

# Unloved trees

## as sustainable feedstock for bioenergy

Evelyne Thiffault, ing.f. PhD  
Assistant professor, Laval University,  
Quebec (Canada)

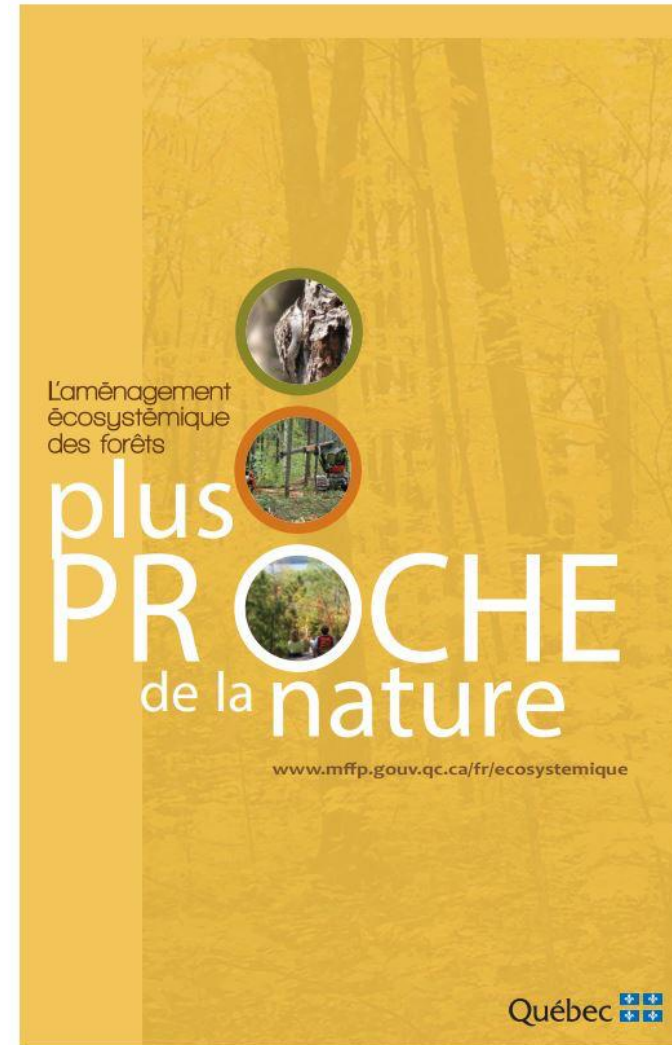


CENTRE DE RECHERCHE  
SUR LES MATÉRIAUX  
RENOUVELABLES



# Ecosystem-based forest management in Quebec

Naturalness at the heart of management decisions





Evelyne Thiffault



Evelyne Thiffault

In landscapes with high naturalness, the forest industrial network needs to adapt to very variable wood quality



Evelyne Thiffault

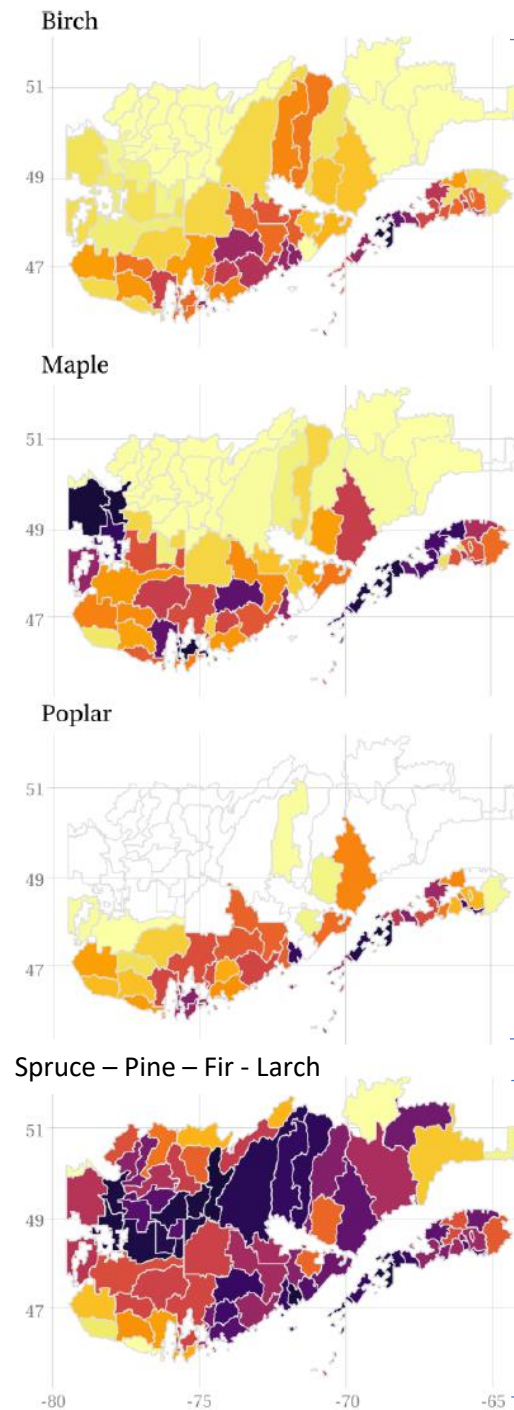
Sawmills and pulpmills often have strict standards and requirements in terms of wood quality



