife for chain	Individual	4	8.00	32.00			
..	..	....	.....	.....	....	....	....		...	....
						Subtotal per activity	**$ 2,087.00**			

Fig. 2

Excerpt from the Green Value Materials and Services worksheet for Ambé (Details have been changed to protect the CFE's privacy)

STEPS (2,3) ENTER: MACH-EQUIP PH. 3 **Name of Initiative:** Coomflona

Instructions: Carefully follow these instructions. Use this worksheet for the third phase of monitoring costs for Machinery and Equipment, at the end of the period of analysis for data collected through either the "Simple" or "Complex" options in phases 1 and 2. Data on items purchased will now be transferred to this worksheet from the *(2,3) Enter: Mach-Equip Ph. 2* worksheet, and organized and analyzed by activity; there should be one table per activity. Enter information in the columns with an arrow (↓). The columns without an arrow contain formulas that will automatically calculate values. **The main steps are: (1)** First, enter the name of each major activity at the beginning of a table provided below; additional tables may be added if necessary. **(2)** In each table, enter in the first column all of the items of Machinery and Equipment used in the corresponding activity; verify the items by reviewing the column that corresponds with each activity in the *(2,3) Enter: Mach-Equip Ph. 2* worksheet used. **(3)** Next, for each item, enter the "Depreciation Cost" from the *(2,3) Enter: Mach-Equip Ph. 2* worksheet used. **(4)** Then, for the same item, enter the "Subtotal of Days Worked for each Activity" for the corresponding activity from the *(2,3) Enter: Mach-Equip Ph. 2* worksheet used. **(5)** Finally, enter the "Total Days Worked per Item", from the *(2,3) Enter: Mach-Equip Ph. 2* worksheet used; this is the total number of days worked for all of the activities in which this item was used. The columns without an arrow contain formulas that automatically calculate values when data are entered with a computer.

* Cost of the Item per Activity = Depreciation Cost x Subtotal of Days Worked for Each Activity / Total Days Worked per Item

Activity: Inventory **Supervisor:** Edivan

Machinery / Equipment	Depreciation Cost ($)	Subtotal of Days Worked for Each Activity	Total Days Worked per Item	* Cost of the Item per Activity ($)	Observations	Data Introduced by (Name)	Data Introduced on (Date)
↓	↓	↓	↓		↓	↓	↓
Compass	130.00	81.0	81.0	130.00		Joao Sosa	04.11.2008
GPS	344.00	81.0	81.0	344.00		Joao Sosa	04.11.2008
Tape 30 meters	42.50	81.0	168.8	20.40		Joao Sosa	04.11.2008
Tape 50 meters	34.50	81.0	137.3	20.36		Joao Sosa	04.11.2008
Toyota truck	5,250.00	81.0	279.3	1,523.00		Joao Sosa	04.11.2008
....	....	....	...	...			
			Subtotal per activity	**34,864.00**			

Activity: Harvest / Tree Felling **Supervisor:** Floriano

Machinery / Equipment	Depreciation Cost ($)	Subtotal of Days Worked for Each Activity	Total Days Worked per Item	* Cost of the Item per Activity ($)	Observations	Data Introduced by (Name)	Data Introduced on (Date)
↓	↓	↓	↓		↓	↓	↓
Chainsaw	4,000.00	80.0	125.0	2,560.00		Joao Sosa	04.11.2008
Chainsaw operator pants	90.00	80.0	125.0	57.60		Joao Sosa	04.11.2008
Wedge	44.00	80.0	80.0	44.00		Joao Sosa	04.11.2008
Mallet	22.00	80.0	80.0	22.00		Joao Sosa	04.11.2008
Viser for helmet	17.00	80.0	80.0	17.00		Joao Sosa	04.11.2008
....	....	....	...	...			
			Subtotal per activity	**4,211.00**			

Fig. 3

Excerpt from the Green Value Machinery and Equipment worksheet for Ambé (Details have been changed to protect the CFE's privacy)

STEP (3) ENTER: ADMIN **Name of Initiative :** Coomilona

Instructions: Use this worksheet to enter data for Administrative costs, including Labor, Machinery and Equipment, and Materials and Services related to Administration. This data can first be collected in written form using printed *(2,3) Enter: Admin* worksheets, (Step 2), and then entered directly into this worksheet using a computer (Step 3). Another possibility is to enter the information directly into this worksheet with a computer (Step 3). Enter information in the columns with an arrow (↓). The columns without an arrow contain formulas that automatically calculate values when data are entered with a computer.

