



Progress Report as of March 2010

# North American Forest Sector Outlook Study

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United States Department of Agriculture, Forest Service

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# Acknowledgements

- Joseph Buongiorno, UW-Madison (GFPM)
  - Ron Raunikar, UW-Madison/USGS
  - Shushuai Zhu, UW-Madison
  - James A. Turner, Scion/NZFRI
- Peter Ince, USFS-Forest Products Laboratory, Madison
- Forest Sector Outlook Study Core Team

# Objectives

- Understand features of alternative futures in the US and Canadian forest sectors
  - Economies
  - Bioenergy Sector
  - Populations
  - Climate
- Account for changing global conditions
  - Scenario-based assessment, not a “forecast”

# Document Organization

- Describe previous outlook studies
  - FAO-based studies of Canada and the US
  - United States Resources Planning Act Assessments
- Recent trends in North American forest sector
  - Forest conditions
  - Markets
- Outlook to 2030
  - Modeling structure
  - Projection results
- Annexes

# Document Organization (cont.)

- Annexes
  - Background on the 2010 RPA Assessment
    - Scenarios covered
    - Models Used (GFPM/USFPM)
  - Discussion of differing assumptions across the new UNECE/FAO Outlook studies
  - Policy Analyses
    - Evaluate how dropping woody biomass assumptions would affect forest sector conditions
    - Evaluate the effects of climate change induced global forest growth alterations
    - Quantify the effects of a new Cap-and-Trade or other carbon policy
    - Assess the role of North America on global forest conditions

# Scenarios

- Based on IPCC Scenarios A1B, A2 and B2
- These are technically called “RPA Scenarios” because they are not pure IPCC Scenarios
- Scenarios selected to provide a diversity of potential futures, have data for the US on climate changes over time



# Scenario Key Variables

	Name	US / Canada / OECD 90 Population Growth to 2006-2060	US / Canada / OECD 90 Economic Growth to 2006-2060	US / Canada / OECD 90 GDP Per Capita Growth 2006- 2060	Global Woody Biomass Production Growth to 2006- 2060
		Percent	Percent	Percent	Percent
A1B	Globalization	51 / 31 / 15	231 / 183 / 175	120 / 116 / 138	500 (6X)
A2	Regionalization	71 / 31 / 27	161 / 113 / 98	53 / 63 / 56	200 (3X)
B2	Sustainable Regionalization	34 / 18 / 2	120 / 126 / 75	64 / 92 / 71	200 (3X)

# Other Features of RPA 2010

- Base year of 2006
  - Ignores recent recession
- Climate change effects only applied to the US
  - Canada's climate change effects not projected
- Income and population projected for the US separately from IPCC
  - Consistent with A1B, but proportional differences are applied to A2 and B2 consistent with IPCC
- Downscaling of climate
  - 16 km grid cells
- Downscaling of population and income to US
  - US counties
- Land use in the US projected to the county



# 2010 RPA Forest Assessment: Contrast to previous efforts

- Inventory data are still critical
- Price endogenous spatial equilibrium to simulate markets
  - Domestic to global
- New techniques to build supply from the “ground-up” and generate useful biological/ecological data
  - Plot-based harvest choice models for southeastern states of the US
  - Approach not applied in West or North (econometric approach used instead)



# Market Modeling for the RPA and NAFSOS

## The Global Forest Products Model

Joseph Buongiorno

Shushuai Zhu

Dali Zhang

James Turner

David Tomberlin

- Dynamic Spatial Economic model
- 180 countries
  - 14 commodities
  - Production, imports, exports
  - Prices
  - Forest area & stock
  - Value added

# GFPM and USFPM

- USFPM is a module within GFPM that allows for more detail within the US
  - Three producing and consuming regions
  - Climate-change induced forest conditions changes
  - More products

# Product Alignment: USFPM-GFPM

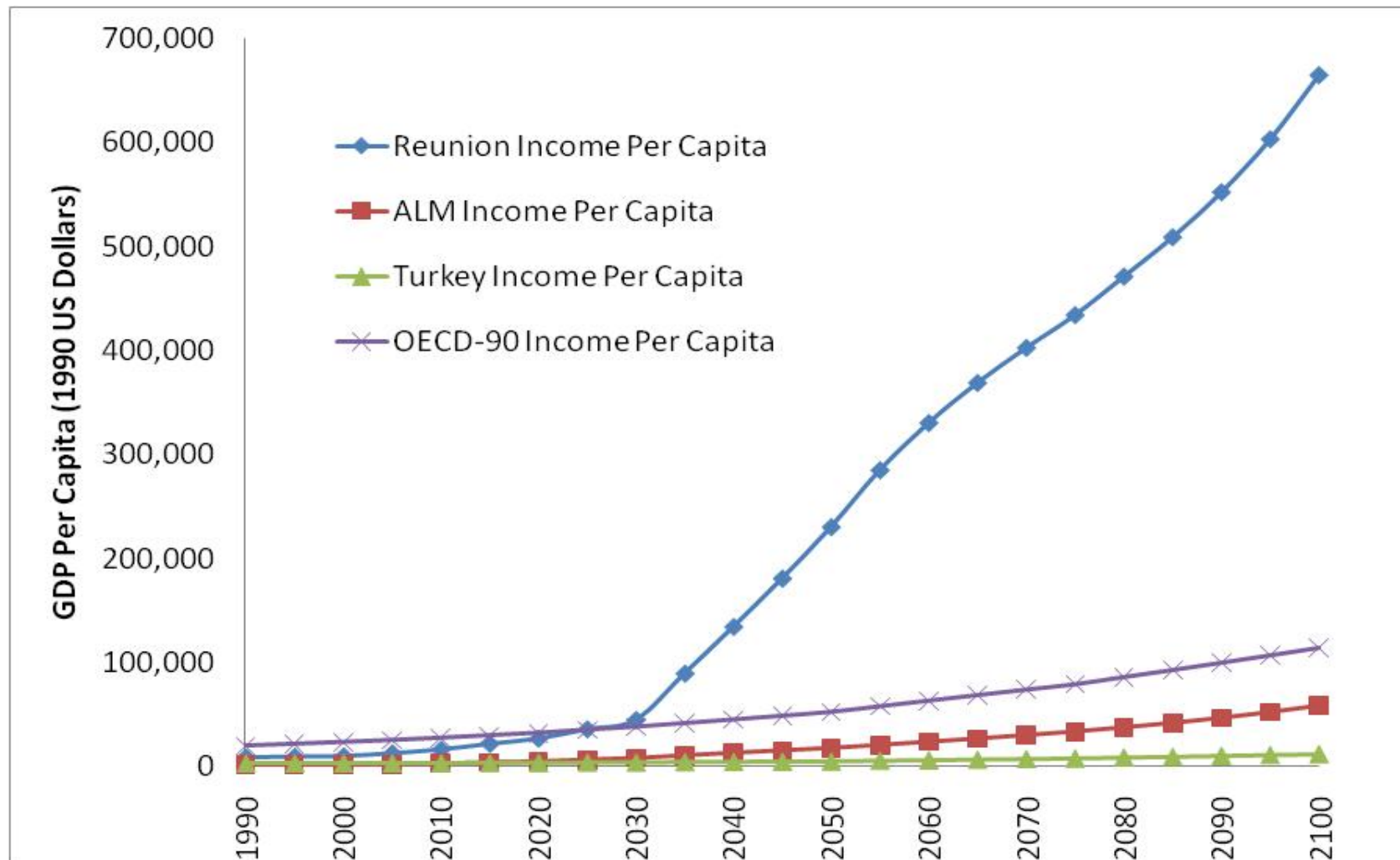
USFPM Product Category		GFPM Product Category
Hardwood lumber		Sawnwood
Softwood lumber		
Softwood plywood		Plywood/veneer
Hardwood plywood		
Oriented Strand Board		Particleboard
Industrial particleboard		
Fiberboard		Fiberboard
Newsprint		Newsprint
Printing and writing paper		Printing and writing paper
Wood fuel stock		Fuelwood roundwood and charcoal
Other industrial roundwood		Other industrial roundwood
Chemical pulp		Chemical pulp
Mechanical pulp		Mechanical pulp
Softwood sawtimber		Industrial roundwood
Softwood non-sawtimber		
Hardwood sawtimber		Fuelwood
Hardwood non-sawtimber		
Hardwood short-rotation woody crops		Other (industrial) roundwood
Softwood short-rotation woody crops		
Recovered paper		Waste paper
Non-wood pulp		Other fiber pulp
Softwood fiber residues		(No wood residues tracked)
Hardwood fiber residues		
Fuel residue		
Harvest (logging) residue		

