

turning knowledge into practice

# Private Landowners and Timber Supply

Presented by

***Robert Beach, RTI International***

Presented at

***SOFAC Organizational Meeting***

***March 28, 2007***

***Greensboro, Georgia***



3040 Cornwallis Road  
Phone 919-485-5579

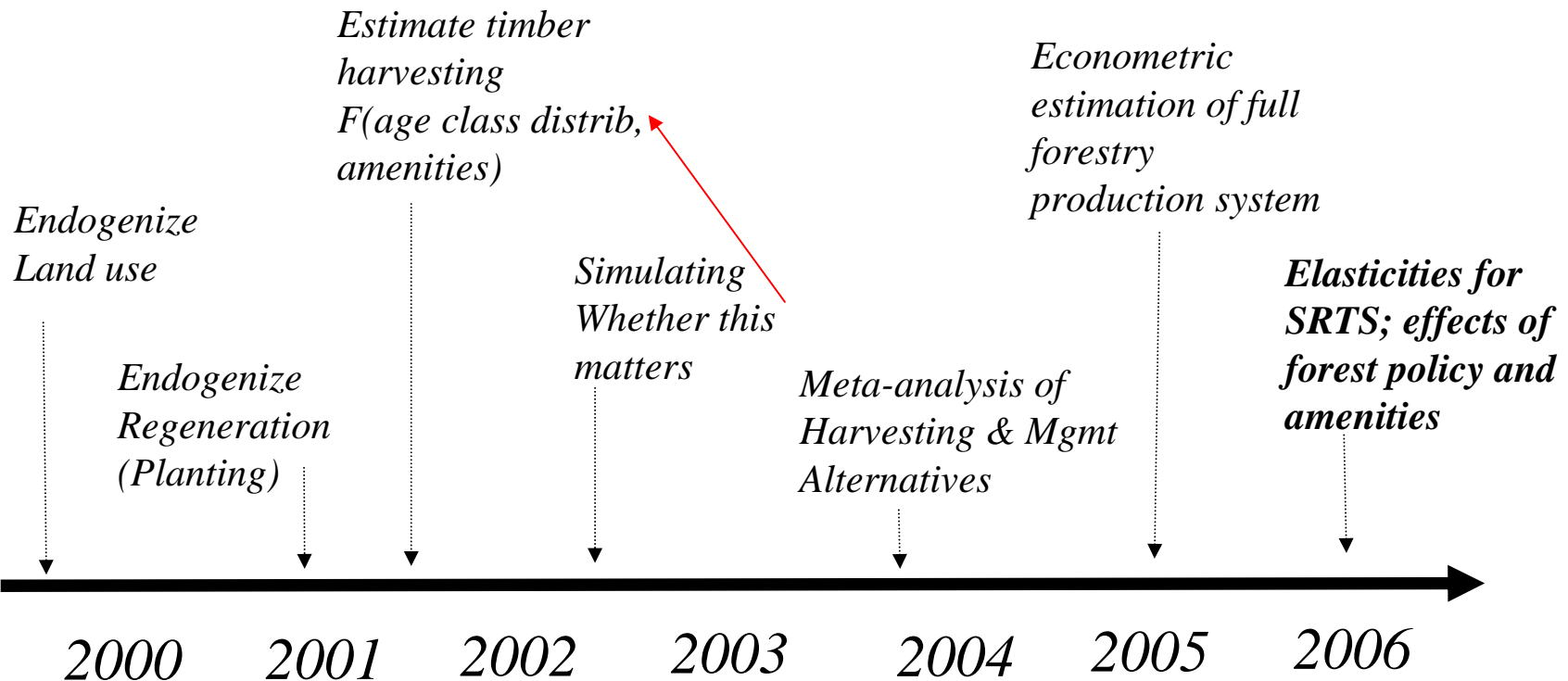
■ P.O. Box 12194 ■  
Fax 919-541-6683

Research Triangle Park, NC 27709  
e-mail [rbeach@rti.org](mailto:rbeach@rti.org)

