

TOOL III

Handbook for Timber Flow Inspections at Sawmills and Lumber Yards

Edgar Maravi



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Handbook for Timber Flow Inspections at Sawmills and Lumber Yards

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Edgar Maravi

Tropical Agricultural Research and Higher Education Center (CATIE)
Research and Development Division
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Technical Editors:

Design:

Images:

Marianela Argüello L.

Julio López, Braulio Buendía y

Tuukka Castren

Andrea Johnson

Olman Bolaños V.

Finnfor

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Abbreviations and Acronyms

AFISAP	Asociación Forestal Integral San Andrés
AHEC	American Hardwood Export Council
AOP	Annual Operating Plan
CATIE	Tropical Agricultural Research and Higher Education Center
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CONADEH	Comisión Nacional de Derechos Humanos en Honduras
CONAP	Consejo Nacional de Áreas Protegidas
INAB	Instituto Nacional de Bosques
NGO	Non-Governmental Organization
NHLA	National Hardwood Lumber Association
PGFC	Proyecto Posicionamiento de la Gobernanza Forestal en Colombia
PROFOR	Program on Forest
WB	World Bank
UTM	Unit Transverse Mercator

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Foreword

Responsible economic, social and environmental logging practices remain the exception from the norm, even today, and are often limited to a few showcase areas. In too many places, loggers and traders still engage in unfair commercial practices, illegal logging, over harvesting or timber theft with severe negative impacts on the economy and natural resources of state-owned forestlands, indigenous and local communities. Monitoring and supervision of the legal origin and volumes of round wood and processed timber in forests, lumber yards, sawmills and warehouses are often limited.

CATIE, through its Finnfor II Project, with the generous funding, technical assistance and extensive contribution of World Bank and PROFOR, has developed this practical Toolkit for Forest Control and Supervision. This set of tools builds on past experiences and includes: i) a user's field manual for verification of the legal origin of timber; ii) guidelines for achieving and monitoring fair economic benefit sharing and good environmental practices in logging contracts between forest industry and indigenous communities; and iii) a handbook for inspection of wood flows at sawmills and other processing facilities.

These innovative tools were developed in partnership with regional intergovernmental organizations, government agencies, forest stakeholder groups and NGOs. The lessons learned were collected from fieldwork, validation meetings and working events, particularly from stakeholders and prospective end users from Bolivia, Colombia, Costa Rica, Guatemala, Honduras, Nicaragua and Peru.

These tools are designed to complement each other by addressing best practices and monitoring throughout the various links of the supply chain. Primary users of these tools will be government agencies and officers; therefore, we hope that bundling them into one Toolkit will make their use easier and more efficient and in-

crease the degree of their adoption. Use of this Toolkit is expected to generate reliable, low cost data and prove a simple method for verifying timber legality, making the Toolkit particularly useful for tropical forest countries with limited budgets.

We hope that the practical suggestions and recommendations for community leaders, promoters and technical forest authority staff included in the Guidelines for monitoring of logging contracts between the forest industry and indigenous peoples will help communities in negotiating and monitoring compliance with logging contracts with middlemen and the logging industry. If used well, this tool will improve those contracts for the benefit of indigenous and local communities, while preventing illegal logging and forest degradation.

In closing, we would like to extend our gratitude to the World Bank, PROFOR and the Ministry for Foreign Affairs of Finland, as well as to the experts and specialists in forest control and supervision for their extensive contributions to this set of guidelines and recommendations. We would also like to extend our heartfelt appreciation to the leaders of indigenous and local communities for their generous contributions to this Toolkit and who endured validation working meetings and consultations. It is our sincere hope that this tool will contribute to improving forest management, reducing illegal logging and ensuring that communities see the benefits from commercial harvest of their forests.

Sincerely,

José Joaquín Campos, PhD.
General Director
CATIE

I. Introduction

This handbook, primarily meant for forest authority officials, is linked to the Field Manual for Timber Verification (Tool 1) as it is a tool that helps “close the loop” of forest control activities by linking the flow of volumes of processed timber through sawmills and lumber yards with the approved and verified volumes in the forest. The overall objective is to prevent trade and processing of illegally harvested timber.

This tool offers a set of procedures for technical teams in charge of monitoring the movement of round wood and sawnwood from forests to mills and onwards. Data obtained through the use of this handbook will also provide useful input for forest industry business plans. Similarly, data resulting from the application of this tool will support forest sector transparency activities.

It is important to note that the processes described in this handbook can play a strategic role in reducing illegal logging and related trade as long as forest laws and authorities make inspections mandatory and demand consistent information from sawmills and lumber yards about their operations. Without valid field data, this tool will only demonstrate that a forest sector is legitimate on paper.

The procedures proposed in the toolkit would contribute to substantially increasing monitoring of the target stakeholders. Using this tool and the others from this toolkit by no means would ensure that forest authorities monitor one hundred percent of timber volumes traded on a national level. At the very least, however, through proposed activities in the handbook it will be possible in a short time to reduce the numbers of sawmills and lumber yards that operate illegally or informally.

This handbook promotes simple methods and procedures for carrying out inspections, taking into account technical, administrative and legal conditions in each country. This tool could also

be used in verifying chain of custody for “controlled wood” and in the stepwise approach for forest certification.

The formulation of this handbook included significant input and experiences gained through the Forest Industry Control and Supervision Pilot Program in Guatemala. Experiences from this program conducted by the Guatemalan Forest Authority (Instituto Nacional de Bosques, INAB) and CATIE (Tropical Agricultural Research and Higher Education Center) with support from the Program on Forests of the World Bank (PROFOR-WB), together with input obtained from existing guidelines used by forest administrations from several countries, serve as the core of this handbook.

