

Summary Table of the Revised Indicators Approved by the Working Group at its 17th Meeting July 29, 2006

Criterion 1: Conservation of biological diversity*

Ecosystem diversity

- 1 (1.1.a) Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure
- 2 (1.1.b) Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage
- 3 (1.1.c) Fragmentation of forests

Species diversity

- 4 (1.2.a) Number of native forest associated species
- 5 (1.2.b) Number and status of native forest associated species at risk, as determined by legislation or scientific assessment
- 6 (1.2.c) Status of *in situ* and *ex situ* efforts focused on conservation of species diversity

Genetic diversity

- 7 (1.3.a) Number and geographic distribution of forest associated species at risk of losing genetic variation and locally adapted genotypes
- 8 (1.3.b) Population levels of selected representative forest associated species to describe genetic diversity
- 9 (1.3.c) Status of *in situ* and *ex situ* efforts focused on conservation of genetic diversity

Criterion 2: Maintenance of productive capacity of forest ecosystems

- 10 (2.a) Area and percent of forest land and net area of forest land available for wood production
- 11 (2.b) Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production
- 12 (2.c) Area, percent, and growing stock of plantations of native and exotic species
- 13 (2.d) Annual harvest of wood products by volume and as a percentage of net growth or sustained yield
- 14 (2.e) Annual harvest of non-wood forest products

Criterion 3: Maintenance of ecosystem health and vitality

- 15 (3.a) Area and percent of forest affected by biotic processes and agents (e.g. insects, disease, invasive alien species) beyond reference conditions
- 16 (3.b) Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions

Criterion 4: Conservation and maintenance of soil and water resources

Protective function

- 17 (4.1.a) Area and percent of forest whose designation or land management focus is the protection of soil or water resources

Soil

- 18 (4.2.a) Proportion of forest management activities (e.g. site preparation, harvesting) that meet best management practices or other relevant legislation to protect soil resources
- 19 (4.2.b) Area and percent of forest land with significant soil degradation

Water

- 20 (4.3.a) Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources such as riparian zones, water quality, quantity and flow regulation

* Indicators are numbered according to the scheme used by the Montreal Process (in parentheses), as well as the continuous number scheme used in the United States.

- 21 (4.3.b) Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical or biological properties from reference conditions

Criterion 5: Maintenance of forest contribution to global carbon cycles

- 22 (5.a) Total forest ecosystem carbon pools and fluxes
23 (5.b) Total forest product carbon pools and fluxes
24 (5.c) Avoided fossil fuel carbon emissions by using forest biomass for energy

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

Production and consumption

- 25 (6.1.a) Value and volume of wood and wood products production, including primary and secondary processing
26 (6.1.b) Value of non-wood forest products produced or collected
27 (6.1.c) Revenue from forest based environmental services
28 (6.1.d) Total and per capita consumption of wood and wood products in round wood equivalents
29 (6.1.e) Total and per capita consumption of non-wood products
30 (6.1.f) Value and volume in round wood equivalents of exports and imports of wood products
31 (6.1.g) Value of exports and imports of non-wood products
32 (6.1.h) Exports as a share of wood and wood products production and imports as a share of wood and wood products consumption
33 (6.1.i) Recovery or recycling of forest products as a percent of total forest products consumption

Investment in the forest sector

- 34 (6.2.a) Value of capital investment and annual expenditure in forest management, wood and non-wood product industries, forest-based environmental services, recreation and tourism
35 (6.2.b) Annual investment and expenditure in forest-related research, extension and development, and education

Employment and community needs

- 36 (6.3.a) Employment in the forest sector
37 (6.3.b) Average wage rates, annual average income and annual injury rates in major forest employment categories
38 (6.3.c) Resilience of forest-dependent communities
39 (6.3.d) Area and percent of forests used for subsistence purposes
40 (6.3.e) Distribution of revenues derived from forest management

Recreation and tourism

- 41 (6.4.a) Area and percent of forests available and/or managed for public recreation and tourism
42 (6.4.b) Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available

Cultural, social and spiritual needs and values

- 43 (6.5.a) Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values
44 (6.5.b) The importance of forests to people

Criterion 7 Legal, Institutional and Economic Framework for Forest Conservation and Sustainable management

These indicators were not changed so the original remain in effect.