# Income and Forest Area Allocations

- Issue: IPCC Income and Population projections imply divergent income per capita
  - Example of Reunion in ALM, Turkey in OECD-90
  - GFPM reallocates IPCC regional projected growth to be consistent with economic convergence theory.
  - Similar Issue arises with GFPM when allocating what the IPCC said is total forest area in IPCC regions, which GFPM also imposes exogenously
    - GFPM uses an Environmental Kuznets Curve approach to projecting deforestation, based on income per capita



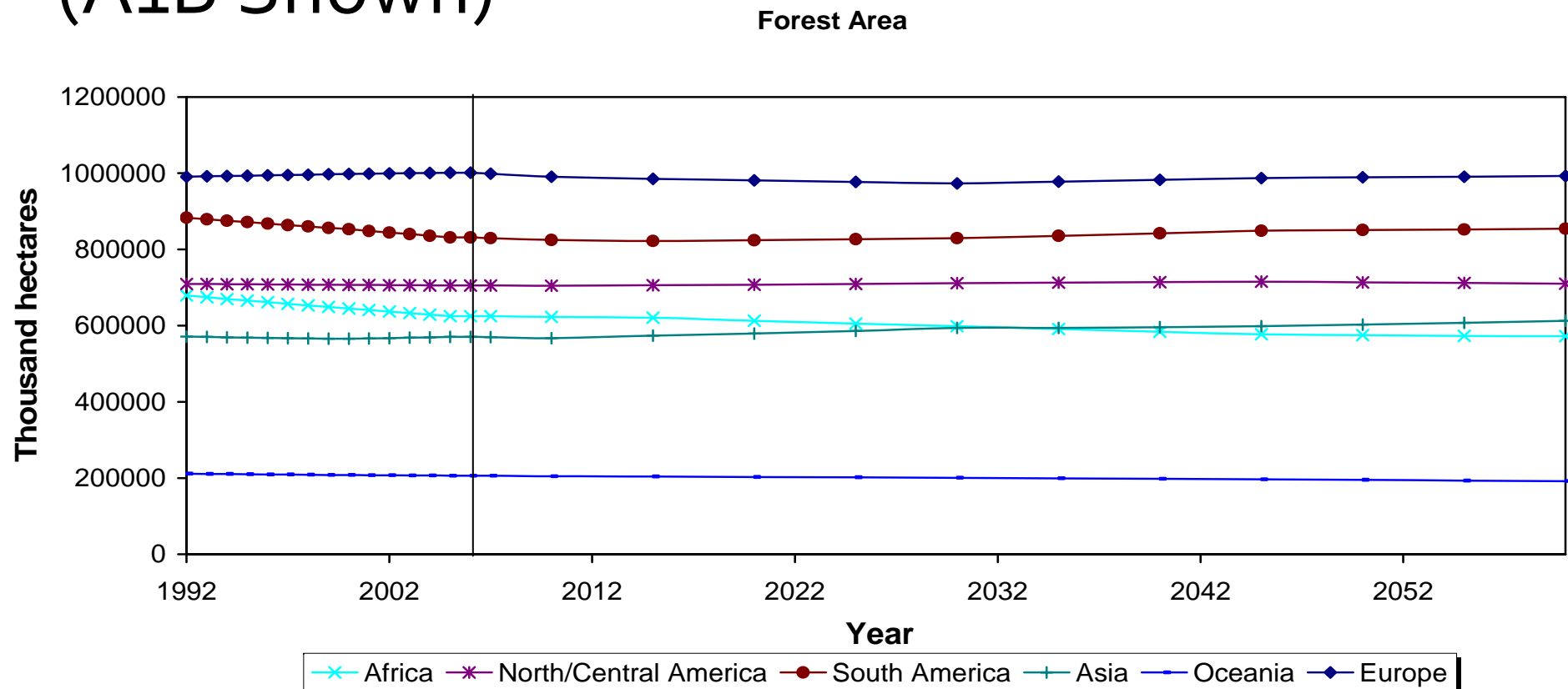
# Reunion and Turkey





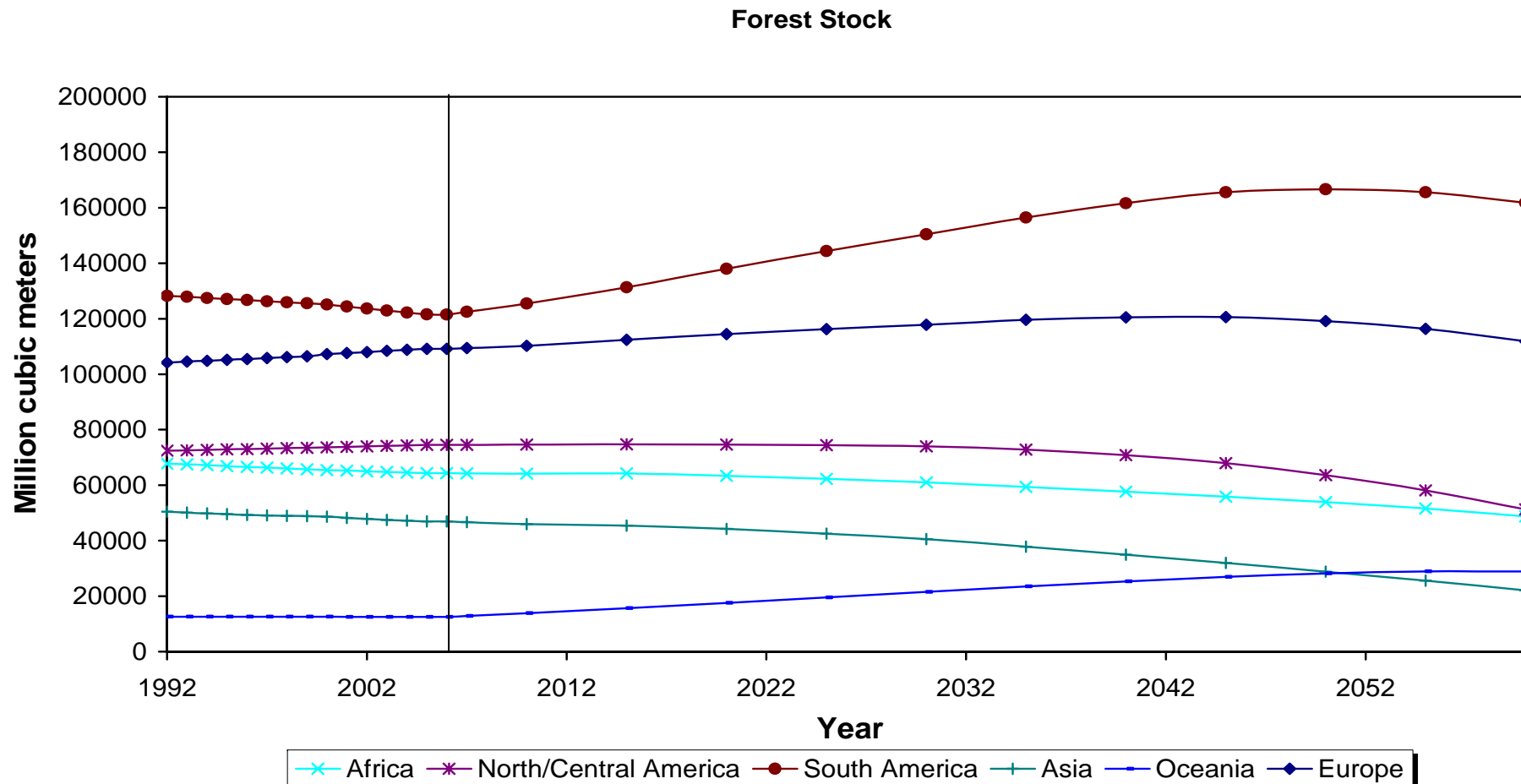
# Latest GFPM Projections

- Forest Area: Few changes under any scenario (A1B Shown)



