



**REPORT OF
WORKSHOP ON TRACKING TECHNOLOGIES FOR
FOREST GOVERNANCE
KUALA LUMPUR, MALAYSIA, 15-17 MAY 2012**



林野庁



THE WORLD BANK



Table of Contents

| | |
|--|----|
| Introduction | 3 |
| Current status of timber tracking technologies | 3 |
| International perspectives..... | 5 |
| New developments and technologies..... | 9 |
| Conclusions and recommendations | 11 |
| Appendix 1 : Agenda of the workshop | 13 |
| Appendix 2: List of participants..... | 16 |

Introduction

General background

The issue of forest governance and enforcement is one of the most crucial challenges to our continuing effort to harness the full potential of forest resources towards the achievement of sustainable development. The lack of governance results in problems such as illegal logging, which, according to the World Bank represents a loss of as much as 15 billion dollars a year to the economies of tropical forest countries. This situation has a substantial negative impact on the livelihoods of forest dependent communities, on national economies as a whole and on the promotion of responsible business in the forest sector. Responsible production and consumption patterns are increasingly being incorporated into societal values in the twenty-first century. This has been a driver to many national and international initiatives in such fields as criteria and indicators for sustainable forest management, certification, forest auditing, combating illegal logging, forest law enforcement, verification of legality, procurement policies and chain of custody, all with the common intention of promoting responsible production and trade in forest resources.

The rapid evolution of tracking technologies and their key role in improving forest governance to meet various market/procurement policy guidelines were the major reasons for ITTO to convene the Workshop on Tracking Technologies for Forest Governance, under ITTO's Biennial Work Programme through a grant from the Government of Japan. The workshop aimed to allow participants to share experiences and learn about the latest developments in timber tracking technologies. The workshop, organized with assistance of the Malaysian Timber Certification Council (MTCC) with support from the EU/EFI FLEGT Asia Program and the World Bank/Profor, was held at the Corus Hotel, Kuala Lumpur, Malaysia, from 15 to 17 May 2012.

Objectives

The objectives of the workshop were to: share experiences on applications of tracking technologies for forest governance; assist in finalizing the compendium of tracking technologies contained in the background document; and provide guidance to governments, international organizations and other stakeholders on how tracking technologies can contribute to improved forest governance. The agenda for the workshop is contained in Appendix 1.

Participation

Nearly 90 participants attended the workshop. These represented 17 countries, 31 NGOs and private sector organizations, and 7 international organizations (including representatives of the ITTO and CITES Secretariats). The full list of participants is contained in Appendix 2.

Structure of the report

This report contains an overview of current timber tracking technologies (based on the background paper/overview report provided prior to the workshop), summaries on national and international experiences with forest governance and tracking technologies, summaries of discussions, and the conclusions and recommendations of the workshop.

Presentations and the final version of the background paper/overview report on timber tracking technologies prepared for the workshop (published as ITTO Technical Series 40 "Tracking Sustainability" and available in English, French and Spanish versions) are available at: www.itto.int/workshop_detail/id=2948.

Current status of timber tracking technologies

The overview report of current timber tracking technologies was prepared by ITTO consultant Felix Seidel and was distributed to the workshop participants prior to the meeting. The overview report was intended to provide guidance to anyone who is planning to implement an electronic timber and timber products tracking system but it also details general information on tracking technologies and the drivers behind it. Whilst historically in many areas there have been paper-based methods of timber tracking and forest monitoring, electronic timber tracking is a relatively new development in the forest sector which are being used in order to address many of the inherent limitations of paper-based systems (such as limited data sharing and access, risks of forgery and corruption) and are developing in line with other technological advances. In order to take stock of these rapid developments there is a need for independent information on a whole array of technologies which are available on the market and that are currently being employed for the use of tracking of timber and timber products—such as physical tracking of logs over the tracking of timber on a batch level up to genetic methods used for origin verification.

The objectives of the overview report were to:

1. Review and summarise all timber tracking systems currently in use;

2. Develop five timber tracking systems case studies, including at least one from each tropical region (Africa, Asia-Pacific, and Latin America/Caribbean).

Major points in the presentation of the overview report included:

- Definition: Timber Tracking Technology Systems (TTTs) are systems which constantly track timber material flow in a chain, collect information (and store it in a database) on the timber products and link this information either to a batch of products or individual item.
- The information collected depends on the layout of the TTTs employed and is steered by the customer demands, certification schemes or areas binding by local law.
- EU FLEGT and Lacey Act for example, are two main external drivers in implementing TTTs by producer countries. Retailers have evidence that the products purchased from producer countries are legally sourced or supplied. And NGOs will no longer “attack” the retailers.
- Electronic timber tracking system answers the questions on where, what and who are the main actors as well as the status of the output, i.e., timber materials, in a transparent manner.
- VPAs (Voluntary Partnership Agreements) aim to guarantee that wood/timber exported from partner countries to the EU is legal in origin.
- Public Procurement Policies of the EU countries and other consumer countries that may already have the policies in place also emphasise that timber purchased by the relevant agencies be proven legal in origin and/or the timber is derived from sustainable sources. The market share in this sector is expanding.
- Private sector purchasers of consumer countries are similarly working on Responsible Purchasing Policies together with their trade associations so as to curb sales of timber from illegal sources.
- TTTs currently available are:
 - a) Mass balance (also called Inventory Management Methods)
 - The object is to monitor the flow of timber throughout production, based on systematic understanding of inputs, outputs and accumulations of timber materials without physical tracking.
 - b) Physical product identification
 - Suitable for larger sized material, and the database can be linked to individual product.
 - Higher running costs.
 - Markers available include paint, plastic tags, bar code and radio frequency identification tags (RFID).
 - c) Chemical identification
 - DNA.
 - Stable isotope.
- Information/data captured in the field are securely stored in the central server which is accessible by authorised departments through internet browser. Transportation, management and production progress reports, etc., can then easily be generated and the outputs are available on line with distinct transparency.
- No TTTs stands alone nowadays, almost all if not all TTTs are interfaced or integrated with software used in other related areas, such as forest inventory, accounting systems, auditing and other management systems. Efficient use of expensive system.
- TTTs contribute to the development of robust legal frameworks that are enforceable and that reflect national social, economic and environmental objectives.
- Mechanisms of controlling the supply chain and its verification are central to the LAS (Legality Assurance System) where TTTs can demonstrate the legality of timber at each stage and mitigate the risk of unverified material entering the supply chain.
- Impact of the TTTs: reduced losses, higher revenue and larger market access, amongst others.
- There has been a marked rise in simplicity, user friendliness and reliability of TTTs in the market, and above all there is also sharp fall in prices.
- Case studies were carried out in Liberia, Indonesia, Brazil and New Zealand.

