

CANADIAN COUNCIL OF FOREST MINISTERS'  
CRITERIA AND INDICATORS OF  
SUSTAINABLE FOREST MANAGEMENT  
INDICATOR REVIEW



CRITERION 4  
TECHNICAL WORKING GROUP MEETING  
7 & 8 October, 2002, Edmonton, Alberta

***MEETING SUMMARY***

**DRAFT**

## **INTRODUCTION**

On March 15, 2002, five Technical Working Groups (TWG) for reviewing the indicators in the Canadian Council of Forest Ministers' (CCFM) framework of Criteria and Indicators (C&I) of Sustainable Forest Management met for the first time via web conference. The objective of this meeting was to define the scope of the work to the TWG members and provide the necessary background information. Each Technical Working Group was assigned the task of refining the indicators under one of Criteria 1, 2, 3, 5 or 6 in the CCFM C&I framework. At this meeting, members were asked to individually produce a preliminary list of indicators for their criterion.

On April 25<sup>th</sup> and 26<sup>th</sup> 2002, five Technical Working Groups met for the second time in Ottawa. The goal of this meeting was to sort through an initial list of draft indicators that each group had put together earlier in April and reduce the list to less than 20 potential indicators per Criterion. Participants were given a list of attributes that each indicator should possess, and each group was asked to describe the rationale for the indicator and give measurement units.

The groups were also asked to try and provide additional information for each indicator, including approaches to measurement, interpretation, benchmarks, and links to other C&I processes. Some groups were able to provide more of this information than others. By the end of the meeting, each group had compiled a list of indicators with additional information.

During the summer, each group worked on their own, meeting several times by email or teleconference, to further refine their indicators. The groups came back together for a third and final time in Halifax on August 26 & 27, 2002. The objective of this meeting was to finalize the list of recommended indicators for each criterion. While most TWGs did conclude their work at the meeting, some groups met by email or teleconference during the month following the Halifax meeting to tie up loose ends with their indicators. In September, each TWG chair submitted their group's recommended set of indicators to the C&I Secretariat.

On October 7<sup>th</sup> & 8<sup>th</sup>, 2002, a working group of six technical experts, co-chaired by Tom Niemann and Rory Thompson, assembled in Edmonton, Alberta to review and revise the indicators under criterion 4. The group recommended a revised set of indicators for this criterion.

## ANNEX 1: MEETING AGENDA

### REVIEW OF CCFM CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

#### CRITERION 4: FOREST ECOSYSTEM CONTRIBUTIONS TO GLOBAL ECOLOGICAL CYCLES

OCTOBER 7 & 8, 2002  
EDMONTON, ALBERTA

#### **PROPOSED AGENDA**

**Purpose:** To revise the indicators under Criterion 4 of the CCFM C&I framework

**Goal:**

Day 1: A long list of suggested indicators for Criterion 4

Day 2: A shortened list of recommended indicators and detailed descriptions

Monday, October 7, 2002	
8:00 – 8:15	Welcome and Introductions
8:15 – 8:45	Background information <ul style="list-style-type: none"><li>- Purpose and goal of meeting</li><li>- 1999 indicator evaluation</li><li>- Focus group values</li><li>- Desired indicator attributes</li></ul>
8:45 – 9:45	Visioning Exercise <ul style="list-style-type: none"><li>- What values should indicators for this criterion address?</li><li>- What should our end product look like?</li></ul>
9:45 – 10:00	break
10:00 – 12:00	Brainstorming session <ul style="list-style-type: none"><li>- Free-flowing, creative generation of long list of indicator ideas, without evaluation.</li></ul>
12:00 – 13:00	Lunch
13:00 – 17:00	Evaluation of suggested indicators <ul style="list-style-type: none"><li>- Which indicators have the desired attributes?</li><li>- Which indicators are Core / Supporting / Potential?</li></ul>
Tuesday, October 8, 2002	
8:00 – 8:15	Summary of previous day
8:15 – 12:00	Refining and describing indicators <ul style="list-style-type: none"><li>- rationale, measurement units, approaches to measurement, etc.</li></ul>
12:00 – 13:00	Lunch
13:00 – 14:00	Refining and describing indicators <ul style="list-style-type: none"><li>- rationale, measurement units, approaches to measurement, etc.</li></ul>
14:00 – 16:45	Gap Analysis <ul style="list-style-type: none"><li>- Compare what we produced with what we said we wanted</li><li>- Fill any gaps in the indicator list</li></ul>
16:45 – 17:00	Wrap up