This tool includes the valuable input from forest administration experts, who have made generous and much appreciated contributions, to substantially improve this and other components of the toolkit. It is also important to mention that based on experts’ suggestions, Annexes IV and V in this handbook include a set of elements for designing national inspection strategies.



II. Purpose

This handbook is a tool for officers and technical staff from forest authorities responsible for inspections of timber volume flows in sawmills and lumber yards. The handbook offers a set of activities and protocols for planning and implementing activities to monitor the existing and traded volumes of round wood and processed timber in sawmills and lumber yards. Verifications need to be based on the approved volumes of verified timber according to forest permits.

III. Background for Inspections

Sawmill inspections are forest control administrative procedures performed by forest authorities that are carried out for a number of reasons. These include:

- a. Standard procedures to ensure forest control and legal compliance related to processed timber
- b. Responses to charges of illegality in processing timber of questionable origin

A country's forest information system provides information on the numbers of trees and their respective volumes approved in the Annual Operating Plans (AOP). Based on this information, inspections can be used to cross-check the approved volumes in the forest with those of the round wood supplied to sawmills and lumber yards.

Inspections must be implemented in compliance with the forest sector regulations from each country. The proposed due diligence, procedures and tasks in this handbook are formulated so that they can be easily adjusted to different country conditions. Users of this Handbook should review local forestry laws and related regulations to identify opportunities for applying this tool and for making relevant adjustments as needed.

One important element of the inspections process is the use of volumetric yield rates that need to be calculated according to countries' regulatory frameworks. Methods, formulas, matrixes and formats used in the inspection process should be part of national regulatory systems.

IV. Preparing the Inspection Plan

Responsibilities

Inspection procedures are conducted by specialized teams reporting to the forest authority. In some countries, where forest control and supervision responsibilities are assigned to organizations other than the forest authority, inspections will be conducted by that agency.

Inspections require coordinated team work. The company running the processing plants or lumber yard is obligated to participate and assist logistically in all activities included in the inspection plan. Depending on the particular conditions in each country, inspections may include participation of NGOs or other civil society organizations to ensure transparency.

Assignments of tasks and responsibilities are expected to be completed based on the inspection plan. Staff distribution will depend on the facility's processing and storage capacity, information needs and planned tasks. Priority will be given to such tasks as timber flow information, specifically information on volumes of round wood and timber grades. Key tasks also include verification of round wood, sawnwood and analysis of documents regarding the amount timber traded. If the inspected facility is a lumber yard, the priority will be verifying inventories and analyzing documentation.

Forest Industry Licenses and Registration

Most forest legislation regulates the registration and operations of the industry, including sawmills, lumber yards and other processing facility regarding timber use and flows. Performing a quick census of all operating businesses and lumber yards operations in the respective jurisdictions, including those operating informally or illegally, will provide important baseline data.

Such a database will help identify the appropriate areas to monitor legal timber flows and processing activities; it also offers an opportunity to improve law enforcement by supporting administrative and judiciary cases of illegal logging and related trade in those facilities operating outside the law. With this data, forest authorities will be able to achieve either legalization or closure of those facilities operating illegally (INAB 2011).

Geographic Location and Mapping

The above mentioned baseline data should provide details as precise as possible of the location of industry facilities. In addition to their formal legal address, the baseline data should include the georeferenced location of sawmills and lumber yards. This location data will enable preparation of maps for identifying the geographical distribution of timber processing activities, location of industrial and trade infrastructure and the geographic flows of timber products throughout the region or country. In addition to its important contributions for administrative and legal processes, these data and maps provide the basis for planning and carrying out inspections (INAB 2011).

Maps are a powerful data visualization tools. Electronic maps also allow overlaying different data sets and help also in identification of risks (e.g. concentration on processing plants in proximity of well-stocked protected or indigenous people's areas could indicate a high risk of illegal logging). This helps also in verifying the origin of timber.

Inspection Dossier

The unit responsible for inspections within the forest authority at the national and provincial levels should have access to current data and registration files of sawmills and lumber yards. This dossier should include the registration certificate of each facility,

standard reports and other relevant documents related to business operations. The registration documents and other company data should be filed in an accessible manner within the responsible agency (INAB *et al.* 2011).

Inspection Plan

Based on the above preparatory tasks and before launching the actual inspection, the unit must develop an inspection plan. A preliminary plan will be prepared with available information from sawmill or lumber yard dossiers, including background information (company owners or legal representatives, other interested parties, location, estimated processing volume, reports, plant capacity, etc.), objectives, team composition, estimated time required for field work, major tasks and logistical arrangements (INAB 2011).

For regular inspections it may be necessary to give a reasonable advance notice to ensure that key people are present. However, if illegal activity is suspected, it is necessary to maintain all preparations confidential and not give advance notice.

Technical Team

In preparation for the actual inspection, an Inspection Team should be established, led by a team leader who will interface with the forest industry as the formal agency representative throughout the inspection process. Prior to the inspection the Team will conduct working meetings to assess the scope of activities, launch needed coordination tasks and allow for the integration of other support staff. The team leader will determine the number of team members and will coordinate responsibilities, assignments and tasks. The Team will seek support from the forest authority's local agency as needed.

Inspection Timeframe

Required time for an inspection will depend on the size, processing capacity and organizational structure of each sawmill or lumber yard and on the volume of supplied timber, inventory and sawmill processing capacity. Inspection time will also vary given the number of Team members available to conduct such intensive tasks as inventories, detailed review of documentation and journals, and report preparation.