# How this component fits into the SOFAC Phase III Proposal Long-term Objectives

- **Overall SOFAC Phase III objective:** To provide better information about the status and trends in the southern forestland conditions and timber supply for private investors and for public policy and planning
- **RTI role**
  - To update, using econometric methods, the empirical foundation of the key timber management decision variables
    - ◆ Harvesting
    - ◆ Regeneration
    - ◆ Silvicultural Treatments (TSI)with a continued emphasis on response to changes in timber prices, but also exploring the effects of incorporating the effects of production and price risk
  - To contribute econometric and simulation modeling expertise for studies of additional topics of interest to SOFAC members, potentially including issues such as:
    - ◆ Impacts of climate change on forest productivity and forest markets
    - ◆ Cogeneration and renewable energy
    - ◆ Measuring carbon stock inventory
    - ◆ Exploring actions to enhance carbon sequestration in the U.S. and abroad
    - ◆ Implications of improved genetic forest stock and other productivity changes
    - ◆ Other environmental issues

# Historical Context: Where Have We Been



# Products To Date

## ■ Peer review validation

1. Beach, R.H., S.K. Pattanayak, J.C. Yang, B.C. Murray, and R.C. Abt. 2005. "Empirical Studies of Non-Industrial Private Forest Management: A Review and Synthesis." *Forest Policy and Economics* 7 (3) 261-281.
2. Pattanayak, S.K., R.C. Abt, A.J. Sommer, F. Cubbage, B.C. Murray, J.C. Yang, D. Wear, and S. Ahn 2004. "Forest Forecasts: Does Individual Heterogeneity Matter for Market and Landscape Outcomes?" *Forest Policy and Economics* 6: 243-260.
3. Pattanayak, S.K., B.C. Murray. and R. Abt. 2002. "How Joint in Joint Forest Production: An Econometric Analysis of Timber Supply Conditional on Endogenous Amenity Values." *Forest Science* 47(3):479-491.
4. Abt, R.C., and B.C. Murray. 2001. "Southeastern U.S. Timber Market Response to Climate Change Impacts on Forestry and Agriculture." *World Resource Review* 13(2):171-186.
5. Murray, B.C., R.C. Abt , D.N. Wear, P.J. Parks, and I.W. Hardie. 2001. "Land Allocation in the Southeastern U.S. in Response to Climate Change Impacts on Forestry and Agriculture." *World Resource Review* 13(2):239-251.

## ■ Papers in progress

- Beach, R.H., S.K. Pattanayak, K. Jones, J.-C. Yang, B.C. Murray, and R.C. Abt. "Determinants of Forest Management: An Econometric Analysis of Private Landowner Behavior in the Southern U.S."
- Beach, R.H., S.K. Pattanayak, J.-C. Yang, and R.C. Abt. "Implications of Forest Policy and Amenities for Forest Investment and Management."

## ■ Enhanced SRTS model

- Incorporation of parameters to endogenize land use, timber harvesting, and forest management

# Southwide Analysis: Empirical Approach

- Secondary data (FIA)
- Discrete choice (probit)
  - Harvest (clearcut and partial harvest)
  - Timber Stand Improvement (TSI)
  - Regeneration
- Explanatory Factors
  - Market Drivers: prices, costs, interest rates
  - Owner Characteristics: NIPF, Industry, TIMO, public
  - Plot/Resource Conditions: site class index, slope, temperature, precipitation, amenities

# Data

- FIA plot data
  - Southeast (5 states): FL, GA, NC, SC, VA
  - Southcentral (7 states): AL, AR, LA, MS, OK, TN, TX
- Timber Mart South
  - Timber prices
- Federal Reserve
  - Interest rates
- Bureau of Economic Analysis
  - County per capita income
- U.S. Southern Global Change Research Program
  - Temperature & precipitation

