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Implementation of the U.S. Legal, Institutional, and Economic Criterion and Indicators for the 2010 Montreal Process for Sustainable Forest Management

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1. Introduction

At the 1992 United Nations “Earth Summit” in Rio de Janeiro, most of the countries in the world, including the United States, agreed to international accords to protect biodiversity and mitigate climate change. However, they could not agree on a convention for forests, because developing countries wanted to preserve their autonomy and sovereign control of their forest resources, and developed countries would not guarantee them financial support to protect their forests (Humphreys 2006). This failure eventually led to the development of multi-lateral forest agreements and treaties to at least measure and monitor forest sustainability through Sustainable Forest Management Criteria and Indicators (SFM C&I), as well as the movement to create forest certification programs for sustainable forestry.

The creation of multilateral SFM C&I frameworks were a public response to the lack of a binding international agreement on forests; similarly, the development of forest certification systems were a non-state market driven response (Cashore et al. 2004). SFM C&I processes have since been developed to measure and monitor various conditions of forest sustainability at the national or regional level. Forest certification, on the other hand, was developed to also measure SFM, but at the forest management unit level. Many efforts have been made to harmonize national-level SFM C&I with national forest certification efforts, particularly in Europe.

These various efforts at measuring, monitoring, and encouraging SFM address biophysical, economic, and social aspects of forest systems. Many of the C&I efforts have made considerable progress at tracking biophysical characteristics of forests, but the measurement and monitoring of legal and institutional features has developed more slowly. Furthermore, determining whether we are achieving SFM, in general, and if our laws and institutions are helping, in particular, is difficult to ascertain.

In this book chapter, we discuss the development of one criterion of SFM C&I in the United States—the Legal, Institutional, and Economic Criterion and Indicators for the 2010 Montreal Process for Sustainable Forest Management (Criterion 7). This criterion has the

greatest number of indicators of the seven Criteria developed by its participating countries, yet most of these are not easily measured or tracked. Thus, this paper describes the approach that we developed in the United States to measure and discuss the legal and institutional indicators for SFM. Criterion 7 and its Indicators have been revised since the U.S. National Report on Sustainable Forests (USDA Forest Service 2011) was issued, and those revisions and suggestions for the next round of C&I reporting also are discussed.

2. International agreements to measure, monitor, and report on SFM

The International Tropical Timber Organization (ITTO) is considered the pioneer of international C&I development, publishing its first framework of C&I for tropical forests in 1992 (Humphreys 2006). That same year, at the United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro, the non-binding plan of action known as “Agenda 21” and Statement of Forest Principles were signed by more than 178 countries (www.un.org/esa/dsd/agenda21/). These non-binding agreements included a call for the development of international criteria for monitoring national forest resources in all forest types (McDermott et al. 2010).

This combination of the initial ITTO C&I work and the UNCED agreements led to the development of eight regional C&I processes—African Timber Organization, Asia Dry Forests, Dry-Zone Africa, Lepaterique (Central America), Montreal (Non-European Temperate and Boreal), Near East, Pan-European Forest, and Tarapoto (Amazon). The Montreal and Pan-European (now known as the Ministerial Conference on the Protection of Forests in Europe (MCPFE)) Processes were the first to develop C&I frameworks in the mid-1990s, adopting comparable sets of national level C&I for the sustainable management of temperate and boreal forests (The Montreal Process 2009). Today, more than 150 countries are engaged in one or more regional and/or international SFM C&I process (Wijewardana 2008).

As of 2011, the Montreal Process includes 12 member countries—Argentina, Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russian Federation, United States of America, and Uruguay. The multilateral Montreal Process demonstrates that the countries agree on the importance of improving understanding of and measuring progress toward SFM (www.mpci.org). The Montreal Process framework of Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests was adopted initially through the Santiago Declaration in 1995. This covered 7 Criteria and 67 associated specific Indicators. Criteria reflect broad principles or themes that measure forest sustainability; while specific Indicators can be used to determine whether these principles are being achieved. As a whole, the C&I framework serves as a tool for assessing trends in forest condition and management at the national level and as a common framework among countries for describing, monitoring and evaluating progress towards sustainability at both national and international levels (The Montreal Process 1999). This framework has also grown to serve as a standard reference for many national statistics about forests in the U.S., both in the National Report on Sustainable Forests and in separate supplemental reports and web based data bases.