V. Implementing the Inspection Plan

The following proposed procedures resulted primarily from the experiences gained through the forest industry control and supervision pilot program in Guatemala and valuable input from forest administration specialists in Amazonian and Central American countries.

Entering the Facility, Identification and Accreditation

As the Team enters a facility, each Team member wears a photo ID in a visible place at all times. Team members should be ready to show their ID upon request from company representatives. The Team should also be ready to show formal documentation related to their appointment and the relevant authority's approval of the inspection (INAB *et al.* 2011).

The Team Leader should lead initial activities by:

- a. Informing the owner or legal representative of the inspection's objective
- b. Presenting all Inspection Team members and their respective credentials
- c. Delivering a copy of the inspection notice
- d. Taking a quick walk through the facilities and offices
- e. Reviewing the inspection plan with the company staff
- f. Requesting company crew needed to assist during inspection tasks. Company staff participation is very important to witness findings during the inspection process

Document Analysis

The Team is expected to carefully review the company's legal documents including:

- a. Registration certificate
- b. Journals and ledgers of timber movements (supplied round wood and processed sawn wood) approved by the forest authority, complementary digital baseline data, documents related to stock or inventories, etc.
- c. Documents that support and/or prove the legal origin of forest products (forest transportation permits, forest permits/licenses, purchase orders, invoices, etc.).
- d. Journals and ledgers tracking volumes of processed wood by species and grades. Documents should also include any timber processed by or for third parties through service contracts. Particular attention should be paid to verify the authenticity of the transportation permits, forest permits, delivery notes and purchase orders, etc.

Considering the importance of this task, section VI presents a more detailed description of its scope. Cases in which the company intentionally refuses to provide the proper documentation, the Team will take note in the Inspection minutes in order to allow for further administrative or legal procedures according to the law and regulations of the respective country. This may also require the assistance of law enforcement to secure evidences.

Verification of Round Wood and Sawnwood

The verification of inventories in sawmill log yards aims at measuring round wood (logs, flitches, etc.) and sawnwood. This task is the responsibility of one Team member assisted by two company staff. Round wood verification in log yards follows procedures described in Section VII and Annex I.

Volume Credits, Debits and Balances

This is a critical task in the inspection and is conducted after completing the Documentation Analysis and volume verifications. Comparing actual volumes of round wood, sawnwood and inventories with the volumes that should be present according to the formal paperwork from the forest authority, will provide a good idea of the company's legal compliance.

A key element for checking volumes and yields of incoming round wood and outgoing processed sawn wood is the volumetric yields or volumetric conversion factors, often described as the percentage of round wood volume that ends up as sawn wood for each species processed.

In cases of significant inconsistencies in volumes and strong evidences of violations, the Team might decide to immobilize relevant timber products following the relevant regulations. Under these circumstances, and always including these facts in the respective inspection minutes, the Team should assess if the case is sufficiently serious to terminate the inspection process and initiate administrative procedure according to the standing legislation.

VI. Analysis of Documents: Tracking Timber Flows

The analysis of timber flows of incoming round wood and outgoing sawnwood is key to the inspection, thus this section provides more details on protocols to review books, ledgers, journals and other documentation that describes the movement of timber and other transactions throughout sawmill or lumber yard facilities.

As the documentation review will be a core part of the inspection's technical report and might be used in administrative procedures and eventually in criminal cases, this analysis should be performed with high standards and objectivity, making sure information is verified accurately (INAB *et al.* 2011).

Documentation analysis includes comparing a facility's inventory and existing timber tally data, particularly related to incoming round wood such as logs and flitches.

Documentation should include official forest transportation permits, forest permits, bill of lading, tracking notes or purchases orders, etc. that demonstrate the origin of the stock of round wood in a sawmill log yards and of the wood already processed during the period that the inspection is investigating.

Likewise, the analysis includes documentation of stock in sawmill facilities (stock inventories in drying kilns and sawmill storage sheds) and outgoing processed products, such as lumber ledgers, transportation notes, sales journals, service invoices, purchase orders, etc. As described above, documentation review and assessment should also include those volumes from third parties processed by sawmill through service contracts.

Once the review process is completed and data is organized, the Team will be able to identify on a preliminary basis, whether data is consistent with reasonable margins of error or if there are major inconsistencies that demand a careful re-checking of documentation.

Key information and data for inspections:

- a. Volume data entries of received round wood and shipped sawn wood in journals and ledgers
- b. Volume of purchases and sales per species and grade
- c. Data on stocks of round wood and sawn wood in log yards and stockrooms, sheds and drying kilns resulting from verification tasks
- d. Volumes in transportation permits, tracking notes, bills of lading, purchase orders, etc. of received round wood and shipped sawn wood
- e. Volumes in official documents, forest permits, transportation permits, certificates from the forest authority according to relevant regulations
- f. Volume in vouchers and order forms or invoices for processing services to third parties
- g. Volumes in reports submitted by the inspected party to the forest authority according to regulations.
- h. Previous reports about the inspected industry

Other important documents include: a) official notice of inspection; b) official minutes from round wood verification in log yards; c) official minutes from sawnwood verification; d) lumber tally sheets and other worksheets with volume data from existing stock of timber products and sub-products.

VII. Timber Products Measurements

Following relevant legislative regulations, the Team should verify the volumes of existing round wood and flitches in log yards per species. This task requires knowledge of conventional methods and criteria for measuring timber, described in Annex I Timber Products Measurements. The decimal metric system is generally used for measuring round wood and sawnwood.



VIII. Volume Conversion Factors or Sawnwood Yield from Standing Timber

Having national volume yield tables for relevant commercial species approved by the forest authority, or obtaining the average yield conversion factors for the inspected sawmill, is important and would allow for better use of this toolkit.