## **ANNEX 2: MEETING PARTICIPANTS**

Mr. Rory Thompson (Co-chair), Alberta Sustainable Resource Development  
Mr. Tom Niemann (Co-chair), BC Ministry of Forests  
Mr. Ed Banfield, Canadian Forest Service  
Dr. Jagtar Bhatti, Canadian Forest Service  
Mr. Michel Campagna, Ministère des Ressources naturelles du Québec  
Dr. Wenjun Chen, Canada Centre for Remote Sensing  
Dr. Ted Hogg, Canadian Forest Service  
Dr. Dave Spittlehouse, BC Ministry of Forests  
Mr. Simon Bridge, C&I Secretariat

## **ANNEX 3: NOTES FROM MEETING**

### **Visioning - what should this criterion include?**

- Consider elements
- What Canadian values?
- What international/scientific values?
- What ecological cycles?

Major cycles that Criterion 4 should deal with:

- Air pollution
- Water cycles
- Carbon cycles
- Nitrogen cycles
- Energy cycles (e.g. impacts on albedo) (surface energy budgets)
- Climate change
- Area of forest change (afforestation & deforestation) land-use change (+ & -)

### **Other issues Criterion 4 should address**

- peatlands (carbon storage, expansion and contraction of peatlands)
- Soil microfauna
- Nutritional status (indicator species)
- “Global” cycles - other criterion deal with more internal (domestic) issues, but crit 4 deals with external, larger issues. Should this indicator stay like this?
- Permafrost
- Area of visible ice sheets
- Tree line movements
- Soil temperature, soil moisture, - drought status, moisture status
- Indicators should assess our impact on an issue.

## Brainstorming

### Carbon Cycles

MP indicators 5a, 5b, 5c

5.a Total forest ecosystem biomass and carbon pool, by forest type, age class, and successional stage (Stock)

(includes managed, unmanaged and forested peatland)

5.b. Current rate of change in Carbon stock over time (how much time??) (Flux rates)

- Flux rates can be calculated much more accurately than stocks.

5.c contribution of forest products to Canada's carbon budget

How much of bioenergy is being used?

Harvesting for bio energy

Offset of fossil fuel use by bio energy from forests

Use of forest products as replacement for other products manufactured from fossil fuels

can remove many indicators under element 4.1

carbon budget (storage) results depends on scale of model

Kyoto (managed vs. unmanaged forest) definitions of forest for carbon sequestration vs. total forest sequestration.

Land-use change that increases or decreases emissions (e.g. flooding, afforestation, deforestation, urbanization, etc.)

Forested areas with minimal human intervention

Frontier land

Disney land

Forest land use conversion (anthropogenic and "natural")

Total forest area

Change in range and distribution of forest (criterion 2)

CO2 emissions from fossil fuels by forest industry

4.3.1 fossil fuel emissions

4.3.2 fossil carbon products emissions

4.3.3 % if forest sector energy usage from renewable sources

Desperation of CO2 emitters (Kleinoto protocol)

### Hydrological Cycles

Drought index /Moisture index (precip – PET)

Precipitation

Gauged river flow rates

Area of surface water in forested areas

# of people dependent of surface water that comes from forested areas

timing of peak flows

size of peak flows

annual water yield from watersheds

proportion of watershed harvested

Equivalent clearcut area in watersheds (basins)

area of wetlands (as proportion of forested area)

### Nitrogen

N distribution in different forest types

N availability index (Total N availability and availability)

N deposition

N loss from forested ecosystems (both dissolve N in water and atmospheric N losses)

N fertilization (e.g. annual contribution of N into forested areas by fertilization)

General nutritional index

### Other elements

Cation deposition

K deposition

### Energy Budgets

Albedo

Surface energy absorption (budgets)

Soil Temperature

Smoke (impact on light reaching earth – nuclear winter)

Quality of sunsets (purpleness of sun)

## Misc.

Leaf area index

Leaf-out time (not hockey)

Remote sensing indicators??? (e.g. NDVI, FPAR, APAR) (greenness index)

NEP/NBP Net Ecosystem Productivity/net biome productivity

Net primary productivity

Crown closure

Southern limit of permafrost

Area of forest with permafrost

Percent of total forest area covered by permafrost

Area of peatlands

Soil species diversity index (for criterion 1) (micro flora and fauna)

Forest fuel build up (Criterion 2)

Temperature sums

Existence of forest inventories (could go under other criterion)

Proportion of indicators reported on

Frequency, scope and statistical reliability of inventories

Availability of inventory information to public (agents of the public)

Quality of inventory

Extent of inventory

## **Evaluating Indicators**

### Forest Land area

Land-use change that increases or decreases emissions (e.g. flooding, afforestation, deforestation, urbanization, etc.)