The initial Montreal Process Criteria for forest conservation and management were intended to measure and monitor forest sustainability with the best indicators possible. Sustainability generally refers to the classic 1987 Brundtland Report definition to “provide for the needs of the present generation without compromising the ability of future generations to meet their needs.” This definition of sustainability has evolved to include ecological, economic, and

social components. The Montreal Process drew from these principles to develop broad criteria that are listed below:

Criterion 1: Conservation of biological diversity

Criterion 2: Maintenance of productive capacity of forest ecosystems

Criterion 3: Maintenance of forest ecosystem health and vitality

Criterion 4: Conservation and maintenance of soil and water resources

Criterion 5: Maintenance of forest contribution to global carbon cycles

Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies

Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management

In general, each Montreal Process member country develops its own approach to measuring and monitoring Indicators, although the Montreal Process Working and Technical Groups facilitate discussions among members and provide technical guidance. In 1997, Montreal Process member countries produced an Approximation Report that provided information on the status of data availability and collection with emphasis on significant implementation issues related to the C&I. The first national reports on the 7 Criteria and 67 Indicators were released in 2003 by participating member countries. These reports varied in the extent and depth to which they covered the suite of C&I. Overall, the 2003 efforts revealed that most countries regularly collected most of the data needed to report conditions with regards to SFM biophysical Indicators, but struggled to address the largely qualitative economic, social, and institutional Indicators in Criterion 7.

Subsequently, the Montreal Process Working Group initiated a process to revise the original C&I, based on experiences with their implementation. At a Montreal Process meeting in Buenos Aires, Argentina in 2007, member countries agreed to revisions of the Indicators associated with the first six Criteria. These Criteria were retained as originally proposed, but some of the Indicators were changed or deleted and new Indicators were added.

In a 2009 meeting in Korea, member countries agreed to revisions of Criterion 7 and its Indicators, including a change to the title of the criterion to “Legal, policy, and institutional framework”, as well as a decrease from 20 to 10 Indicators. For the 2010 reporting cycle, member countries had time to incorporate the revised Indicators for Criteria 1 - 6, but the modified Indicators under Criterion 7 were released too late to be analyzed and integrated with the 2010 country reports. Table 1 summarizes the original and revised Indicators under Criterion 7. The revised 2010 Montreal Process reports had 64 Indicators, and with no further changes, the 2015 reports will have 54 Indicators.

3. Criterion 7 developments

Criterion 7 and its original 20 Indicators are intended to address the crucial question of whether current laws, institutions, and economic structures are adequate to sustainably manage and conserve a nation's forests. The importance of the legal, institutional and economic framework in forest conservation and sustainable management to the Montreal Process participants is clear given the quantity and breadth of the original Indicators. Most of these Indicators, however, are not amenable to concise quantified measurement. Characterizing national trade policies in terms of their impact on forest sustainability (Indicator 7.3.b), for example, entails an analysis framework and synthesis of information at the level of a full research paper. However, Indicator 7.3.b is but one of 20 Indicators under Criterion 7, and one of 64 within the entire suite of C&I in the 2010 reports.

Table: Initial Criterion 7 Indicators, 1995-2010	Table: Revised Criterion 7 Indicators, 2011+
<i>Criterion 7: Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management</i>	<i>Criterion 7: Legal, Policy, and Institutional Framework</i>
7.1 Legal and Policy Framework	
7.1 Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it:	7.1.a Legislation and policies supporting the sustainable management of forests.
7.1.a Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous people, and provides means of resolving property disputes by due process;	7.1.b. Cross-sectoral policy and programme coordination
7.1.b Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including coordination with relevant sectors;	
7.1.c Provides opportunities for public participation in public policy and decision-making related to forests and public access to information;	
7.1.d Encourages best practice codes for forest management;	
7.1.e Provides for the management of forests to conserve special environmental, cultural, social and/or scientific values.	
7.2 Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to:	7.2.a Taxation and other economic strategies that affect the sustainable management of forests.
7.2.a Provide for public involvement activities and public education, awareness and extension programs, and make available forest-related information;	
7.2.b Undertake and implement periodic forest-related planning, assessment, and policy review including cross-sectoral planning and coordination;	
7.2.c Develop and maintain human resource skills across relevant disciplines;	
7.2.d Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management;	
7.2.e Enforce laws, regulations and guidelines	
7.3 Extent to which the economic framework	7.3a Clarity and security of land

(economic policies and measures) supports the conservation and sustainable management of forests through:	and resource tenure and property rights
7.3.a Investment and taxation policies and a regulatory environment which recognize the long-term nature of investments and permit the flow of capital in and out of the forest sector in response to market signals, non-market economic valuations, and public policy decisions in order to meet long-term demands for forest products and services;	7.3.b Enforcement of laws related to forests
7.3.b Non-discriminatory trade policies for forest products	
7.4 Capacity to measure and monitor changes in the conservation and sustainable management of forests, including:	7.4.a Programmes, services, and other resources supporting the sustainable management of forests
7.4.a Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with criteria 1-7;	7.4.b Development and application of research and technologies for sustainable management of forests
7.4.b Scope, frequency and statistical reliability of forest inventories, assessments, monitoring and other relevant information;	
7.4.c Compatibility with other countries in measuring, monitoring and reporting on indicators	
7.5 Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services, including:	7.5.a Partnerships to support the sustainable management of forests
7.5.a Development of scientific understanding of forest ecosystem characteristics and functions;	7.5.b Public participation and conflict resolution in forest-related decision making
7.5.b Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect forest-related resource depletion or replenishment in national accounting systems;	7.5.c Monitoring, assessment and reporting on progress towards sustainable management of forests
7.5.c New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies;	
7.5.d Enhancement of ability to predict impacts of human intervention on forests;	
7.5.e Ability to predict impacts on forests of possible climate change	

Table 1. Initial and Revised Indicators for Montreal Process Criterion 7: Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

The time, financial, and human resources available for the development of each Indicator are limited, as is space for reporting. Moreover, the US National Report on Sustainable Forests is set up to provide concise two-page reports on the importance, status and change in each Indicator, albeit longer technical reports for each Indicator are available in an on-line database. This is not just a matter of limited space for analysis, but also reflects the broad scope for different levels of details and perspectives in the analysis. Comparing the data and numbers in the comparable two-page summaries within and between reports is much easier than comparing two larger associated research papers.