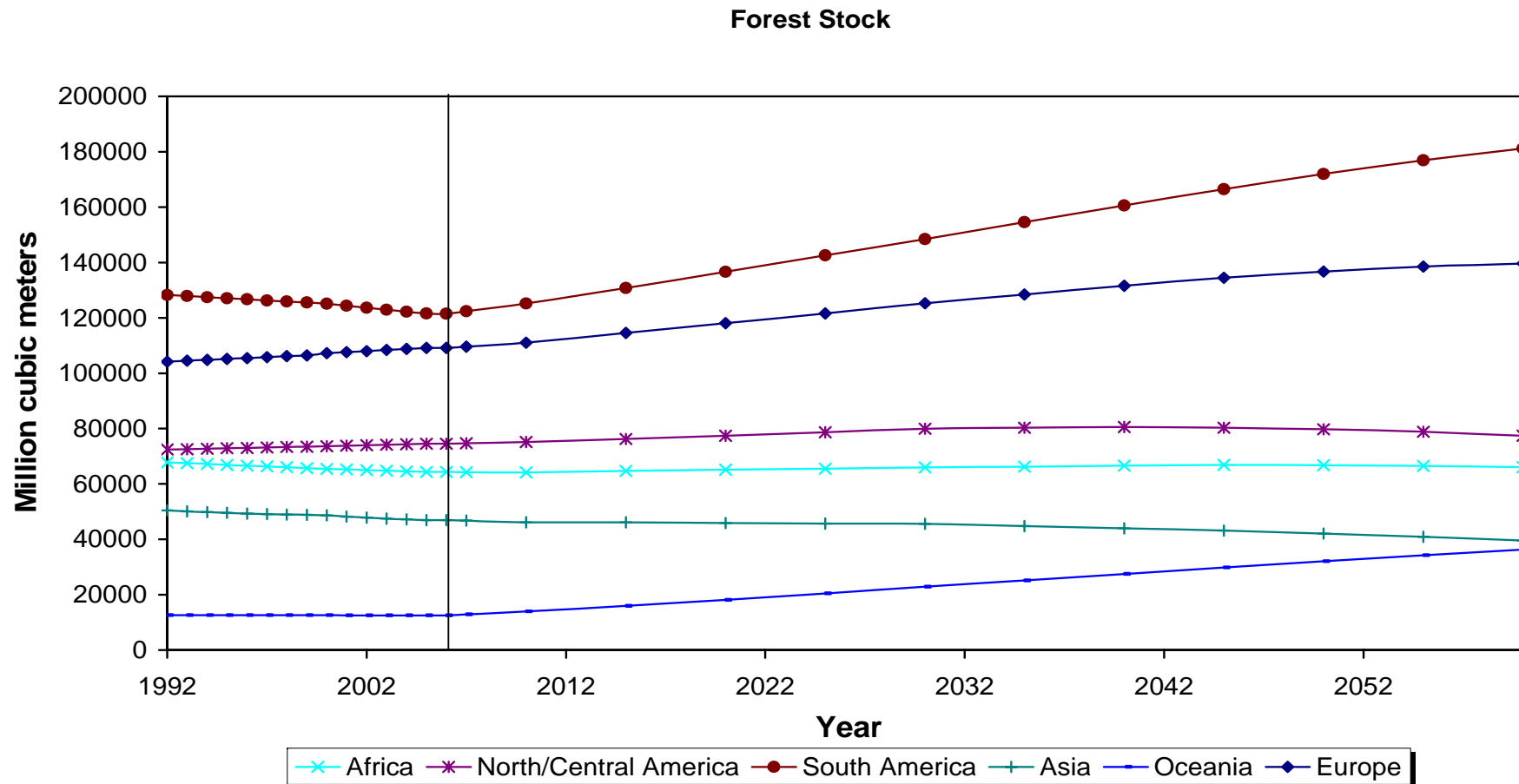
# Latest GFPM Projections

## ■ Forest Stock (Inventory Volume): A1B



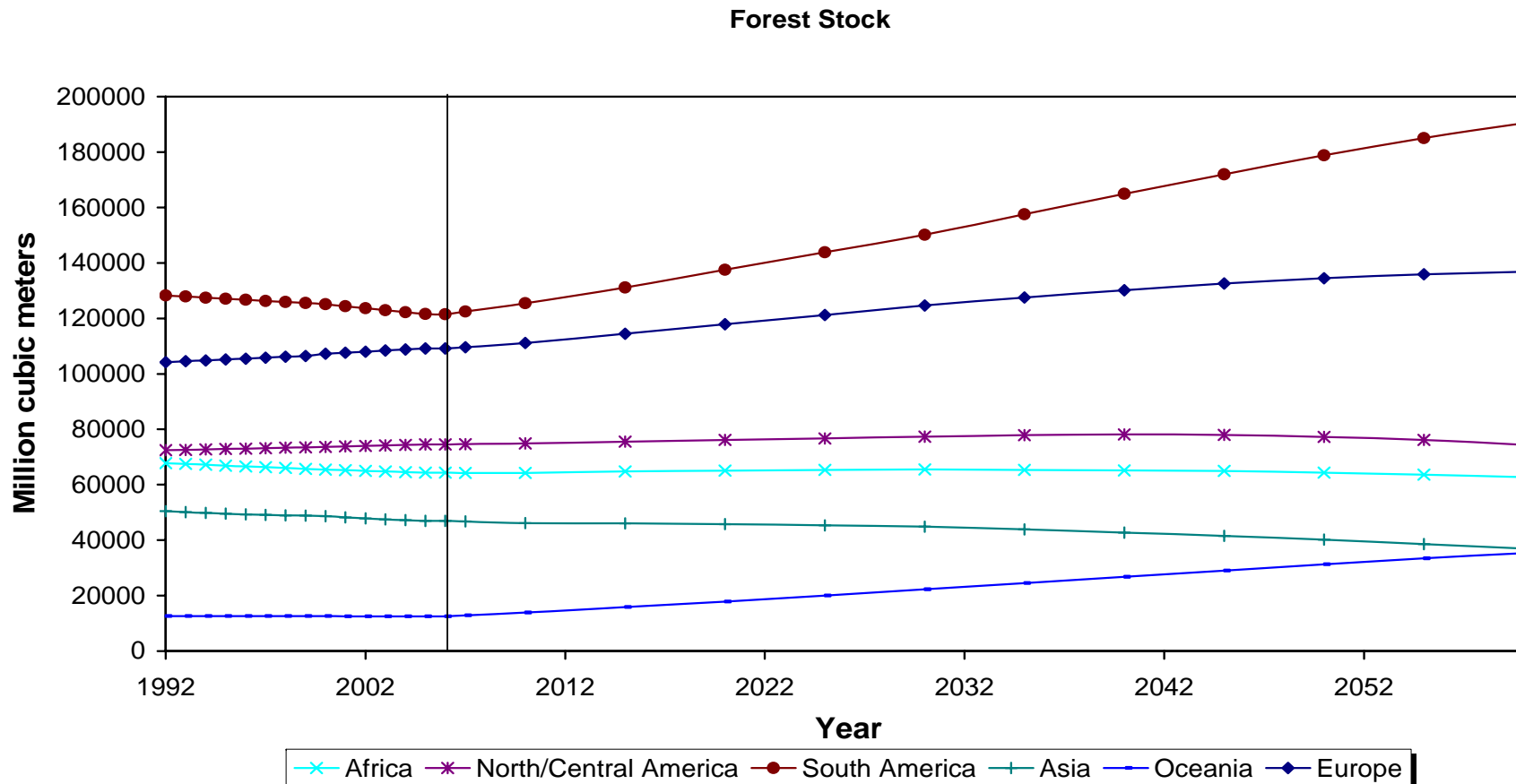
# Latest GFPM Projections

## ■ Forest Stock (Inventory Volume): A2



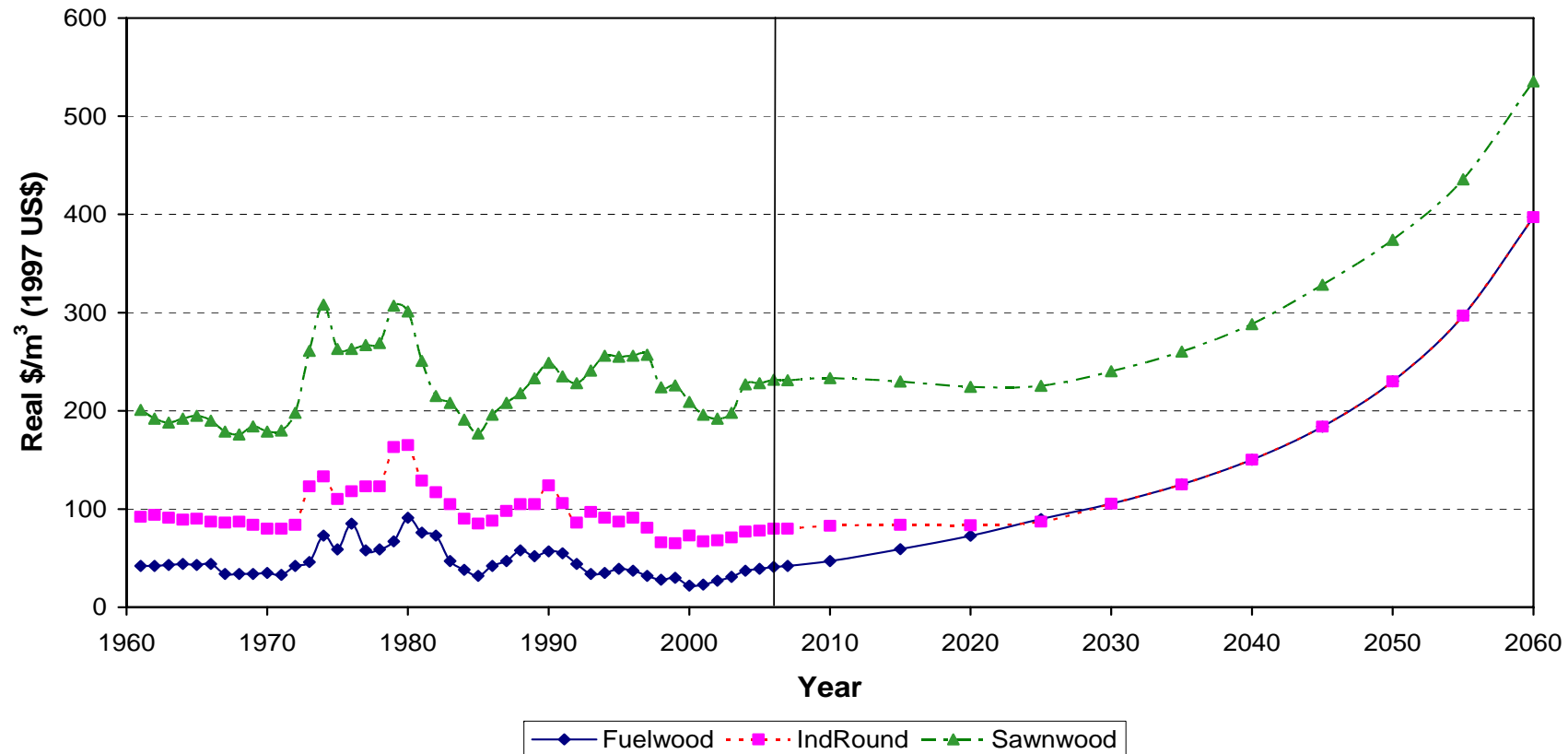