The yield conversion factor – often described as an average percentage and also known as the volume conversion factor – is the relationship between the volume of standing timber or round wood that enters the sawmill, and the resulting volume of sawnwood.

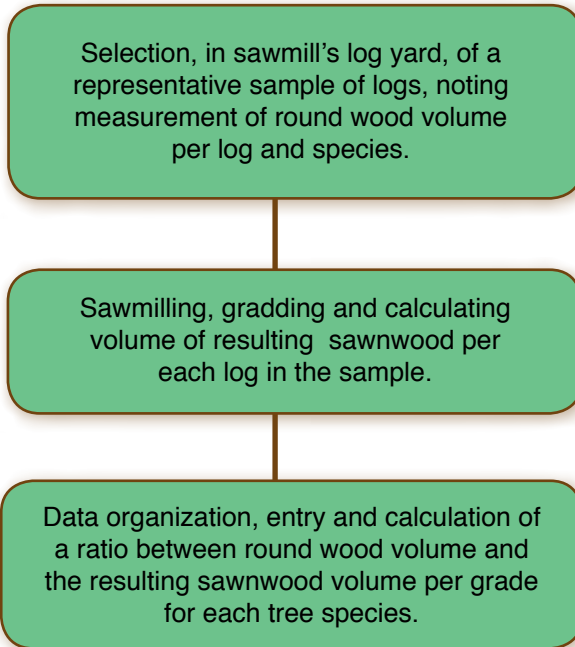
Given the importance of conversion factors and in the absence of national yield tables or at the request of the inspected party, the Team can perform an onsite study of the inspected sawmill. This task should be completed by assigning at least one Team member, assisted by sawmill crew as needed. The result of the study should then be approved by the relevant unit of the forest authority (INAB *et al.* 2011).

Based on experience in Guatemala and established guidance in the methodology for Mahogany (*Swietenia macrophylla*), this section describes some of the most relevant steps of the process for conducting the study in an inspected sawmill. The following link includes the methodology mentioned above:

<http://siteresources.worldbank.org/EXTFORESTS/Resources/985784-1217874560960/Methodologia.pdf>

The steps described here are sufficient and appropriate for the calculation of individual cases.

Steps overview



(Kometter & Maravi 2007)

Selection and Marking of Logs

The first step is to randomly select a representative number of logs of all existing species in the log yard. The Inspection Team decides the sampling method to be used including the numbers of individual logs per sample. However, a suggested sample is made up of approximately 20% of the total number of existing logs per species.

Marking both ends of each log is completed using codes similar to those used for chain of custody for forest certification (Figure 1). If logs have already been measured as a result of the verification, then they only need to be marked (CONAP *et al.* 2010). Otherwise, all logs included in the sample need to be measured following instructions in Annex I.



Figure 1. **Measurement of the diameter of mahogany tree in the La Union Management Unit of the “Sociedad Civil Custodios de la Selva” concession, Petén, Guatemala**

Image: Geoffrey Venegas/Proyecto Finnfor II

Data Entry per Log

Before logs enter the sawmill ramp they must be marked and measured for respective volume. All data per log is recorded on a data sheet prepared for the study (See chart 1). If a given log presents defects, it would be necessary to mark those defects so that they are trimmed away before the log is sawn.

Chart 1. **Comparative data sheet, yield factor of round wood to sawnwood for hardwood species**

LOG Code	ROUND WOOD (Volume m ³)	Sawnwood			YIELD RATIO (%) (Round wood/ sawn-wood x 100)
		Grade	# boards	Volume (m ³)	
		FAS			
		F1F			
		Select			
		1 Common			
		2 Common			
		3A Common			
		3B Common			
Sub total					
		FAS			
		F1F			
		Select			
		1 Common			
		2 Common			
		3 A Common			
		3 B Common			
Sub total					

Sawmilling, Grading and Measuring

Each log needs to be sawn separately (Figure 2) in order to obtain the highest possible volume, pieces in standard dimensions and grading features required by the market.



Figure 2. **Log milling in the sawmill of the Asociación Forestal Integral San Andrés (AFISAP), Petén, Guatemala**
In the first picture the sawmill can be observed processing a log; the product obtained (2nd foto) are planks in the dimensions required by the market.

Image: Geoffrey Venegas, Proyecto Finnfor II

If the yield calculation includes grading, as soon as the log is sawn the resulting boards should be graded and measured by the Team (Figure 3). It is important to realize that this handbook uses mahogany (*Swietenia macrophylla*) as an indicative case, and as it is a hardwood species, grading should follow the National Hardwood Lumber Association (NHLA) guidelines (Kometter and Maravi 2007).



Figure 3. **Sawnwood timber classification according to the NHLA grading rules**

Image: Geoffrey Venegas, Proyecto Finnfor II

In the case of softwood species, grading should be completed following the particular grading system used in each country (Kometter & Maravi 2007).

If the plant has different types of sawmilling machines, yield calculations will be completed for each of the machines.

Quality	Dimensions		Observations
	Table	Cuts	
FAS grade	6" x 8'	4" x 5' o 3" x 7'	Both faces of the board must meet the minimum requirements for FAS.
Select grade	4" x 6'	4" x 5' o 3" x 7'	Every board must have a minimum of one FAS face. The lesser face should meet grade No. 1 Common.
Common grade No 1	3" x 4'	4" x 2' o 3" x 3'	The lesser quality face should meet minimum requirements for this grade.
Common grade No 2	3" x 4'	3" x 2'	The lesser quality face should meet the minimum requirements of this grade.
Common grade No 3 A	3" x 4'	3" x 2'	
Common grade No 3 B	3" x 4'	Minimum size of clear cutting 1 ½"	Boards No. 3B Commons are graded by the poorest face. Given that this is the lowest grade, any board that does not meet the minimum requirement for this grade is considered below the standard.