# Regeneration Area Elasticities

- Calculated for a variety of ownership, region, management type combinations
- NIPF slightly more price-responsive than industry
- Planted pine less price-responsive than lowland, natural pine and oak-pine more price-responsive
- Price responsiveness varies considerably across survey units

# Supply Elasticities

- Change in quantity supplied as a function of price calculated for a variety of ownership, region, age class, management type combinations
- NIPF less price-responsive than industry
- Planted pine and oak-pine less price-responsive than lowland; upland and natural pine not significantly different from lowland
- Price responsiveness varies considerably across survey units
- Less price-responsive in 11-20 year old age class, similar responsiveness across age classes for ages 21 and above

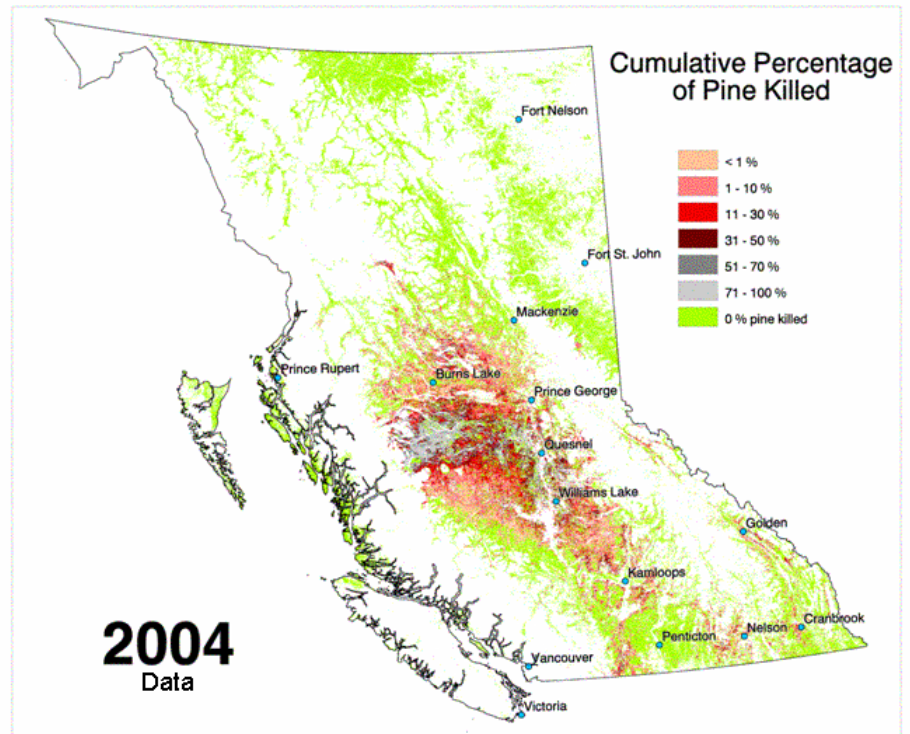
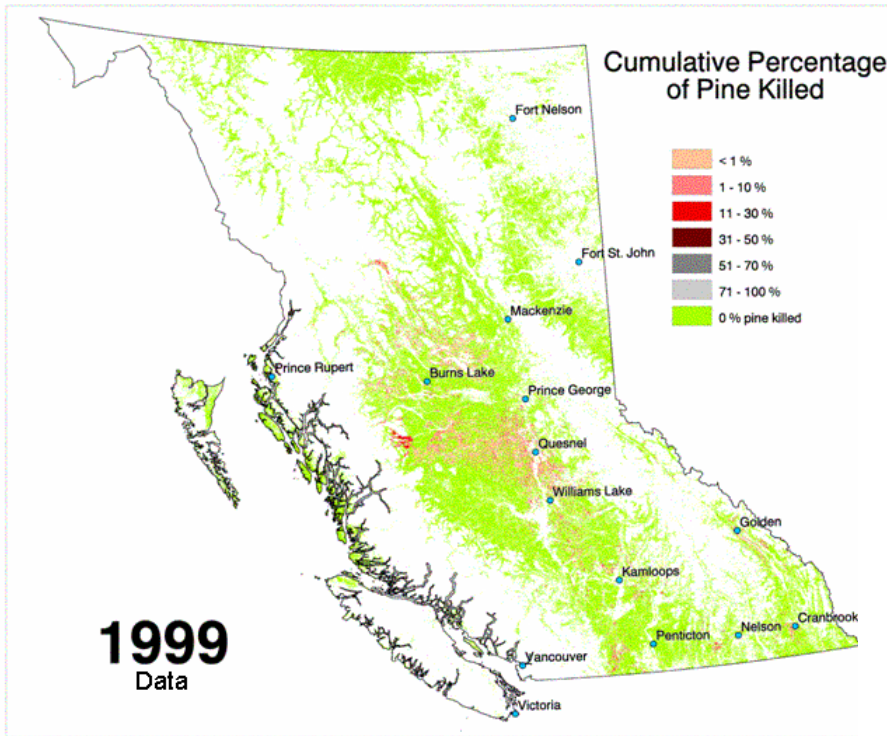
# Implications