# Latest GFPM Projections

## ■ Forest Stock (Inventory Volume): B2



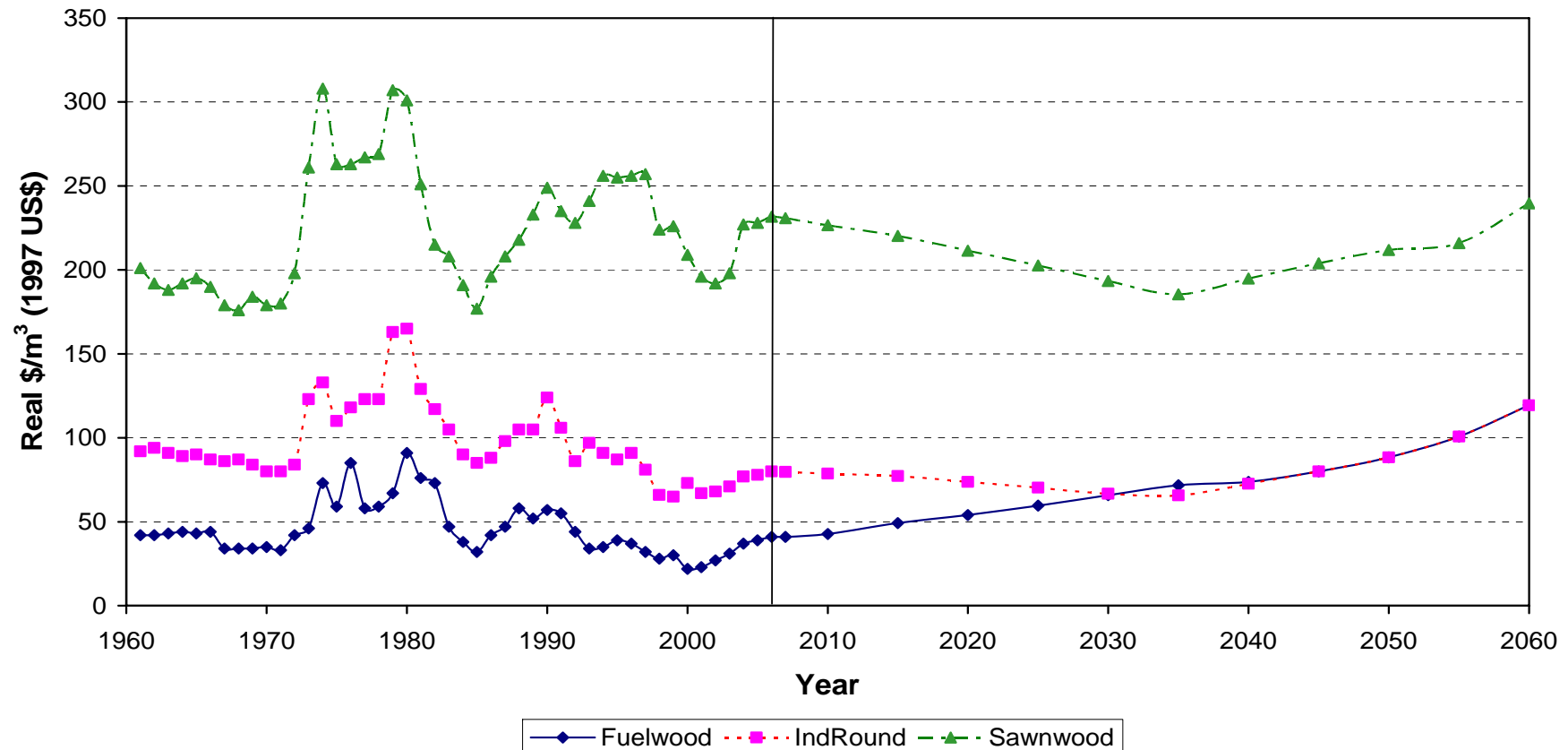
# Latest GFPM Projections

## ■ World Prices: A1B



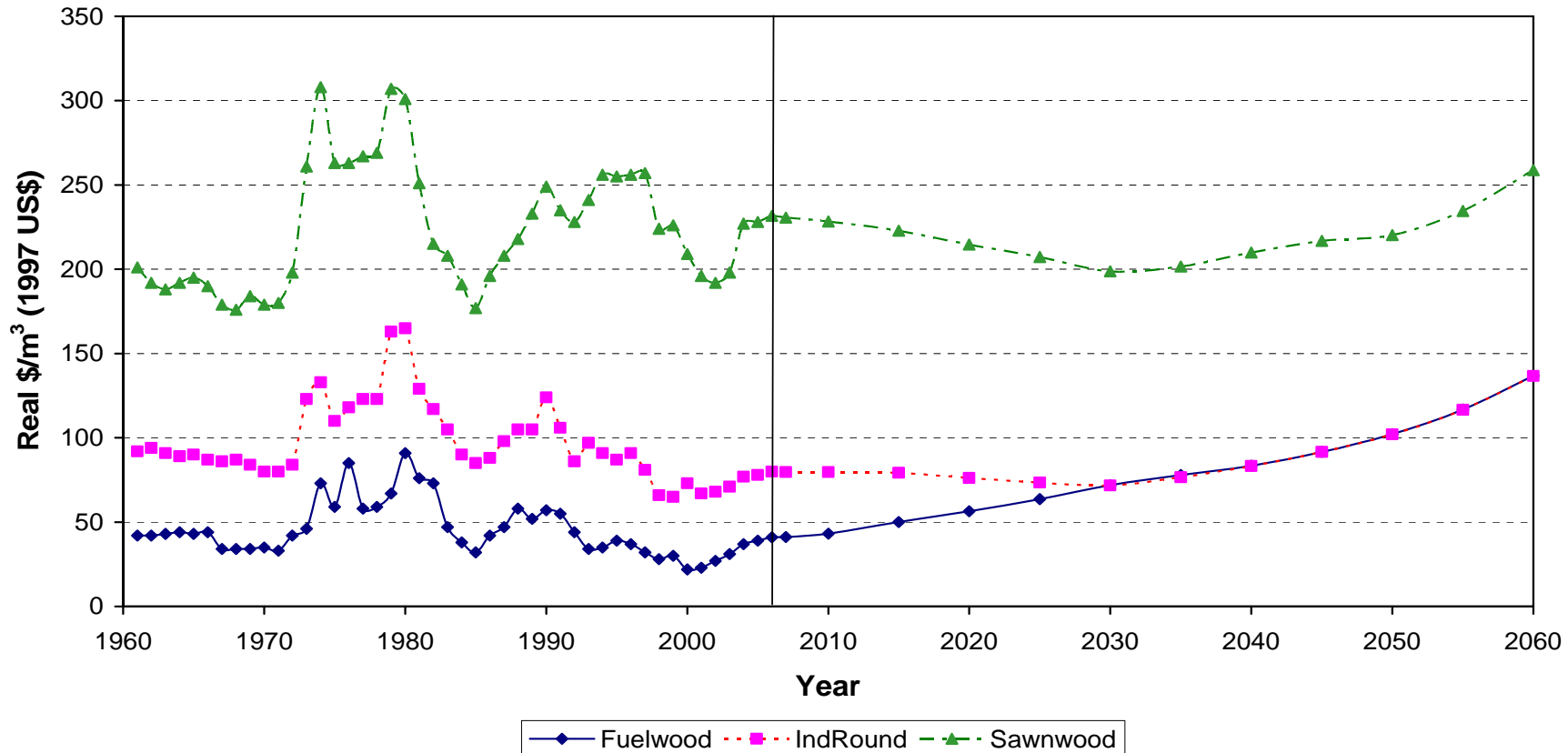
# Latest GFPM Projections

## ■ World Prices: A2