Sawnwood Data Tracking

Measurements of the resulting boards from each log will be entered in Chart 1, making sure that the species' name and log codes are included, as well as number of resulting boards per log, their respective sizes and volumes. In order to ensure proper timber tracking, board marking and coding should follow methods used for chain of custody, so that results show yield per log and total volume in order to establish the overall yield ratio or volumetric conversion factor for each of the existing species.

Calculating yield ratio or Conversion factor

Yield Ratio (%) = Round wood volume/Sawnwood volume x 100

IX. Cross Checking Timber Flows

Comparing Timber Volumes

Setting the right timber flow controls will depend fundamentally on the availability of data from forest information systems, which are usually under the forest authority's responsibility. The required information is not complicated, but a common justification for not initiating or completing forest control and supervision operations is the alleged lack of information or inability to obtain the information needed in a timely fashion.

However, based on the proposed procedures, the Team could provide during the inspection onsite, preliminary findings by simply cross-checking existing round wood and resulting sawn wood volumes in sawmill facilities with the existing documents (official transportation permits, forest permits, etc.) that support the origin of the timber products.

The information system should be able to provide the total numbers of trees and their volumes from each approved and verified AOP. Taking into account the possibility of fragmented information systems, Annex II presents a simple table to facilitate computation.

The table includes the following data:

- a. Forest permit or transportation note number/code
- b. Approved AOP name
- c. Number of approved trees, species
- d. Pre-existing harvest balance (if appropriate)
- e. Yield conversion factor
- f. Company's reports and balances
- g. Incoming round wood and outgoing sawn wood volumes by species and grades

In order to secure accurate volumes, cross-checking is important and should consider the following aspects (INAB *et al.* 2011):

1. Entries in sawmill journals need to be updated and matched with all official documents of supplied round wood. Depending on the country's regulations, the incoming round wood shipments need to have their respective transportation authorization, permits or licenses.
2. All of the above-mentioned official documents and journals/ledgers should be handed over to the Team for the analysis.
3. In the case of any document, such as transportation permits, already used and canceled (depending on country regulations), the Team should verify that both the original and copies are in files.
4. The journals, ledgers, books and documentation need to be in the facilities at all times.
5. Cross-outs, deletions and alterations in journals and on official documents are considered faults unless there is a valid justification.
6. Round wood entering a sawmill for processing should be entered in the journal, supported by official documentation on origin of the timber (AOP, contract, etc.)
7. In the case of CITES-listed species, the Team should pay greater attention to reviewing data and documentation and verifying volumes. Any inconsistencies should be reported to national CITES authorities. The same due diligence should be applied to other species in high commercial demand.
8. Inspection teams should take into account the statistical margins of error or tolerance in the verification of volumes, and the yield ratios allowed by the regulations.
9. Timber processed in a sawmill, but allowed to be harvested for family consumption, needs official permits and a clearly marked notification designating that it is not for commercial purposes.

X. Completing the Inspection and Administrative Documentation

Inspection Minutes

Once the initial inspection is completed and while still onsite, the Team will prepare detailed administrative minutes to make sure all findings, observations, occurrences, tasks and outcomes are registered. Minutes are very important documents, thus they should be prepared carefully using approved forms and signed by all parties involved in the inspection. If the facility is found to be in full compliance, the Team will prepare administrative minutes, providing a copy for the company.

In the case of inconsistencies, offenses or faults found, the Team will follow procedures according to standing regulations. Involved products should be re-measured and marked, listed, photographed and described in a detailed inventory by the Team. All of this information needs to be included as part of the minutes for the respective administrative process. The law in most countries would allow officers to immobilize the timber products in question until administrative or criminal processes are completed. In this case separate minutes should be completed. Annex III includes a generic form that can be used for minutes.

Minutes may be prepared for each day of the inspection if needed.

Inspection Report Preparation

The final task of the inspection is preparation of inspection report: detailing findings, results, conclusions and recommendations. The report describes and analyzes the situation of the company's control systems, books, journals and ledgers documenting operations of sawmill or lumber yard related to timber flows. The report needs to present a technical opinion of the Team based on the results and findings of the inspection, including consideration of current country legislation.

This opinion should provide findings, conclusions, recommendations, inconsistencies, faults and offenses clearly and appropriately.

In the case of faults, inconsistencies, etc., the report should be sufficiently descriptive to present clear findings so that relevant administrative or judicial procedures could be completed without additional information.

Considering particular conditions in each country, the following is a suggested format in memorandum structure for the inspection report:

1. Document code number and date
2. Name and signature of the Team Leader
3. List of Team members
4. Code number of formal assignment of the inspection
5. Name of the interested party (sawmill or lumber yard owner/representative)
6. Location of the business
7. Background and inspection objectives
8. Results of the inspection
9. Responsible parties for findings and any further implications resulting from their inspection
10. Limitations and opportunities found
11. Conclusions and recommendations
12. Annexes and photographs

XI. Observations, Violations and Offenses

If inconsistencies violations and offenses have been documented, the relevant authority (following regulations and administrative procedures) notifies the company to respond to charges, provide clarifications and additional information within the time frame established by law. If responses and clarifications are not submitted or valid, the relevant forest authority will process the charges based on current country regulations.

