



Designation: **D7480–08 (Reapproved 2014) D7480 – 21**

Standard Guide for Evaluating the Attributes of a Forest Management Plan¹

This standard is issued under the fixed designation D7480; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides a list of criteria and indicators that have been shown to be useful in achieving the goals of a sustainable forest management plan. This guide lists a set of criteria considered to be important for the following tasks:

1.1.1 To describe, assess, and evaluate progress toward sustainability of forest management at the national, regional, or individual forest level.

1.1.2 To inform the policy debate at regional, national, and international levels.

1.1.3 To evaluate the attributes of a forest management certification or evaluation system with a specific combination of forest management principles, practices, or adaptations, where such practices are evaluated against a set of prescribed standards. Although this guide provides a qualitative list of criteria for evaluation of forest conditions, it does not purport to recommend any specific forest management certification or evaluation system or subset of overall attributes. The guide does not replace forest certification or verification standards.

1.2 This guide will require compilation of information from multiple sources across various governmental and nongovernmental agencies. For this guide to be useful, it is recommended that the information collected is in alignment with that which is already collected for other purposes; otherwise these indicators may be too great an effort to combine in a timely fashion.

NOTE 1—Although this document provides general guidance applicable to forests and forest products from many countries, its initial application is expected to focus on North America.

1.3 This guide cannot replace education or experience and should be used in conjunction with professional judgment such as that provided by foresters, forest scientists, and wood technologists.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This guide is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.08 on Forests. Current edition approved Feb. 1, 2014 Oct. 1, 2021. Published February 2014 October 2021. Originally approved in 2008. Last previous edition approved in 2008 2014 as D7480–08, –08 (2014). DOI: 10.1520/D7480-08R14.10.1520/D7480-21.

TABLE 1 Criteria 1–6

Criterion	Element	Indicator
1. Conservation of biological diversity	1.1 Ecosystem diversity	1.1a Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure 1.1b Area and percent of forest in protected areas by forest ecosystem type and by age class or successional stage 1.1c Fragmentation of forests
	1.2 Species diversity	1.2a Number of native forest associated species 1.2b Number and status of native forest associated species at risk, as determined by legislation or scientific assessment 1.2c Status of on site and off site efforts focused on conservation of species diversity
	1.3 Genetic diversity	1.3a Number and geographic distribution of forest associated species at risk of losing genetic variation and locally adapted genotypes 1.3b Population levels of selected representative forest associated species to describe genetic diversity 1.3c Status of on site and off site efforts focused on conservation of genetic diversity
2. Maintenance of productive capacity of forest ecosystems		2.a Area and percent of forest land and net area of forest land available for wood production 2.b Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production 2.c Area, percent, and growing stock of plantations of native and exotic species 2.d Annual harvest of wood products by volume and as a percentage of net growth or sustained yield 2.e Annual harvest of non-wood forest products
		3.a Area and percent of forest affected by biotic processes and agents (for example, disease, insects, invasive species) beyond reference conditions 3.b Area and percent of forest affected by abiotic agents (for example, fire, storm, land clearance) beyond reference conditions
	4.1 Protective Function	4.1a Area and percent of forest whose designation or land management focus is the protection of soil or water resources
	4.2 Soil	4.2a Proportion of forest management activities that meet best management practices or other relevant legislation to protect soil resources 4.2b Area and percent of forest land with significant soil degradation
	4.3 Water	4.3a Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources 4.3b Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical, or biological properties from reference conditions
5. Maintenance of forest contribution to global carbon cycles		5.a Total forest ecosystem carbon pools and fluxes 5.b Total forest product carbon pools and fluxes 5.c Avoided fossil fuel carbon emissions by using forest biomass for energy
6. Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies	6.1 Production and consumption	6.1a Value and volume of wood and wood products production, including primary and secondary processing 6.1b Value of non-wood forest products produced or collected 6.1c Revenue from forest based environmental services 6.1d Total and per capita consumption of wood and wood products in round wood equivalents
	6.1 Production and consumption	6.1e Total and per capita consumption of non-wood products 6.1f Value and volume in round wood equivalents of exports and imports of wood products 6.1g Value of exports and imports of non-wood products 6.1h Exports as a share of wood and wood products production and imports as a share of wood and wood products consumption 6.1i Recovery or recycling of forest products as a percent of total forest products consumption
6. Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies	6.2 Investment in the forest sector	6.2a Value of capital investment and annual expenditure in forest management, wood and non-wood product industries, forest-based environmental services, recreation, and tourism 6.2b Annual investment and expenditure in forest-related research, extension and development, and education
	6.3 Employment and community needs	6.3a Employment in the forest sector
		6.3b Average wage rates, annual average income, and annual injury rates in major forest employment categories
6.3c Resilience of forest-dependent communities		
6.3d Area and percent of forests used for subsistence purposes		
	6.3e Distribution of revenues derived from forest management	

