Indicators to monitor progress of forest law enforcement and governance initiatives to control illegal practices in the forest sector

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INTRODUCTION

This paper offers a preliminary and conceptual look at the use of indicators to evaluate forest sector law enforcement and governance. Corrupt and illegal practices are widespread in the forest sector, they pose a major threat to the sustainable management of forest resources, and hamper economic growth, equitable income distribution, and efforts at poverty reduction. More specifically illegal practices may:

1. Put at risk the livelihoods of the poor and forest dependent populations who rely heavily on timber and non-timber forest products.
2. Distort markets for timber and pose an obstacle to responsible forest operators attempting to practice SFM.
3. Lead to a leakage of resources (tax revenues in particular) that legitimately belong in the government treasury for possible use in protecting and improving the quality of the resource and other development activities[1].
4. Make a significant addition to the illegal or unofficial economy and therefore jeopardise national monetary and exchange rate policies, and encourage other illegal activities.
5. Directly threaten ecosystems, biodiversity and environmental services in protected areas and parks.
6. Reduce the intended beneficial impacts of forest sector projects and contribute to their failure.

Improving forest law enforcement and governance reduces illegalities and establishes a better environment for sustainable forest management. To be successful, it requires a reasonably good understanding of the illegal practices in the sector. It also requires the establishment of a baseline, which can capture the extent of the problem and a set of indicators to monitor progress of the recommended actions.

ILLEGAL PRACTICES IN THE FOREST SECTOR

Recent papers have identified a broad range of illegal practices in the forest sector:

- 'There are many types of illegal forest practices.... Public servants may approve illegal contracts with private enterprises. Private commercial corporations may harvest trees of species that are protected by law from timber exploitation. Individuals and communities may enter public forests and illegally take products that are public property. Illegal activities do not stop at the forest. They travel down the line to operations in transportation, processing and trade of forest products. Individuals or corporations may smuggle forest products across international borders or process raw forest materials without a licence. Corporations with strong international links may artificially inflate the price of imported inputs or deflate the volume and prices of their exports to reduce their tax liability and to facilitate the illegal transfer of capital abroad' (FAO 2001).
- 'Illegal acts include ... unauthorised occupation of public and private forestlands, logging in protected or environmentally sensitive areas, harvesting protected species of trees, woodland arson, wildlife poaching, unlawful transport of wood and other forest products, smuggling, transfer pricing and other fraudulent accounting practices, unauthorised processing of forest products, violation of environmental regulations, and bribing government officials' (Contreras-Hermosilla 2002a).
- 'Examples of the types of illegal practices that have been detected in the forest industry largely fall into three categories: illegal logging of various forms; movement of wood products (which may or may not have been harvested legally) without proper authorisation or in contravention of controls; and activities directly aimed at avoidance of payment of taxes or forestry charges' (Callister 1999).

[1] A low-end estimate of the royalties, reforestation fund and export tax payments that are not being paid to the Government of Indonesia on stolen timber amount to US$600 million per annum. This amount is more than twice what the government spent on subsidised food programmes for the poor in 2001.

- "Illegal logging' has no single definition. It is not a legal term derived from treaties, statutes, or court opinions. Neither is it a technical term that professionals use in a consistent way. In a general sense, 'illegal logging takes place when timber is harvested, transported, bought or sold in violation of national laws' (Brack and Hayman 2001). This broad definition includes almost any illegal act that may occur between the growing of the tree and the arrival of the forest-based product in the hands of the consumer' (Rosenbaum 2003).

Consistent with the above definitions, Box 1 presents examples of some of the most prevalent illegal acts in the forest sector.

INDICATORS TO MONITOR PROGRESS: GENERAL CONSIDERATIONS

Indicators are necessary to pick up early warning signs of forest crime, to identify problem areas, to track the progress of interventions, and to allow for appropriate modifications and timely correction of intervention strategies. That is why indicators are often considered synonymous with instruments for monitoring and evaluation.

Indicators can be harbingers of 'good-news' as well as 'bad-news'. For example, an indicator of scholastic achievement that all of us have grown up with, and have viewed with pride at some time but with dread at other, is our school report card! However, 'good news' should not lull us into complacency, but should encourage us to look closely for opportunities for improvement. By the same token, 'bad-news' should not be seen as a failure per se but as an opportunity to learn from mistakes and to minimise the scope of future errors.

