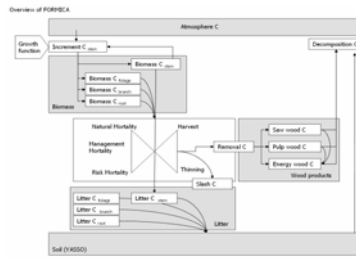


# Options for choices in the national definition of “Forest management activities” under Article 3.4 of the Kyoto Protocol and their influence on accountable carbon sinks



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# Contents

- Legal background
- Model and data
- Options
  - for definitions of „forest management“
  - for accounting rules
- Effects on accountable areas
- Effects on accountable C stock changes
- Conclusions



# Legal Background

- Marrakech Accords:  
*'Forest management' is a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner*
- IPCC GPG LULUCF:
  - Either: specified forest management practices, such as fire suppression, harvesting or thinning, undertaken since 1990
  - Or: broad classification of land subject to a system of forest management practices, without the requirement that a specified forest management practice has occurred on each land

**Effects on accountable C stock change and area for Art. 3.4 ?!**



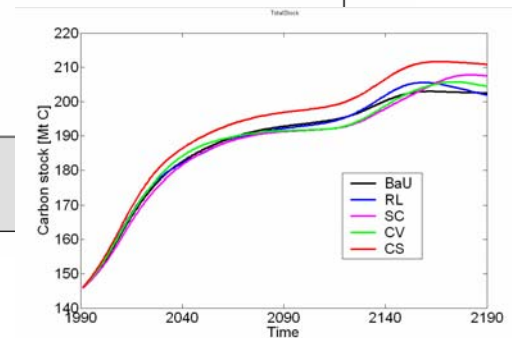
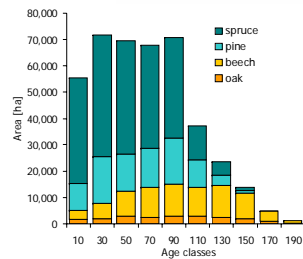
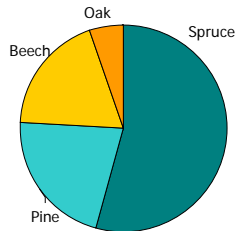
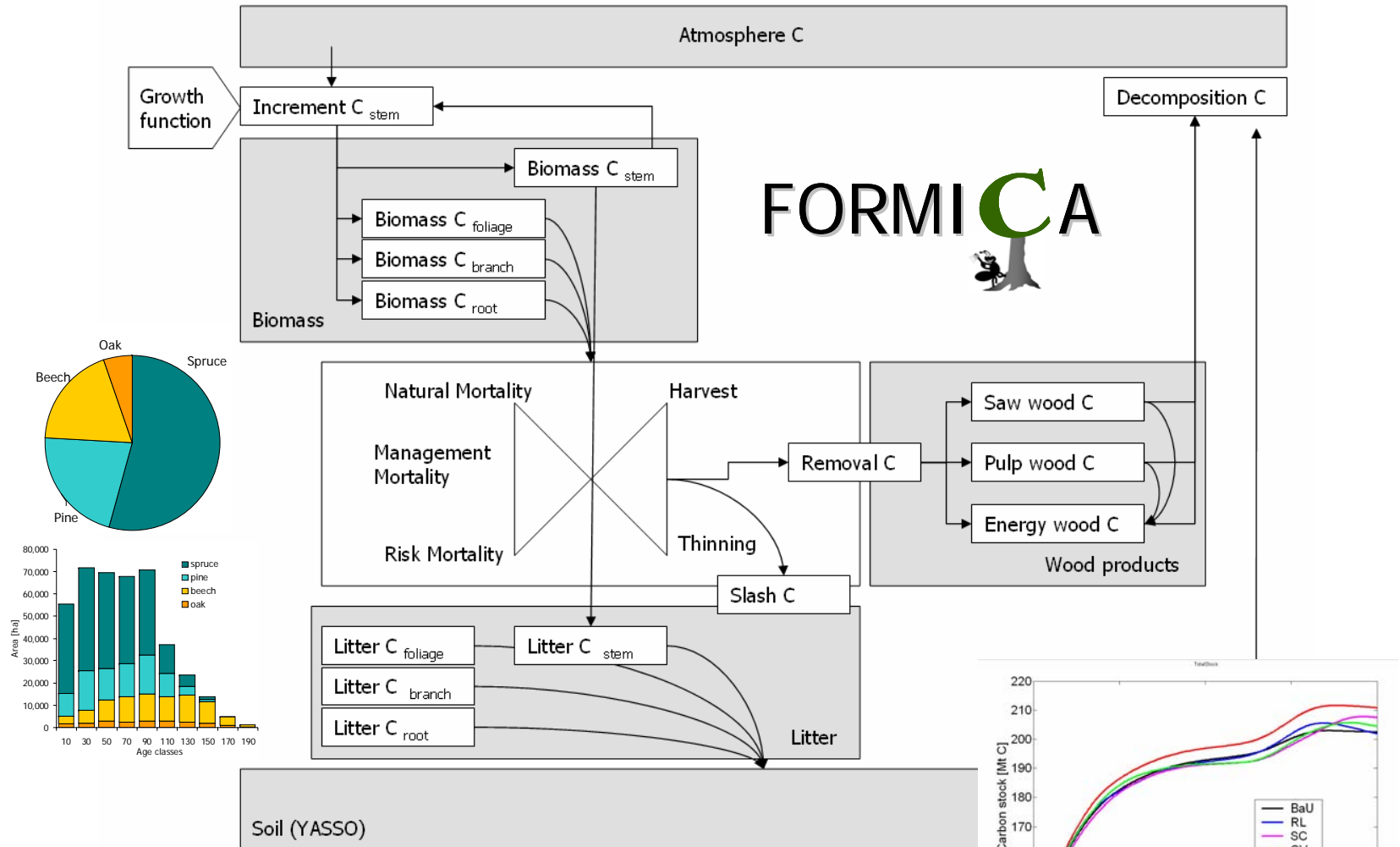
# General Model Properties