Discussion

The following points were raised during the discussion of the overview report:

- Information on “efficiency gained” from employing TTTs should also be included in the report.
- “Logs left behind” (at harvest) should also be tagged, although with difficulty, as this activity will reflect the overall timber harvest recovery and utilization efficiency. Incentives may be given by the authority (e.g. reduced tax) to extract these materials out for further processing add value to the scheme.
- Regarding plantation teak and mahogany in Indonesia, it is proposed to move quickly into electronic tracking system rather than sticking to the paper- based system.

- Forest upstream increasing sustainability: large volume of merchantable logs are still available from “conversion or dam area” sites for example (one-off tracking system not from concession areas), if they are tagged and taken out indicating legality and good governance, this will surely increase the utilization efficiency.

International perspectives, Part 1

This section provides summaries of presentations on the relevance of timber tracking to CITES, FAO Forestry Department, EU/EFI FLEGT Asia and the government of Japan. Following a summary of discussions on these presentations, a second set of international perspectives from the World Bank, Program for the Endorsement of Forest Certification (PEFC), WWF Global Forest and Trade Network (GTFN), Tropical Forest Foundation (TFF) and TRAFFIC International are summarized.

Relevance of tracking technologies to CITES (CITES Secretariat)

- TTTs are useful and powerful tools for strengthening the sustainable management of resources.
- Credible reports of industries utilizing certified/legal materials are plus points in marketing.
- CITES supports TTTs implementation and enforcement as one of the many ways in curbing trading of illegal forest produce.
- There are many challenges with many agencies involved. The private sector is, however, playing an increasing role in supporting the work of CITES management authorities, and the traders make strong commitments in cooperating with the authority in order to achieve the common goal.
- Tracking improves transparency and further strengthens the chain of custody (CoC) to meet demands for species identification.
- TTTs also improve the speed with which countries share common enforcement intelligence data.
- CITES aim is to ensure that international trade does not threaten the survival of CITES-listed tree species.

FAO governance work and support to improve timber tracking technologies (FAO Forestry Department)

- Complexity may arise due to mixed wood from multiple concessions, regional trans-shipment, etc.
- National system of traceability is towards better forest management and administration – transparency and governance. Understanding the local “drivers” of illegal logging and therefore measures can be taken to “block”/rectify it from the early stage.
- Liberia can be a model for guidance in building module formulations on VPA for outside funding....BOT principles.
- TTTs is royalty payment friendly.
- Model or emphasizes on EU FLEGT Programme – need to demonstrate origin of timber.
- There is a concern on companies could “perform,” while governance does not change.
- With TTTs in placed opportunities arise to evaluate issues of domestic production and consumption, forest management outside concession areas, etc.
- VPA FLEGT execution includes incorporation of legal definition, assurance of traceability and the approach is government-to-government basis and not business-to-business.
- Should also work out procedures/process for management purposes for those timber areas outside concessions areas, i.e. not involved in TTTs. What can be done (to assist)?

Timber tracking technologies to support Forest Law Enforcement, Governance and Trade (FLEGT) and Voluntary Partnership Agreements (VPAs) (EU/EFI - FLEGT Asia)

- VPA is legally binding treaty to improve forest governance and aimed at working together to stop illegal logging.
- VPA is a system to verify legal compliance and confirmed through a licence, and EU customs can block entry of non-licensed timber.
- No mixing/blending of uncertified/illegal timber with the legal and verified timber material – green lane product.
- Currently the number of FLEGT VPA partner countries is thirteen coming from the tropical regions of Latin America, Africa and Southeast Asia.
- Legality definition is based on existing regulation/legislation of the country and on the principles of sustainability, i.e., economic ↔ environment ↔ social.
- The multi stakeholder process brings more credibility in the markets.
- Routinely ensures the integrity of timber product flows from the stump or point of import to the point of export using traceability / tracking technologies.

- Third party monitoring is a non-political, national or international conformity assessment body, monitors full implementation of the TLAS according to specific term of reference.

Promotion of legality/sustainability verified (Goho) wood in Japan (Forestry Agency, Japan)

- Only about 26% of timber consumed in Japan comes from domestic sources, the rest are all imported.
- In 2006 the government of Japan (Forestry Agency) included legally/sustainably verified wood (Goho Wood) in the environmentally friendly goods list which are subject to “Green Purchasing Law.”
- The Forestry Agency Guideline specifies three types of Verification for private sector:
 - i) Utilizing SFM Certification and CoC.
 - ii) Verification conforming to Associations’ Code of Conduct.
 - iii) Verification by individual company’s own systems (by relevant associations).
- Majority of the suppliers in Japan are engaged and put into practice the options i) and ii) above.
- On curbing the illegal logs entering the country, Japan adopts the main points outlined by “G8 Forest Experts” Report on Illegal Logging” – mainly on Bilateral Cooperation and Dialogues.
- Cooperation with Indonesia:
 - i) Action plan for cooperation in combating illegal logging.
 - ii) Developing technologies for monitoring logging and forest conditions using satellite images.
 - iii) Developing wood tracking system using two-dimensional bar code.
- China imports round wood and exports processed wood products, and China currently is the largest wood exporting country to Japan. Memorandum of cooperating and tackling illegal logging was signed by Japan and China in August 2011.
- Japan has its own unique way of combating illegal timber and timber products entering the country as both industries and government working hand-and-glove on this matter. Relevant Associations’ rules/regulations are stringent enough to curb any wrongdoings by members and encourage mutual respect of laws.
- Public Procurement Policy: “Act for Promoting the Use of Wood in Public Buildings” enforced since October 2010; the Act itself strongly encourages the use of Legally/Sustainably Verified Wood.
- Public awareness campaign through DIY/exhibitions/internet, etc. further add credibility of Goho wood utilization or the credibility of legality/sustainability verification.

Discussion

The following points were raised during the discussion of the first four presentations on International Perspectives.