Much of the Indicator development for Criterion 7 in the 2003 National Report relied on separate narrative assessments that identify key concepts and policy components, but which are not regularly collected or monitored and are difficult to update in a consistent fashion. Other Montreal Process Working Group countries had similar results from their efforts to address Criterion 7, largely resulting in revisions of these Indicators to a more qualitative structure. Criterion 7 Indicator assessment and reporting for the 2010 US National Report on Sustainable Forests was seen as an opportunity to bridge between the original and revised Indicators. To achieve this, we developed a new theoretical approach to describe the status and changes in the SFM Indicators under Criterion 7.

In the following sections, we present the approach developed in the U.S. to analyze the original Criterion 7 Indicators and discuss some of the key findings as well as implications for the next assessment of forest sustainability in the U.S. through the Montreal Process.

4. Indicator analytical methods

4.1 Theoretical model

An understanding of the effectiveness of the legal, institutional, and economic framework for forest conservation and sustainable management first requires knowledge of related policy. Policy may be considered a purposive course of action or inaction that an actor or set of actors takes to deal with a problem (Anderson 2010, Hiedenheimer et al. 1983). Policy statements are the formal written outputs of government or private decisions that express the means for implementing policy goals. Laws and regulations are generally the first formal step to policy implementation, which may also include informational, educational, fiscal, market-based and voluntary mechanisms and applications.

In order to understand and analyze the effectiveness of the legal, institutional, and economic framework for forests in the U.S., we drew from theory and research on policy instruments and their analysis (Sterner 2003, Cabbage et al. 2007), “smart regulation” (Gunningham et al. 1998), forest regulatory “rigor” (Cashore and McDermott 2004), and nonstate governance of sustainable forestry (Cashore et al. 2004). Rooted in this literature, McGinley (2008) developed a theoretical model for analyzing the forest policy *structure* and *approach* of government regulation and non-government forest certification in prospective study countries in Latin America. Policy *structure* refers to the level of obligation on the part of individuals and organizations, or government compulsion (voluntary, mandatory) and the policy *approach* refers to the type of policy or practice employed (prescriptive, process-based, performance-based). This model was developed to examine forest policy directives intended for the forest management unit level. Thus, it was modified for use in our analysis of Criterion 7 Indicators for the U.S.

For Criterion 7, the scale of the institutional responses to forest conservation and sustainable management is particularly relevant, since there is wide variation among the 50 U.S. states, not to mention the innumerable local government jurisdictions. Furthermore, many of our U.S. policies and institutions are actually determined by private markets, not government, so this must be considered as part of the analysis of the Criterion 7 Indicators. Therefore, modifications to McGinley’s (2008) model included the expansion of policy structure to account for higher level policy mechanisms (non-discretionary/command-and-control; informational/educational; discretionary/voluntary; fiscal/economic; market-based), and adding an approach component for the role of private enterprise in setting institutional policy (Figure 1).

The model displayed in Figure 1 illustrates the range and variation in forest policy mechanisms, approaches, and scales, as characterized by Gunningham et al. (1998); Cashore and McDermott (2004); Cashore et al. (2004); Sterner (2003), and Cubbage et al. (2007). Note that the schema summarized in Figure 1 varies by policy mechanism (often referred to as policy instruments) from command-and-control to market-based, and by approach from prescriptive to private enterprise. To some extent these are continuous scales, not categorical, but we used the categories to make classification and discussion clearer.

We operationalized the theoretical concepts presented in Figure 1 into a “Forest Policy and Governance Matrix” by converting the model into a two-sided classification schema, which we used to classify U.S. SFM laws, institutions, and economic programs under Criterion 7 (Table 2), and to provide comparisons and a meaningful basis for the discussion of each Indicator. This classification schema also fits nicely within the more detailed schema of policy instruments for multi-functional forestry developed by Cubbage et al. (2007), which is presented in Appendix A.

I. Scale				
National	Regional		State	Local
II. Mechanism				
(A) Non-Discretionary/ Command and Control	(B) Informational/ Educational	(C) Voluntary/ Discretionary	(D) Fiscal/ Economic	(E) Market Based
III. Approach				
Prescriptive	Process or Systems Based	Performance or Outcome Based	Private Enterprise	

Fig. 1. Forest Policy and Governance Matrix by Geographic Scale, Mechanism, and Approach for the United States

In its application, we added specificity to the Matrix by detailing the types of policy instruments that may be employed through the legal, institutional, and economic framework for forest conservation and sustainable management. These include government ownership, Best Management Practices, payments for environmental services, and forest certification, among many others. The typology of specific policy instruments that we reviewed is listed at the bottom of Table 2 and described in detail in the next section.