- Semi-empirical regional forestry model FORMICA
- Included pools:
  - Biomass
  - Litter and soil organic matter
  - (Wood products)
- Biomass: species-specific growth functions depending on biomass stocks, derived from yield tables or BGC model runs
- Litter and soil: sub-model YASSO driven by litter input and mean climate variables
- Management rules prescribed



# Model Structure

Simplified overview of the model structure

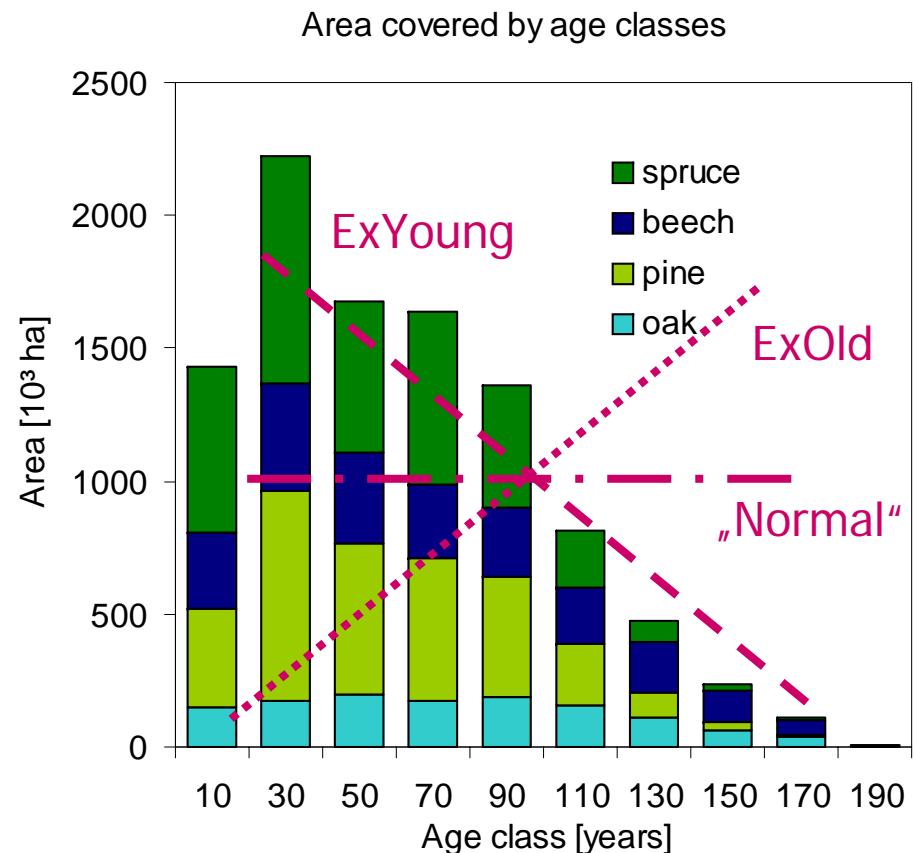


Model



# Case Study Germany: Data

- Forestry data from EFISCEN European Forest Resource Database (EEFR, [www.efi.fi/projects/eefr](http://www.efi.fi/projects/eefr))
- Forest management as business as usual (BaU) according to recommendations of forestry administration