- Important differences across regions and ownership to consider for projections
- Estimating system of equations jointly significantly improves predictions
- Amenities very significant factor influencing forest management on private lands
- Need more complete data for forest policy variables to better assess impacts of public policy

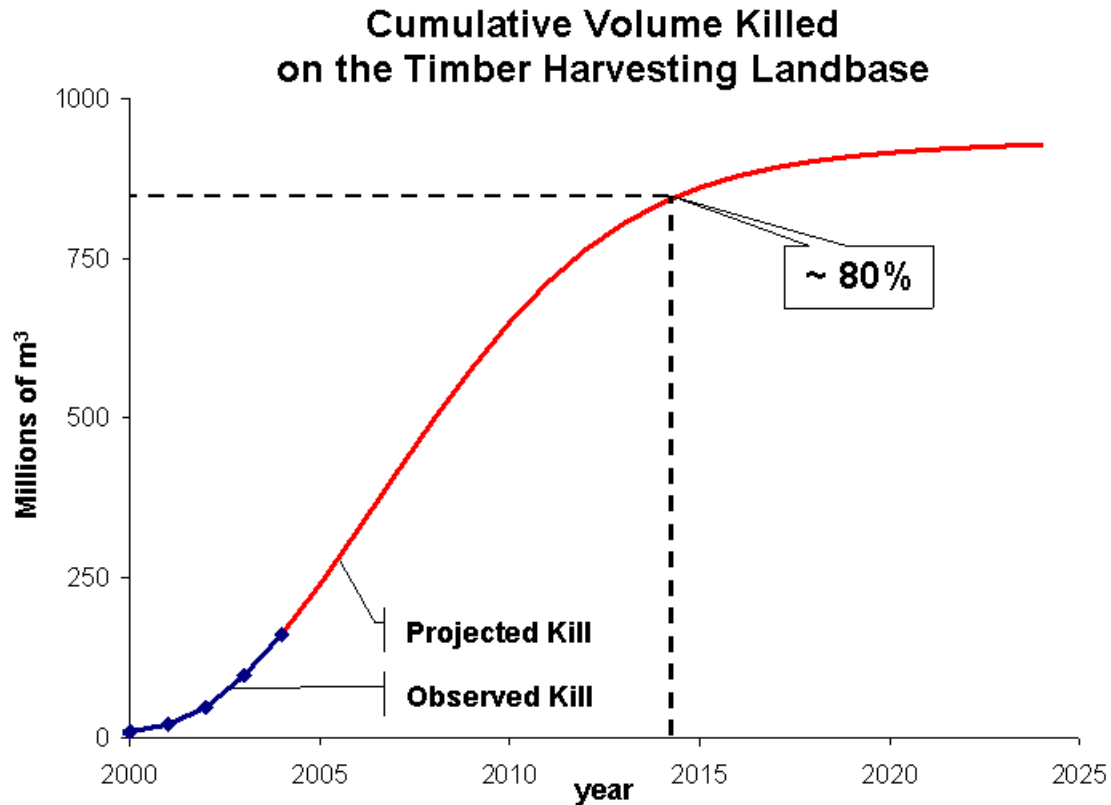
# Production under Risk

- Past SOFAC analyses have not focused on production under risk, but there are very important implications of forest disturbances such as:
  - Wildfire
  - Insects
  - Weather/Storms
  - Disease
- Disturbances have generally been trending upward in recent years at the national level
- Important to better reflect the impacts of these disturbances in forest model projections