Mechanism	Scale: National (N), Regional (R), State (S), Local (L)	Approach			
		Prescrip- tive	Process or Systems Based	Perfor- mance or Outcome Based	Private Enter- prise
Non-Discretionary/ Mandatory ^a					
Informational/ Educational ^b					
Discretionary/ Voluntary ^c					
Fiscal/Economic ^d					
Market Based ^e					

Policy Instruments Possible that Could Be Entered in Each Row of the Table 2 Above:

^a Laws (L), Regulations or Rules (R), International Agreements (I), Government Ownership or Production (G)

^b Education (E), Technical Assistance (T), Research (R), Protection (P), Analysis and Planning (A)

^c Best Management Practices (B), Self-regulation (S)

^d Incentives (I), Subsidies (S), Taxes (T), Payments for Environmental Service (P)

^e Free enterprise, private market allocation of forest resources (M), or market based instruments and payments, including forest certification (C) wetland banks (W), cap-and-trade (T), conservation easement or transfer of development rights (E)

Table 2. U.S. Forest Policy and Governance Matrix by Geographic Scale, Mechanism, and Approach

The Forest Policy and Governance Matrix developed for the U.S. corresponds well with the general qualitative indicators developed by the Ministerial Conference on the Protection of Forests in Europe (MCPFE 2003). That Process also categorized forest policy instruments into three similar classes: legal/regulatory, financial/economic, or informational. In addition, the MCPFE schema identifies the main policy area, objectives, and relevant institutions. We include most of these factors in our matrix in similar categories, which we termed policy *mechanisms*.

4.2 Using the Matrix model

In our Matrix (Table 2), *approaches* to forest policy and governance include prescriptive, process- or systems based, performance or outcome based, and private enterprise. A *prescriptive* policy identifies a preventive action or prescribes an approved technology to be used in a specific situation. It generally requires little interpretation on part of the duty holder, offers administrative simplicity and ease of enforcement, and is most appropriate for problems where effective solutions are known and where alternative courses of action are undesirable. However, a prescriptive policy may also inhibit innovation or discourage

adaptive management (Gunningham et al. 1998). An example of non-discretionary prescriptive standard is: "Cutting intensity does not exceed 60% of the number of trees per species with a diameter at breast height greater than or equal to 60 cm."

A *process-based* policy identifies a particular process or series of steps to be followed in pursuit of a management goal, such as conservation of endangered species habitat or public involvement in National Forest management planning. It typically promotes a more proactive, holistic approach than prescriptive-based policies. Challenges associated with process-based policies include complicated oversight, compliance 'on-paper' rather than on the ground, and an over-reliance on management systems (Gunningham et al. 1998). An example of discretionary process-based is: "Measures should exist to control hunting, capture and collection of plant and animal species." The fact that there is a process developed also has an embedded assumption that a good process leads to good outcomes, which is often but not always the case.

Performance-based policy specifies the management outcome or level of performance that must be met, but does not prescribe the measures for attainment. It allows the duty holder to determine the means to comply, permits innovation, and accommodates changes in technology or organization. Performance-based policies neither specifically promote nor preclude continuous improvement, and enforcement may require intensive monitoring, analysis, and related resources (Gunningham et al. 1998). An example of non-discretionary performance-based policy is: "The rate of forest products harvested does not exceed the rate of resource growth."

Private enterprise relies on voluntary market exchange to allocate many of the forest resources in the world, both in private markets and for allocation of goods and services on public lands. Many new market-based conservation incentives are being developed as well (Cubbage et al. 2007). Market mechanisms represent both a broad philosophical policy approach—letting the private sector develop policies—and a number of mechanisms or instruments, often supported by government. Markets provide flexibility in individual and firm responses and promote innovation, but outcomes are not directly measured or guaranteed. Furthermore, markets do not ensure or even yield equitable outcomes. In many cases in the U.S. and elsewhere, markets for private goods are deemed best to achieve SFM. In addition, many public policy mechanisms, such as the regulation of no net loss of wetlands or payments for permanent easements to protect forest lands, have involved public-private partnerships to achieve SFM.

In addition to the various *approaches* to policy implementation, there are various *mechanisms* or *policy instruments* that have been employed to protect and sustainably manage forests. These range from mandatory command-and-control regulations or government ownership to reliance on market-based certification or cap-and-trade to allocate forest resources. Intermediate steps between these approaches include information and education, voluntary, and fiscal or incentive mechanisms. Cubbage et al. (2007) outline these approaches in detail (Table 3), and we relied on that schema to identify specific policy *mechanisms* relevant to each SFM Criterion 7 Indicator.