# Choice of Forest Management Definition

- Broad definition: entire forest area, forest management = managed forest according to UNFCCC
- Time-dependent definition as interpreted in IPCC GPG LULUCF: all areas subject to forestry activities since 1990
- Narrow definition including only areas subject to *change* in management since 1990:
  - **Extended rotation length by 20 years on 10% of forest area (all species, RL)**
  - **Change from coniferous to broadleaved species on 10% of forest area (SC)**
  - **Conversion from rotation forest to continuous cover forestry with single tree selection with spruce (target 15%) and beech (20% as BaU) (CV)**
  - **Conservation of old forests with high carbon stocks: abandonment of thinning and harvest in oldest age classes on 10% of forest area (all species, CS)**

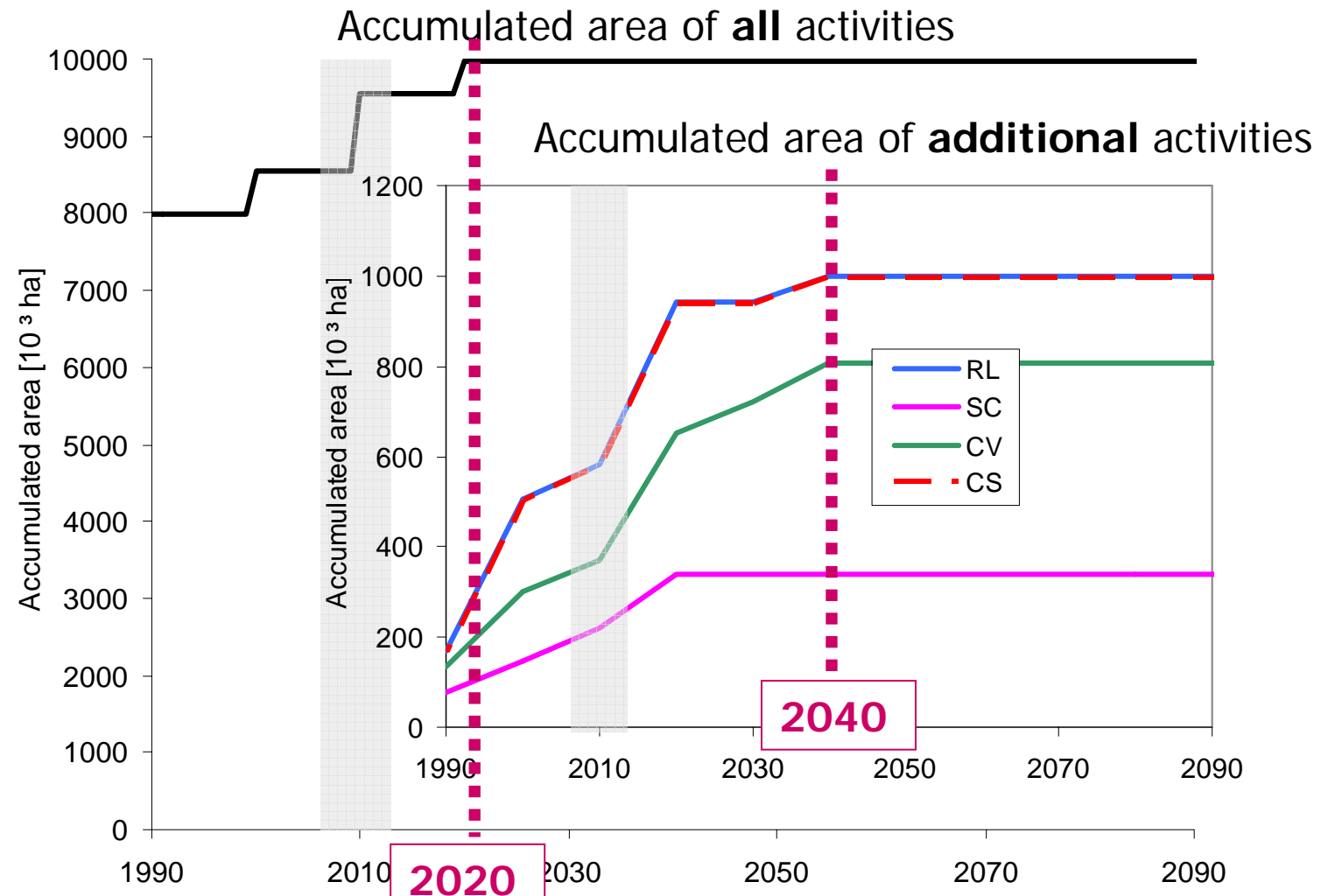


## Choice of Accounting Schemes

- (Inclusion of forest products)
- Gross versus net accounting
  - Full carbon accounting
  - Only directly human induced stock changes
    - > National cap
- “Factoring out past management”
  - Determining the age class effect (“legacy effect”)
  - Determining other management effects
- “Additionality”  
Accounting of narrow definitions against a baseline



