Developing Sustainable Forest Bioenergy Production Systems
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The Role of Adaptive Management

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Panel 2. Sustainability safeguards

Ensuring Forest Sustainability in the Development of Wood Biofuels and Bioenergy In the Great Lakes Region

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Outline

Basic assumptions & questions

• How is forest management expected to evolve to accommodate long-term increased use of wood for energy?

• What biomass harvesting and/or procurement guidelines have been developed?

• What is the potential role for certification and other nongovernmental sustainability programs?

Stress the importance of Adaptive Forest Management and certification systems
Assumptions

« In the long term, sustainable forest management strategies aimed at maintaining or increasing forest carbon stocks, while producing a sustained yield of timber, fibre, or energy from the forest, will generate the largest sustained mitigation benefit. »

IPCC 2007 ch 9: Forestry, AR4, Group III
Are any of these forest bioenergy production systems sustainable in the Great Lakes region?
Is whole-tree harvesting at landscape-scales sustainable?

Northern Maine – early 1980s
Assumptions

- Many of the practices used to sustainably manage forests for conventional products can be used in bioenergy production systems.

- If forest biomass is utilized more intensively to produce bioenergy and other bio-based products, then we need to assess risks to environmental values and alternatives to mitigate risks:
  - Soil productivity
  - Water quality
  - Biodiversity

- How adequate is our knowledge of risks and mitigation alternatives? Do managers work with ‘validated’ practices?
Our responsibility & challenge:

Design low-impact systems
- Identify risks to soils
- Identify practices to mitigate risks

Graphics source:
Courtesy Tapio Ranta, VTT Processes 2002
Assessing risks

• **There are multiple criteria for assessing soil conservation**
  – Soil health
  – Nutrient balances and availability
  – Base cation status
  – Tree growth
  – Water quality

• **Basis for risk assessment will vary according to intensity of management**
  – Should we prevent damage or correct it later?
Types of scientific knowledge

Strength of the evidence

Generality

Source: Stupak 2009

- Field experiments
- Modelling and calculations
- Expert knowledge

- Criteria & indicators
- Recommendations
- Guidelines
- BMPs

What progress on empirical-validation of C&I, recommendations, guidelines and BMPs?
Concern – How to manage forests responsibly given uncertainty about management consequences on specific sites?

Apply concept of Adaptive Forest Management

• Approach to management developed to improve sustainable land stewardship and the effectiveness of management systems through formal commitment to planning, performance evaluation procedures, and continual improvement

• AFM formally incorporated in certification systems (e.g. FSC and SFI) and governmental guidelines
Adaptive Forest Management

- Plans (stakeholders set goals, indicators and targets)
  - Operational guidelines (implementation)
    - Monitored outcomes (use of indicators)
      - Evaluation processes (comparison with goals, targets)
        - Agreed responses (adaptation of plans or guidelines)
          - Reports to stakeholders
System requirement for continual improvement

Ontario site disturbance standards – Application of Adaptive Management approach in 1997 vs 2010

Source: Duckert et al. 2009
Assumption:

Certification of forest bioenergy production systems using internationally accepted standards defining Sustainable Forest Management (SFM) are essential for public acceptance of forestry, and forest bioenergy and bio-based products.

How much adaptation and revision is necessary?

Can key stakeholders find consensus?
There are many systems for defining C&I

Countries participating in international processes defining C&I for sustainable forest management

Source: Rametsteiner and Simula 2003
North America has already committed to SFM C&I

The member countries represent about 90 per cent of the world's temperate and boreal forests in the northern and southern hemispheres. This amounts to 60 per cent of all of the forests of the world.

Note: Europe's forests are not included - they are being addressed by the Helsinki or Pan-European Process a.k.a. MCPFE - Ministerial Conference on the Protection of Forests in Europe.

http://www.mpci.org/
Some relevant certification systems with international with national/regional credibility –

- Forest Stewardship Council (FSC)
- Sustainable Forest Initiative (SFI) – now within PEFC
- American Tree Farm System (ATFS)
- ISO 14000
SFM systems need site-specific applicability

Source: McCormack
Conclusions

• Sustainable forest management systems can be implemented to produce bioenergy feedstocks immediately.

• SFM Adaptive Forest Management and certification programs can be applied to bioenergy production systems.
  – Rational way to manage uncertainty and improve management outcomes over time
Conclusions

• Implementation requirements:
  – Site-specific management is required to attain environmental sustainability.

  – The long-term environmental effects of management on forest ecosystems must be monitored and evaluated through carefully designed experiments and permanent plots.

  – The best time to install permanent plots was at least 30 years ago…
Thanks!

Questions?

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