Forested areas with minimal human intervention (Frontier land)

Forest land use conversion (anthropogenic and “natural”)

Total forest area

Change in range and distribution of forest (criterion 2)

Area of wetlands

Area of peatlands

Southern limit of permafrost

Area of forest with permafrost

Percent of total forest area covered by permafrost

### Carbon Cycles

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5.b. Current rate of change in Carbon stock over time (how much time??) (Flux rates)  
- Flux rates can be calculated much more accurately than stocks.

5.c contribution of forest products to Canada's carbon budget

carbon budget (storage) results depends on scale of model

Kyoto (managed vs. unmanaged forest) definitions of forest for carbon sequestration vs. total forest sequestration.

### Hydrological cycles

Drought index /Moisture index (precip – PET)

Precipitation

Gauged river flow rates

Area of surface water in forested areas

# of people dependent of surface water that comes from forested areas

timing of peak flows

size of peak flows

annual water yield from watersheds

proportion of watershed harvested

Equivalent clearcut area in watersheds (basins)

### Fossil carbon use and substitution

How much of bioenergy is being used?

Harvesting for bio energy

Offset of fossil fuel use by bio energy from forests

Use of forest products as replacement for other products manufactured from fossil fuels

CO2 emissions from fossil fuels by forest industry

4.3.1 fossil fuel emissions

4.3.2 fossil carbon products emissions

4.3.3 % of forest sector energy usage from renewable sources

#### Misc.

Albedo (Potential Indicator). Harvesting can change the reflectance of the land surface, having an impact on surface air temperatures and energy budget. There are several indicators which could measure this but it requires more research to define it.

#### **Indicators that should be considered under other criterion**

N distribution in different forest types (Criterion 2 & 3)

N availability index (Total N availability and availability) (Criterion 2 & 3)

N deposition (Criterion 2 & 3)

N loss from forested ecosystems (both dissolved N in water and atmospheric N losses) (Criterion 2 & 3)

N fertilization (e.g. annual contribution of N into forested areas by fertilization) (Criterion 2 & 3)

General nutritional index (Criterion 2 & 3)

Cation deposition (criterion 2)

Leaf area index

Leaf-out time (not hockey)

Remote sensing indicators??? (e.g. NDVI, FPAR, APAR) (greenness index)

NEP/NBP Net Ecosystem Productivity/net biome productivity

Net primary productivity

Crown closure

Temperature sums

Existence of forest inventories (could go under other criterion) Criterion 6

Proportion of indicators reported on (Criterion 6)

Frequency, scope and statistical reliability of inventories(Criterion 6)

Availability of inventory information to public (agents of the public) (Criterion 6)

Quality of inventory(Criterion 6)

Extent of inventory(Criterion 6)

Soil species diversity index (for criterion 1) (micro flora and fauna)

Forest fuel build up (Criterion 2)

## **Evaluating Indicators – Day 2**

### 4.1 Forest Land area

Total forest area, specifically identifying: (CORE)

Area of forested peatlands

Area of forest with permafrost

Changes in forest area (reported as additions and subtractions by forest type and cause where feasible)  
(CORE)

### 4.2 Carbon Cycles

Net change in forest ecosystem carbon (**Flux**) (CORE)  
(inputs from atmosphere minus losses to products and losses to atmosphere)

Forest ecosystem carbon, by forest type and age class (**Stock**) (SUPPORTING)  
(includes managed, unmanaged and forested peatland)

Net change in forest products carbon (**Flux**) (CORE)  
(inputs to products minus losses from products to atmosphere)  
does not include energy input to produce product

carbon budget (storage) results depends on scale of model  
NEP/NBP Net Ecosystem Productivity/net biome productivity

### 4.3 Fossil carbon use and substitution

Forest sector carbon emissions (reported by bioenergy and fossil fuel energy emissions) [(direct and indirect emissions)] (CORE)

Forest sector energy use (SUPPORTING)

### Hydrological cycles

Moisture index (criterion 2?) (CORE)

Proportion of forest area below or above a given index value for a given number of days (reported annually)

e.g. Climatic moisture index (precip – PET)

e.g. drought code (FWI)

Forested watersheds with hydrological impacts (what size watershed, what % disturbed, what time span?)  
(SUPPORTING)

Proportion of watersheds with greater than 30% stand-replacing disturbance in last 20 years

Misc.

Albedo (POTENTIAL). Harvesting can change the reflectance of the land surface, having an impact on surface air temperatures and energy budget. There are several indicators which could measure this but it requires more research to define it.