# Effect on Accountable Forest Areas

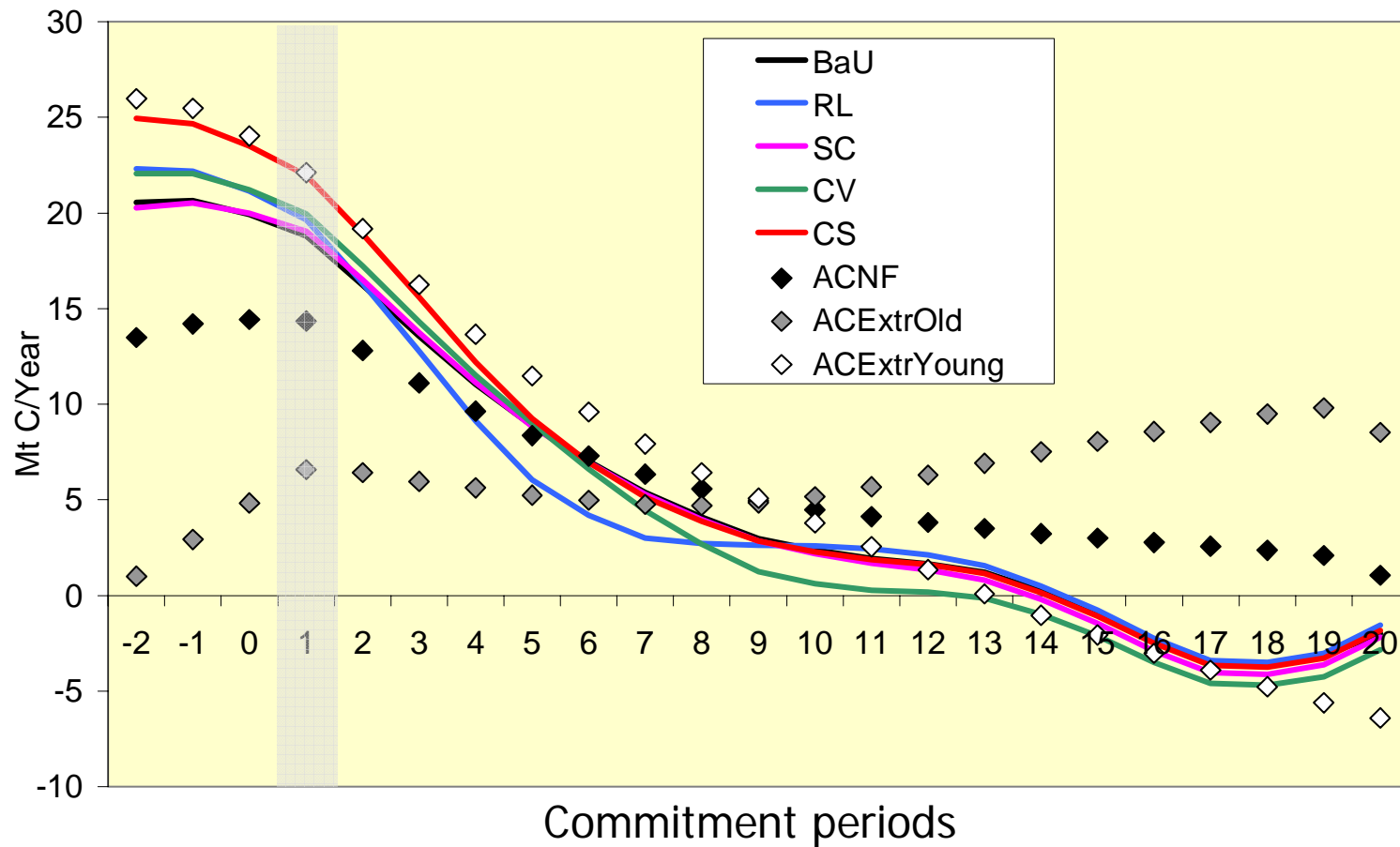


Results



# C Stock Changes in Commitment Periods – Broad = Atmospheric View

Forest C = Biomass C + Soil C

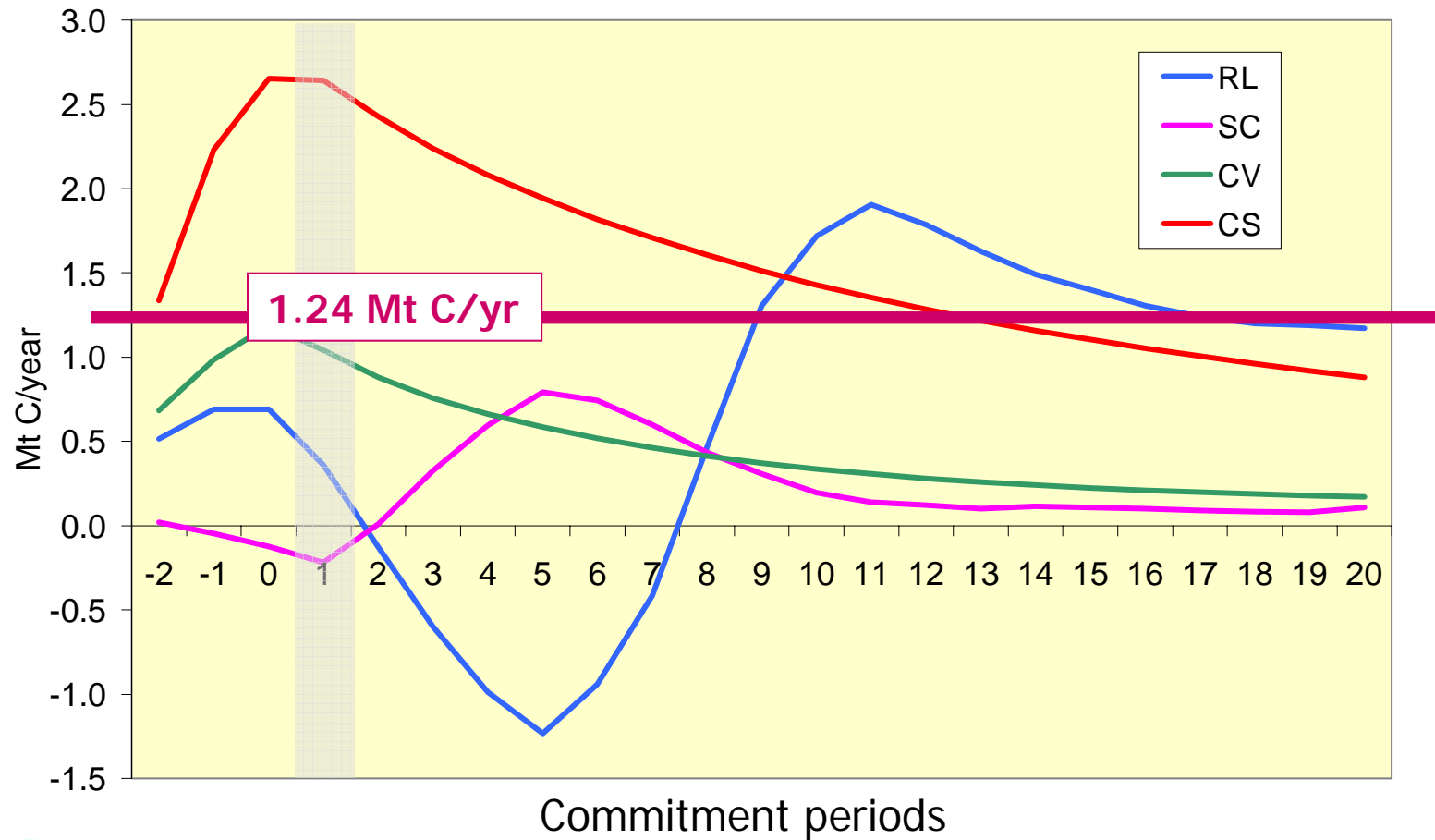


Results



# Accounted Stock Changes on Areas of Additional