In using the Forest Policy and Governance Matrix displayed in Table 2, the first column identifies the *mechanism* or instrument through which policies and programs are implemented. The second column denotes the *scale* at which policy is developed and applied. The final four columns show the policy *approach* (prescriptive, process-based, performance-based, private enterprise). Specific policy *instruments* are listed in further detail at the bottom of the table. These are used to add further detail to the *approach* columns, with

the most prescriptive policies appearing in the upper left of the matrix and the most voluntary appearing in the lower right.

In the matrix, non-discretionary approaches and instruments would include, laws (L), regulations and rules (R), international agreements (I), and government ownership (G). Informational or educational approaches include education (E), technical assistance (T), research (R), protection (P), and analysis and planning (A). Voluntary approaches include best management practices (B), or self-regulation (S), such as forest certification. Fiscal and economic approaches include incentives (I), subsidies (S), taxes (T), or payments for environmental services (P). Last, free market mechanisms include private markets (P), market based systems such as forest certification (C), wetland banks (W), cap-and-trade (T), and conservation easements (E).

The Criterion 7 analysis for the 2010 US National Report on Sustainable Forests (USDA Forest Service 2011) was seen as an opportunity to bridge between past, current, and future assessments of forest laws, institutions, and policies. The Forest Policy and Governance Matrix that we developed for the 2010 National Report can be utilized, along with the in-depth analysis of previous reporting, to track changes in the status of the Criterion 7 Indicators in future assessments.

For the 2003 National Report on Sustainable Forests, Ellefson et al. (2003) performed detailed analyses and summaries of most Criterion 7 Indicators (USDA Forest Service 2004). We utilized these analyses as the basis for the 2010 Criterion 7 update, examining them through the lens of the Forest Policy and Governance Matrix, and identifying and analyzing any changes in the associated legal, institutional, or economic framework. These combined analyses served to generate the 2010 C7 Indicator reports. The Matrix can be used in future assessments to analyze revisions in Criterion 7, and to assess trends in a systematic manner. This approach also provides a framework for comparing U.S. and other Montreal Process countries at a given point in time.

We used the Forest Policy and Governance Matrix to classify the U.S. legal, policy, and economic approaches to forest conservation and management as described by the Indicators under Criterion 7 of the Montreal Process. We first prepared an initial draft characterizing the U.S. approach to each Indicator according to the relevant variables and cells in the matrix. These draft analyses were reviewed by experts in a set of three public workshops on the U.S. SFM C&I, and well as through an extensive open public comment process.

Based on the political science theory, the draft Forest Policy and Governance matrix, and the public meetings and written reviews, we revised the approach slightly, and the application to various indicators moderately. Then we re-analyzed and applied the matrix to each of the 20 legal, institutional, and economic indicators used for the 2010 report.

To illustrate the application of the Forest Policy and Governance Matrix, Appendix B shows the relevant matrix and associated text published in the U.S. National Report on Sustainable Forests 2010 for Indicator 7.1.d - Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it encourages best practice codes for forest management. A similar set of matrices and text was published for each of the 20 C7 Indicators in the National Report (Moffat et al. 2011). In using the Matrix, note that each Indicator in Criterion 7, and in the National Report, with a couple of exceptions, had a standard two-page write-up. The Criterion 7 template for each Indicator included a description of what the indicator is and why it is important; the Policy and Governance Matrix with the Relevant Approach,

Mechanism and Scale cells completed; a statement of what the indicator shows; and what has changed since 2003.

5. Discussion

The summaries from the 2003 National Report and the Forest Policy and Governance Matrix were used as a framework to discuss each Indicator in Criterion 7 and to make more general observations about the U.S. legal and institutional approach to SFM in the 2010 National Report on Sustainable Forests. Conclusions from this theory-based analysis verify that there is a wide variety of legal, institutional, and economic approaches that encourage sustainable forest management in the United States, at all levels of government. Public laws govern public lands, which comprise about one-third of the nation's forests. They dictate management and public involvement through various detailed approaches and mechanisms. Federal and state laws also provide for technical and financial assistance, research, education and planning on private forest lands, but do not prescribe specific actions or standards. However, at the state and local level, in many cases, laws do prescribe specific management actions or standards, such as state forest practice acts, prescribed burning laws, water quality standards, and local zoning regulations.

Federal and state environmental laws protect wildlife and endangered species in forests on all public and private lands. They regulate or promote (best) forest practices to protect water quality, air quality, or other public goods, varying significantly by state. Private markets allocate forest resources on most private forest lands, and even governments use markets for making timber sales, leasing lands for minerals, contracting with private concessionaires for tree planting, or providing recreation services. Many new market based mechanisms, including forest certification, wetland banks, payments for environmental services, conservation easements, and environmental incentives are also being developed to implement sustainable forest management and conservation on private and public lands in the United States.