In the case of possible criminal offenses the forest authority will hand over the case to the corresponding judicial agency for potential indictment as prescribed in current country regulations. A copy of the case file should be provided to the legal unit of the forest administration and to other agencies as established by law. Once the criminal case is defined by the judiciary system the company will be sanctioned by the relevant authority (CONADEH 2012).

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Annexes

ANNEX I

Timber Products Measurements

Measurement of Round Wood or Logs

Overall volume of a log is estimated by using the Smalian formula (see simplified formula below). In order to measure using this formula it is necessary to obtain (a) the average diameter of the log; and (b) the length of log (Figure 1). The average diameter of the log can be obtained by measuring the sum of the cross-sectional diameters of both the small end and the larger end of log divided by 4. Diameters are measured without the bark. The full length of the log is obtained by measuring the distance between each end of log without deduction or discounts (CONAP & INAB 2004). These two dimensions (average diameter and length) are used in the Smalian formula as detailed below:



Figure 1.

Log length and diameters

Smalian's formula

$$V = D^2 \times L \times 0.7854$$

V = Log volume (m³)

D = Average log diameter (m)

L = Log length (m)

0.7854 = resulting factor $3.1416/4$ ($\pi/4$)

(Mancilla 2003)

In the case of stacked logs, volume measurement entails calculations of volume log by log; once completed all volumes are added to obtain the total volume of the stack.

Measurement of Sawnwood

To calculate the volume of sawnwood (Figure 2) the following dimensions are needed: thickness, width and length, all in meters (PGFC 2012). The following formula will be used to obtain the volume of boards of sawnwood:

$$V = \text{Thickness (m)} \times \text{Width (m)} \times \text{Length (m)}$$

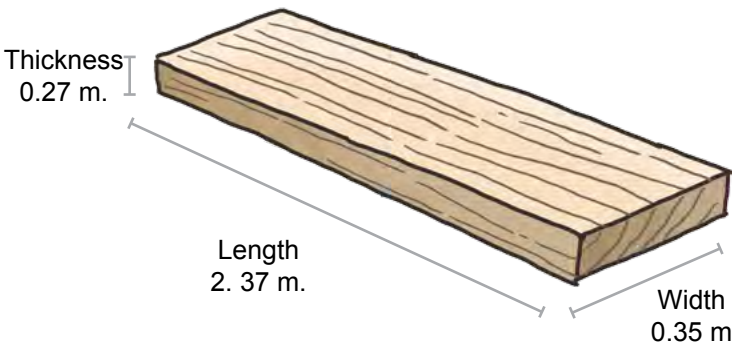


Figure 2.
Sawnwood dimensions
(INAB *et al.* 2011)

The above formula is also applicable for squared/planked timber or flitches.

In the case of bundled sawn wood (Figure 3), the following dimensions in meters are needed: width, length and height (as long as all bundled boards have same dimensions). Since the bundle has gaps (spaces between boards) the calculation formula includes a conventional bundling factor to discount gaps and is included in the following formula:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)} \times 0.80$$

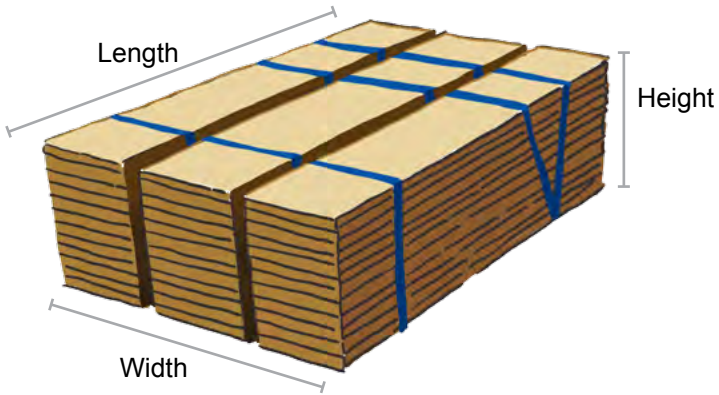


Figure 3. **Bundled sawnwood dimensions** (INAB *et al.* 2011)

If a bundled product is veneer or plywood the following formula applies:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)}$$

If processed wood is in the form of round wood sticks piled or stacked (Figure 4), measurement includes the following dimensions: width, length and height and a conventional factor (0.75) to make up for gaps as in following formula:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)} \times 0.75$$

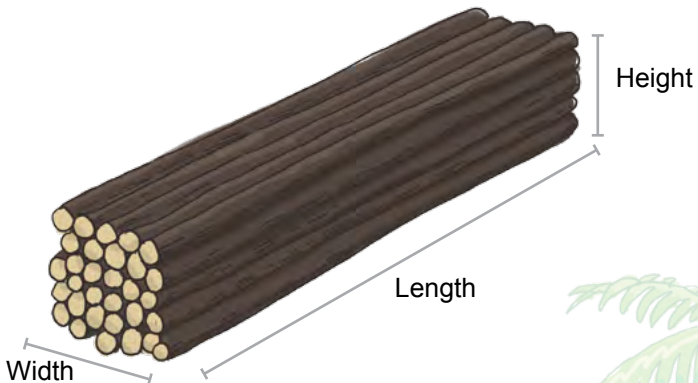


Figure 4. **Round wood sticks dimensions** (INAB *et al.* 2011)

Firewood Measurement

Firewood splits (Figure 5) are measured using the following dimensions: width, length and height also in meters. Volume is calculated by an adjustment factor for stacking to measure only solid wood according to the following formula:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)} \times 0.784$$