* Total Monthly Compensation = Monthly Salary + Montly Benefits

** Total Annual Labor Cost = Total Monthly Compensation x Number of Months of Work

Labor - Salaries

Date			Name	Position / Title	Monthly Salary ($)	Monthly Benefits ($)	* Subtotal Monthly Compensation ($)	Number of Months of Work	** Subtotal Annual Labor Cost ($)	Observations	Data entered by (Name)	Data entered on (Date)
Day	Mo.	Year										
↓	↓	↓	↓	↓	↓	↓		↓		↓	↓	↓
-	-	-	Joanna	Forestry Engineer	2,000.00	400.00	2,400.00	12	28,800.00		Joao Sosa	04.01.2008
-	-	-	Maria	Administrator	2,000.00	400.00	2,400.00	12	28,800.00		Joao Sosa	04.01.2008
-	-	-	Jorge	Cook	600.00	120.00	720.00	6	4,320.00		Joao Sosa	04.01.2008
.	..	....	.....	.....	...	...	...	...	...		...	...
								Subtotal Cost $	169,770.00			

* Subtotal Cost = Quantity x Price / Unit

Materials and Services (e.g., diesel, oil, rent, electricity, telephone, water, internet, insurance, vehicle maintenance, training)

Date			Item	Unit	Quantity	Price / Unit ($)	* Subtotal Cost ($)	Observations	Data entered by (Name)	Data entered on (Date)
Day	Mo.	Year								
↓	↓	↓		↓	↓	↓		↓	↓	↓
1	8	2011	Utilities	per month	1	300.00	300.00	varies by month	Joao Sosa	01.08.2008
2	8	2011	Vehicle maintenance (total)	per year	1	1,250.00	1,250.00		Joao Sosa	02.08.2008
3	8	2011	Training	per event	1	5,000.00	5,000.00		Joao Sosa	03.08.2008
3	8	2011	Office supplies	per month	1	400.00	400.00	varies by month	Joao Sosa	03.08.2008
.	..	....	.....	...	...	...	...		...	...
						Subtotal Cost $	16,190.00			

* Total Cost = Quantity x Price / Unit

** Depreciation Cost = Total Cost / Useful Life

Machinery and Equipment

Date			Item	Unit	Quantity	Price / Unit ($)	* Total Cost ($)	Useful Life (in # of years or productive periods)	** Depreciation Cost ($)	Observations	Data entered by (Name)	Data entered on (Date)
Day	Mo.	Year										
↓	↓	↓	↓	↓	↓	↓		↓		↓	↓	↓
1	6	2007	Computer, printer, programs	Packaged computers	4	3,500.00	14,000.00	3	4,666.67		Joao Sosa	04.08.2008
1	6	2007	Flatbed Truck	Individual	1	97,400.00	97,400.00	3	32,466.67		Joao Sosa	04.08.2008
1	6	2007	Air conditioner	Individual	1	430.00	430.00	4	107.50		Joao Sosa	04.08.2008
.	..	....	.....	.....	...	...	...	...	...		...	...
								Subtotal Depreciated Cost $	185,425.00			

Fig. 4

Excerpt from the Green Value Administrative costs worksheet for Ambé (Details have been changed to protect the CFE's privacy)

As can be seen in Figs. 5 and 6, fixed costs associated with the administration of the CFE were the most expensive cost category, accounting for more than 70 % of total costs. Further, office-related administrative activities accounted for nearly 90 % of the total labor costs. The use of heavy equipment also incurred major expenses, especially rents paid for road construction (a component of the inventory and planning expenditures) and tree removal (skidding).

STEP (5) ANALYZE: SUMMARY

Instructions: Use this worksheet at the end of the period of analysis to summarize the total costs, organized by type and by activity, and total income related to the product or service being analyzed. **First**, enter information about the producer in the tables "Information about the Producer" and "Basic Operational Information". Then enter the major productive activities in the first column in the table "Cost by Activity and Cost Type"; the Administrative costs are always included after the list of major productive activities. Rows can be added to the table as necessary. There are links between this worksheet and each of the *(4) Compile* worksheets for cost data as well as the *(2,3) Enter: Sales* worksheet for income data. The rest of the columns do not have an arrow because they contain either data copied over with links from other worksheets or formulas that automatically calculate values.