TABLE 1 *Continued*

Criterion	Element	Indicator
	6.4 Recreation and tourism	6.4a Area and percent of forests available or managed for public recreation and tourism, or both 6.4b Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available
	6.5 Cultural, social and spiritual needs and values	6.5a Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values 6.5b The importance of forests to people

2. Referenced Documents

2.1 ASTM Standards:²

D9 Terminology Relating to Wood and Wood-Based Products

3. Terminology

3.1 *Definitions*—Standard definitions of wood terms are given in Terminology **D9**.

3.2 *Definitions of Terms Related to the Field of Forestry:*

3.2.1 *crit*erion, *n*—a category of conditions or processes by which sustainable forest management may be assessed. A criterion is characterized by a set of related indicators which are monitored periodically to assess change.

3.2.1.1 *Discussion*—

A criterion is characterized by a set of related indicators which are monitored periodically to assess change. **Montréal Process**³

3.2.2 *crit*erion indicator, *n*—a measure (measurement) of an aspect of the criterion. A quantitative or qualitative variable which can be measured or described and which when observed periodically demonstrates trends. **Montréal Process**³

3.2.2 *ecosystem*, *n*—a dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment with which they interact. **Montréal Process**³

3.2.3 *forest management practice, management*, *n*—a specific activity, measure, course of action, or treatment branch of forestry concerned with the overall administrative, economic, legal and social aspects and with the essentially scientific and technical aspects, especially silviculture, protection and forest regulation. **USFS Natural Resources Canada**⁴

3.2.4 *forest type*, *n*—a category of forest defined by its vegetation, particularly composition, or locality factors, or any combination thereof, and/or locality, as categorized by each country in a system suitable to its situation. **Montréal Process**³

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ "Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests," *The Montréal Process: Montréal Process Criteria and Indicators*, Third Edition, DecemberFifth Ed., Sept. 20072015, Online, Online: available, <http://www.rinya.maff.go.jp/mpci/meetings/an-6.pdf>, 1 December 2008; <https://bit.ly/3s8kozZ>.

⁴ Available from the United States Forestry Service (USFS), 1400 Independence Ave., Forestry Glossary of Natural Resources Canada, Dec. 8, 2020SW Washington, DC 20250-0003, <http://www.fs.fed.us>; <https://bit.ly/3mG2zHp>.

⁵ Available from the Society of American Foresters (SAF), 5400 Grosvenor Lane, Bethesda, MD 20814-2198, <http://www.safnet.org>.

3.2.5 *forestry, n*—forestry is the science profession embracing the science, business, and art of attaining desired forest conditions and benefits to sustain and enhance forest resources for diverse benefits in perpetuity, creating, conserving, and managing forests and forest lands for the continuing use of their resources, material or other.

Society of American Foresters/Natural Resources Canada⁵

3.2.6 *indicator, n*—measure (measurement) of an aspect of the criterion.

3.2.6.1 *Discussion*—

A quantitative or qualitative variable which can be measured or described and which when observed periodically demonstrates trends.

Montréal Process³

3.2.7 *monitoring, n*—the periodic and systematic measurement and assessment of change of an indicator.

Montréal Process³

3.2.8 *sustainable forest management, management (SFM), n*—the practice of meeting the forest resource needs and values of the present generations with a goal of preserving the similar capacity of future generations. Sustainable forest management involves practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air, and water quality; wildlife and fish habitat; and aesthetics. Stewardship and use of forests and forest lands in such a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, and vitality, and their potential to fulfill, now and in the future, relevant ecological, economic, and social functions at local, national, and global levels, and that does not cause damage to other ecosystems.

Dictionary of Forestry/Montréal Process⁶

3.2.9 *sustained yield, n*—the achievement and maintenance over multigenerational timeframes of a high-level annual or regular periodic output of the various renewable resources of the forest without impairment of its productivity.

USFS⁴

3.3 *Additional Terms Related to Sustainability and Certification/Verification Programs:*

3.3.1 *biobased product*—a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable agricultural materials (including plant, animal, and marine materials) or forestry materials.