Activities since 1990

Forest C = Biomass C + Soil C

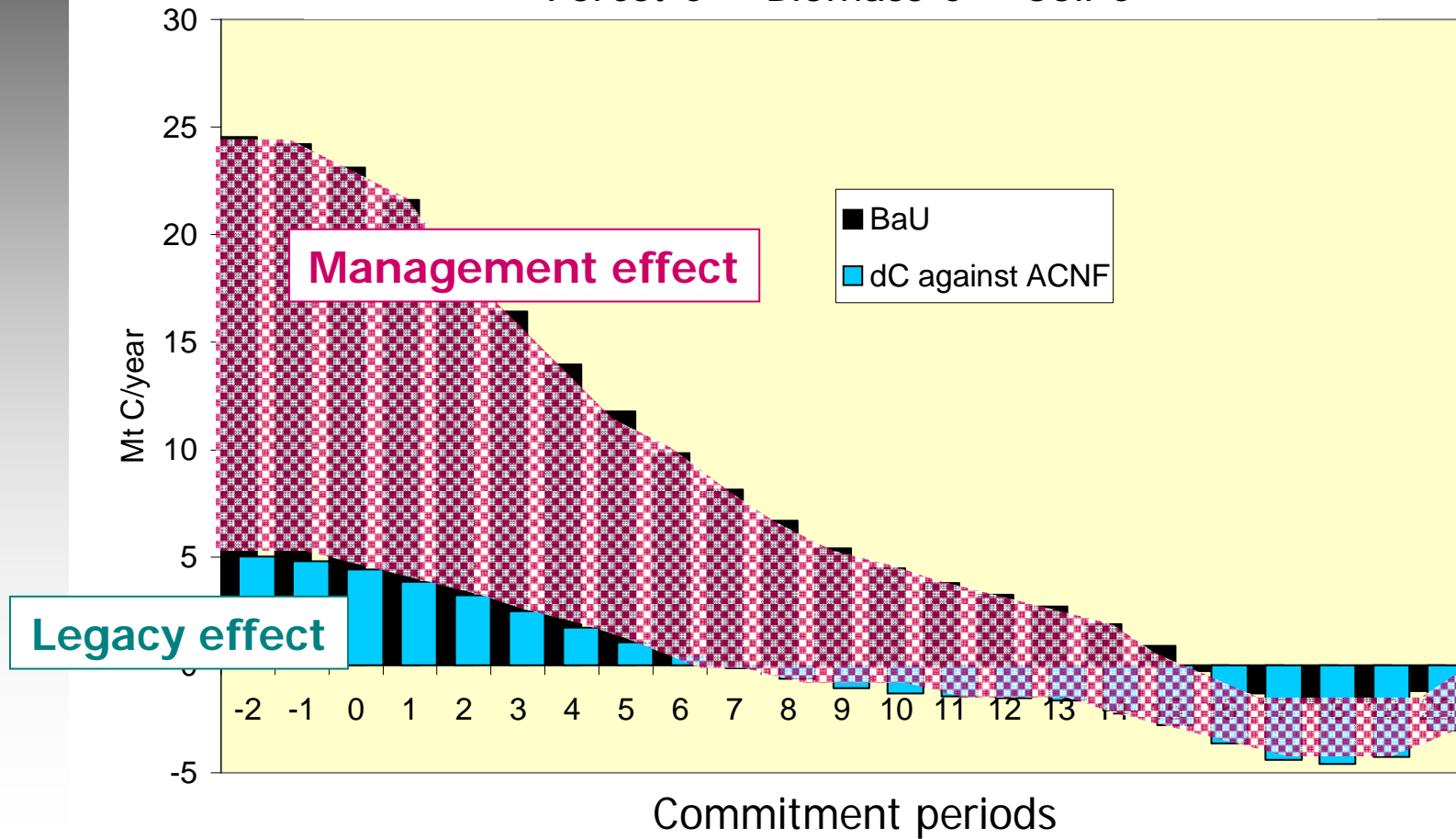


Results



# Effects of Past Management on Accountable C Stock Changes

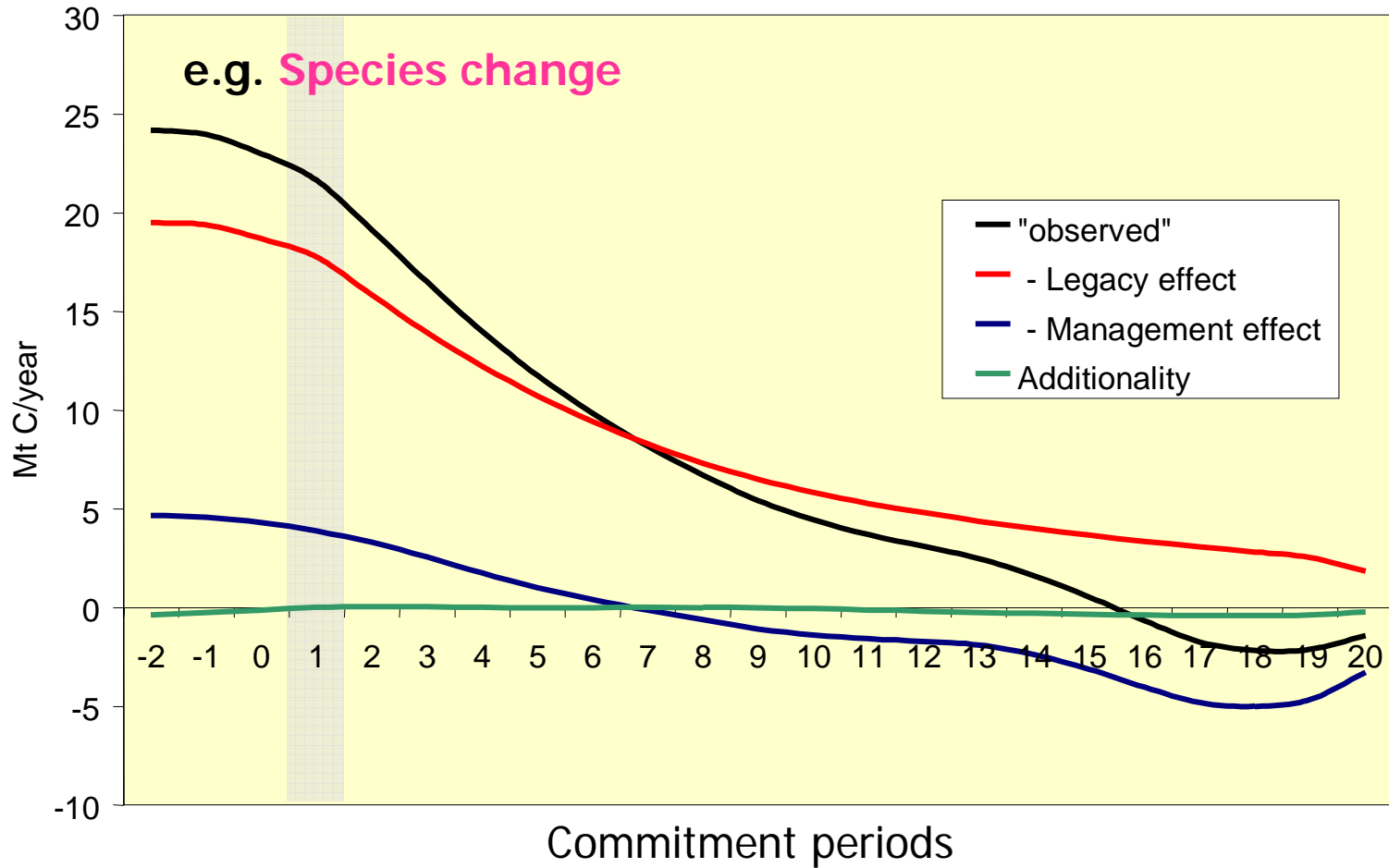
Forest C = Biomass C + Soil C



Results