# Mountain Pine Beetle: British Columbia



# Mountain Pine Beetle Projections



# Climate Impacts

- Changes in disturbance patterns are frequently attributed in large part to changes in climate
  - Net US forest productivity may increase or decrease over the next few decades under alternative climate scenarios
  - One of the key issues identified is increased productivity from higher temperatures and CO<sub>2</sub> fertilization vs. greater losses to disturbances and changes in precipitation patterns as well as reduced productivity once temperatures exceed threshold levels
  - Implications for Southern forest projections

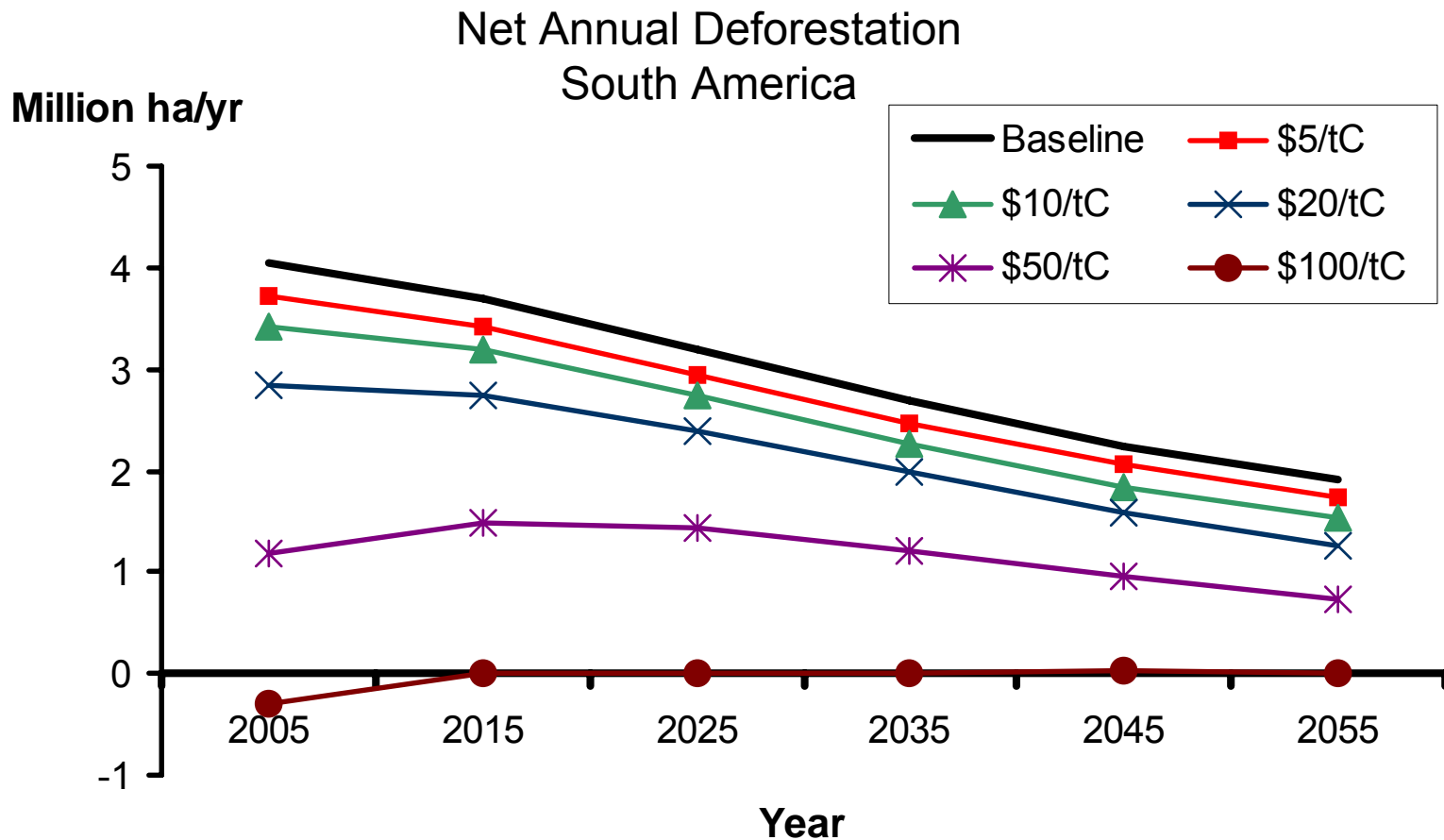
# Selected Ongoing Research Related to the Proposed Scope of Work