Ratio of actual harvest on allowable annual cut  
%



Durocher et al. Untapped volume of surplus forest growth as feedstock for bioenergy. Biomass Bioenergy, accepted.



No industrial taker  
for low-quality boreal hardwoods

- Sound coniferous locked among boreal hardwoods with no taker
- No industrial taker for degraded coniferous



Evelyne Thiffault



Evelyne Thiffault

Jonathan Beauséjour



Can unloved trees serve as sustainable feedstock for bioenergy?



Evelyne Thiffault

# WHOLE TREES FOR BIOENERGY??

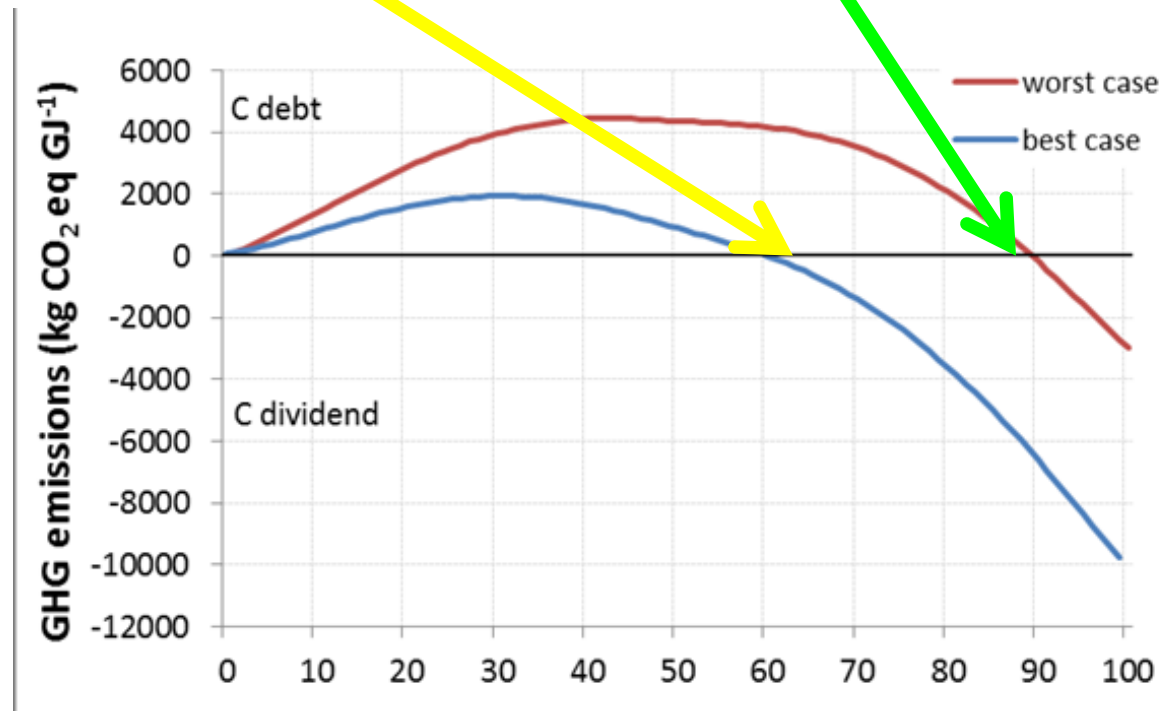


## Timing of carbon benefits of bioenergy systems relative to counterfactual, fossil-based systems

Forest bioenergy system does not provide mitigation benefit

Uncertainty period

Forest bioenergy system provides mitigation benefits



Years after system implementation

# Boreal balsam fir stand (*Abies balsamea*)



<https://tidcf.nrcan.gc.ca/en/insects/factsheet/12018>

Evelyne Thiffault