Information about the Producer	↓
Name of Initiative	*Coomflona*
Product or Service Analyzed	*Logs*
Period of Analysis	*Harvest 2007-8*

Basic Operational Information	↓
Monetary Unit	*R$*
Area of Production (ha)	*300*
Unit of Sale	*m3*
Quantity sold	*3,651*
Average Quantity Sold/Area	*12.17*

Costs by Activity and Input Type

Activity	Labor	Materials and Services	Machinery and Equipment	Subtotal Cost ($)	Percent	Average Cost per unit ($)
↓						
Inventory & Planning	9 486	3 150	34 864	***47,500***	*8%*	*13*
Harvest	4 320	2 087	4 211	***10,618***	*2%*	*3*
Skidding	3 666	16 325	64 109	***84,100***	*15%*	*23*
Product measurement & loading	6 450	838	843	***8,131***	*1%*	*2*
Permanent plots	1 890	0	421	***2,311***	*0%*	*1*
Administration	169 770	185 425	61 247	***416,442***	*73%*	*114*
Subtotal Cost	***195,582***	***207,825***	***165,695***	***569,102***		***156***
Percent	***34%***	***37%***	***29%***			

Revenue, Net Revenue, and Rate of Return

Total Revenue	*$637 175*
Total Costs	*$569 102*
Net Revenue (Profit)	***$68 073***
Rate of Return	***12%***

