

Can Forestry and Forest Sector Activities Contribute to Mitigating Climate Change? A Science Synthesis in Support of Policy

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contribute to mitigating climate change?
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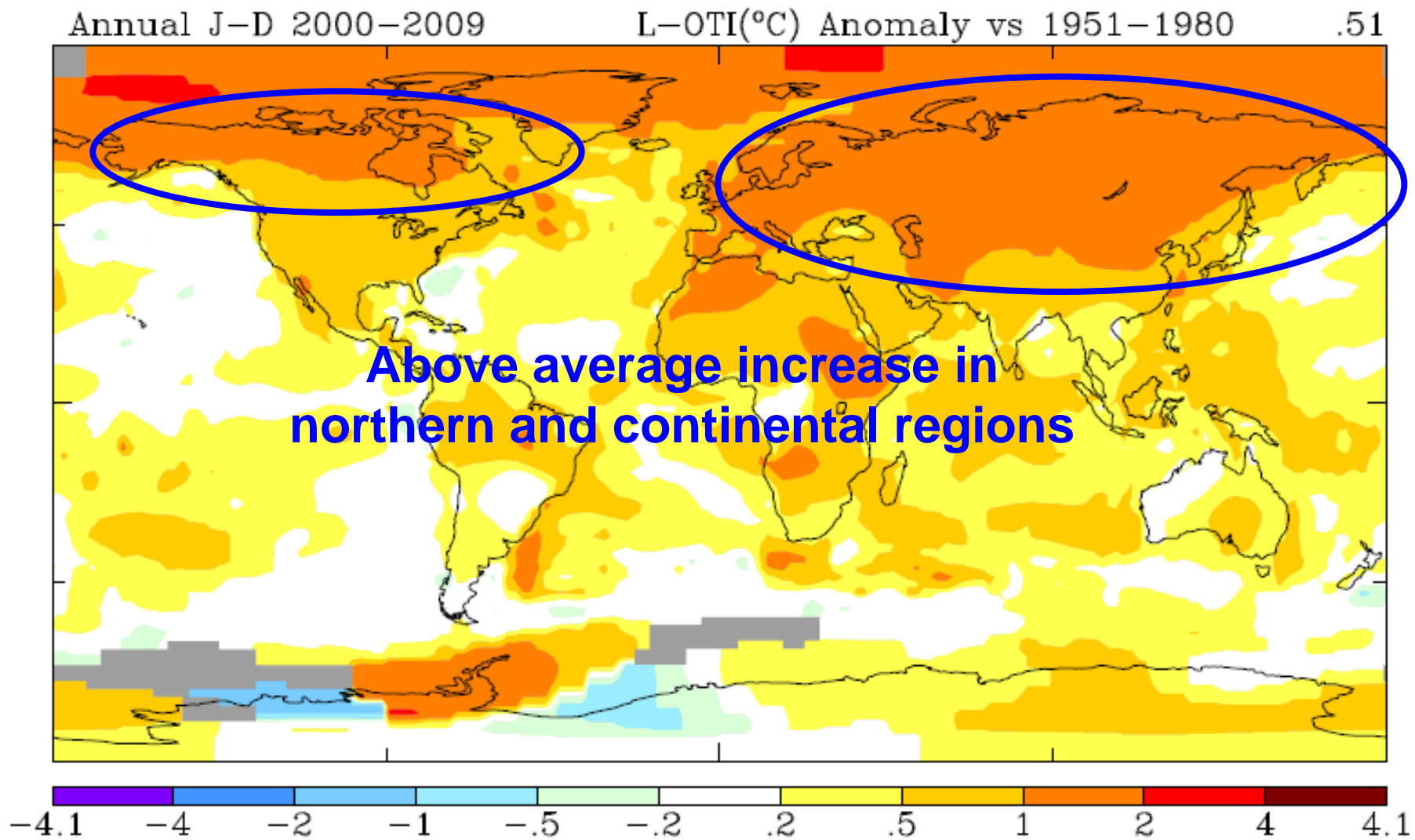