# Latest GFPM Projections

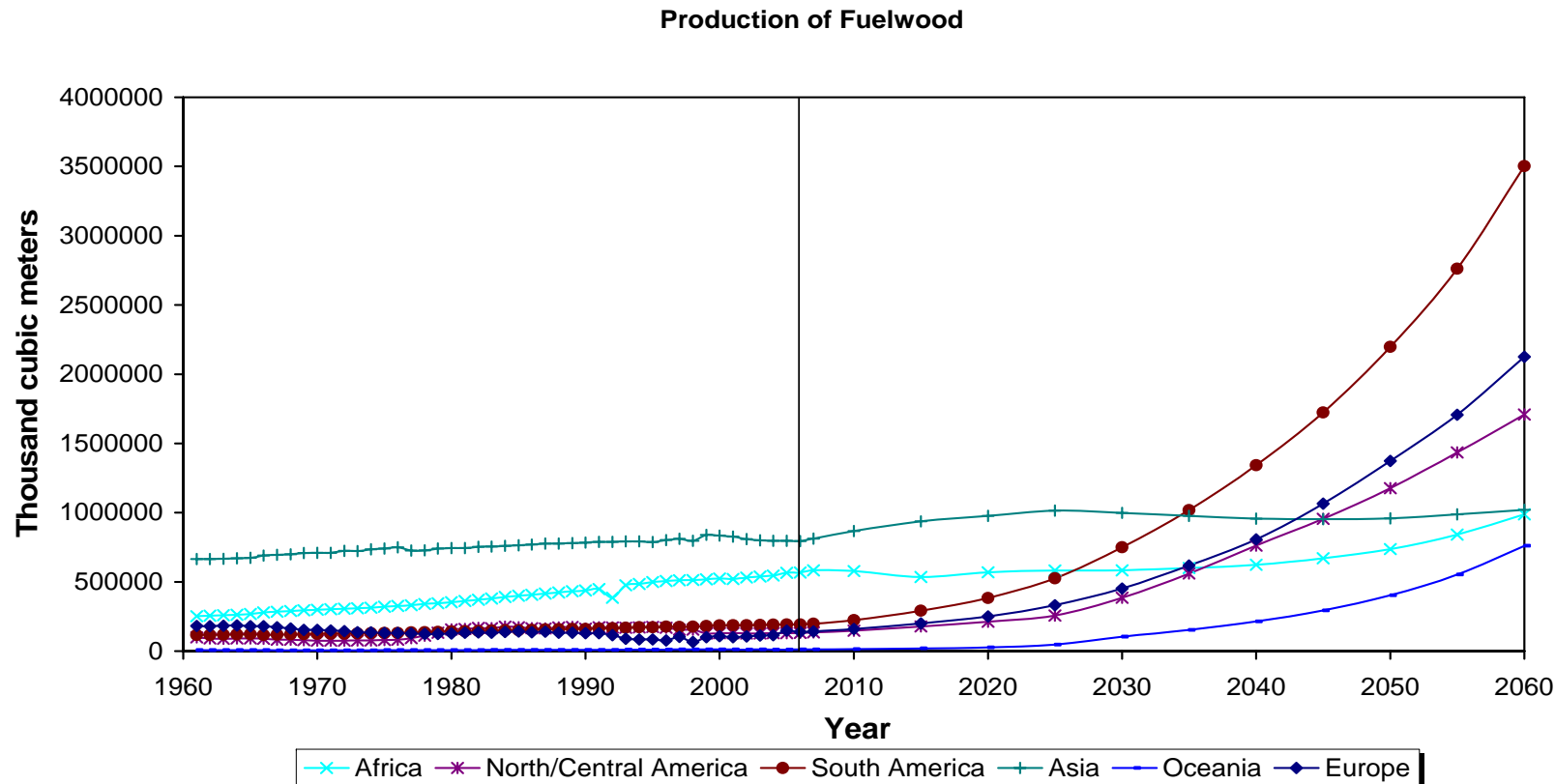
## ■ World Prices: B2





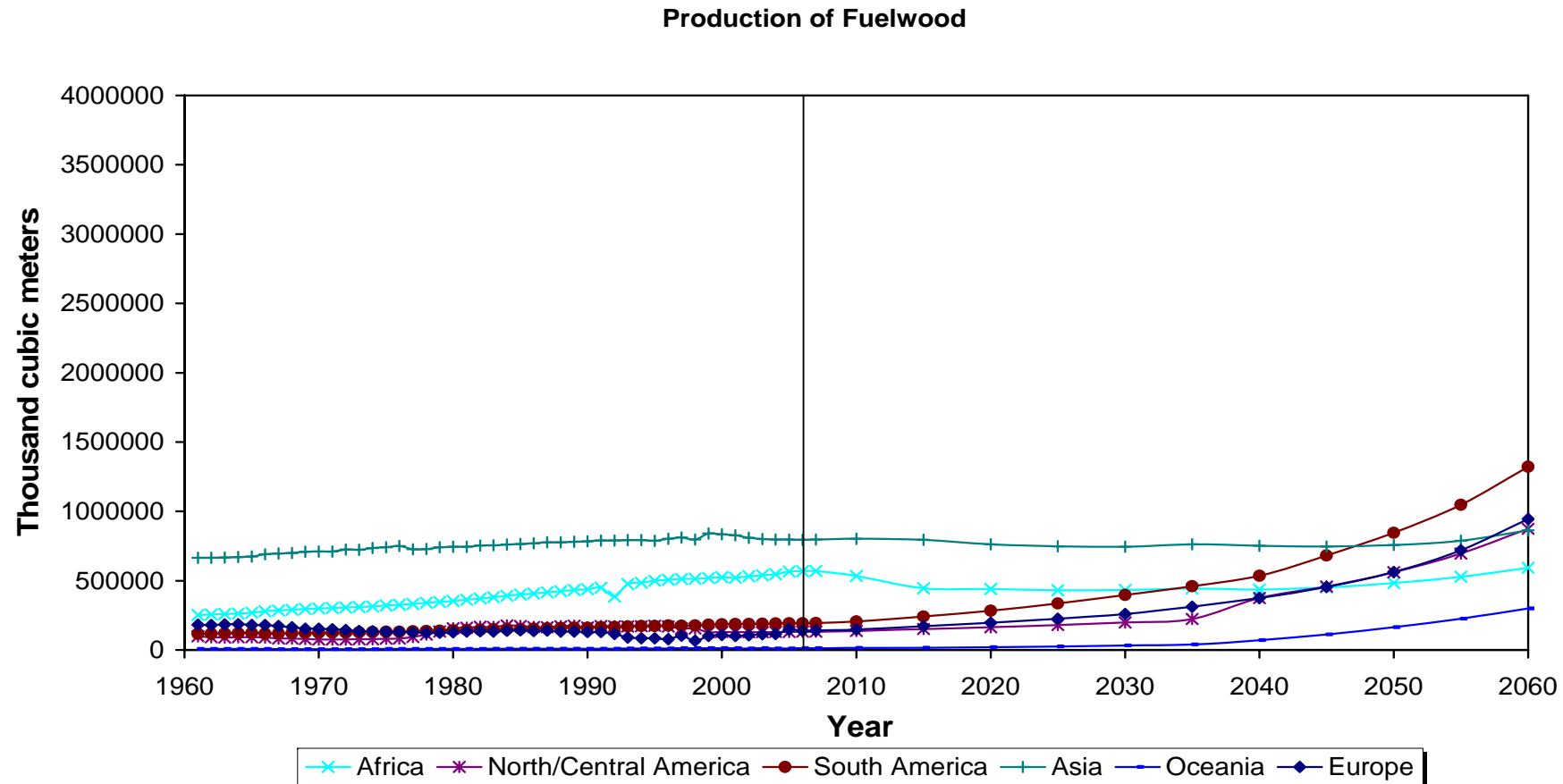
# Latest GFPM Projections

## ■ Fuelwood Production : A1B



# Latest GFPM Projections

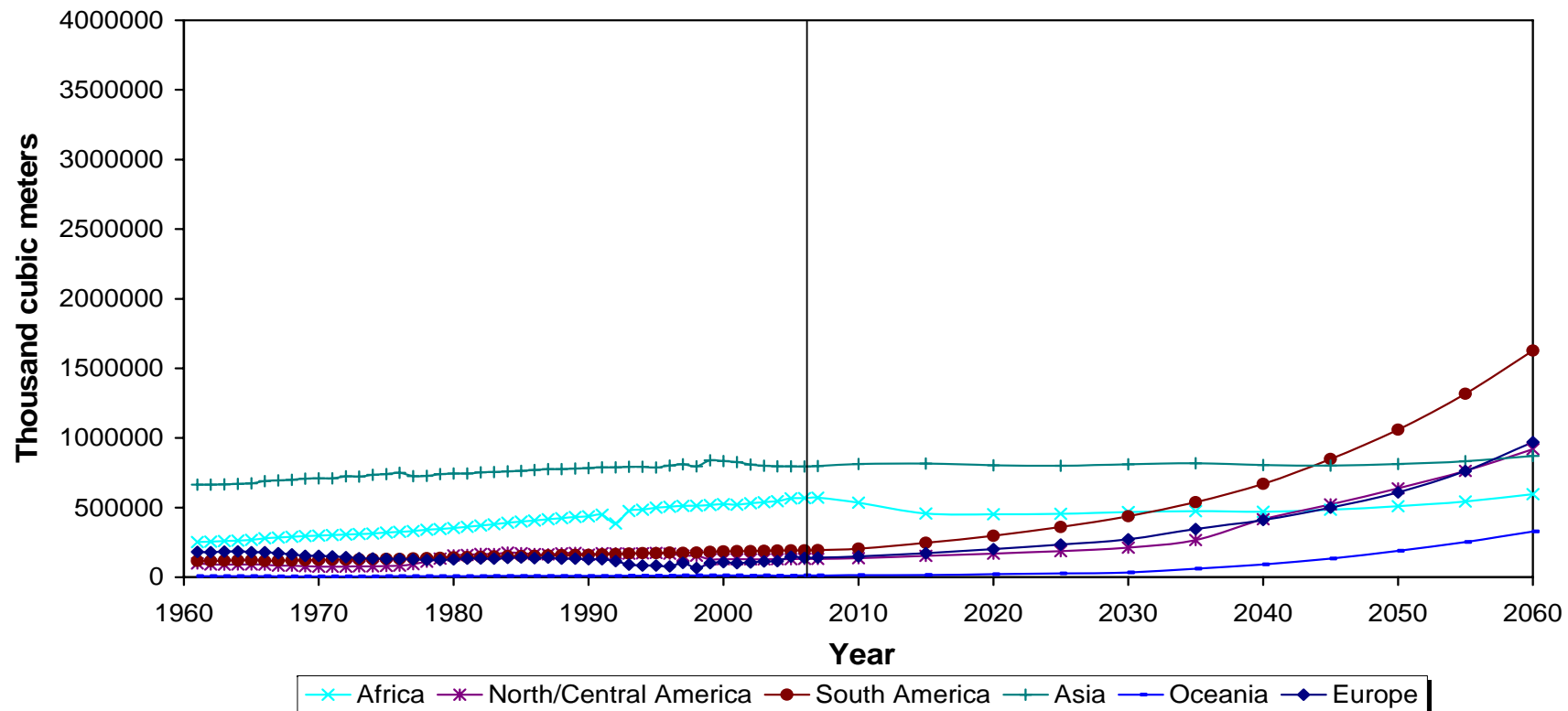