# Including All Effects on Accountable C Stock Changes

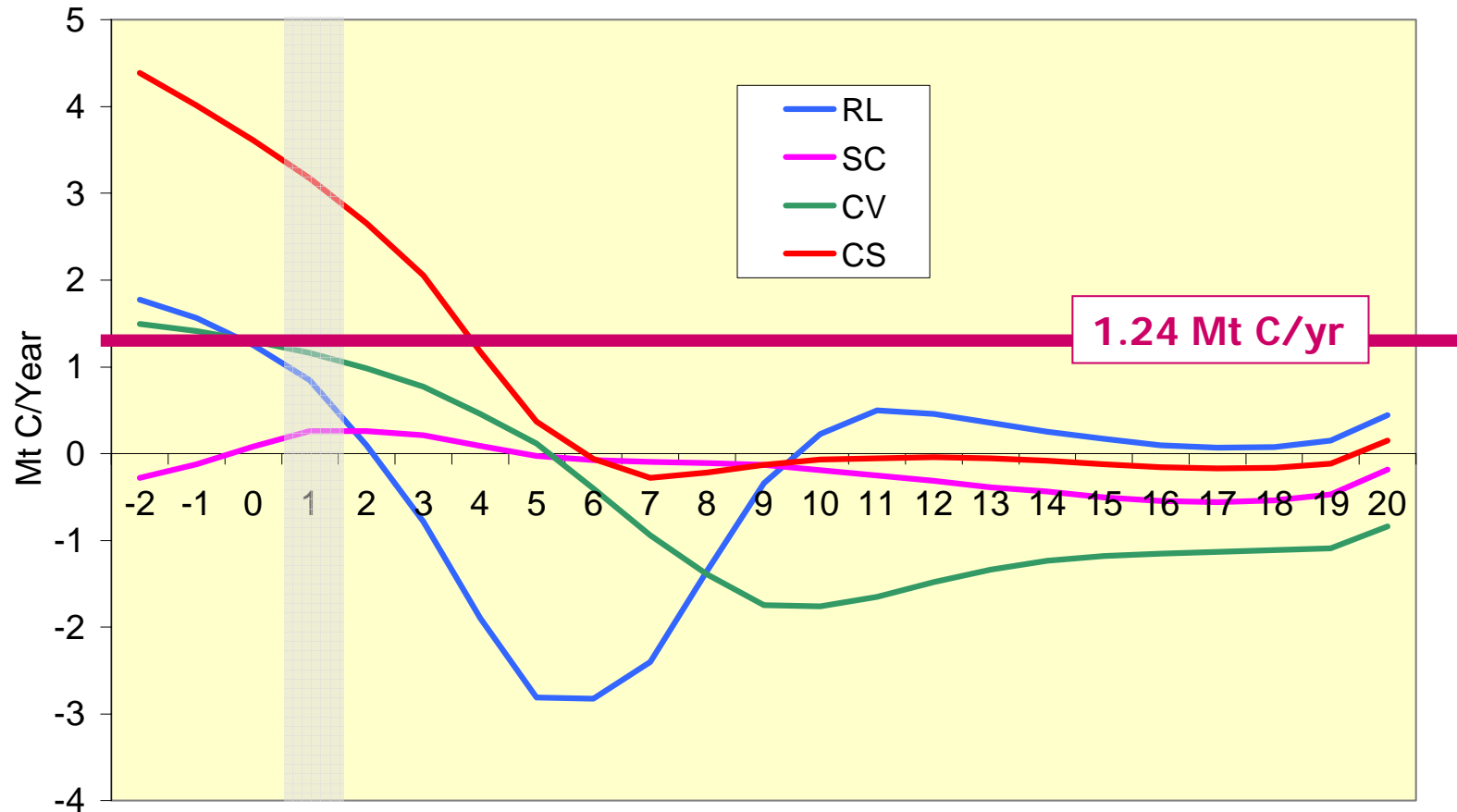


Results



# Effect of **Additionality** on Accountable C Stock Changes

Forest C = Biomass C + Soil C



Results



# Conclusions I

- Past management determines long-term C sink
- Age class effect alternates
- Other management effects saturate
- Conservation creates the largest short-term carbon sink



## Conclusions II

- Criteria “since 1990” affects only accountable areas for additional activities significantly
- Selected additional activities since 1990 may reach the national cap
- Factoring out of past management considerably reduces accountable C stock changes
- Factoring out of the legacy effect decouples accounted credits from the atmospheric signal
- Only full carbon accounting matches with the CO<sub>2</sub> signal witnessed by the atmosphere



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