Indicators come in a variety of forms, with varying qualities:

1. *Indicators can be Booleans, scalars, or arrays.* Mostly we think of indicators as scalars: that is, single numbers indicating the magnitude of a phenomenon. Examples include the amount of revenue from timber taxes or the rate of deforestation in an area. It is also possible to have valid replicable Boolean indicators, which reflect the presence or absence of a phenomenon. Examples include whether a government awards concessions through public auction or whether concession accounts face annual outside audits. Indicators can also be arrays of linked numbers, such as the pay scale of civil servants (which may shed light on their vulnerability to bribes).
2. *Indicators can be continuous or discrete.* We mostly think of scalar indicators as being continuous, but there are also indicators that take on discrete values. These include ordinal indicators, reflecting rank amongst a set of peers (such as an indicator ranking a country's deforestation rate compared to other countries in the region of similar geography, or of similar GDP). They also include indicators that measure phenomena on

BOX 1 *Examples of illegal practices in the forest sector*

Illegal occupation of forestlands
- Invasion of public forested lands by either rural families, communities or private corporations to convert them to agriculture or cattle ranching
- Practice of slash and burn agriculture on invaded lands
- Induce landless peasants to illegally occupy forested areas to force governments to grant land ownership rights to them and then buying these lands from peasants.

Woodlands arson
- Setting woodlands on fire to convert them to commercial uses

Illegal logging
- Logging protected species
- Counterfeit duplication of felling licenses
- Girdling or ring-barking to kill trees so that they can be legally logged
- Contracting with local entrepreneurs to buy logs from protected areas
- Logging in protected areas
- Logging outside concession boundaries
- Logging in prohibited areas such as steep slopes, riverbanks and water catchments
- Removing under/oversized trees from public forests
- Extracting more timber than authorised
- Passing off volumes extracted from non-authorised areas outside the concession boundaries as those legally harvested
- Logging without authorisation
- Obtaining logging concessions through bribes

Illegal timber transport, trade and timber smuggling
- Transporting logs without authorisation
- Transporting illegally harvested timber
- Smuggling timber
- Falsifying and/or reusing timber transportation documents
- Exporting and importing tree species banned under international law, such as CITES.
- Exporting and importing timber in contravention of national bans

Transfer pricing and other illegal accounting practices
- Declaring lower values and volumes than have exported
- Declaring higher purchase prices above the prevailing market prices for inputs such as equipment or services from related companies
- Manipulating debt cash flows to transfer money to subsidiary or parent company, for example by inflating debt repayment to avoid taxes on profits
- Colluding in submitting bids/tenders to obtain timber concessions cheaply
- Avoiding royalties and duties through under-grading, under-valuing, under-measuring and misclassification of species exported or for the local market
- Non-payment of license fees, royalties, fines and other government charges

Illegal forest processing
- Operating without a processing license
- Ignoring environmental, social and labour laws and regulations
- Using illegally obtained wood

Based on Callister 1999 and Contreras-Hermosilla 2002b.

arbitrary scales of, say, 1–5 or 1–10, or ask people to assign situations to a limited set of ordered categories (e.g. 'Are concession terms violated almost always, often, sometimes, seldom, or never?').

3. *Indicators can vary in precision.* An indicator of economic activity may report a figure to the nearest dollar or to the nearest million dollars. An indicator of deforestation may report in hectares or thousands of hectares. Ideally, an indicator's precision should reflect its presumed accuracy, or the reported figures should include some notion of the uncertainty attached.
4. *Indicators can vary in accuracy.* The distinction between accuracy and precision is worth remembering. An indicator can report a figure to the nearest dollar and be off by a factor of ten, or it could report to the nearest million and be exactly right. The first is precise but not accurate. The second is accurate but not precise.
5. *Indicators can be largely objective or can contain subjective elements.* An indicator that reports on the area of timber harvested or price paid for stumpage is largely objective. An indicator that relies on professional judgment (percentage of forest officers adequately trained in law enforcement) is somewhat less so. An indicator that relies on general opinion (the reputation of forest officers for honesty) has an even larger subjective component. However, even subjective indicators can be measured in replicable ways.