3.3.2 *certified forest content*—certified forest content is tracked through a chain of custody process either by physical separation or percentage based approaches.

3.3.3 *certified wood (or wood-based product)*—derived/manufactured from an acceptable content of raw material from certified forest, other acceptable sources and recycled content as determined by a credible and reliable forest certification programs. Certified wood or wood-based products comply with all applicable standards for their intended use as required by the International Building Code and related Codes.

3.3.4 *chain of custody (COC)*—a defined process that allows companies to make claims about how much of the fiber in their product comes from certified forests, how much fiber comes from acceptable sources, and how much of the fiber comes from recycled content. COC is typically third party audited in accordance with forest certification/verification programs.

3.3.5 *forestry materials*—materials derived from the practice of planting and caring for forests and the management of growing timber. Such materials must come from short rotation woody crops (less than ten years old), sustainably managed forests, wood residues, or forest thinnings.

3.3.6 *other acceptable sources*—other acceptable sources refers to forest content that, while not from a certified forest, can be verified as not coming from a non-acceptable source as defined by the certification program.

⁵ Forestry Glossary of Natural Resources Canada, Dec. 8, 2020, Online: <https://bit.ly/3t9aqjj>.

⁶ Helms, J. A., ed., *The Dictionary of Forestry*, Society of American Foresters, Bethesda, MD, 1998. Technical Notes on Implementation of the Montreal Process Criteria and Indicators, Third Edition, June 2009 (Revised July 2014), Online, Available: <https://bit.ly/2Rpbu4C>.

3.3.7 *non acceptable sources*—illegal or unauthorized harvesting as defined by the forest certification programs referenced in this guideline.

3.3.8 *procurement system*—a system requiring organizations buying raw materials to have an auditable procurement process designed to improve forest management on all suppliers' lands and ensure all fiber comes from known and legal sources.

3.3.9 *wood-based product*—any material which consist of a minimum of 90 % of forest materials as measured by either weight or volume.

4. Summary of Guide

4.1 The criteria and indicators listed under Sections 6 and 7 apply broadly to temperate and boreal forests. They are intended to provide a common understanding of what is meant by sustainable forest management. Section 6 provides a common framework for describing, assessing, and evaluating a country's progress toward sustainability at the national or regional level. Section 7 provides smaller-scale systems, plans, and practices to assess sustainability at the individual forest management level.

4.2 The criteria and indicators are intended to provide an international reference for policy-makers in the formulation of national and regional policies and a basis for international cooperation aimed at supporting sustainable forest management. Internationally agreeable criteria and indicators will help to clarify ongoing dialogues related to international trade in products from sustainably managed forests.

4.3 The additional terms related to sustainability and certification/verification systems (see 3.3) are included in this guide to provide a common reference for these terms that are commonly associated (either directly or indirectly) with products derived from sustainably managed forests.

NOTE 2—While the inclusion of the terms noted in 3.3 are peripheral to the main thrust of this guide, their “standardization” within an ASTM document provides enormous benefits for various groups of users of this document.

5. Significance and Use

5.1 This guide is intended to be used by developers of standards and other documents in the field of renewable resources and green building to evaluate whether the attributes of a specific forest management system meet the intent of sustainable forest management.

5.2 In addition to the attributes addressed by this document, some users may wish to impose other evaluation criteria intended to satisfy goals beyond maintaining sustained-yield and sustainable forest management. While these issues are not specifically addressed in this guide, some are discussed in [Appendix X1](#), Commentary.

6. Criteria and Indicators Used to Assess a National or Regional Forest Management Program

6.1 The criteria and indicators provide a common framework to describe, monitor, assess, and report on national or regional forest trends and progress toward sustainable forest management. They also provide a common understanding of what is meant by sustainable forest management and may be understood to constitute an implicit definition of sustainable forest management.

6.2 The criteria and indicators help provide an international reference for policy-makers in the formulation of national policies and a basis for international cooperation aimed at supporting sustainable forest management.

6.3 Taken together, the criteria and indicators reflect a holistic approach to forests as ecosystems, addressing the full range of forest values. No single criterion or indicator is alone an indication of sustainability. Rather, individual criteria and indicators should be considered in the context of other criteria and indicators.

6.4 The seven criteria given in [Tables 1 and 2](#) characterize the essential components of sustainable forest management (for example, biodiversity conservation). Each criterion is characterized by a set of indicators, which provides a way to measure or describe the criterion. No priority or order is implied in the listing of seven criteria or their associated indicators.

