Towards enhancing the carbon stocks in forests: Unravelling the wood production potentials under sustainability conditions for Austria

Unravel

Presentation at the Klimatag
12. April 2023
Karlheinz Erb
Today

• Introduction: Aims and objectives
• Starting point: stakeholder interaction
• First results
  • Towards a dynamic view on wood production in Austria
  • Global origin of forest biomass processed in Austria
  • Imports and carbon sinks in originating countries
• Outlook: next steps
Aims of the Project

The starting motivation of UNRAVEL is to turn around the conventional direction of research ("what are the carbon implications of using wood") and to choose an alternative point of departure: "How much wood is available under sustainability conditions and what are best uses for climate protection"

Work packages:
1. Biophysical accounting of wood production and use
2. Modelling forest C sequestration potentials under climate change
3. Scenarios of C sequestration targets for Austria under different rationales of emission allocation
4. Exploring interlinkages between wood provision, C sequestration and other ecosystem services
5. Knowledge co-production and knowledge re-integration
6. Project Management
Starting point: Stakeholder interaction

Particular knowledge needs of interview partners which were named by two or more interview partners include:

- Quantify C dynamics of forest extensification (reduced harvest) and conservation (put areas out of use): what yield levels (under which management strategies) are compatible with which biomass stocks (climate-change mitigation effects)

- Investigate co-benefits between carbon sequestration and biodiversity conservation: Which management strategies are favourable for both? What is the C uptake of old forest stands?

- International “responsibility” of Austria for forest change abroad: locate and quantify the impact of the Austrian forest sector on forest areas abroad
First empirical results: *wood production an use*

- Available 2010-2020
- A systematic account of the Wood „inputs“, internal processing, and „outputs“
- Discerns wood categories
- Does not systematically account for recycling streams
- Is not explicit about the fate of final products (domestic consumption, addition to stocks, exports)
- Difficult to handle: time series
Extension of the „Holzflussdiagramm“
(Strimitzer et al., 2010-2020)

Roux et al., forthcoming
Wood flows in Austria
Extension of the „Holzflussdiagramm“ (Strimitzer et al., 2010-2020)

Dynamic Sankey Implementation

Temporal dynamics
Energy production

International trade

Roux et al., forthcoming
Countries of Origin of Wood imported to Austria

- International trade statistics refer to countries of last origin (added value), and not ecosystem origins
- Problem are the re-exports
- Can be "cleaned", approximated by a matrix-solution based on the geographically explicit information of the Direct Material Input (DMI=DE+Imp)
Linking imports to the forest-C-sink in countries of origin

- Simple comparison: the wood C-flux to Austria compared to the remaining sink
- Exports to Austria are significant when compared to the domestic C-sink in some countries
- The 10th country is Brazil: massive emissions, "Austrian share" on harvest is low, but still: 60ktC/yr
Expand and apply a novel method: „Trilateral“ trade flows. Example: livestock products

- Does not only discern countries of origin, but is explicit about the geography of production, processing and consumption
- Allows to move beyond simple „Roundwood equivalent“ calculations, but to draw a more complete picture of the Austrian wood production chain system
- Important for the comparison of territory-based, consumption-based and income-based accounts of wood-related C-fluxes
- Will be applied to Austria (= globally) in the second year
Opportunity Carbon Cost of Wood Harvest

Erb et al., 2022, 10.1111/gcbb.12921
Next steps

• The focus of the second year will be on WP2 (model advancement) and WP3 (scenario analysis)
  • Termination of the biophysical database (including detailed trade information)
  • Expansion of the CRAFT model
    • model-based assessment of C-sequestration potentials as well as C-opportunity costs
    • deadwood and soil compartments
    • discerning energy and material wood uses.
  • Appraisal of Austria’s negative emissions obligations for 2020-2100 under different CC scenarios
  • Start Integration of ecosystem services, C-fluxes/dynamics and biodiversity
    • establishment of an impact database.
  • towards assessing sustainable yield levels and best wood uses, and co-benefit/trade-off analysis wood use/C-dynamics/biodiversity
Institute of Social Ecology

Products so far: Publications

Changes in perspective needed to forge ‘no-regret’ forest-based climate change mitigation strategies

Karl-Heinz Erb1 | Helmut Haberl1 | Julia Le Noë1,2 | Ulrike Tappeiner3,4 | Erich Tasser3 | Simone Gingrich1

Commentary

Biomass—Critical limits to a vital resource

Karl-Heinz Erb1,2 and Simone Gingrich1

Energie aus Holzbiomasse: begrenzte Klimaschutz-Potenziale

Autoren: Karl-Heinz Erb, Georg Gärtner, Helmut Haberl, Ulrike Tappeiner, Erich Tasser, Simone Gingrich

Klimawandel

Vermeidung

und Anpassung

CCC A Fact Sheet #41 | 2023
**Revised Timeline**

- **Official Start:** Nov 21
- **Official End:** Oct 2024

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Thanks to the team!

Simone Gingrich, Sarah Matej, Julia Le Noë, Nicolas Roux, Rupert Seidl, Ulrike Tappeiner, Erich Tasser