## ■ Fuelwood Production : A2



# Latest GFPM Projections

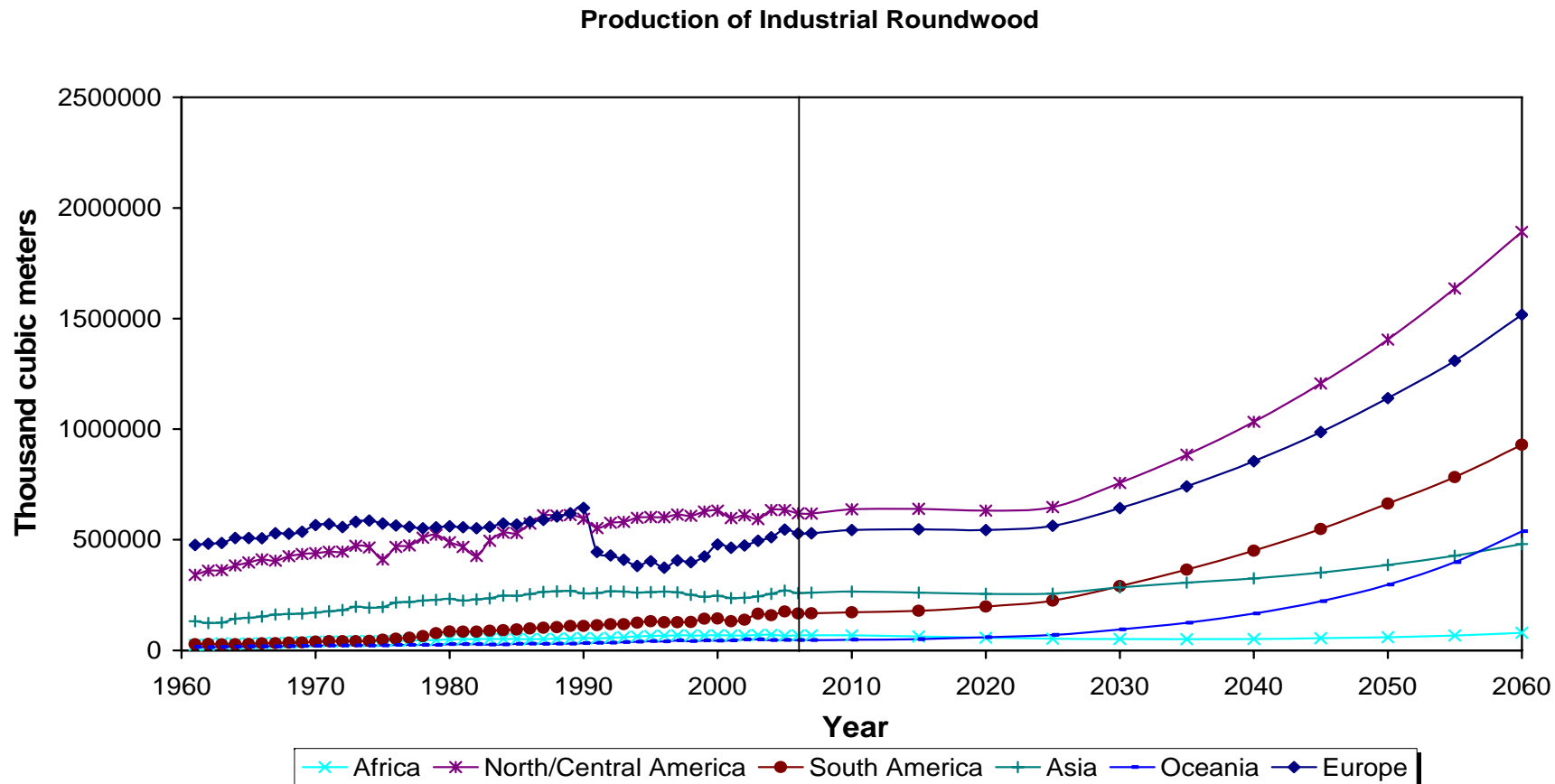
## ■ Fuelwood Production: B2

Production of Fuelwood



# Latest GFPM Projections

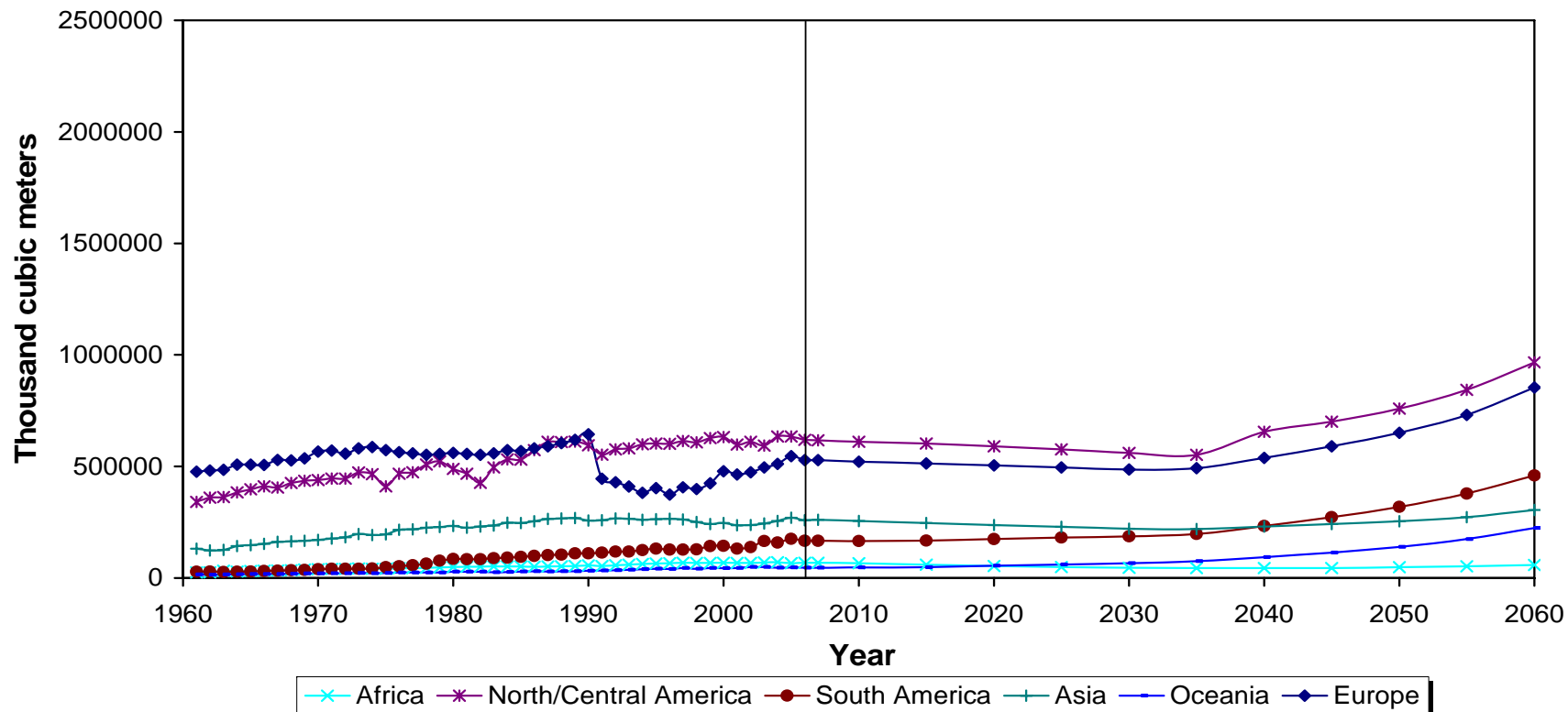
## ■ Industrial Roundwood Production : A1B