Montreal Process Criteria & Indicators

Side-by-Side Comparison of 2010 versus 2003

2010 Montreal Process C&I

Criterion 1: Conservation of biological diversity

1.1 *Ecosystem diversity*

1. Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure
2. Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage
3. Fragmentation of forests

1.2 *Species diversity*

4. Number of native forest associated species
5. Number and status of native forest associated species at risk, as determined by legislation or scientific assessment
6. Status of *in situ* and *ex situ* efforts focused on conservation of species diversity

1.3 *Genetic diversity*

7. Number and geographic distribution of forest associated species at risk of losing genetic variation and locally adapted genotypes
8. Population levels of selected representative forest associated species to describe genetic diversity
9. Status of *in situ* and *ex situ* efforts focused on conservation of genetic diversity

2003 Montreal Process C&I

Criterion 1: Conservation of biological diversity

1. Extent of area by forest type relative to total area
2. Extent of area of forest by type and by age-class or successional stage
3. Extent of area by forest type in protected area categories as defined by IUCN or other classification system
4. Extent of area by forest type in protected areas as defined by age-class or successional stage
5. Fragmentation of forest types
6. Number of forest-dependent species
7. Status (threatened, rare, vulnerable, endangered, or extinct) of forest-dependent species at risk of not maintaining viable breeding populations as determined by legislation or scientific assessment
8. Number of forest-dependent species that occupy a small portion of their former range.
9. Population levels of representative species from diverse habitats monitoring across their range

Criterion 2: Maintenance of productive capacity of forest ecosystems

10. Area and percent of forest land and net area of forest land available for wood production
11. Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production
12. Area, percent, and growing stock of plantations of native and exotic species
13. Annual harvest of wood products by volume and as a percentage of net growth or sustained yield
14. Annual harvest of non-wood forest products

Criterion 3: Maintenance of ecosystem health and vitality

15. Area and percent of forest affected by biotic processes and agents (e.g. insects, disease, invasive alien species) beyond reference conditions
16. Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions

Criterion 2. Maintenance of productive capacity of forest ecosystems

10. Area of forest land and net area of forest land available for timber production
11. Total growing stock of merchantable and nonmerchantable tree species on forest land available for timber production
12. Area and growing stock of plantations of native and exotic species
13. Annual removal of wood products compared to the volume determined to be sustainable
14. Annual removal of nontimber forest products (e.g., fur bearers, berries, mushrooms, game) compared to the levels determined to be sustainable

Criterion 3: Maintenance of forest ecosystem health and vitality

15. Area and percentage of forest affected by processes or agents beyond the range of historic variation (e.g., by insects, disease, competition from exotic species, fire, storm, land clearance, permanent flooding, salinisation, and domestic animals)
16. Area and percentage of forest subject to specific levels of air pollutants or ultraviolet-B that may cause negative effects on the forest
17. Area and percentage of forest land with diminished biological components indicative of changes in fundamental ecological processes and/or ecological continuity

Criterion 4: Conservation and maintenance of soil and water resources

4.1 Protective function

17. Area and percent of forest whose designation or land management focus is the protection of soil or water resources

4.2 Soil

18. Proportion of forest management activities (e.g. site preparation, harvesting) that meet best management practices or other relevant legislation to protect soil resources

19. Area and percent of forest land with significant soil degradation

4.3 Water

20. Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources such as riparian zones, water quality, quantity and flow regulation

21. Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical or biological properties from reference conditions

Criterion 4: Conservation and Maintenance of Soil and Water Resources

18. Area and percentage of forest land with significant soil erosion

19. Area and percentage of forest land managed primarily for protective functions (e.g., watersheds, flood protection, avalanche protection, riparian zones)

22. Area and percentage of forest land with significant compaction or change in soil physical properties resulting from human activities

21. Area and percentage of forest land with significantly diminished soil organic matter and /or changes in other soil chemical properties

25. Area and percentage of forest land experiencing an accumulation of persistent toxic substances

20. Percentage of stream kilometers in forest catchments in which stream flow and timing have deviated significantly from the historic range of variability

23. Percentage of water bodies in forest areas (e.g., stream kilometers, lake hectares) with significant variance of biological diversity from the historic range of variability

24. Percentage of water bodies in forest areas with significant variance from the historic range for dissolved oxygen, temperature, electrical conductivity, acidity (pH), and sedimentation

Criterion 5: Maintenance of forest contribution to global carbon cycles

- 22. Total forest ecosystem carbon pools and fluxes
- 23. Total forest product carbon pools and fluxes
- 24. Avoided fossil fuel carbon emissions by using forest biomass for energy