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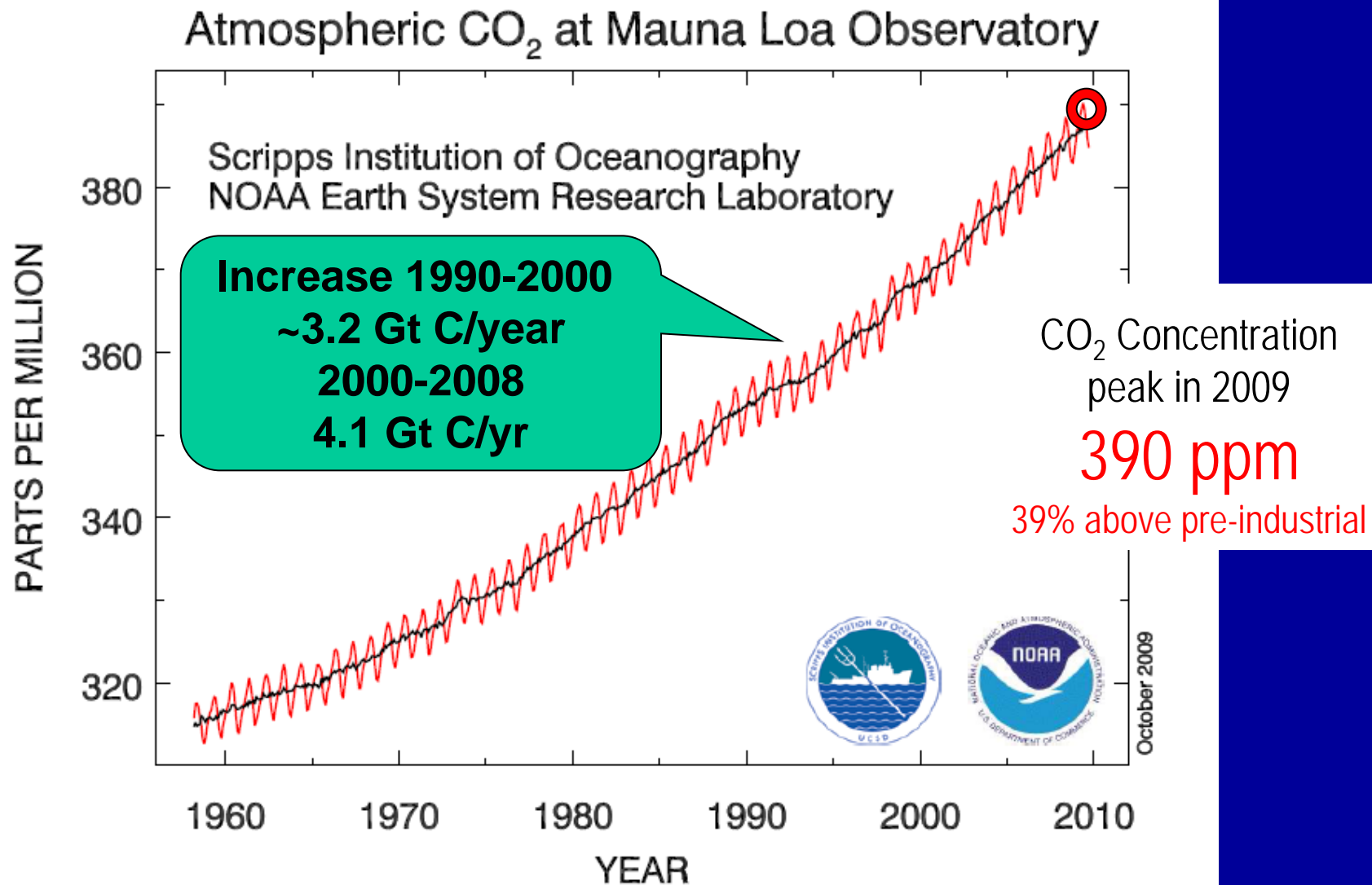
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2000-2009: The Warmest Decade on Record