Fig. 5
Green Value Summary worksheet for Ambé

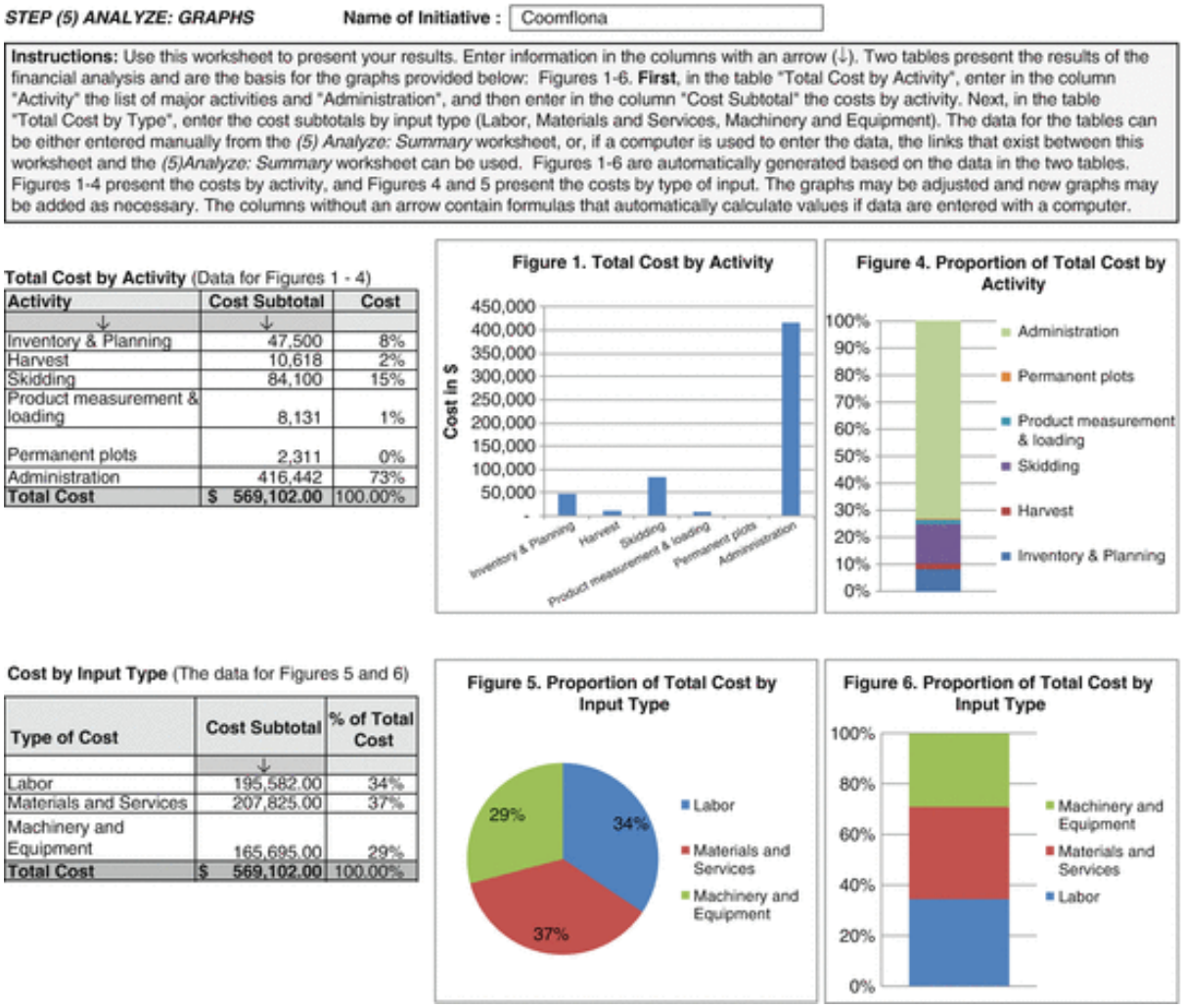

Fig. 6
Green Value Graphics worksheet for Ambé

Given estimates of total cost, it is simple to compute the average total cost of producing logs by dividing total cost by the volume produced:

$$ATC = R\$569{,}102/3{,}651\ m^{3} = R\$155.88\ m^{-3}$$

The average total cost of producing logs is a useful metric because it can be compared with the average total revenue obtained from selling logs. This comparison is helpful for understanding potential inefficiencies when the CFE is producing various classes of products for sale, each with a different market value, where the cost of producing outputs does not vary across the classes of products sold.

To see this, we report the average (per unit) revenue associated with each product class sold, as well as the number of units sold and total revenue (Table 3). The most common products produced were class 2 logs (1,747 m^{3}), receiving R$180 m^{-3} and accounting for nearly half of the total revenue. The production of class 1 logs was very lucrative, receiving R$280 m^{-3}, accounting for roughly 20 % of the total volume produced while receiving nearly one-third of the total revenue. As is readily observable, the (average) revenue received per unit of class 1 and 2 logs exceeded the average cost (R$155.88 m^{-3}) of producing those logs. However, the average cost of producing class 3 logs exceeded the average revenue received (R$100 m^{-3}), thereby inducing a loss for each unit produced. Although there are often good silvicultural and/or commercial reasons for harvesting low-value species, it is important for the CFE to recognize that profits are being lost for each class 3 log produced.**Table 3**

Annual total revenue for Ambé community forest enterprise (R$, 2008, rounded values)

Product	Price m^{-3}	Volume (m^3)	Revenue
Class 1 log	280	735	205,872
Class 2 log	180	1,747	314,429
Class 3 log	100	1,169	116,874
Total	–	3,651	637,175

In addition to average cost and revenue, estimates of total cost and revenue are useful for evaluating the overall profitability of a CFE. Total revenue from the Ambé CFE is simply computed by multiplying the price received per unit times the quantity in each quality class and then summing across the quality classes:

TR = (R$280*735) + (R$180*1747) + (R$100*1169) = R$637,175

Subtracting total cost ($569,102) from total revenue, the net revenue (or profit) from the 2008 timber harvest was $68,073 (Fig. 5).

Similar to the computation of average total cost, average total revenue across all value classes can be computed by dividing total revenue by the volume produced:

ATR = R$637,175/3,651 m^3 = R$174.52/m^3

The average net revenue (profit) is then computed by subtracting the average total cost from the average total revenue:

ANR = R$174.52/$m^3$ − R$158.88/ m^3 = R$15.64/m^3

That is, for every cubic meter of logs produced, an average net revenue of R$15.64 was received. Thus, although we saw that class 3 logs reduced net revenues, the profitability of producing class 1 and class 2 logs more than compensated for the losses incurred in producing class 3 logs.

Just as average net revenue can be computed for the entire logging operation, average net revenue can also be computed for each class of products. As would be expected, the ANR for the highest value class is large (R$280 – R$159 = R$121/$m^3$). Although the ANR for the medium value class is positive (R$180 – R$159 = R$21/$m^3$), the profit per unit produced is much smaller. As anticipated from the discussion above, the ANR received from class 3 logs (R$100/$m^3$) was less than the cost of producing them (R$159/$m^3$). However, it is important to recognize that the production of class 3 logs provided income to community members for the hours that they worked producing those logs. Of course, the labor income was subsidized by the positive ANR obtained from medium and high value class logs.

Overall, the income from the sale of logs was found to be greater than the cost of production. This was based on a critical assumption that workers were paid on a daily basis for work performed, and not on a monthly basis, as the CFE was considering this change. In addition, the CFE had valuable baseline information for analyzing other scenarios, such as comparing net income based on purchasing versus renting a skidder (machinery used to transport logs from the forest to a central loading location) or the production of dimensional lumber with a sawmill versus logs. It also had important information regarding the social benefits of the CFE, including that all of its labor costs for field activities and a good part of its administrative labor costs represented in fact income for local community members.

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Footnotes

1
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2
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