Counterfactual case: Fossil diesel is used  
Affected stand is left untouched



Evelyne Thiffault

# Timing of carbon benefits of biodiesel

Joint procurement of wood for lumber and bioenergy is best

Feedstock

Defoliated trees - only bioenergy is procured

Defoliated trees - sawnwood and bioenergy are procured

Dead trees - only bioenergy is procured

Dead trees - sawnwood and bioenergy are procured

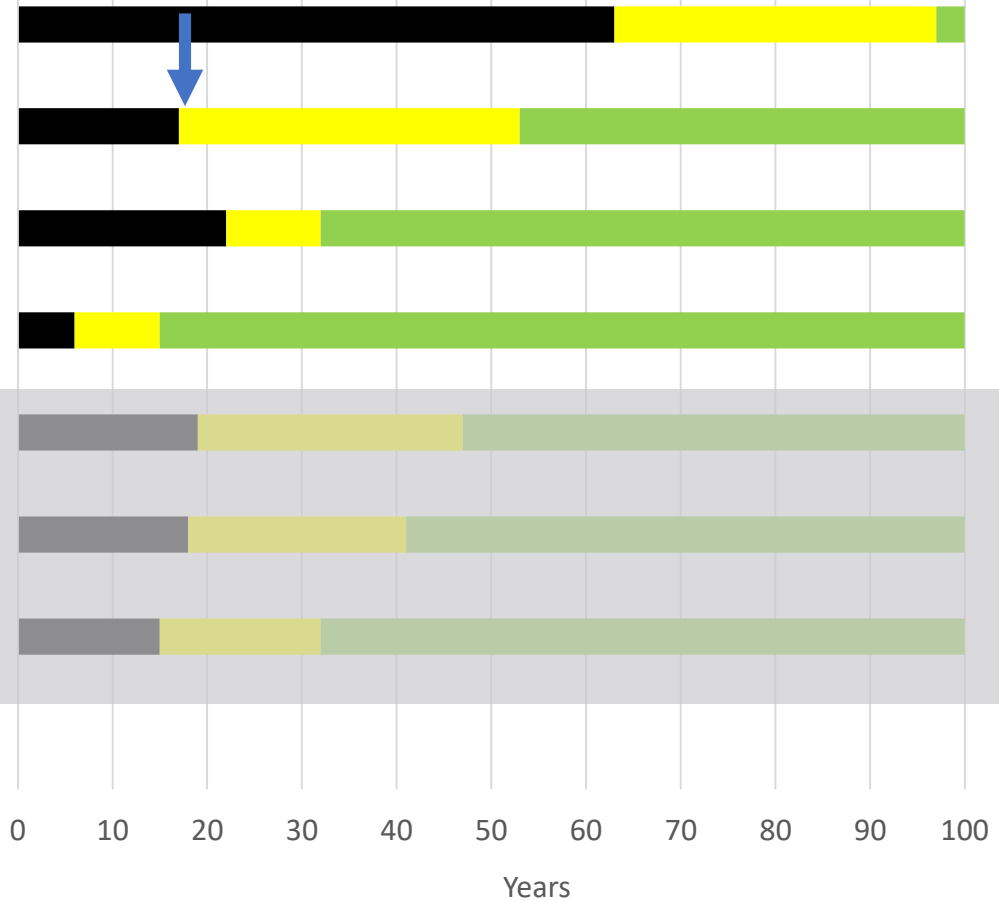
Trees left as residues on site

Trees left as residues on site - biomass procurement improves microsites (accelerates growth by 2 year)

Trees left as residues on site - biomass procurement greatly improves microsites (accelerates growth by 5 years)

Best case: Efficient biofuel conversion

Sawnwood is used in long-lived products with high substitution effect



■ Debt ■ Uncertainty ■ Benefit

Careful tree sorting and processing: degraded wood used for biofuels; sound wood used for lumber