To identify useful indicators decision-makers need to screen indicators against a set of desirable characteristics. These are as follows:

1. *Appropriate in the context of project objectives*[2]*:* The selected indicator (or indicators) must be directly relevant to the project objectives and the problems that the project seeks to address. This is a key requirement for a good indicator. This also implies that the project objectives must be defined very clearly. Otherwise, it would be difficult to identify clear-cut indicators. Fuzzy objectives will lead to fuzzy indicators and a generally poor prognosis for a successful project.
2. *Appropriate to the scale of the project:* Indicators can track illegalities globally (e.g. the World Bank's estimate of revenues lost to governments from illegal activities in the sector), locally (e.g. an estimate of illegal harvest volume associated with a particular concession), or at any scale in between. The scale of the indicator should reflect the scope of the project being monitored.
3. *Sensitive to the objectives and quick to change:* In part this is a matter of precision, and in part appropriateness. An indicator must be sensitive to project interventions and it should respond to changes quickly and with as small a lag as possible. Further, indicators should be insensitive to "outside" factors, or the effect of outside factors should be well understood. Therefore, if lumber price is a project indicator, the monitor should understand that a gradual rise in prices in the legal market could reflect a clampdown on the illegal markets or it could reflect general economic conditions.
4. *Reasonably accurate, and therefore replicable:* Even highly subjective indicators can be defensible if they are unbiased and replicable. Even highly objective indicators are of little use if attempts to verify them prove them to have little accuracy.
5. *Free of hidden bias:* Every indicator embodies some notion of what is good. Sometimes that is apparent from the nature of the indicator itself. Sometimes it is hidden in the way the indicator is measured. Sometimes the notion is widely held or reflects accepted project objectives, sometimes not. Since biases cannot be eliminated they should be left out in the open, to be analysed and critiqued. If a project monitor chooses an indicator with an unpopular bias, the monitor should be prepared to defend it.
6. *Easy and inexpensive to measure:* Indicators should be easy to measure and should not be prohibitively expensive to construct. The reality of the situation is that indicators which entail high cost of collection are rarely chosen, even though they may be perceived as the most useful.
7. *Politically palatable:* Here we leave the realm of measurement for the realm of diplomacy. Projects will want to promote a climate of constructive debate and increased willingness to undertake reforms. Strong indicators of poor performance can lead those in power to attack the monitor or the objectives of the project rather than the problem. At the same time, failing to point out poor performance will hamper reform. In a search for a middle way, some studies have pointed to the benefits of shaping indicators to avoid recriminations and rancor (WB-WWF-IIED, 2002, 2003; Thomas *et al.* 2000).

From a practical perspective, the monitor will have to face up to the challenge of 'trading-off' amongst the desirable qualities of indicators. For example, an indicator may be both easy and cheap to measure, but it may be relatively insensitive to the project objectives. Political palatability is likely to be a frequently contentious issue, and often the monitor may have to compromise by trading-off cardinal rankings against broader ordinal categories. In addition, in all likelihood several indicators will be necessary to monitor project progress in a reliable and comprehensive way. Finding the compromises amongst the desirable qualities, and determining the most relevant set of indicators is not an easy task. It is best opened up to a broad-based consultation process involving the stakeholders responsible for the execution, and affected by the outcomes of the project. This will likely result in objective selection of indicators, identification of the responsibilities for their timely collection and dissemination, and consensus on how to use them in positive ways.

[2] In this paper, 'project' will be used for all proposed interventions whether they are policy reforms or actual investment projects.

Examples of indicators to monitor the progress of FLEG initiatives

What indicators can monitors use to measure the progress of FLEG initiatives? Table 1 contains an extended though preliminary list of illegalities and associated indicators. For each class of illegality the table identifies some ideal indicators, which are probably unavailable but which identify the desired focus of monitoring. It also identifies some more practical indicators that might cast some light on progress.

As an example, consider the indicators that might track the extent of illegality in awarding concessions. The ideal indicators would report the relative number of awards influenced by unlawful activities. If the monitor knew the following with confidence, it would have an excellent way to track the progress of efforts to ensure that concession awards were lawful:

- The percent of concession awards influenced by bribery, cronyism, patronage, or the like.
- The percent of concession awards involving fraudulent applications.
- The percent of concession awards affected by extortion.
- The percent of concession awards affected by unintentional but unlawful acts, such as failure to follow legal mandated award processes.

These ideal indicators are almost certainly unavailable. Indeed, if unlawful concessions could be so readily identified, honest governments could easily prevent or suppress the unlawful acts.