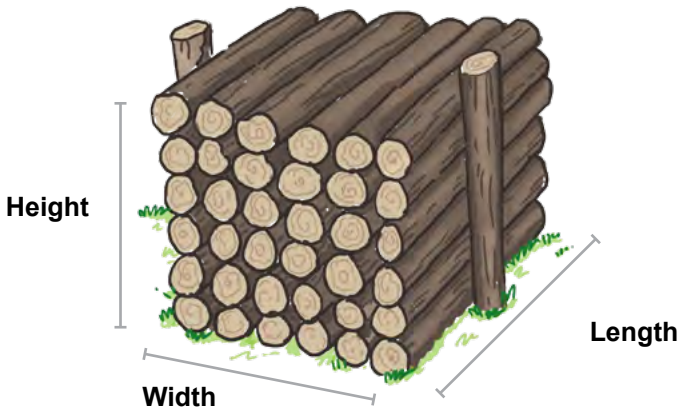


Figure 5. **Dimensions of stacked firewood** (INAB *et al.* 2011)

In the case of stacked firewood with smaller sticks (Figure 6), volume calculation is similar to stacked firewood, however, with a stacking factor adjustment of 0.5 as in the following formula:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)} \times 0.5$$

In the case of an unorganized pile of firewood sticks, the following formula can be used:

$$V = \pi/3 \times r^2 \times h \times 0.624$$

$$\pi = 3.14$$

V = volume in m³

R = radius in m

H = height in m

Stacking adjustment factor = 0.624

(INAB *et al.* 2011)

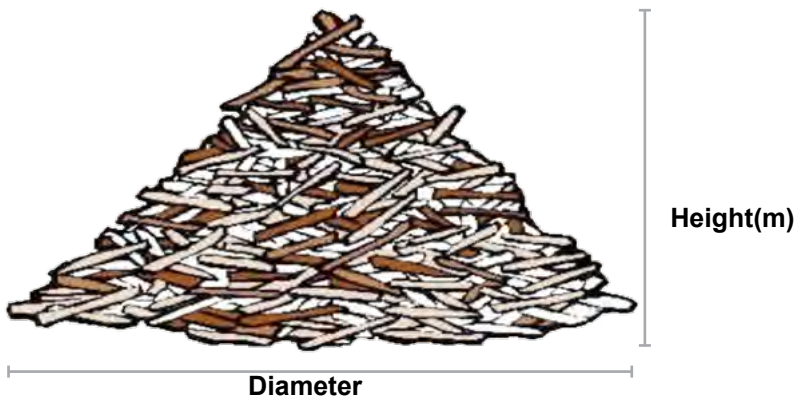


Figure 6. **Measurements of firewood in small sticks**
(INAB *et al.* 2011)

Charcoal measurement

Charcoal is loaded for transportation or storage in different ways. Containers are various types of nets, sacks, wooden boxes, etc. If nets are used, volume calculation can be completed by using the dimensions of width, length and height multiplied by a stacking adjustment factor of 0.5, following a formula similar to that for small stick firewood:

$$V = \text{Width (m)} \times \text{Length (m)} \times \text{Height (m)} \times 0.5$$

Also, a cubic meter of charcoal is equivalent to 43 wooden boxes measuring 0.35 m width x 0.35 m height and 0.5 m length. (INAB *et al.* 2011)

ANNEX II

Cross Checking Control Spreadsheet

Number	Permit Transportation Number	Name Approved AOP	Number Approved Trees/ species	Previous Balance (*)	Yield Factors	Previous Reports Balances	Incoming-outgoing volumes sawn & round wood species / grades
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
TOTAL							

(*) If applicable

ANNEX III

ADMINISTRATIVE REPORT OF SUPERVISION OF FOREST COMPANY

In the city of _____, department of _____, at _____ hours of the day _____ of month _____ of the year _____, we, _____, in accordance with appointment number _____ of the Subregional Directorate _____ of the National Forest Institute, and in compliance with Articles sixty three and sixty four of Legislative Decree one hundred one dash ninety six (101-96) of the Forest Law, find ourselves in the forestry company named _____, located in the community _____ of the municipality of _____, department of _____, to execute SUPERVISION activities, with the objective of quantifying, evaluating and verifying the legal origin of the forest products, proceeding in the following manner;

FIRST: The person who answers to the name of _____, and who possesses personal identification document number _____, issued by _____, of the municipality of _____, department of _____, and who indicates himself/herself to be part of this company, is present;

SECOND: In conformance with the law, the company presents the following documents: (Proof of Registration with the RNF, registries showing entry and exit of forest products from the company, documents that support the entry and exit registries). These same documents were reviewed and analyzed to obtain the following volumetric results: [In this space we must include the volumes resulting from the review of the documents that register entry and exit of forest products];

THIRD: Subsequently I proceeded to evaluate the volumes located in the lumber yard and warehouses, these being as follows: [this should include the volumes found on-site];

FOURTH: The information has been reviewed and if it is determined that there are indeed anomalies, therefore in accordance with Article 61 of the Forest Law Regulation, five (5) business days are granted to dispel the anomalies found; if at the deadline these anomalies have not disappeared, a complaint shall be submitted before the appropriate public prosecutor who will have the responsibility to investigate and determine the corresponding legal responsibilities;

FIFTH: Mr. (Mrs.) _____ has been informed of the activities conducted and findings of this supervision, and is hereby acknowledged to be cognizant;

SIXTH: There being nothing further to note, this supervision is completed at _____ hours of the day _____ of month _____ of year _____, and this report is read completely to those present in their official capacity, who sign this report in cognizance thereof.