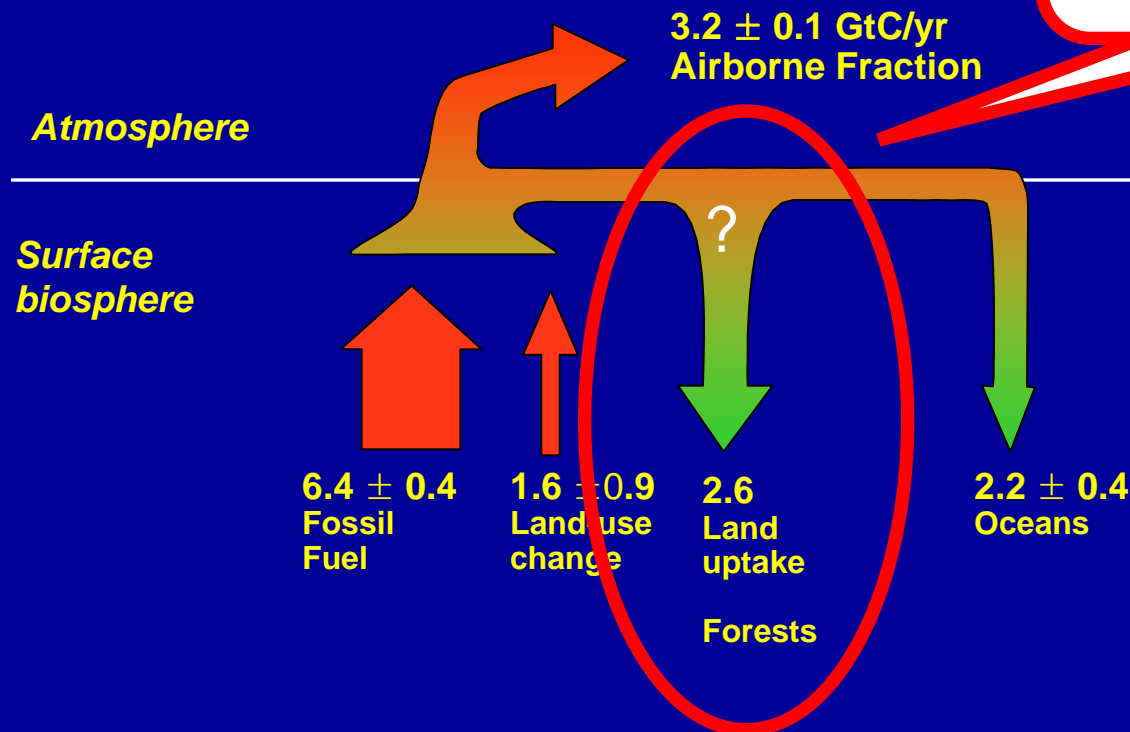
Increase in Atmospheric CO₂ Concentration



Human Perturbations to the Global C Cycle

Airborne Fraction: ~45% of *human* emissions stay in the atmosphere:
 8.0 Pg emitted but only 3.2 Pg remain.
 AF stable despite increases in emissions.

Forests will affect the future CO₂ concentration.



Feedback to Climate Change

- Climate changes will affect many processes (growth, decay, disturbances) with large differences between ecosystems and regions.
- Currently not able to predict net impacts, but ...
- **Asymmetry of risks:** unlikely that productivity increases can off-set increased disturbance losses (Kurz et al. 2008).



Feedback to Climate Change

- Forests' response to climate change has the potential to provide positive feedback to future climate change through increased emissions that could completely negate the benefits of mitigation efforts in all other sectors.

Does the Forest Sector have a Role in a Climate Change Mitigation Portfolio?

- Despite potential impacts of climate change, human activities in forest sector can contribute to mitigation objectives by reducing sources & increasing sinks, relative to a baseline.
- Future forest C budgets are affected by many processes and factors – age-class legacy, recovery from past land-use, climate change impacts, etc.
- Need to evaluate mitigation benefits relative to a “forward looking baseline” and seek to improve C balance relative to this baseline through directed mitigation efforts.
- Merely claiming credit for existing sinks does not contribute mitigation benefits.
- Reducing a source does contribute to mitigation objectives.