The obtainable quantitative data is likely to provide a much less direct measurement of illegal activity. Depending on the transparency of the concession system, the available indicators might include these:

- The percent of major concession awards drawing multiple competitive bids.
- The percent of awards granted to the highest bidder.
- The percent of awards (determined by number, area, or volume) that on their face comply with law regarding location, size, and number of concessions.
- The records of concessions voided after discovery of illegality.

These indicators all have some correlation to illegal activity, but each is flawed. Auctions can draw multiple bids and still be fixed. High bids can come from irresponsible operators whom the government legitimately avoids. Concessions that appear lawful can still involve corruption. In addition, many illegal concessions are never exposed as such.

The above indicators are scalar; some Boolean (i.e. true or false) indicators also could be useful. These include the following:

- Whether public notice and opportunity to bid is given before the award of a major concession.
- Whether bids are made public after the concession is awarded.
- Whether the rules for awarding concessions are publicly available.
- Whether there is a process for unsuccessful bidders and other interested parties to challenge concession awards.
- Whether there is an independent internal government watchdog that polices the concession process.
- Whether there is a requirement for government forest officials to disclose financial interests in the forest sector, or for concession holders to disclose familial connections to the government.

These are all statements about the process rather than the outcome. They are neither necessary nor sufficient to guarantee that all concessions are lawful. However, they all reflect aspects of the process that tend to prevent or suppress illegality. Taken singly none is a strong indicator of legality, but a large group of Boolean indicators like these taken together can provide a replicable and comparable snapshot of the prevalence of deterrence mechanisms.

With some investment of effort, a monitor might be able to collect new data and generate new indicators. For example, even if the government itself kept few records, the monitor could select a sample of recent concessions and investigate how they were awarded. Alternatively, the monitor could conduct an opinion survey measuring the reputation of the concession process for honesty.

CONCLUSIONS

Corrupt and illegal practices in the forest sector can be a strong constraint to achieving sustainable forest management and there is an urgent need to control such practices through initiatives to improve forest law enforcement and governance. In this context, developing appropriate indicators to measure the performance of FLEG initiatives is a key requirement, and this paper makes a preliminary contribution to this need. It also provides a point of departure for policy makers to go about identifying a set of indicators for a specific FLEG initiative in the context of its own special circumstances such as the country situation, etc. It is envisaged that the selection of indicators takes place through a consultative process involving all major stakeholders who stand to be affected by the FLEG initiative. It is also anticipated that the consultative process will identify the agency/ies responsible for collecting information on the indicators and how the associated costs will be met. In overall terms, consultations will likely ensure that the monitoring information is used effectively to bring about improvements in the FLEG initiative.

Furthermore, the information in Table 1 can be helpful in alerting policy makers to the opportunity of 'piggy-backing' on to reforms in other sectors to control illegal practices in the forest sector. As an example, making a provision that the financing of new processing capacity be financed only by banks and agencies subscribing to the Equator principles into a programme of general banking