# Latest GFPM Projections

## ■ Industrial Roundwood Production : A2

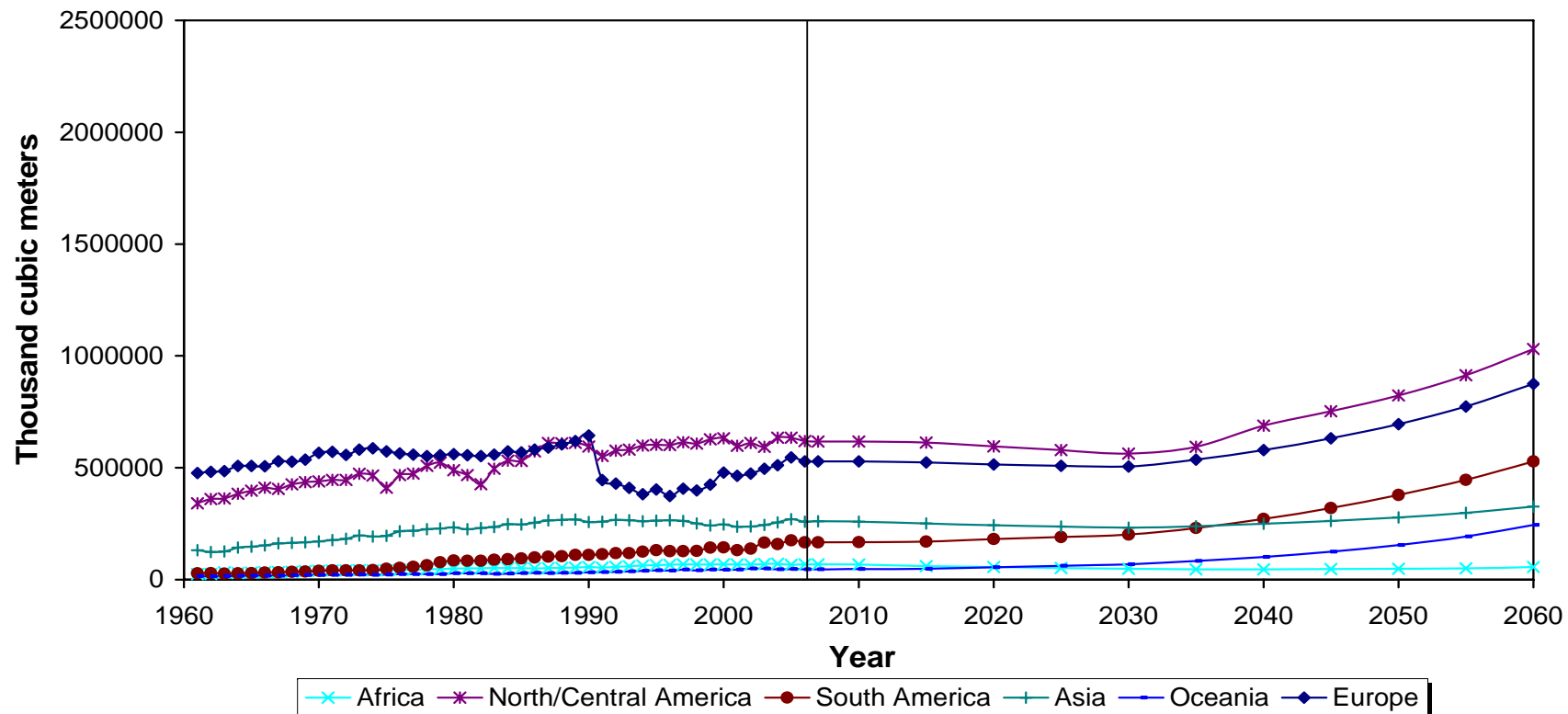
Production of Industrial Roundwood



# Latest GFPM Projections

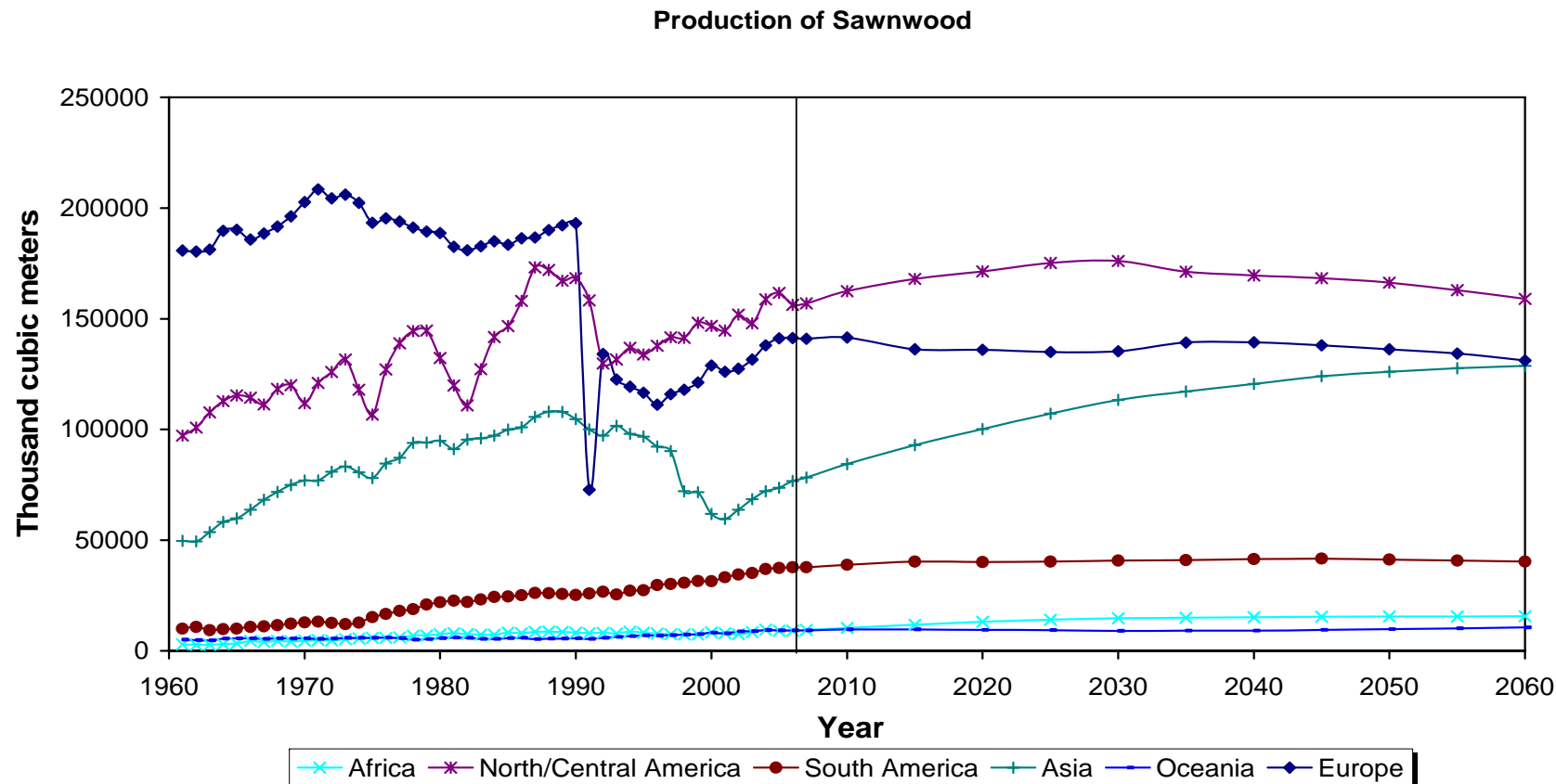
## ■ Industrial Roundwood Production : B2