- Managing the tracking of CoC: trees are marked and data are locked in the system, when harvested – all the available logs from that tree are coded/tagged too and the captured data are relayed to central server, and so on. Verification can be conducted at any point of the CoC.
- Need to be able to trust the credibility of the organization carrying out TTTs.
- VPA and land tenure – legality provisions of each country applies. Products coming out are traceable indicating that VPA functions/works.
- At the onset and before any TTTs being deployed, all stakeholders (government, NGOs, land owners, etc.) involved must have had roundtable consultation/meetings/discussions on economy ↔ environment ↔ social issues, so as to come out with common workable system.
- Tracking for CITES materials – work with other relevant agencies/organizations. CITES accepts certificates of recognized sponsor agencies.
- Legality issues only taken up once the product goes to “open” market where certificates are required; not required by such market, then the product is clear for sales in that area, for now.
- Where necessary scientific society (DNA and/or isotopes methods) could also be called to verify those timber coming from questionable sources under the CoC scheme.
- Japan supports those internationally sponsored TTTs.
- Input from many relevant stakeholders can further improve the “procedures” to curb illegal felling practices.
- Each country has its own legality/sustainability definitions, but the denominating principles are fairly similar; a buyer may accept/reject a country’s timber product. VPAs are quite similar throughout the countries implementing them.
- TTTs trial runs should be done in each country to ensure that when the requirements of FLEGT for example, come into force, the participating countries are ready and may not have interruption in their timber export business.
- Once VPA is signed and implemented then the receiving country (supplier) is assured that its timber products are genuine and sourced legally.
- Each country has its own legality assurance system.

- Information in tags/bar codes, etc. is fairly standard: source, species, block/compartment, volume, etc

International perspectives, Part 2

Certification and verification in SE Asia as a tool for SFM, law enforcement and forest governance (World Bank)

- This presentation is actually a report of work-in-progress.
- Forest degradation and deforestation increased in SEA due to:
 - i) Rapid urbanization and residential development.
 - ii) New infrastructure development.
 - iii) Expansion of industrial agriculture.
 - iv) Mineral, oil and gas exploration.
 - v) Unsustainable harvesting practices, and
 - vi) High incidence of illegal logging and trade.
- Three main initiatives were put forward in order to curb the last two (v and vi) activities:
 - i) FLEGT and EU's FLEGT Action Plan.
 - ii) Trade legality measures.
 - iii) Green procurement policies/building initiatives.
- Also two aspects of Voluntary Legality Verification were proposed:
 - i) Verification of Legal Origin (VLO) – this demonstrates legal right to procure timber from forests.
 - ii) Verification of Legal Compliance (VLC) – this verifies conformity with relevant legislation in timber procurement operations.
- A total of five SEA nations participated – Indonesia, Lao PDR, Malaysia, Thailand and Vietnam. There are already many Standards across these countries.
- The voluntary CoC certification, amongst others, include:
 - i) Controls of flow of wood through the entire value chain.
 - ii) Complementary requirements such as CITES species, workers' health and safety, etc.
- Noted: Major buyers and key importing countries have a preference for FSC and PEFC:
 - i) EU Timber Trade Regulation requires valid FLEGT or CITES license, though not necessary for certified timber.
 - ii) Green Public Procurement policies increasingly require FSC or PEFC certification.
 - iii) Green Building Initiatives recognize multiple forest certification standards including FSC and PEFC.
 - iv) Main retailers have adopted stepwise approach to gradually increase proportion of certified timber.
- Since no universally agreed definition of legality, the six ASEAN criteria for Legality of Timber are used as benchmark:
 - i) Legal right to operate and harvest.
 - ii) Approved authorization for the harvesting operations based on approved annual cut.
 - iii) Compliance with social laws and regulations.
 - iv) Payment of statutory charges.
 - v) Implementation of traceability system that allows for tracking all logs.
- TTTs deployed were opened to third party verification bodies to assess compliance.

Relevance of tracking technologies to the PEFC (PEFC)

- PEFC is a global, not-for-profit, non-governmental organization dedicated to promoting sustainable forest management.
- PEFC is the world's largest forest certification system which also offers the widest supply of certified materials.
- PEFC provides independent third party certification of forest goods.
- For small family forest-owners/smallholders, the PEFC certification system is first choice.
- PEFC certification elements involved TTTs for upstream (sustainable forest management) and downstream (CoC).
- Tracking options:
 - i) Conventional CoC.
 - ii) Physical tracking from source to end use.
 - iii) Physical tracing from product to source.
 - iv) DNA based tracing.
- Tracking option(s) pursued will provide transparency, legality risk assessment, contribute to attainment of CSR goals, etc. for PEFC/members.

- The bottom-up standards scheme development ensures local stakeholders address local conditions in order to commit to PEFC requirements.

Forests for a living planet: roles of tracking technologies (GFTN)

- GFTN pioneered the Stepwise Approaches in TTTs development. Complicated process was broken up into a series of steps.
- GFTN made it possible for 300 companies and 200 buyers worldwide to achieve responsible purchasing.
- Legality and traceability have always been a key component TTTs.
- Also tried out DNA, isotopes, fibre identification and “sniffer dogs” in addition to conventional electronic-based technologies.
- GFTN shared their learning experiences in that the new techniques/technologies need to be:
 - Accessible.
 - Low cost.
 - Integrated with existing CoC tracking systems.
 - Understood as to the best use of each technology; not every technique suits every player – TTTs need to be trusted as to their effectiveness.
- These technologies will increasingly play a role in ensuring the integrity of supply chains and that chain of custody is maintained.
- GFTN welcomes all new developments that promote traceability and enable more responsible purchasing.
- Proven track record that products are legal and traceable ensures larger market access.
- Some increase in certified material in domestic markets has been observed too.

Verification of legal origin - a programme in responsible supply chain management (TFF)

- TFF (Tropical Forest Foundation) is a coalition of industry, conservation and scientific leaders working together to achieve sustainable management of tropical timber in the major tropical timber producing regions worldwide.
- Amongst others, TFF is involved in Chain of Custody and Legality and Certification support activities.
- VLO (Verification of Legal Origin) is a TFF programme in responsible supply chain management focusing on business-to-business, participating manufacturers and their supplying FMUs, third party independent auditor and as facilitator.
- TFF regional programme participating countries include Brazil, Gabon, Guyana and Indonesia.
- Programme topics include:
 - i) Verification of “right to harvest.”
 - ii) Verification of “legal origin,” etc.
- CoC is a system of protocols and procedures designed to provide assurance regarding the origin of materials associated with specific product claims; it helps to minimize the risk of illegal products entering the chain and at the same time maximizing the credibility of product claim.