TABLE 1 *Examples of indicators to measure the progress of FLEG initiatives*

Problem area	Ideal indicators	Existing or obtainable scalar data	Boolean data (true/false)	Possible expansions
Illegalities in awarding concessions	• Percent of concession awards influenced by bribery, cronyism, nepotism, patronage, or the like • Percent of concession awards involving fraudulent applications • Percent of concession awards affected by extortion • Percent of concession awards affected by unintentional but unlawful acts (clerical errors, failure to follow mandated process, etc.)	• Percent of concession awards drawing multiple competitive bids • Percent of concession awards granted to highest bidder • Percent of awards (determined by number, area, or volume) that on their face comply with laws regarding location, size, and nature of concessions • Records of concessions voided after discovery of illegality	• The public has notice and opportunity to bid before awards • Bids are made public after awards • Award rules are publicly available • Unsuccessful bidders and other interested parties may challenge awards • An independent internal government watchdog polices the process • Forest officials must disclose financial interests in the forest sector, and concession holders must disclose familial connections to government	• Detailed investigation of a random sample of awards • Opinion survey of the reputation of the concession system for honesty and fairness
Illegal acts related to valid concessions	• Ratio of authorised to actual harvest, by species • Ratio of expected to actual concession revenues • Ratio of expected to actual successful completion rate of non-harvest operations (planting, stand improvement etc.) • Rate of compliance with management practice requirements (maintenance of buffers, disposal of slash, protection of sensitive soils, limits on skidding and yarding of logs, etc.) • Amount or number of bribes to concession system enforcement officials	• Pre-harvest and post-harvest inventory estimates of concession • Reported revenue payments • Site inspection reports indicating evidence of management practices • GIS information on logging activity within a concession • GIS information on access roads and skid trails within concession • GIS information on unauthorised logging in nearby areas that might be "laundered" through concessions	• Concession contracts, inventories, and plans are publicly available • Rules regarding forest practices are publicly available • Citizens may bring lawsuits or file administrative complaints to enforce concession requirements	• Detailed independent investigation of conditions at a random sample of concession sites
Theft or other illegal harvest of trees from private lands	• Volume or value of stolen or illegally harvested timber, perhaps broken down by species, perhaps as a percentage of legal harvest • Bribes paid to obtain permission to harvest or to avoid taxation	• Periodic inventory-based estimates of volume on private lands, as a means of estimating harvest volumes • Official reports of trees harvested or marked for harvest on private land, as collected for tax or regulatory purposes • Taxes paid on timber harvested from private lands, as a means of determining reported harvest • Police reports of timber theft • Records of prosecution for bribery	• Special timber trespass laws allow recovery of damages above market value of trees stolen • Branding or marking laws allow log branding unique to ownership	• Surveys of private owners regarding the prevalence of theft, unauthorised harvest, and tax evasion
Theft of non-timber forest products, including wildlife	• Amount of product harvested illegally, or ratio of illegal to total harvest	• Periodic inventory-based estimates of resource • Availability/price of products in marketplace • Records of police reports, arrests, or prosecutions for product theft	• Laws restrict sale or possession of protected species	
Illegal occupation of forest land	• Percentage of forest land with clear title • Area of forest lands used for illegal private, non-forest uses	• Unauthorised agricultural or residential use of government forest lands, as determined by remote sensing • Numbers of court suits filed concerning evictions from or ownership of forest lands	• Workable survey system allows boundaries of properties to be reliably determined in field • Government maintains reliable records of property ownership	• Field survey/ census of forest area residents cross-checked against property records

TABLE 1 ... continued *Examples of indicators to measure the progress of FLEG initiatives*

Problem area	Ideal indicators	Existing or obtainable scalar data	Boolean data (true/false)	Possible expansions
Arson and vandalism	• Area/volume/ecosystem services affected by arson-caused fires • Volume or ecosystem services lost to vandalism	• Total area or volume lost to fires, perhaps divided into natural and human-caused fires • Expenditures to replace or repair public forest property subject to vandalism • Police reports, arrests, or prosecutions for forest-related arson or vandalism		
Timber trespass due to traditional versus modern tenure conflicts	• Area or volume harvested under traditional rights not recognised under modern law • Area otherwise used (grazed, cleared for agriculture etc.) under traditional rights not recognised under modern law • Area harvested under modern rights in conflict with traditional uses • Area subject to conflicts between traditional and modern claims of right (whether used or not)	• Geographical distribution of peoples potentially claiming traditional rights to forest • Number of complaints, arrests, or prosecutions of people tied to exercise of traditional rights	• Forest laws recognise specified traditional rights	• Survey of traditional communities to identify conflicts
Violations of police power laws (laws to promote health, safety, or welfare) governing forest management or harvest	• Percentage of forest harvests conforming to required plans • Percentage of harvest operations in compliance with particular forest practice standards (fire prevention measures, measures to protect sensitive soils, water quality, wildlife etc.) • Percentage of harvest operations in compliance with business, labour, and safety laws. • Percentage of forest roads built to standards • Percentage of harvest areas where regeneration requirements were met • Rate of compliance with laws governing forest pesticide use • Bribes paid to avoid enforcement of above requirements	• Percentage of forests covered by required management and operational plans • Percentage of forest covered under required inventories • Numbers of licenses or permits secured for forest operations • Complaints, arrests, or prosecutions for violations of forest management laws • Complaints, arrests, or prosecutions for other forest-related violations of health, safety, or welfare laws • Percentage of lands managed under certification of code of conduct that requires compliance with local regulations	• Law requires management and operational plans for public forests	• Random sampling of operational sites to determine rate of compliance, including sites subject to certification
Violations of timber transport laws	• Number of trips or volume hauled in violation of timber transport laws • Percentage of illegal transport associated with illegal harvest • Bribes paid or solicited to issue transport licenses	• Number of permits or licenses granted for timber transport and associated volume covered by issued permits (to be compared with estimates of volumes harvested or sold) • Arrests or prosecutions for violation of transport laws		• Sampling of transporters arriving at mill gate or market to determine compliance rates
Illegalities in sales of forest products	• Sales volumes and values traded in grey and black markets • Sales subject to misrepresentation of species, grade, volume, certification status, or place of origin • Bribes paid to evade sale taxes or restrictions • Collusion among bidders at auctions for timber and other forest products	• Sales taxes collected on legal sales. • Required reports of legal sales including sales of government products or sales to government buyers • Price data • Volume data in government-monitored markets.		• Investigation of origins of forest products available in sample of public markets