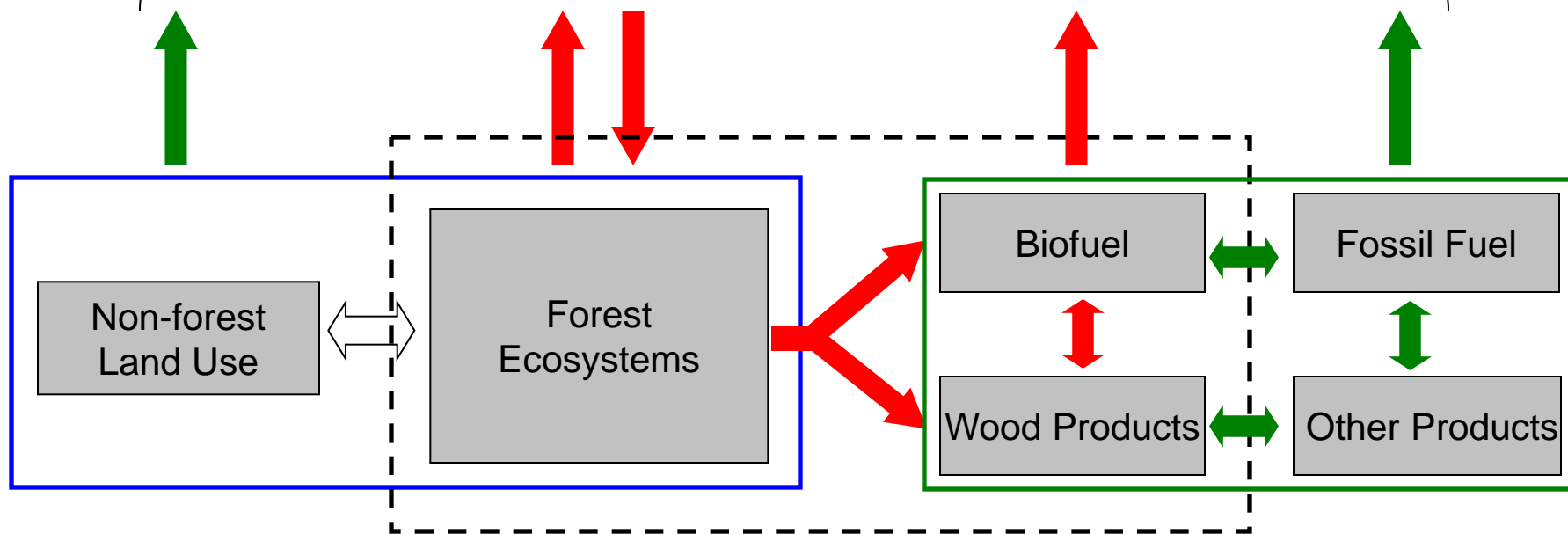
Mitigation Options in the Forest Sector

1. Increase (or maintain) forest area
 - Reduce deforestation (REDD), increase afforestation
2. Increase stand-level carbon density
 - Silviculture, avoid slashburning, reduced regeneration delays, species selection, fertilization, tree improvement programs
3. Increase landscape-level carbon density
 - Longer rotations, conservation areas, protection against fire
4. Increase C stored in products, reduce fossil emissions through product substitution and through bioenergy use