(INAB *et al.* 2011)

ANNEX IV

Elements for a Forest Industry Timber Volume Inspections Strategy

Set inspection objectives (quantify, verify and assess legal compliance of forest industry)

- Determine inspection types: (i) Contingent; (ii) Programmed; (iii) Complaints-based
- Segment facilities and plants for inspections (sawmills, lumber yards and carpentries)
- Review timber flows and links in supply chain with local forest control post
- Application of Pereto principle (80% - 20%) (volumes, species and users)
- Plan inspection
- Define roles and responsibilities of forest authority units and branches at national, sub-national and local level.
- Consider outsourcing inspection responsibilities to independent, credible monitors
- Use photos, videos and GPS as tools for monitoring and evidence.
- Ensure traceability (codes, inspections, trade, and product location maps)
- Establish inspection tactics based on existing information (maximizing the information use)

Planning the inspection

- Set yield ratios
- Establish methods for product quantification according to product type
- Verify proper use of permits and other forest documentation.
- Prevent improper use of transportation permits
- Verify changes in timber product movements
- Verify compliance with procedures and legislation
- Measurement methods: census vs sample systems
- Link timber legal origin authorizations with timber flows from the industry
- Analyze incoming and outgoing timber flows

Implementing the inspection

- Verify due diligence compliance according to regulation
- Ensure full participation of company owner or legal representative
- Use appropriate forms and documents to quantify volumes
- Create product distribution maps
- Use established yield ratios or calculate onsite
- Analyze documentation
- Inspect incoming timber paperwork
- Verify sawn timber volume inventory
- End the inspection properly

This handbook, primarily meant for forest authority officials, is linked to the Field Manual for Timber Verification, as it is a tool

that helps “close the loop” of forest control activities by linking the flow of volumes of processed timber through sawmills and lumber yards with the approved and verified volumes in the forest.

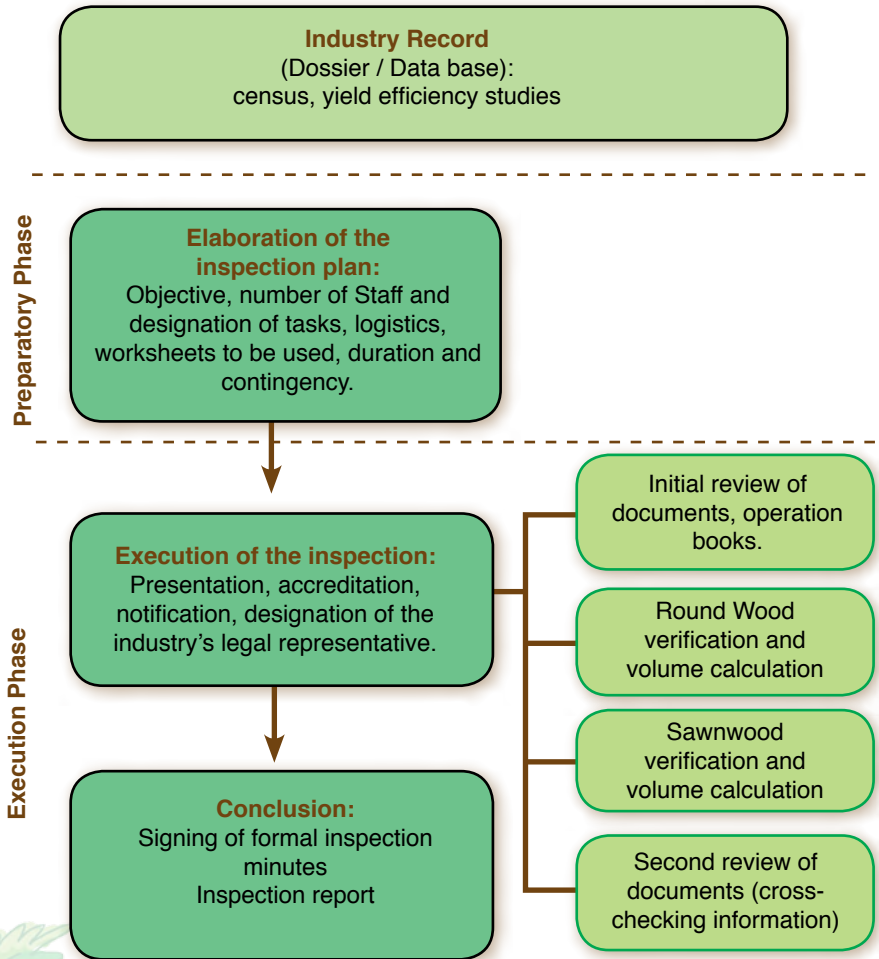
This tool offers a set of procedures for technical teams in charge of monitoring the movement of round wood and sawn wood.

Data obtained through the use of this Handbook will also provide useful input for forest industry business plans. Similarly, data resulting from the application of this tool will support forest sector transparency activities.

This tool includes the valuable input from forest administration experts who have made generous and much appreciated contributions to substantially improve this and other components of the toolkit. Based on experts’ suggestions, Annex IV in this Handbook include a set of elements for designing national inspection strategies.

ANNEX V

Flow of the Inspection



The Tropical Agricultural Research and Higher Education Center (CATIE) is a regional center dedicated to research and graduate education in agriculture, and the management, conservation and sustainable use of natural resources. Its members include the Inter-American Institute for Cooperation on Agriculture (IICA), Belize, Bolivia, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Venezuela and the State of Acre in Brazil.

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CATIE

Headquarters, CATIE 7170
Cartago, Turrialba, 30501
Costa Rica
Phone: + (506) 2558-2000
Fax: + (506) 2558-2060

www.catie.ac.cr

Program on Forests (PROFOR)

The World Bank
1818 H St NW
Washington DC 20433
USA
Phone: + 1 202 458 1692
Fax: + 1 202 522 3307

<http://www.profor.info/>

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