Tracking technologies and legality frameworks (TRAFFIC International)

- Principle of timber legality assurance system (TLAs) applies to all timber exported and traded.
- Common legality framework: roundtable stakeholder consultations including; economics ↔ environment ↔ social, access, use rights and tenure, conservation regulations, import and export regulations, etc.
- Material in transition must have legal transit document.
- Linking of TTTs data is required to integrate with other relevant departments such as customs, law and enforcement, police, etc.
- TRAFFIC has helped in the development of a Common Framework to assess legality in the timber trade. The Framework, with 9 principles and 24 criteria covers everything from forest tenure to timber supply chain.

Discussion

The following points were raised during the discussion of the final five presentations on International Perspectives.

- Cost and effectiveness of any TTTs to be deployed must be assessed closely. More information on costs and effectiveness is required in ITTO and other international organizations’ technical guidebooks on TTTs.
- Production of “legal wood products” will become a major consideration to ensure ultimate survival of companies.
- Whichever TTTs employed, system should be open to upgrading with improved technologies.

- TTTs can be relatively easily integrated within current CoC systems.
- Public awareness campaigns should show that the products sourced under TTTs support wildlife conservation and other forest values too.
- Credibility of the country in producing and exporting legal and sustainable timber and timber products is enhanced by use of TTTs; it may be possible to demand price premiums in some markets.
- The draft report (World Bank presentation) will be further circulated and made available for comments and/or face-to-face interviews to fill in gaps or clarify other matters raised in the draft.
- VPAs – requirements and obligations are agreed to by the countries involved.
- VPA timber has a “Green lane import line” – timber products can enter EU market free of “burdens” if the importers have all the necessary documents (whenever called for).
- Dissolvable tags (e.g. RFID) are also available now, and they are acceptable for use in wood chips for the pulp industry.

New technologies and developments

This section of the report provides summaries of presentations on new technologies and/or developments of relevance to timber tracking, including radio frequency identification and DNA/stable isotope analysis.

How traceability software fulfils the legality assurance requirement of EU VPA programme (Helveta)

- Noted that by March 3, 2013, the EU Timber Regulations prohibit the placing of illegal timber on the EU market.
- Legal/illegal status of the timber is based on the laws of the country of harvest.
- VPA/FLEGT licence gives clear definition of legal timber. LAS is to identify, monitor and license legal timber.
- Amongst others, legality here (VPA) encompassing the three aspects:
 - i) Social,
 - ii) Economic, and
 - iii) Environment
- Wide ranging timber tracking technologies are available, and more importantly they must suit the local communication highway/infrastructure, be robust and abuse resistant, cheap and effective, and user-friendly.

RFID enablement for forestry in Peninsular Malaysia (Heitech Padu)

- RFID trackability benefits include flexible data capture, better revenue collection, reduced illegal logging (potential) and increased forest management efficiency.
- Through internet the data captured in the main server is accessibly by authorities in the forestry field office, transport, enforcement, regional/state offices and headquarters in a transparent manner.
- Different types of RFID tags were evaluated and their hardness and effectiveness were also assessed.

Private sector applications of DNA technology (DoubleHelix Tracking)

- The system utilises natural genetic information to validate man-made information.
- Verify forest/wood source, i.e., population genetics in forest concession.
- DNA is universal and it integrates well with and strengthens existing TTTs, i.e., focussing on portions of supply chain most at risk.
- DNA does not replace CoC.
- No physical tagging of products, and DNA sampling can be taken anytime of the supply chain.
- Relatively data intensive.

Practical applications of stable isotopes technologies for timber tracking (Agroisolab)

- Environmental conditions do change, but stable isotopes in organic matter remains the same providing a basis for identification.
- Stable isotopic database of teak and mahogany species was already tested with 15 blind test samples; countries participating were from SEA, India, and Latin America including Panama and Brazil. Results confirmed the reliability of the technique.
- Analytical tracking system was also tested with the objective of verifying or authenticating the species origin of mixed species.
- Isotopes found in the soil are analysed to identify an isotope profile of a geographic area.

- Samples taken from the timber products can then be traced to the location by analysing the isotope profile to ascertain if it is matching or not.

Putting DNA and stable isotopes timber tracking technologies into practice (Bioversity International)

- DNA technique could be applied on four levels:
 - i) Species check,
 - ii) Individual log tracking,
 - iii) Concession origin and
 - iv) Regional origin,
 but stable isotopes are practicable only in iii) and iv).
- Features of DNA and stable isotopes timber tracking include:
 - i) Control of traits inherent to the wood (no adulteration possible).
 - ii) Applicable to processed wood
 - iii) Control is rapid and cost-effective, and
 - iv) No conflict with existing CoC TTTs.
- Stable isotope sampling is similar to DNA where it does not require physical marking on the product.
- Tasks and responsibilities of Bioversity International include:
 - i) Coordinating and networking:
 - Maintain a network of experts and institutes research in origin to timber with DNA-based methods/stable isotopes/wood anatomical method.
 - Phylo-geographic studies of timber species.
 - ii) International standard setting/formulating:
 - Standards for sampling design, methods, storage and documentation, etc.
 - DNA extraction, stable isotope finger printing and data analysis.
 - iii) International open access database
 - Online data base development with geo-reference data.
 - Agreement for data input and use.
 - Accreditation systems for private/public labs.

DNA profiling technique for timber tracking (FRIM)

- DNA is a stable but highly variable substance.
- Scientific method of DNA identification can't be manipulated whether samples are taken at harvesting, in transit, processing, etc.
- The requirements to use DNA to infer the origin of wood is:
 - a) DNA isolation from wood,
 - b) Development of informative markers, i.e., strong spatial signal, and
 - c) Comparison to reference material; from regions of origin and database.
- DNA profiling databases on four important tropical species for timber tracking have been developed (*Neobanocarpus heimii*, *Gonystylus bancanus*, *Koompasia malaccensis* and *Shorea platyclados*).
- Possible to trace down to species, population and individual identification.