Evelyne Thiffault

Counterfactual case: Fossil diesel is used

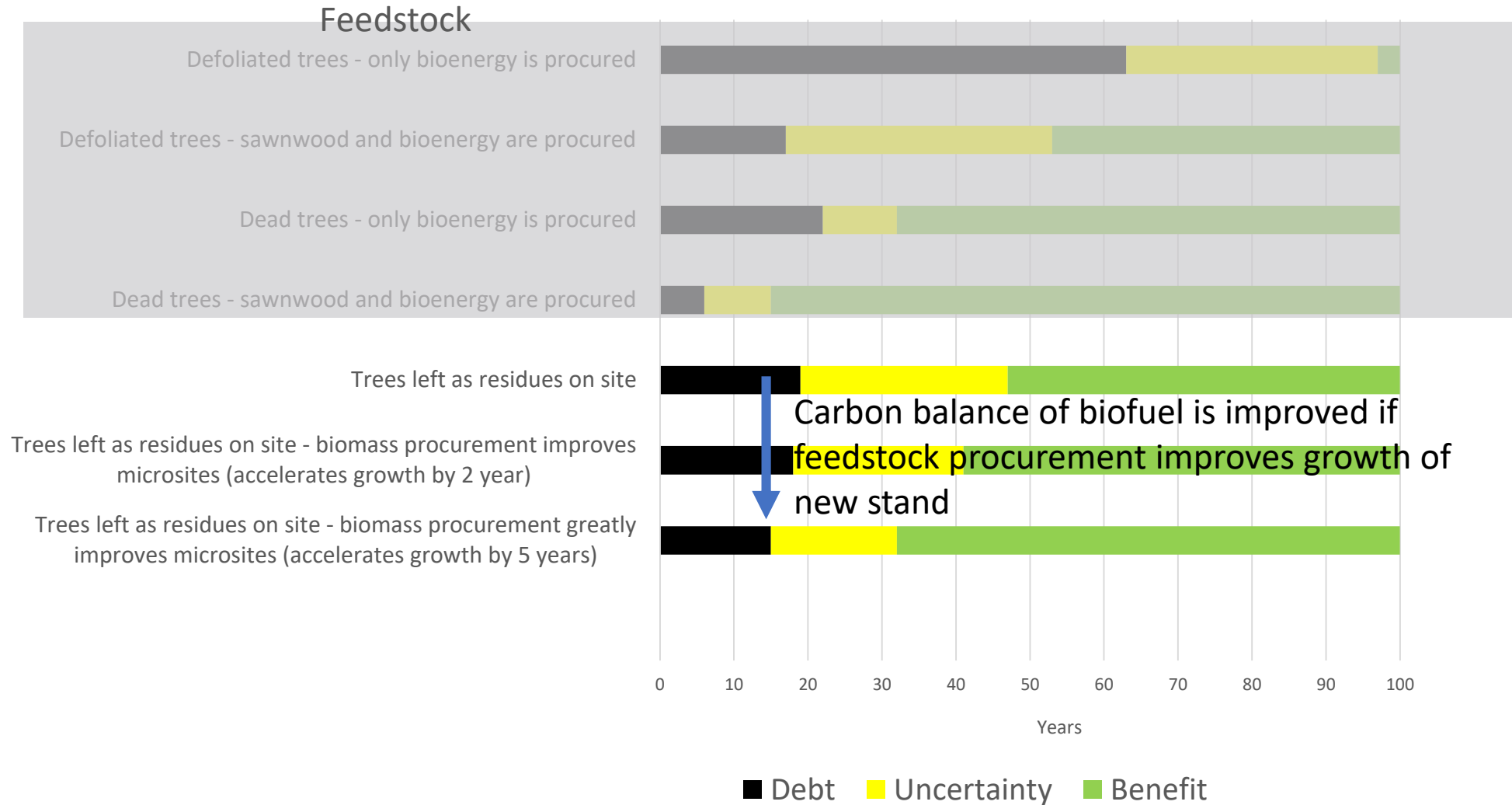
Sound trees are harvested for sawnwood and degraded trees are left as residues





Sutherland et Foreman (1995)

# Timing of carbon benefits of biodiesel



## Ecosystem-based forest management in Quebec:

- Managed landscapes with high level of naturalness, but with high variability in quality of wood supply
- Abundance of unloved trees that do not meet standards of conventional forest industries (sawntimber, pulp)



## Unloved trees can serve as sustainable feedstock for bioenergy:

- When they help to unlock stands with a proportion of sound trees for sawnwood
  - **Requires training of forest workers for improved tree sorting during joint procurement of wood for lumber and bioenergy, and improved processing into products**
- When their procurement serve as a silvicultural practice to improve establishment and growth of the new stand
  - **Requires training of forest managers for improved planning of silviculture**
- When bioenergy is considered an integral part of forestry systems
  - **No policy/political discrimination against whole trees for bioenergy**

Naturalness in managed forest landscapes...



Evelyne Thiffault

requires diversity in the forest industrial network...

including takers of unloved woods...



which require improved training of forest workforce...



Marine Dupérat



David Paré

and...

# Forest bioenergy products need to be considered members of the forestry team