TABLE 1 ... continued *Examples of indicators to measure the progress of FLEG initiatives*

Problem area	Ideal indicators	Existing or obtainable scalar data	Boolean data (true/false)	Possible expansions
Illegalities in processing of forest products	• Volume of protected species processed • Percentage of processing facilities without proper licenses • Extent (in monetary value) of processing taxes evaded • Extent of violation of pollution control, labour, or other health, safety, or welfare laws in processing. • Payment of bribes to avoid enforcement of above laws.	• Taxes paid by processing facilities • Volumes reported (if required) by processing facilities • Complaints, arrests, or prosecutions for violations of laws at processing facilities • Estimates of actual production in an area compared to records of licensed production capacity	• Law requires licensing or registration of commercial processing facilities • Government performs regular inspections of processors	• Percentage of processing subject to certification or code of conduct requiring compliance with regulations • Percentage of new processing capacity financed by banks or agencies subscribing to codes of environmental practice (e.g. the Equator principles)
Illegalities in the export or import of forest products	• Percentage of forest product exports conducted outside the legal requirements • Percentage of forest product imports involving legally harvested and traded goods • Extent of under-invoicing of exports • Extent of over-invoicing of imports • Bribes paid to customs officials in connection with forest products trade • Loss of tax and tariff revenue due to illegal trade • Amount of trade in contravention of CITES	• Total tax and tariff revenue from trade in forest products (as an indicator of legal trade) • Volume of forest products legally exported • Volume of forest products legally imported • Records of trade subject to CITES control (as an indicator of lawful trade)	• Customs officials trained to recognise restricted species	• Estimates of exports based on estimates of production and internal consumption • Estimates of exports based on records of imports from trading partners
Concealing revenues from illegal forest activities	• Total amount of money not reported • Amount of money laundered through legitimate businesses • Money invested in illegitimate activities such as land speculation, smuggling, drug trafficking, financing armed conflicts and political campaigns	• Overall estimated size of the illegal economy • Estimates of taxes evaded on forest activities • Disclosure of sources of campaign finances by candidates/ political parties	• Banking system facilitates tracking of income	• Percentage of lenders or loans subject to anti-money-laundering codes (e.g. Wolfsberg principles)
Civil service, social, and institutional factors that permit illegal activity	• Ability of forest law enforcement officials to prepare prosecutable cases for forest offences • Freedom of public access to information • Level of discretionary powers subject to abuse available to field staff • Level of honesty • Vulnerability to bribes	• Annual expenditures on training programmes to upgrade enforcement skills of forestry officials • Annual expenditures and staffing on forest-related law enforcement • Annual expenditures on training of officials regarding ethics and professionalism • Civil service salary scales	• Forestry officials regularly trained to upgrade law enforcement skills • Judges and prosecutors trained in forest sector issues • Forest law sets clear limits for use of discretionary powers • Civil service has code-of-conduct and law has reporting requirement regarding conflict of interest • Civil service laws discourage cronyism and patronage • Whistleblowers protected by law • Forest agency is subject to independent audits • Ombudsman or other independent mechanisms responds to public complaints	• Success rate of forest-related prosecutions, in terms of conviction rate and size of penalties • Survey of reputation of forest officers for corruption

system reforms would clearly have favourable impacts on controlling illegal logging. Thus, the forestry community should be on the lookout to capitalise on such opportunities.

Finally, it must be emphasised that documenting the lessons learned from field-testing of indicators and their widespread dissemination will be an important means to make progress in this area. The international community of practice should be prepared to take up this challenge.

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