Discussion

The following points were raised during the discussion of the presentations on new technologies and developments.

- DNA and other scientific methods of identification/verification may prove very useful in many aspects of preventing/combating trade in illegal wood products.
- No "simple" DNA technique is available to identify any species and origin of the timber; massive databases need to be established but subsequent uses will see the decline in prices. Companies may not invest in DNA technology during the initial phases of development.
- The bigger the relevant database in chemical identification technology tracking systems, the more accurate is the identification.
- Chemical identification tracking system is resistant to forgery, and not affected by physical abuses.
- Availability of DNA and stable isotope systems sends message to "opaque" timber and timber products suppliers that they need to be transparent.
- Whichever TTTs is employed, it supports sustainable forest management efforts, and it provides visibility into timber supply chain.
- Reliable and practical tracking and verification systems and are the cornerstone of the VPA/FLEGT legality assurance systems.
- DNA/isotope finger-printing methods are a fast way to verify accompanying documents and the information is fixed in the wood (it cannot be altered).

- Finger-printing techniques allow verification of existing control mechanisms and jointly building a much more reliable system.
- Electronic TTTs, in general, are expensive and external funds are often needed (from ITTO/other international agencies) in establishing the infrastructure in tropical timber producer countries.

Conclusions

All participants agreed that timber tracking technologies (TTTs, which exist in some form in most countries) were becoming increasingly relevant within the tropical forest sector for demonstrating legality, and meeting market requirements (e.g. Voluntary Partnership Agreement or VPA, the U.S. Lacey Act, etc). For most countries already involved in forest certification or monitoring species covered by international regulations such as CITES, chain of custody monitoring including timber tracking systems are already in place or planned. These systems are deemed essential for the achievement of sustainable forest management (SFM) which is the ultimate objective for all countries; however the technology cannot replace the human capacity necessary for SFM.

Electronic timber tracking systems can help to improve efficiency and reliability of tracking the movement of timber from harvest areas to downstream wood industries or even the final consumer. However, the level of technology needs to be appropriate to each individual country/industry and adequate capacity building needs to be undertaken to ensure sustainability and local ownership of the system after any pilot phase. New technologies such as DNA and isotope analysis can help to verify the accuracy of information in TTTs. Support and/or incentives for establishment of systems, capacity building, etc, will continue to be a necessity. Particular attention needs to be paid to addressing the challenges faced by smallholders (communities, etc) in understanding and implementing TTTs as well as those countries who have not initiated VPA or forest certification schemes for a variety of reasons. Participants recognized that an internationally agreed definition of legality was unlikely, but that accepted principles for tracking and legality should be developed. Finally, countries seeking assurances of timber legality should try to maintain flexibility in the application of new requirements, recognizing progress and working to ensure that new requirements do not have adverse unforeseen consequences on the trade in tropical timber. The evolution of Timber Legality Assurance Systems (TLAS) and/or Timber Verification and Legality Systems (TVLS) in some countries are assisting both timber importing and exporting countries to have a common understanding of legal timber.

Recommendations

Participants made several comments, suggestions and recommendations to further improve the draft compendium of TTTs, including:

- Add description of paper based systems used in some countries and additional country-level information as far as feasible
- Add to the case examples the costs for setup and operation and also estimated benefits derived from each system
- Make the introduction longer and more general and add relevance to SFM, indicating that legality is a step on the road to SFM
- Highlight that tracking is part of a system that provides credibility and that it can help to protect forest operators from criticism and potential legal charges (e.g. Lacey Act USA)
- Include more about the benefits of TTTs including that only one database (DB) is needed to connect many authorities e.g. Tax, Transport, Customs, etc.
- Concern was raised that the server for a tracking DB is sometimes located in a third country. Therefore a paragraph should be added which indicates that countries can have an influence on the layout of such systems and also that software is flexible and clients can have an influence on the layout of timber tracking software/systems
- Incorporate information on what TTTs are/could be used for non-timber products
- Incorporate summary table evaluation of systems

Recommendations for countries included:

- Carry out capacity building not only for new fully electronic TTTs but also for current systems (e.g. paper based) in place (including customs officials)
- Reduce the level of excessive regulation and bureaucracy in current tracking systems
- Do not replace one weak system with another weak system; ensure adequate capacity exists before adopting technologically advanced systems

- Before implementing new fully electronic TTTs, any current system should be analyzed to identify areas for improvement; a transitional phase may be needed where both systems operate at the same time
- Inter-sectorial approaches are needed. Before implementing TTTs the forest sector should investigate relevant partnerships with telecom, transport and other services and authorities
- Countries should consider incentives for establishment of tracking systems (eg tax incentives, priority recognition of companies with TTTs in licensing processes, legal requirement for tracking systems (new or existing), support for smallholders, etc)
- Countries should allow use of TTTs in prosecuting forest infractions and train judiciary accordingly
- Countries should seek advice when entering negotiations with TTTs providers
- Ensure TTTs are consistent with national goals
- Extend TTTs to domestic market as well as for export. Consider links/compatibility upstream/downstream including with industry developed systems and with other countries' systems where relevant
- Countries should ensure that relevant information (transport authorizations, customs clearances, etc) from TTTs is made available in a transparent manner (eg user-friendly web-based systems)
- Strengthen south-south and north-south-south cooperation and experience sharing
- Implement demand side measures to promote TTTs, including at the business to business level

Recommendations for ITTO/other international organizations included:

- Continue to provide funding for countries to establish TTTs
- ITTO and partners should provide guidance as to what makes a 'good' tracking system and what is good practise at the current time for countries/industries at different stages of readiness
- ITTO should display a list of TTTs service providers (including email contacts) on its website and the list should be kept up to date
- Bulletin on TTTs should be published periodically by ITTO and other partners
- Promote harmonization of technical standards in so far as possible
- Encourage international organizations, and in particular, financial organizations and institutions to support the development of TTTs and the implementation of timber tracking systems, especially by medium and small-scale enterprises
- Support countries in consultations/negotiations with service providers to ensure sustainable TTTs are delivered
- CITES should consider recommendations on the role/relevance of tracking systems in implementing the convention for timber and other species
- Convene future workshops/conferences on this and related topics, including defining guidance for TTTs, relevance to judiciary/customs, effectiveness of TTTs, etc.