The effectiveness of the Criteria and Indicators in achieving SFM does rely ultimately on value-based politics, which determine the effectiveness of policies and institutions. The Matrix can enhance the rigor and clarity of this discussion and analysis, help clarify gaps and weaknesses in our institutions, and identify opportunities for improvement in the pursuit of sustainable forest management. Note that the Matrix and associated discussion are intended to summarize the institutional context, not to make policy recommendations. Other parts of the National Report and related subsequent implementation efforts such as that by the Pinchot Institute (Sample et al. 2006) can provide appropriate means of identifying policy responses.

The 2009 Montreal Process modifications to Criterion 7 and its Indicators are expected to better facilitate assessments of the current status and trends in forest laws, institutions, and policies. The revised 10 C7 Indicators to be used in the next round of reporting and beyond stem from the original 20 Indicators, but are more succinct and objective. While they are still more apt to be described qualitatively than measured quantitatively, they are expected to improve measurement and reporting.

Based on the revised 2011 Criterion 7 Indicators, future analysts will be able to summarize existing laws and polices supporting SFM; effects of taxation or incentives; the relative strength of tenure rights; programs and cooperative efforts; public participation; and monitoring and reporting. The Policy and Governance Matrix developed for the 2010 US

National Report on Sustainable Forests can be used to categorize these efforts and subsequent data summaries and legal or policy analyses can add depth to the theoretical framework.

6. Applications

The usefulness of the original 2010 Criterion 7 Indicators and the Forest Policy and Governance Matrix rests on their abilities to condense and convey national, regional, and state information about the policies, laws, and institutions promoting the conservation and sustainable management of U.S. forests. Like the other C&I, Criterion 7 and its Indicators represent an attempt to track the status and trends of forest sustainability for the nation. However, as documented here, the social and legal bases for sustainability are difficult to quantify. We tried to at least make the analysis of this Criterion and its Indicators more consistent and objective through a theoretically-based approach.

Many of the Montreal Process C&I are being used beyond the mere reporting of status and trends, and indeed are leading to program or policy changes and development. Examples include the identification of forest health problems or tracking of fire occurrences and conditions, which then lead to new programmatic responses. The C&I reports for several countries also form the basis for national program development and monitoring, such as for implementation of programs to achieve Reduced Emissions from Degradation and Deforestation (REDD). Comprehensive C&I assessments provide the data and structural platform to design and implement national REDD programs, and in some cases even the structure for forest management level measurement and monitoring.

Description, monitoring, and tracking of the C7 Indicators can also assist in identifying and improving national or state programs for SFM. For example, bilateral trade agreements often require demonstration of sustainable forest practices, which can be evidenced by laws, institutions and policies tracked in Criterion 7, by the U.S. and by our Montreal Process trading partners. Questions about environmental laws and illegal logging addressed in Criterion 7 have become key issues in trade of forest products. These Indicators also are relevant for cross-country comparisons. As the 10 new simplified Criterion Indicators are implemented, the comparison within and among countries will become even more useful. Similarly, so will our Forest Policy and Governance Matrix, or some adaptation of that conceptual framework.

In general, the characterization/categorization of legal and institutional aspects related to SFM as required by Criterion 7 is not a measure of their adequacy for forest conservation and management. Though this same tact (i.e., 'just the data') is taken for the Indicators associated with Criteria 1 through 6, for many of those Indicators the linkage between the data and sustainability can be surmised or, at least, considered. This link is more difficult to make with characterizations of forest policies, laws, and institutions. Perhaps the best use of the C7 analysis is a more explicit and comprehensive categorization of the legal and institutional framework for forests that leads to a better understanding of related policy, law, and institutions, and thereby provides a more complete and transparent basis for assessing the overall framework in regards to actual outcomes and, ultimately, to forest sustainability.

The Criterion 7 indicators do not measure sustainability directly, but address the social components of sustainable development. To some extent, they are the tools used to achieve sustainable forest management. The ecological and even social SFM C&I help directly

measure and monitor the status of SFM. Thus in the Montreal Process C&I construct, Criteria 1 to 6 are mostly objective measures of forest sustainability, and Criterion 7 is the assessment of the institutions that help achieve sustainability. The implementation and effectiveness of these laws and institutions will determine how well sustainable forest management is achieved.

Consistently using an analytical tool like the Forest Policy and Governance Matrix in future assessments would facilitate measurements of changes in policy over time, as well as cross-country comparisons, and would potentially permit assessments of related results. The key will be in detecting variance both in terms of matrix coding and in terms of forest impacts and outcomes. These sorts of comparisons (i.e., over time, cross-country) would permit a more substantive characterization of forest policy approaches, to determine, for example, if the U.S. relies more/less on economic incentives to promote SFM than in the past, or more/less than other countries, and given links to other forest measures, may permit associations with changes in forest conservation and management.