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

6.1 Production and consumption

- 25. Value and volume of wood and wood products production, including primary and secondary processing
- 26. Value of non-wood forest products produced or collected
- 27. Revenue from forest based environmental services
- 28. Total and per capita consumption of wood and wood products in round wood equivalents
- 29. Total and per capita consumption of non-wood products
- 30. Value and volume in round wood equivalents of exports and imports of wood products
- 31. Value of exports and imports of non-wood products
- 32. Exports as a share of wood and wood products production and imports as a share of wood and wood products consumption
- 33. Recovery or recycling of forest products as a percent of total forest products consumption

Criterion 5: Maintenance of forest contribution to global carbon cycles

- 26. Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age-class, and successional changes
- 27. Contribution of forest ecosystems to the total carbon budget
- 28. Contribution of forest products to the global carbon cycle

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

- 29. Value and volume of wood and wood products production, including value added through downstream processing
- 30. Value and quantities of production of non-wood forest products
- 43. Non-consumptive forest use and values
- 31. Supply and consumption of wood and wood products including consumption per capita
- 34. Supply and consumption of non-wood forest products
- 32. Value of wood and non-wood products production as a percentage of GNP
- 33. Degree of recycling of forest products

6.2 Investment in the forest sector

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| <p>34. Value of capital investment and annual expenditure in forest management, wood and non-wood product industries, forest-based environmental services, recreation and tourism</p> <p>35. Annual investment and expenditure in forest-related research, extension and development, and education</p> | <p>38. Value of investment, including investment in fast-growing forest health management, planted forests, wood processing, recreation, and tourism</p> <p>39. Level of expenditure on research and development and on education</p> <p>40. Extension and use of new and improved technologies</p> <p>41. Rates of return on investment</p> |
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6.3 Employment and community needs

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| <p>36. Employment in the forest sector</p> <p>37. Average wage rates, annual average income and annual injury rates in major forest employment categories</p> <p>38. Resilience of forest-dependent communities</p> <p>39. Area and percent of forests used for subsistence purposes</p> <p>40. Distribution of revenues derived from forest management</p> | <p>44. Direct and indirect employment in the forest sector and the forest sector employment as a proportion of total employment</p> <p>45. Average wage rates and injury rates in major employment categories within the forest sector</p> <p>46. Viability and adaptability to changing economic conditions of forest-dependent communities, including indigenous communities</p> <p>47. Area and percentage of forest land used for subsistence</p> |
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6.4 Recreation and tourism

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| <p>41. Area and percent of forests available and/or managed for public recreation and tourism</p> <p>42. Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available</p> | <p>35. Area and percentage of forest land available for general recreation and tourism, in relation to the total area of forest land.</p> <p>36. Number and type of facilities available for general recreation and tourism in relation to population and forest area.</p> <p>37. Number of visitor days attributed to recreation and tourism in relation to population and forest area</p> |
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6.5 Cultural, social and spiritual needs and values

43. Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values

44. The importance of forests to people

Criterion 7: Legal, Institutional, and Economic Framework

The 17th Montreal Process Working Group meeting in Sapporo, Japan decided to keep the same indicators for Criterion 7 as used in the 2003 reports, pending possible changes resulting from further discussions at the next MPWG meeting

42. Area and percentage of forest land managed in relation to the total area of forest land to protect the range of cultural, social, and spiritual needs and values

Criterion 7: Legal, Institutional, and Economic Framework

48. Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous peoples, and provides a means for resolving property disputes by due process.

49. Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including coordination with relevant sectors

50. Provides opportunities for public participation in public policy and decision making related to forests and public access to information

51. Encourages best practice codes for forests

52. Provides for the management of forests to conserve special environmental, cultural, social, and/or scientific values

53. Provide for public involvement activities and public education, awareness, and extension programs, and make available forest-related information

54. Undertake and implement periodic forest-related planning, assessment, and policy review, including cross-sectoral planning and coordination

55. Design and maintain human resource skills across relevant disciplines

56. Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and to support forest management
57. Enforces laws, regulations, and guidelines
58. Investment and taxation policies and a regulatory environment that recognizes the long-term nature of investments and permits 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
59. Nondiscriminatory trade policies for forest products
60. Availability and extent of up-to-date data, statistics, and other information
61. Scope, frequency, and statistical reliability of forest inventories, assessments, monitoring, and other relevant information
62. Compatibility with other countries in measuring, monitoring, and reporting on indicators
63. Development of scientific understanding of forest ecosystem characteristics and functions
64. Methods to integrate environmental and social costs and benefits into markets, public policies, and national accounting systems
65. New technologies and the capacity to assess the socioeconomic consequences associated with the introduction of new technologies
66. Enhancement of the ability to predict effects of human intervention on forests
67. Capacity to predict effects on forests of possible climate change