Recommendations for industry included:

- Service providers need to adapt their solutions to local needs
- Increase transparency of TT systems as openness/transparency is required before clients start to use and trust them (need to ensure countries get what they need)
- Promote harmonization of technical standards in so far as possible
- Forest industry should be encouraged to use TTTs and be involved in development of TTTs and demonstrating TTTs at field level
- Industry should make information on proprietary ('in-house') systems available

Recommendations for other stakeholders included:

- Civil society should work closely with governments and industry and especially smallholders in developing/implementing tracking technologies/systems

APPENDIX I

AGENDA OF THE WORKSHOP

Day 1: Tuesday, 15 May 2012

| | |
|---------------|---|
| 07:30 – 09:00 | Registration of Participants (Lobby of Ballroom 1) |
| 09:00 – 10:00 | <p>Opening Session</p> <p>Welcoming Remark by Mr. Emmanuel Ze Meka, Executive Director, ITTO</p> <p>Statement by Mr. Koichi Ito, Minister, Embassy of Japan</p> <p>Statement by Mr. Haji Sanuri Shahid, Deputy Secretary General , Ministry of Plantation Industries and Commodities, Malaysia</p> |
| 10:00 – 10:30 | <i>Coffee/Tea Break</i> |
| 10:30 – 12:30 | <p>Keynote Presentation</p> <p>Timber Tracking Technologies – Mr. Felix Seidel (Consultant)</p> <p>Discussion</p> <p>International Perspectives</p> <p>Ms. Milena Sosa Schmidt (CITES) – Relevance of Tracking Technologies to CITES</p> <p>Mr. Robert Simpson (FAO Forestry Department) – FAO Work on Forest Governance and Tracking Technologies</p> <p>Mr. Vincent van den Berk (EFI-FLEGT Asia) – Timber Tracking Technologies to Support Forest Law Enforcement, Governance and Trade (FLEGT) Voluntary Partnership Agreements (VPA)</p> <p>Mr. Koji Hattori (Forestry Agency, Japan) – Promotion of Legality/Sustainability Verified (=Goho) Wood</p> |
| | Discussion |
| 12:30 – 14:00 | <i>Lunch Break</i> |
| 14:00 – 15:45 | <p>International Perspectives (cont.)</p> <p>Ms. Stefanie Sieber (World Bank) – Certification and Verification as a Tool for Sustainable Forest Management, Law Enforcement and Good Forest Governance in Southeast Asia</p> <p>Mr. Chew Lye Teng (on behalf of PEFC) – Relevance of Tracking Technologies to the PEFC</p> <p>Mr. George White (GFTN) – Relevance of Tracking Technologies to the GFTN</p> <p>Mr. Hasbillah (TFF) - Experience of TFF with Forest Governance for Responsible Supply Management</p> <p>Mr. H.K. Chen (Traffic International) – Tracking Technologies and Legality Frameworks</p> <p>Discussion</p> |

| | |
|---------------|--|
| 16:00 – 18:15 | <p>New Developments and Technologies</p> <p>Mr. Dan Ternes (Helveta) - How traceability software fulfills the legality assurance requirements of the EU VPA programme</p> <p>Mr. Razif Bustamal (Heitech Padu Bhd) - RFID Enablement for Forestry in Peninsular Malaysia</p> <p>Mr. Darren Thomas (DoubleHelix Tracking) – Current Private Sector Applications of DNA Technology in Indonesia and Africa</p> <p>Mr. Markus Boner (Agroisolab) – Practical Applications of Stable Isotopes Technologies for Timber Tracking</p> <p>Mr. Marius R.M. Ekué (Bioversity International) - Putting DNA and Stable Isotope Timber Tracking Technologies into Practice</p> <p>Dr. Lee Soon Leong (FRIM) - DNA Profiling Techniques for Timber Tracking</p> <p>Discussion</p> |
| 19:00 – 21:00 | Welcome Dinner at Corus Hotel |

Day 2: Wednesday, 16 May 2012

| | |
|---------------|---|
| 08:30 – 09:45 | <p>National Perspectives</p> <p>AFRICA</p> <p>Mr. Belinga Salomon Janvier (Cameroon)– Experience of Cameroon with Forest Governance and Tracking Technologies</p> <p>Mr. Joachim Bilé Allogho (Gabon) – Attempt to Implement Tracking Technologies for an Improved Forest Governance in Gabon</p> <p>Mr. Eric Abbey Quaye / Mr. Gustav Adu (Ghana) - Experience of Ghana with Forest Governance and Tracking Technologies</p> <p>Mr. Samuel A. Tseganu (John Bitar & Co. Limited, Ghana) - Trade Promotion in Tropical Timber from Sustainably Managed and Legally Harvested Sources; Timber Tracking System for John Bitar & Co. Limited - Ghana</p> <p>Mr. William B. Pewu (Liberia) - Experience of Liberia with Forest Governance and Tracking Technologies</p> <p>Discussion</p> |
| 09:45 – 10:00 | <i>Coffee/Tea Break</i> |
| 10:00 – 12:15 | <p>National Perspectives (cont.)</p> <p>ASIA</p> <p>Mr. Manasa Luvunakoro (Fiji) - Experience of Fiji with Forest Governance and Tracking Technologies</p> <p>Mr. Dewono Siswardiyanto (Indonesia) – Experience of Indonesia with Forest Governance and Tracking Technologies</p> <p>Dato' Dr. Abdul Rahman Abdul Rahim (Malaysia) - Experience of Malaysia with Forest Governance and Tracking Technologies</p> <p>Mr. Tom Bukon / Mr. Axel Wilhelm (PNG) - Experience of PNG with Forest Governance and Tracking Technologies</p> <p>Mr. Raul Briz (Philippines) - Experience of the Philippines with Forest Governance and Tracking Technologies</p> <p>Discussion</p> |

| | |
|---------------|---|
| | <p>LATIN AMERICA</p> <p>Mr. Flavio Guiera (Brazil) – Experience of Brazil with Forest Governance and Tracking Technologies</p> <p>Mr. Mario Rafael Rodriguez Palma (Guatemala) – Experience of Guatemala with Forest Governance and Tracking Technologies</p> <p>Mr. Mohamed Tasreef Khan (Guyana) - Experience of Guyana with Forest Governance and Tracking Technologies</p> <p>Ms. Damiana Mann (Paraguay) – Experience of Paraguay with Forest Governance and Tracking Technologies</p> <p>Ms. Micha Torres (Peru) – Experience of Peru with Forest Governance and Tracking Technologies</p> <p>Discussion</p> <p>Establishment of Working Groups</p> |
| 12:30 – 13:30 | <i>Lunch Break</i> |
| 13:30 – 15:30 | <p>Working Groups</p> <p>Topics:</p> <p>1 - Comments/suggestions on compendium/background document;</p> <p>2 - Recommendations for:</p> <ul style="list-style-type: none"> ● Countries; ● ITTO/International Organizations; and ● NGOs |
| 15:30 – 16:00 | <i>Coffee/Tea Break</i> |
| 16:00 – 17:30 | Reports of Working Groups and Discussions |
| 19:00 – 21:00 | Dinner hosted by EFI-FLEGT Asia (Saloma Theatre Restaurant, Jalan Ampang, Kuala Lumpur) |