- Forest management under endogenous weather risk
  - Literature review and theory
    - ◆ Beach, Sills, Liu, and Pattanayak. Forthcoming. “The Influence of Forest Management on Vulnerability to Severe Weather.”
      - Site and species selection
      - Silvicultural practices
  - Empirical analysis using NC FIA data and wind speed data
- Fire management
  - Using USFS Forest Vegetation Simulator-Fire and Fuels Extension to examine implications of different thinning and prescribed burning regimes for fire severity and carbon sequestration

# Selected Ongoing Research Related to the Proposed Scope of Work (2)

- Avoided deforestation
  - Sohngen and Beach. “Avoided Deforestation as a Greenhouse Gas Mitigation Tool: Economic Issues for Consideration.” Under review.
  - Examining implications of incentives for avoiding deforestation on currently forested lands in tropical regions for deforestation rates and carbon sequestration
- Climate change impacts
  - Potential impacts of climate change on forests
  - Climate change and extreme events

# How Much May C Incentives Reduce Deforestation?

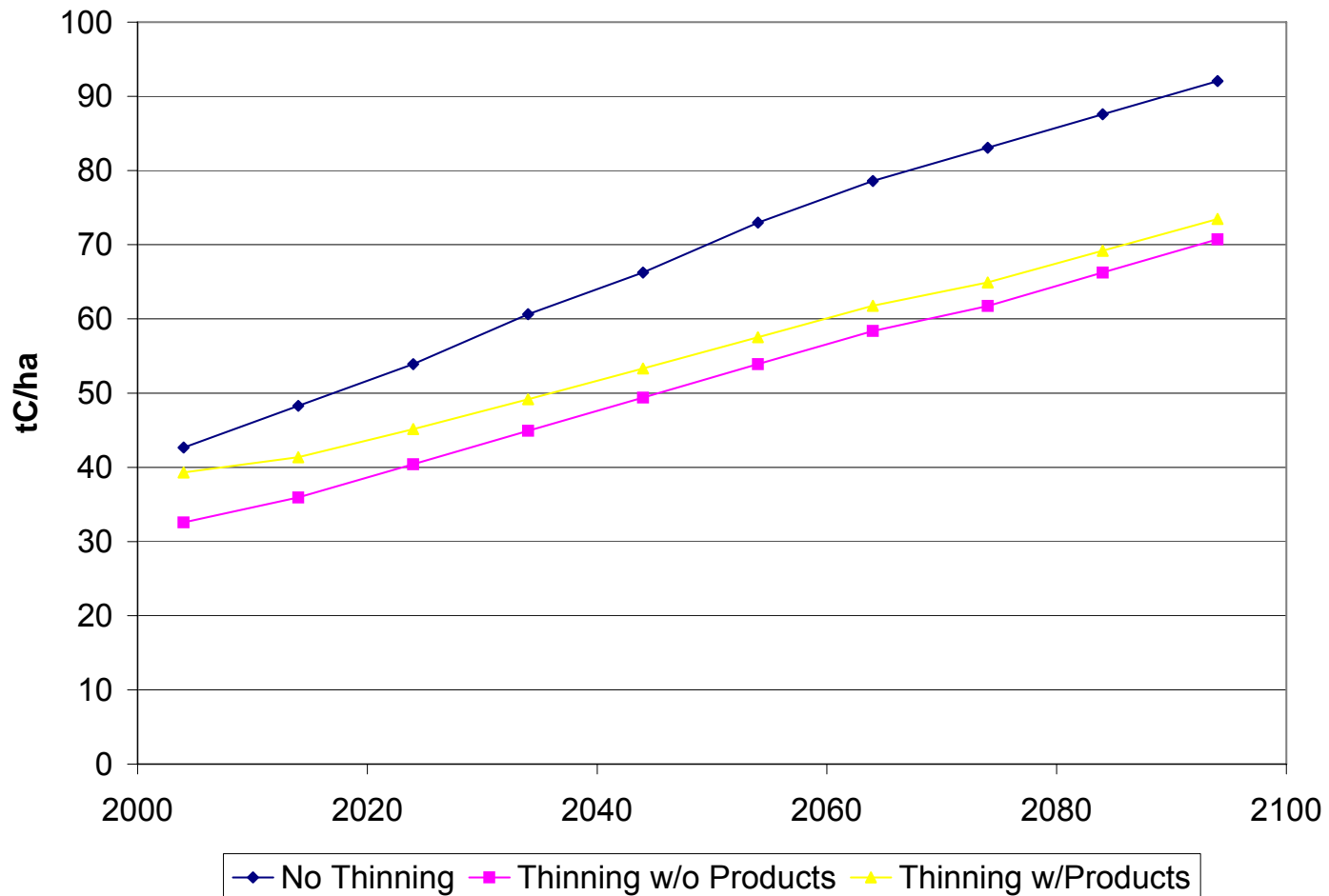


Note: All Carbon Prices,  $P_c$ , are assumed to be constant over time period

# Average Annual Rental Payments at Different Carbon Prices (\$/hectare/year)

Region	Carbon Price (\$/t C)				
	\$5	\$10	\$20	\$50	\$100
South America	\$29.84 (3.17 , 34.13)	\$59.68 (6.35 , 68.27)	\$119.37 (12.72 , 136.54)	\$298.46 (31.92 , 341.35)	\$596.98 (64.2 , 682.7)
Central America	\$23.22 (3.19 , 33.46)	\$46.44 (6.39 , 66.93)	\$92.96 (12.81 , 133.87)	\$232.66 (32.2 , 334.69)	\$465.83 (64.91 , 669.38)
Southeast Asia	\$32.93 (3.06 , 61.21)	\$65.87 (6.13 , 122.43)	\$131.77 (12.3 , 244.86)	\$329.55 (30.88 , 612.15)	\$659.37 (62.83 , 1224.31)
Africa	\$24.97 (3.18 , 29.92)	\$49.94 (6.37 , 59.85)	\$99.9 (12.78 , 119.71)	\$249.83 (32.22 , 299.28)	\$499.79 (66.42 , 598.56)

# Change in Carbon Stock with Thinning



# Change in C Storage from Thinning Relative to Baseline