Mitigation Strategies: Need for Systems Perspective

Minimise net Emissions to the Atmosphere

Maximise Carbon Stocks



Land-use Sector

Forest Sector

Services used by Society

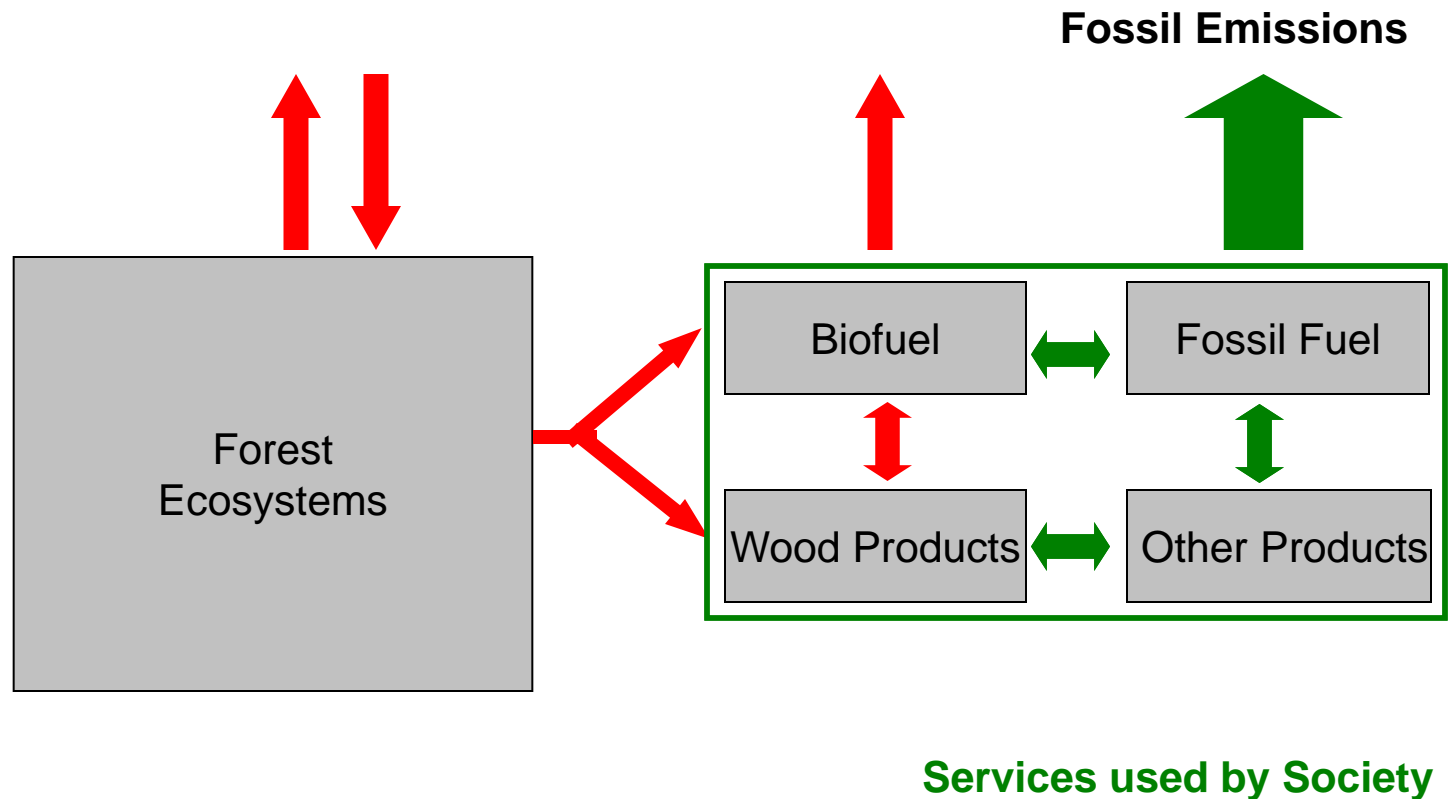
Source: IPCC 2007, AR4 WG III, Forestry

Forest Sector C Mitigation Strategies

- The assessment of net benefits of various mitigation options should include
 1. carbon in forests,
 2. carbon in harvested wood products, and
 3. avoided emissions from wood use.
- Any policy aimed at increasing C in forests, harvested wood products or the substitution benefits (e.g. bioenergy) typically reduces C in the other pools.
- Quantifying these trade-offs and relationships can identify mitigation opportunities.
- Assessment should also include the time dynamics of when C costs and benefits occur.

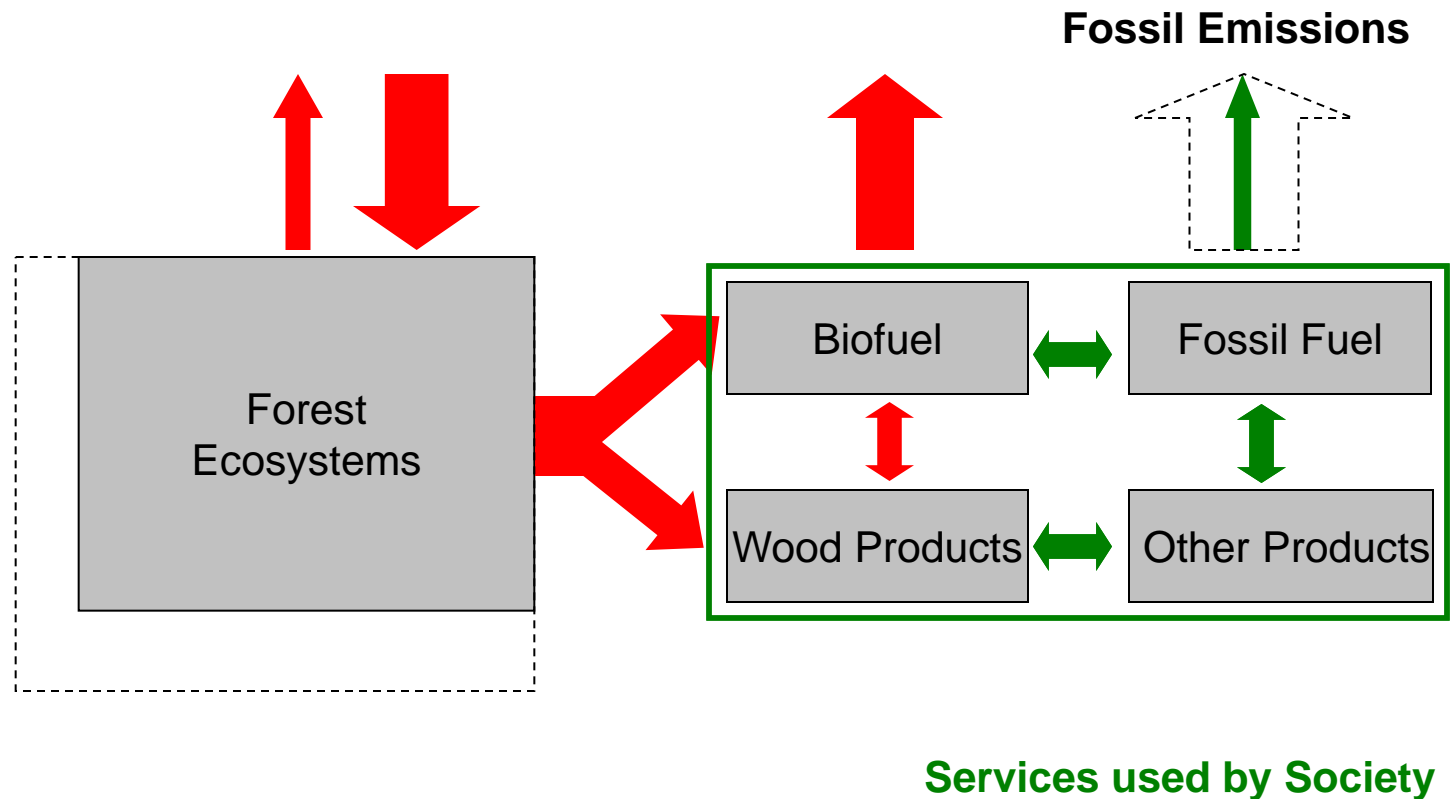
Forest Mitigation Strategies: Two competing positions