TABLE 2 Criteria 7

Criterion	Element	Indicator
7. Legal, institutional, and policy framework for forest conservation and sustainable management	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:	7.1a 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 7.1b Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including coordination with relevant sectors 7.1c Provides opportunities for public participation in public policy and decision-making related to forests and public access to information 7.1d Encourages best practice codes for forest management 7.1e Provides-for the management of forests to conserve special environmental, cultural, social, or scientific values, or a combination thereof
	7.2 Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to:	7.2a Provide for public involvement activities and public education, awareness and extension programs, and make available forest-related information 7.2b Undertake and implement periodic forest-related planning, assessment, and policy review including cross-sectoral planning and coordination 7.2c Develop and maintain human resource skills across relevant disciplines 7.2d Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management 7.2e Enforce laws, regulations, and guidelines
	7.3 Extent to which the economic framework (economic policies and measures) supports the conservation and sustainable management of forests through:	7.3a 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 7.3b Non-discriminatory trade policies for forest products
	7.4 Capacity to measure and monitor changes in the conservation and sustainable management of forests, including:	7.4a Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with Criteria 1-7 7.4b Scope, frequency, and statistical reliability of forest inventories, assessments, monitoring, and other relevant information 7.4c 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:	7.5a Development of scientific understanding of forest ecosystem characteristics and functions 7.5b 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 7.5c New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies 7.5d Enhancement of ability to predict impacts of human intervention on forests 7.5e Ability to predict impacts on forests of possible climate change

ASTM D7480-21

<https://standards.iteh.ai/catalog/standards/sist/b342cee8-d6c1-4134-b073-5892f254b807/astm-d7480-21>

6.5 While many indicators are quantitative in nature, others are qualitative or descriptive. Some indicators can be readily measured (for example, percent of forest cover). Others may require the collection of new or additional data, the establishment of systematic sampling or even basic research.

6.6 When indicators are measured periodically over time, they indicate change and trends in conditions relevant to sustainable forest management, including natural, social, economic, and policy conditions. Monitoring these changes provides information needed to evaluate a country's progress toward sustainable forest management. This information is essential to making informed forest policy decisions.

6.7 Each country or region is different in terms of the quantity, quality, and characteristics of its forests. Countries also differ in terms of population and land ownership patterns, stages of economic development, governance structures, and expectations of how forests should contribute to society. These differences affect the capacity of countries to collect data, as well as the data collection methods employed. While the criteria and indicators facilitate harmonized approaches to forest assessment and reporting among countries, they also allow for flexibility in application to reflect national circumstances.

NOTE 3—Harmonization of information—collecting data for specific indicators in a common or comparable manner—among countries or regions is key to meeting the objectives of 1.1.

6.8 As national level assessment tools, the criteria and indicators provide a basis for reporting on all forests in a country, including public and private forests, tropical forests, and plantation forests. Although they are not performance standards or designed to

assess sustainability at the forest management unit level, they provide a framework for developing policies, plans, and inventories at both national and regional levels and can serve as a model for monitoring and reporting on other natural resources, such as rangelands, freshwater, and minerals.

6.9 **Tables 1 and 2** list the criteria and indicators for the measurement of conservation and sustainable management of temperate and boreal forests. They relate specifically to forest conditions, attributes, or functions and to the values or benefits associated with the environmental and socio-economic goods and services that forests provide. The intent or meaning of each criterion is made clear by its respective indicators. No priority or order is implied in the alphanumeric listing of the criteria and indicators.

7. Criteria and Indicators Used to Assess an Individual Forest Management Program

7.1 **Table 3** lists the criteria and indicators for the measurement of conservation and sustainable management of individual forests. The intent or meaning of each criterion is made clear by its respective indicators. No priority or order is implied in the alphanumeric listing of the criteria and indicators. Elements of each criteria are also considered to be systems. Indicators are also considered to be plans or practices common to forest management principles.

7.2 Some users may wish to include forest management program attributes that extend beyond those normally associated directly with sustainable forest management. Examples of such optional program features include:

7.2.1 *Certification/Verification*—Documentation of fulfillment of specific criteria and indicators is ultimately the responsibility of the forest owner or forest product manufacturer. However, some programs provide the additional feature of independent verification or certification of conformance, or both.

7.2.2 *Other Forest Harvesting Restrictions*—To address specific forest related issues, some programs impose restrictions related to species type, tree age, or similar concerns.

7.2.3 Additional considerations related to specific societal concerns (not related to forest sustainability).

8. Keywords

8.1 criterion; forest management plans; forests; indicators; sustainability

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