7. Conclusion

In the 2010 U.S. National Report on Sustainable Forests, we developed a theory-driven classification scheme to discuss each of the Indicators of SFM in Criterion 7. This approach relied on existing available data and information that was examined through the lens of the Forest Policy and Governance Matrix to measure and monitor legal, institutional, and policy trends related to SFM in the U.S.. The effectiveness of these C&I in achieving SFM does rely ultimately on normative measures about the effectiveness of policies and institutions. Moreover, there is significant debate regarding which forest policies are “best” for achieving SFM, particularly in different countries and biophysical and social contexts. Our analytical approach can enhance the rigor and clarity of this discussion and analysis, help clarify gaps and weaknesses in the legal and institutional framework, and identify opportunities for improvement to achieve SFM.

It is important to note that the intent of Criterion 7 is to provide an objective measurement of the status of laws, policies, and institutions that support forest conservation and management in each country, and perhaps allow comparisons among countries. This is nominally a “positive” or value-free analysis, not a normative assessment designed to make policy recommendations. This is a subtle distinction, since each Indicator reflects specific elements of the value-laden policies that governments choose to enact. Criterion 7 and its Indicators are meant to reveal the status of public policies related to forest conservation and management. Decisions on the adequacy of these public policies in promoting SFM are left to high-level government policy-makers and the relevant legislatures and related interest groups.

In most countries, agency personnel are charged with implementing legislative, executive, and judicial policy decisions, not advocating for changes, even through analytical assessments like those derived from SFM C&I applications. This requires that the C&I be analyzed and reported judiciously in each country report. In fact, the U.S. report primarily focused on the technical findings of the seven Criteria and 64 Indicators, such as forest area trends, forest health issues, carbon storage, forest fragmentation, timber and nontimber market values. And, though the report identifies the “implications of the findings for policy and action”, it purposefully does not make policy judgments or recommendations. Nonetheless, an assessment of the status and change in forest policy, law, and institutions through the Criterion 7 Indicators provides information to decision- and policy-makers,

who are then authorized to determine if the legal and institutional framework at various levels is adequately addressing forest conservation and sustainability, or if changes should be made, and whether that can be afforded in the current and probably enduring times of budget austerity.

Overall, this new approach to analyzing the 2010 and perhaps future Criterion 7 Indicators provides a better understanding over time of the ways in which policy, legal, and institutional capacity affects forest sustainability. The outcome of this process will determine the extent to which the work on Criterion 7 presented in this document becomes a foundation for future reporting. In any case, the analysis presented here provides a consistent and useful way of characterizing and understanding a broad and complex topic area.

Appendix A. Selected Policy Instruments for Multi-Functional Forestry (Cubbage et al. 2007)

<u>Government Ownership and Planning</u>	<u>Government Regulation</u>	<u>Subsidies & Protection</u>	<u>Education & Research</u>	<u>Private Markets</u>	<u>Private/Public Project Financing</u>	<u>Private/Public Market Development</u>
<i>Land ownership</i>	Best practices	Plantations	<i>Education</i>	<i>Land Ownership/ Management</i>	<i>Financing and grants</i>	Tradable development rights
National	Harvesting, roads	Timber stand improvement	Professional	Small private	International bank Loans	Conservation easements
Community	Illegal logging	Income tax reduction	Continuing	Industrial	Debt-for-nature swaps	Concession/ extraction quotas
Native/indigenous	Water quality and quantity	Property tax reduction	Public	Timber investment organizations	Venture capital funds	Tradable protection rights
<i>Production</i>	Wildlife, biodiversity	Forest industry & manufacturing	Landowner	Environmental organizations	National forestry funds	Water resource use charges
Timber products	Endangered species	Ecosystem management	Logger and worker	Cooperatives	Policy/ business guarantees	Bioprospecting fees
Nontimber products	Landscape effects	Environmental services	<i>Research</i>	<i>Goods and Services</i>	Conservation trust funds	Payments for environmental services
Final products	Aesthetics	Fire protection	Federal	Products	Environmental protection funds	Payments for environmental degradation
Services & Amenities	Conversion	Insect & disease protection	State	Services	Securitization	Carbon offset payments
Recreation	Workers/safety/ pay	Invasive species	Forestry schools	Amenities	Grants by philanthropies, NGOs	Clean Development Mechanism
Environmental Services	Community benefits/ impacts	Trespass, theft, illegal logging	Other academic disciplines	<i>Financing</i>	<i>Joint management arrangements</i>	
<i>International Fora and SFM Processes</i>	International trade agreements	Forest law enforcement & governance	Private industry	Banks/loans/ credit	Contracting, leasing, joint	
SFM Criteria & Indicators			Non-government organizations	Foreign direct investment	Build Operate Transfer	
UN Forum on Forests				Forest certification	Build Own Operate	

Appendix B. Verbatim Text of Indicator 7.48 from The National Report on Sustainable Forests, 2010

Indicator 7.48 - Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it encourages best practice codes for forest management

What is the indicator and why is it important?

Forest management practices that are well designed are fundamental to the sustainability of forest resources. At all levels (stand, landscape, local, regional, national, global), forests depend on the application of forest practices that are capable of ensuring sustained use, management, and protection of important social, economic, and biological values. Well-founded best practice codes, and the forest management practices that comprise them, can ensure sustained forest productivity for market goods; protection of ecological values; and protection of the various social, cultural, and spiritual values offered by forests. They can be among the most important tools for responding to national trends and conditions involving forests.