Maximise Carbon stocks



Forest Mitigation Strategies: Two competing positions

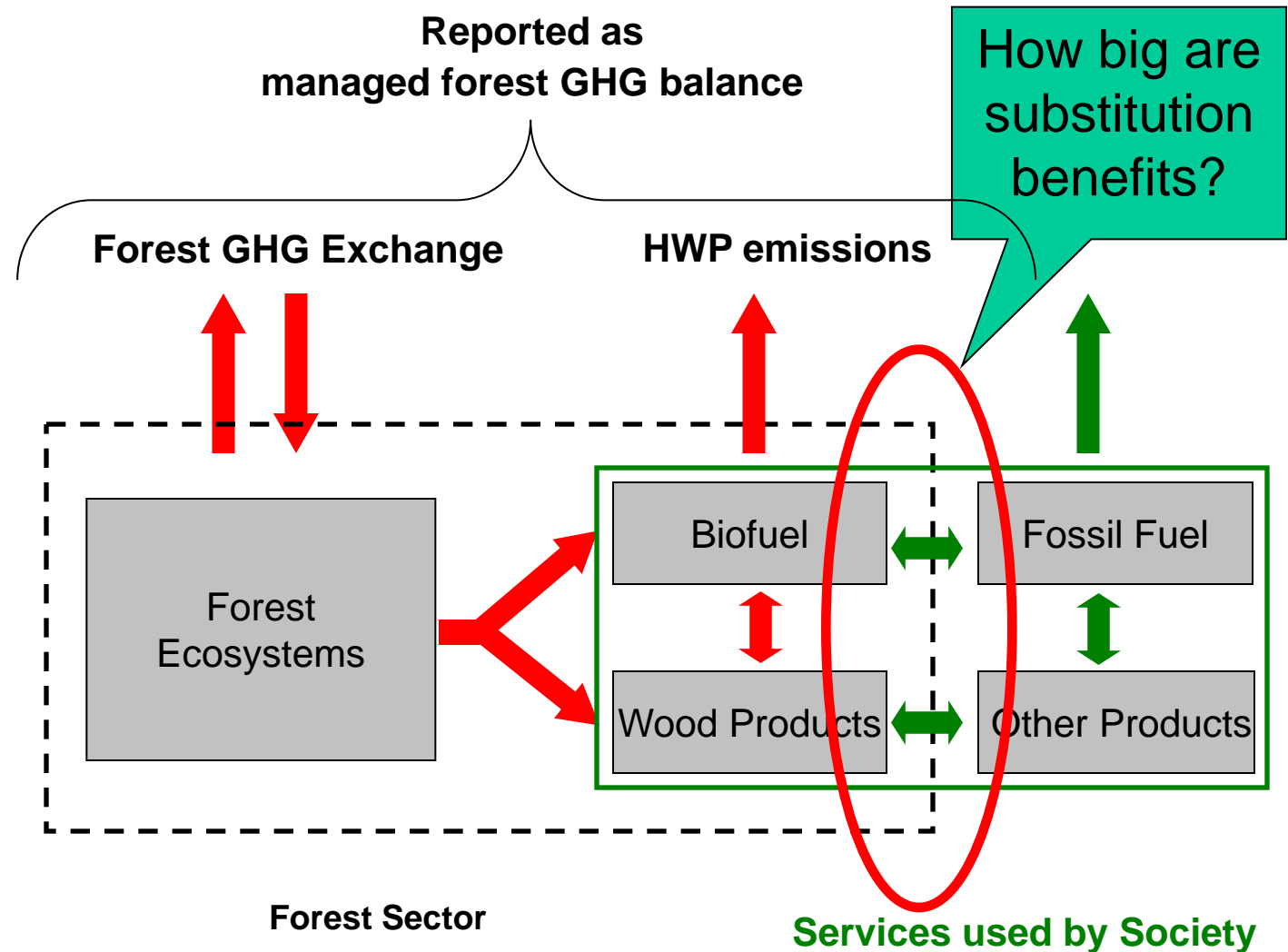
... or maximise Carbon uptake?