**Indicators that should be considered under other criterion**

NUTRITIONAL GROUP (SUPPORTING FOR ELEMENT 2.3)

N distribution in different forest types (could be measured with remote sensing indexes such as NDVI)

N availability index (Total N availability and availability)

N loss from forested ecosystems (both dissolve N in water and atmospheric N losses)

N fertilization (e.g. annual contribution of N into forested areas by fertilization)

General nutritional index

Cation deposition

Forest Inventory Group (CORE FOR CRITERION 6)

Frequency, geographic scope, attributes and statistical reliability of inventories

Availability of inventory information to public (agents of the public)

# of people dependent of surface water that comes from forested areas (criterion 5?)

**APPENDIX 4: PRESENTATION TO TWG**

# Overview, FAQs, Your Task

## CCFM C&I Indicator Review

### Criterion 4

Technical Experts Meeting

October 7-8, 2002

Tom Niemann

# Agenda

- Day 1
  - **Overview, FAQs, Your Task**
  - Visioning - what values?
  - Brainstorming - potential indicators?
  - Evaluation - which indicators?
- Day 2
  - Refine and describe indicators
  - Gap analysis

# Overview of Indicator Review Process

- Focus Groups review values (Dec 2001)
- Technical Working Groups
  - review background material (Mar 2002)
  - revise / propose indicators (Apr 2002)
  - evaluate indicators
  - refine indicators (Aug 2002)
- TWG Chairs, C&I Task Force
  - review and adjust recommended indicators
- CCFM approves new C&I (Sep 2003)

# FAQs

- Why this review?
- Why C&I? For whom? How?
- Reviewing the criteria?
- What kind of indicators?
- Links to the Montreal Process?
- Links to other criteria?
- Benchmarks and targets?

# FAQ:

## Why this review?

- 1995 C&I were a first attempt
- Dynamic process of defining SFM
- New understanding
  - provinces
  - model forests
  - certification
- 1999 review
  - conserve 2, modify 68, remove 13

# FAQs:

## Why C&I? For whom? How?

- *Canadian* C&I of SFM to *inform* and *meet commitments* to:
  - ***Define, Monitor, Communicate***
- Many audiences:
  - domestic, international
  - public, interest groups, decision makers
- Comprehensive, balanced, science-based

# FAQ:

## Reviewing the criteria?

- No
  - Canadian values, issues and concerns
  - linkages to other C&I
- Some rewording possible
- Elements may change

# FAQ:

## What kind of indicators?

- Ideal attributes:
  - Relevant
  - Measurable
  - Understandable
  - Can be forecast
  - Have reference values
- Core, Supporting, Potential indicators

# FAQ:

## Links to the Montreal Process?

- CCFM & MP both report at national level
  - simplify reporting
- Consider MP indicators and indicators similar to MP indicators
  - relate to Canadian values, issues, concerns
  - 5 attributes
- Consider MP Criterion 7 indicators

# FAQ:

## Links to Other Criteria?

- Indicators may relate to  $>1$  criterion
  - e.g. forest types and ages
  - e.g. water quantity
- TWG Chairs choose indicator location
- Full list of indicators will be circulated to TWGs

# FAQ:

## Benchmarks and Targets?

- Define where obvious
- May require separate public input
- May not be possible
  
- Discussion paper on reference values

# Your Task

- GOAL:
  - < 20 indicators for Criterion 4,  
with detailed descriptions
- STEPS:
  - Review material
  - Visioning                      - what values?
  - Brainstorming                - potential indicators?
  - Evaluation                     - which indicators?
  - Refine and describe indicators
  - Gap analysis

# Review material

- CCFM and MP lists
- 1999 Reevaluation
- Focus Group - Canadian values
- National Status 2000 report
- CCME indicators of climate change
- Suggested hydrological indicators

# Visioning

- Consider elements
  - What Canadian values?
  - What international/scientific values?
  - What ecological cycles?
- What end product by tomorrow?
  - Suggested formats

# Brainstorming

## ideas for indicators

- ✓ let ideas flow
- ✓ build on ideas of others
- ✓ be creative
- ✓ be humorous
- ✓ think out-of-the-box
- ✗ no “bad” ideas
- ✗ no evaluating
- ✗ no debating
- ✗ no worries about wording

# Evaluation of indicator ideas

- Desired attributes
  - Relevant
  - Measurable
  - Understandable
  - Can be forecast
  - Have reference values
- Important? Feasible?
  - Core
  - Supporting
  - Potential
  - Combine/reduce number of indicators

# Refine and describe indicators

- clear, concise, non-directional wording
- rationale
- approach to measurement  
(identify data gaps)
- interpretation of indicator

# Gap analysis

- have we achieved what we set out to accomplish?
- any gaps?
- concepts missing?
- barriers to measurement? reporting?
- what still needs to be done?