Policy and Governance Classification

Mechanism	Scale: National, Regional, State, Local	Approach			
		Prescriptive	Process or Systems Based	Performance or Outcome Based	Private Enterprise
Non-Discretionary/ Mandatory ^a	N,S,L	L,R,G	L,R,G	L,R	
Informational/Educational ^b	N,S,L	P,T,R	E,T,R	E,T,R	
Discretionary/Voluntary ^c	N,S	B	B	B	B,S
Fiscal/Economic ^d					
Market Based ^e	N,S,L				C

^aLaws (L), Regulations or Rules (R), International Agreements (I), Government Ownership or Production (G)

^b Education (E), Technical Assistance (T), Research (R), Protection (P), Analysis and Planning (A)

^c Best Management Practices (B), Self-regulation (S)

^d Incentives (I), Subsidies (S), Taxes (T), Payments for Environmental Service (P)

^e Free enterprise, private market allocation of forest resources (M), or market based instruments and payments, including forest certification (C) wetland banks (W), cap-and-trade (T), conservation easement or transfer of development rights (E)

What does the indicator show?

National, state, and local government landowners, as well as all private landowners, have various levels of recommended or required forest best management practices (BMPs). BMPs may be implemented through educational, voluntary guidelines, technical assistance, tax incentives, fiscal incentives, or regulatory approaches.

Ellefson et al. (2005) provide detailed summary of BMPs, albeit for 1992, but it can provide a guide for types of programs now. More than 25 states have regulatory forestry BMPs to protect water quality and to protect landowners from wildfire, insects, and diseases. Almost all states (≥ 45) have educational and technical assistance programs for BMPs about water

quality, timber harvesting methods, protecting wildlife and endangered species; and more than 40 have such programs to enhance recreation and aesthetic qualities.

Even states that do not have legally required BMPs often have water quality laws intended to control surface erosion into water bodies of the state, and can be used to enforce BMP compliance. Local governments also implement BMPs for private forest lands, along with other land use controls on development, agriculture, or mining.

BMPs may be prescriptive and mandatory, as required in the state forest practice laws of all the states on the West Coast and many in the Northeast; may require that forest managers and loggers follow specific processes, such as in Virginia; or may be performance or outcome based, ensuring that water quality is protected, such as in North Carolina.

BMPs may cover a variety of practices, such as timber harvest, road construction, fire, site preparation and planting, and insect and disease protection. They also may cover diverse natural resources to be protected, such as water quality, air quality, wildlife, endangered species, or visual impacts.

While BMPs are pervasive, differences of opinion exist about their effectiveness. Almost all forestry compliance surveys have found a high overall rate of compliance for most landowners, but environmental groups contend that many individual practices, such as road-building or wildlife habitat impacts, remain problematical.

The federal government and most states provide detailed technical assistance for information and education about BMPs, as well as research about efficacy, benefits, and costs. The private sector including forest industry, large timberland investors, nonindustrial private forest owners, and forest consultants have been actively involved in development and promotion of BMPs. BMP compliance also is required as part of the standards of all three major forest certification standards in the U.S.—the Sustainable Forestry Initiative, Forest Stewardship Council, and American Tree Farm System.

What has changed since 2003?

Voluntary and regulatory state best management practices for forestry have continued to evolve and improve since 2003. They have been evaluated periodically through on-the-ground effectiveness surveys, and periodically revised. Their scope has been extended in some states to cover more than just timber harvesting and roads to include wildlife, landscape level effects, or aesthetics. Enforcement has increased through inspections, even in states with voluntary BMPs. Several states also have issued separate BMPs for biomass fuel harvesting. And BMPs are now explicitly required under all forest certification systems in the United States.

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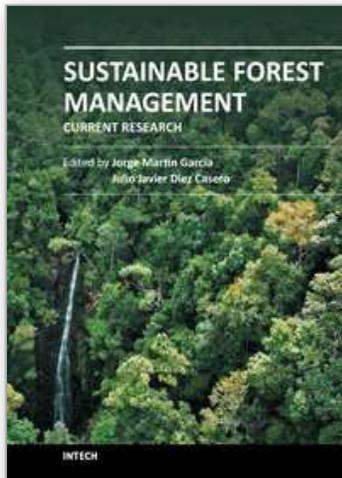
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Sustainable forest management (SFM) is not a new concept. However, its popularity has increased in the last few decades because of public concern about the dramatic decrease in forest resources. The implementation of SFM is generally achieved using criteria and indicators (C&I) and several countries have established their own sets of C&I. This book summarises some of the recent research carried out to test the current indicators, to search for new indicators and to develop new decision-making tools. The book collects original research studies on carbon and forest resources, forest health, biodiversity and productive, protective and socioeconomic functions. These studies should shed light on the current research carried out to provide forest managers with useful tools for choosing between different management strategies or improving indicators of SFM.

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