Substitution Benefits

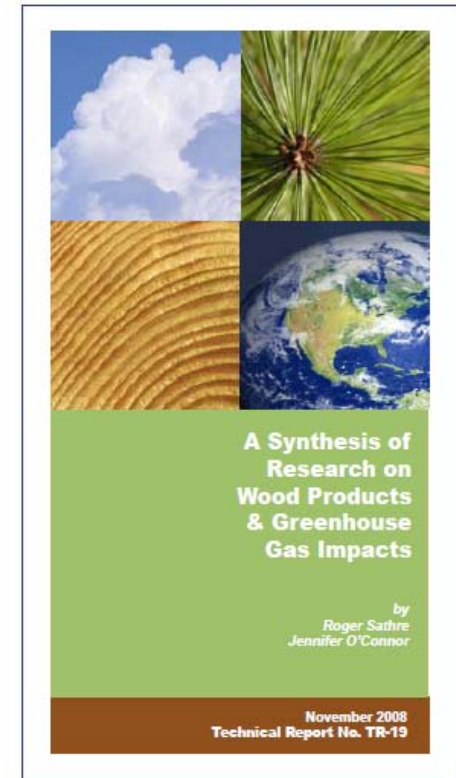
- In addition to C stored in HWP, their use contributes to meeting societal demands that would otherwise be met with steel, concrete or plastics – all of which are energy-intensive to produce.
- Although substitution benefits – where they do occur – cannot be accounted for in the forest sector, they do result in real emission reductions in other sectors.
- Substitution benefits should be considered when developing climate change mitigation policies.

Accounting of Harvested Wood Products



Substitution Benefits from Wood Use

- Displacement factor (DF) quantifies the amount of emission reduction achieved per unit of wood used in products (i.e. substitution)
- On average, we avoid 2 tons of C emissions for every 1 ton of C used in wood products (a wide range of values affected by many factors).
- Substitution benefits of wood use for bioenergy typically < 1 .



Conclusions

- Mitigation opportunities – i.e. reducing sources and increasing sinks relative to a baseline – exist in both forest management and the forest product sector.
- Limiting the impacts of climate change is one important step towards maintaining the mitigation potential of forests.
- Development of mitigation portfolios should assess C stocks in forests, in harvested wood products and substitution benefits achieved through wood product uses.
- Mitigation portfolio design should include full accounts of GHG emissions and removals and their time dynamics.
 - Assumptions such as C neutrality of bioenergy are convenient for accounting but can lead to incorrect conclusions about atmospheric impacts.

Conclusions

- Scientific evidence continues to increase and support the IPCC conclusions of the 2007 Fourth Assessment Report that:

A sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit (IPCC AR4, Nabuurs et al. 2007).

Conclusions

- Forests and forestry cannot solve the problem of fossil C emissions, but they can contribute to the solution.



Thank you very much!



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Forest Carbon Accounting Comptabilisation du Carbone Forestier

Canadian Forest Service
Service canadien des forêts



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