Day 3: Thursday, 17 May 2012

| | |
|---------------|---|
| 10:00 – 11:30 | Presentation of Draft Report and Discussions |
| 11:30 – 12:00 | Closing Session |
| 12:00 – 13:00 | <i>Lunch Break</i> |

Appendix II List of Participants

| No. | Title | Name | Organisation | Country | Email |
|-----|-------|--------------------------------|--|-------------|--|
| 1 | Mr. | Abdul Hamid Muhamad Ali | Sabah Forestry Department | Malaysia | ahma_hwq@yahoo.com |
| 2 | Ms. | Aimi Lee | EU-EFI FLEGT Asia Regional Programme | Malaysia | aimi.lee@efi.int |
| 3 | Ms. | Alexis Chang | Malaysian Timber Council | Malaysia | alexis@mtc.com.my |
| 4 | Mr. | Andrew Ballance | Double Helix Tracking Technologies | Singapore | andy@doublehelixtracking.com |
| 5 | Ms. | Annie Ting | Sarawak Timber Association | Malaysia | annie@sta.org.my |
| 6 | Mr. | Antonci Leo | Forest Product Testing Officer, MOF of Indonesia | Indonesia | antoncikalteng@yahoo.com |
| 7 | Mr. | Ashida Zalia Zainal Abidin | Min. of Natural Resources and Environment | Malaysia | ashida@nre.gov.my |
| 8 | Mr. | Axel Wilhem | PNG Forest Industries Association | PNG | axelwilhelm@rhpng.com.pg |
| 9 | Mr. | Baharuddin Ghazali (Dato' Dr.) | Co-facilitator | Malaysia | bahargha@hotmail.com |
| 10 | Mr. | Barney Chan | eFSM Tropics | Malaysia | barney.chan@gmail.com |
| 11 | Mr. | Belinga Solomon Javier | Ministry of Forestry and Wildlife | Cameroon | janviersbelinga@yahoo.fr |
| 12 | Mr. | Bill Maynard | Global Forestry Services | Malaysia | bill@gfsinc.biz |
| 13 | Mr. | Bob Tate | PNG Forest Industries Association | PNG | bob@fiapng.com |
| 14 | Mr. | Bruce Telfer | SGS PNG Ltd. | PNG | bruce.telfer@sgs.com |
| 15 | Ms. | Caroline Stein | Independent Consultant | Switzerland | Caroline.Stein@unilever.com |
| 16 | Mr. | Chen Hin Keong | Traffic International | Malaysia | hk.chen@traffic.org |
| 17 | Ms. | Chew Lye Teng | Malaysian Timber Certification Council | Malaysia | chewlt@mtcc.com.my |
| 18 | Mr. | Chitra Subramaniam | Min. of Natural Resources and Environment | Malaysia | chitra@nre.gov.my |
| 19 | Mr. | Damiana Mann | National Forest Institute | Paraguay | dami.mann@gmail.com |
| 20 | Mr. | Dan Ternes | Helveta Chief Technology Officer | UK | dan.ternes@helveta.com |
| 21 | Mr. | Darren Thomas | Double Helix Tracking Technologies | Singapore | darren@doublehelixtracking.com |
| 22 | Mr. | Dewono Siswadiyanto | Head of Section Forest Product Levies, Region 1, MOF | Indonesia | dewono@dephut.com |
| 23 | Mr. | Emmanuel Ze Meka | ITTO | Japan | zemeka@itto.int |
| 24 | Mr. | Eric Abbey Quaye | Forestry Commission | Ghana | torashman@yahoo.com |
| 25 | Dr. | Felix Seidel | Consultant | Germany | felix@seidelheinze.de |
| 26 | Mr. | Flavio Guiera | Consultant-SFB-Brazilian Forestry Services | Brazil | f.guiera@ativaflorestal.com |
| 27 | Dr. | Freezailah Che Yeom | MTCC | Malaysia | freezailah@mtcc.com.my |
| 28 | Mr. | George White | WWF-GFTN | UK | george.white@wwf.panda.org |

| | | | | | |
|----|-----|------------------------------|--|-------------|--|
| 29 | Mr. | Gustav Adu | Kumasi Wood Cluster Association | Ghana | gustavadu@hotmail.com |
| 30 | Mr. | Harnarinder Singh | Malaysian Timber Certification Council | Malaysia | harnarinder@mtcc.com.my |
| 31 | Mr. | Hasbillah | Tropical Forest Foundation | Indonesia | hasbie@tff-indonesia.org |
| 32 | Ms. | Ian J. Shelley | | Singapore | ian@allrightnow-sb.com |
| 33 | Ms. | Ishii Kanako | ITTO | Japan | ishii@itto.int |
| 34 | Ms. | Ivy Wong | WWF - Malaysia | Malaysia | iwong@wwf.org.my |
| 35 | Mr. | Jaime Chan | Sarawak Timber Association | Malaysia | jaime@sta.org.my |
| 36 | Mr. | Jean Daniel Ravier | Bureau Veritas Certification | Malaysia | jean-daniel.ravier@bureauveritas.com |
| 37 | Mr. | Joachim Bilé Allogho | Ministry of Forestry (GABON) | Gabon | bilealloghojoachim@yahoo.fr |
| 38 | Mr. | Khairul Amin Mohd. Salleh | Heitech Padu Bhd. | Malaysia | amins@heitech.com.my |
| 39 | Mr. | Khamphone Bounthavy | Department of Forest Inspection | Laos | KhamBTV@gmail.co |
| 40 | Mr. | Koh Hock Lye | Forest Department Peninsular Malaysia | Malaysia | koh@forestry.gov.my |
| 41 | Mr. | Koichi Ito | Forestry Agency, Japan | Japan | koichi-ito@inofa.go.jp |
| 42 | Mr. | Koji Hattori | Forestry Agency, Japan | Japan | koji_hattori@nm.maff.go.jp |
| 43 | Mr. | Le Dinh Thom | Directorate of Forestry of Vietnam | Vietnam | ledinhthom@hotmail.vom |
| 44 | Mr. | Le Nho Hoan | Directorate of Forestry of Vietnam | Vietnam | lenhohoan@gmail.com |
| 45 | Mr. | Le Thi Long Huong | Directorate of Forestry of Vietnam | Vietnam | lelonghuong@yahoo.com |
| 46 | Dr. | Lee Soon Leong | FRIM | Malaysia | leesl@frim.gov.my |
| 47 | Mr. | Lim Teck Wyn | Malaysian Nature Society | Malaysia | teckwyn@hotmail.com |
| 48 | Mr. | Madhan Kiflie (Hj) | Sarawak Forestry Corporation | Malaysia | madhan@sarawakforestry.com |
| 49 | Ms. | Manasa Luvunakoro | Ministry of Fisheries and Forest | Fiji | mluvunakoro@gmail.com |
| 50 | Mr. | Mario Rafael Rodriguez Palma | National Forest Institute | Guatemala | mrodriguez@inab.gob.gt |
| 51 | Dr. | Marius R.M. Ekué | Bioversity International | Malaysia | m.ekue@cgiar.org |
| 52 | Mr. | Markus Boner | Agroisolab | Germany | m.bonct@agroisolab.de |
| 53 | Ms. | Micha Torres | CORFO | Peru | micha@terra.com.pe |
| 54 | Ms. | Milena Sosa Schmidt | CITES Secretariat | Switzerland | milena.schmidt@cies.org |
| 55 | Mr. | Mohamed Shah Redza | Malaysian Nature Society | Malaysia | director@mns.org.my |
| 56 | Mr. | Mohamed Tasreef Khan | Guyana Forestry Commission | Guyana | tasreff_khan@hotmail.com |
| 57 | Mr. | Mohd Jinis Abdullah | Forest Department Peninsular Malaysia | Malaysia | jeffri@forestry.gov.my |
| 58 | Mr. | Mouavixay Palee | Min. of Industry and Commerce | Laos | mpalee555@gmail.com |
| 59 | Mr. | Ngumbang Anak Juat | Wildlife Biologist, WCS | Malaysia | ngumbangjuat@hotmail.com |
| 60 | Mr. | Nguyen Tuan Hung | Forest Utilization of Department Vietnam | Vietnam | hung@vnforest.gov.vn |

| | | | | | |
|----|-----|-----------------------------|---|-------------|--|
| 61 | Ms. | Noor Eshah Yat | Malaysian Timber Certification Council | MTCC | noor@mtcc.com.my |
| 62 | Ms. | Ong Lay Lee | Malaysian Timber Council | Malaysia | ong@mtc.com.my |
| 63 | Mr. | Phomma Pathoummavong | DOF (Forest Certification Unit) | Laos | p.pathoummavong@yahoo.com |
| 64 | Mr. | Quek Karl Yen | Project Officer, Tropical Forest Trust | Malaysia | k.quek@tft-forests.org |
| 65 | Mr. | Raul Briz | Forest Management Bureau | Philippines | briz_raul@yahoo.com |
| 66 | Dr. | Razali Abd. Kader | K-Spatial Sdn. Bhd. | Malaysia | drrak50@yahoo.com |
| 67 | Dr. | Razani Ujang | IRIM | Malaysia | razani@gmail.com |
| 68 | Mr. | Razif Bustamal | Heitech Padu Bhd. | Malaysia | razifp@heitech.com.my |
| 69 | Mr. | Robert Simpson | FAO Forestry Department | Italy | robert_simpson@fao.org |
| 70 | Mr. | Samuel Tseganu | John Bitar & Co. Ltd | Ghana | tseganu.samuel@gmail.com |
| 71 | Mr. | Sangkhapanya Phengthalangsy | Min. of Industry and Commerce | Laos | |
| 72 | Mr. | Semilan Ripot | Sarawak Forestry Corporation | Malaysia | semilan.sem@gmail.com |
| 73 | Dr. | Shamsudin Ibrahim | FRIM | Malaysia | shamsudin@frim.gov.my |
| 74 | Ms. | Siti Syaliza Mustapha | Malaysian Timber Certification Council | Malaysia | siti@mtcc.com.my |
| 75 | Mr. | Soukanh Inthanouhack | PAFO Khammouan Province | Laos | soukanh65@gmail.com |
| 76 | Mr. | Stefanie Sieber | Economist, World Bank | USA | ssieber@worldbank.org |
| 77 | Dr. | Steve Johnson | ITTO | Japan | johnson@itto.int |
| 78 | Ms. | Sunita Muhamad | Malaysian Timber Industry Board | Malaysia | sunita@mtib.gov.my |
| 79 | Mr. | Sven Vos | Trainee, EU-EFI FLEGT Asia Regional Programme | Malaysia | sven.vos@efi.int |
| 80 | Mr. | Tang Chi Lin | SGS Forest Monitoring | Singapore | chilin.tang@sgs.com |
| 81 | Mr. | Thang Hooi Chiew | ITTO-CITES Programme | Malaysia | hcthang@streamyx.com |
| 82 | Mr. | Tom Bukon | PNG Forest Authority | PNG | tbukon@pngfa.gov.pg |
| 83 | Mr. | Tom ter Horst | EU-EFI FLEGT Asia Regional Programme | Malaysia | tom.terhorst@efi.int |
| 84 | Mr. | Vincent Van den Berk | EU-EFI FLEGT Asia Regional Programme | Malaysia | vincent.vandenberk@efi.int |
| 85 | Mr. | William B. Pewu | Regional Forested/FDA | Liberia | pewuwilliam@yahoo.com |
| 86 | Mr. | Yong Teng Koon | Malaysian Timber Certification Council | Malaysia | yongtk@mtcc.com.my |