Production of Industrial Roundwood



# Latest GFPM Projections

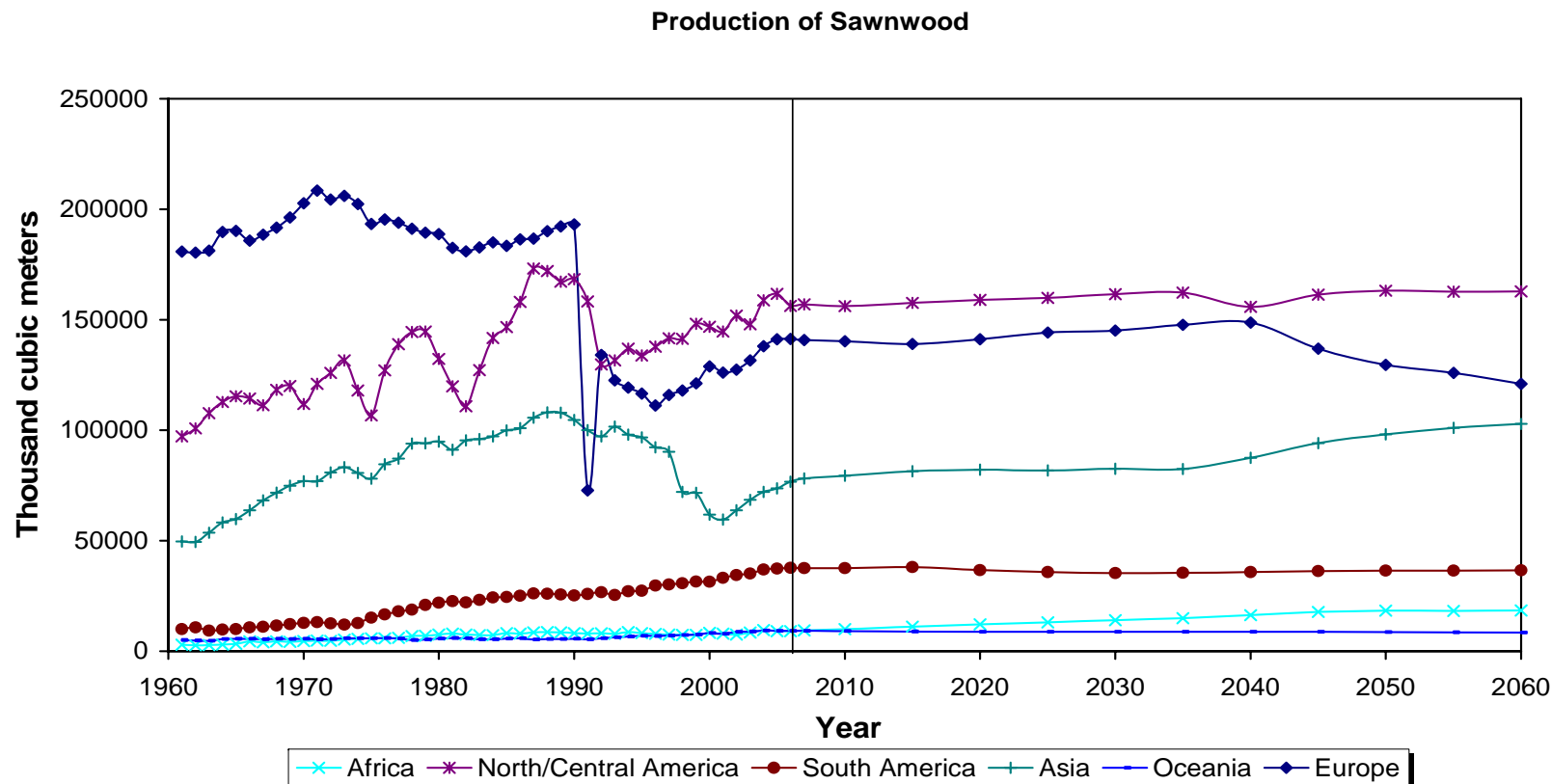
## ■ Sawnwood Production : A1B





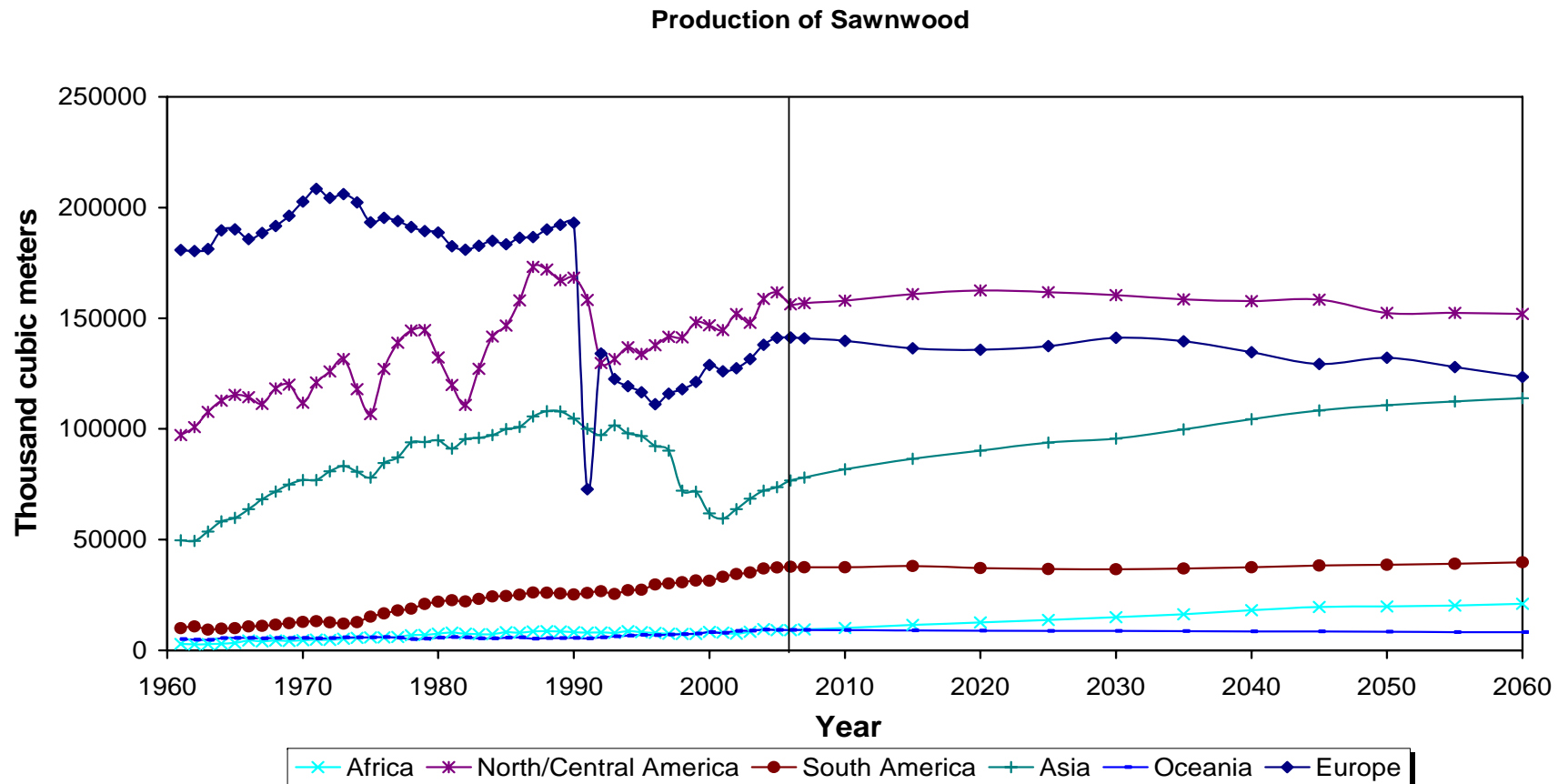
# Latest GFPM Projections

## ■ Sawnwood Production : A2



# Latest GFPM Projections

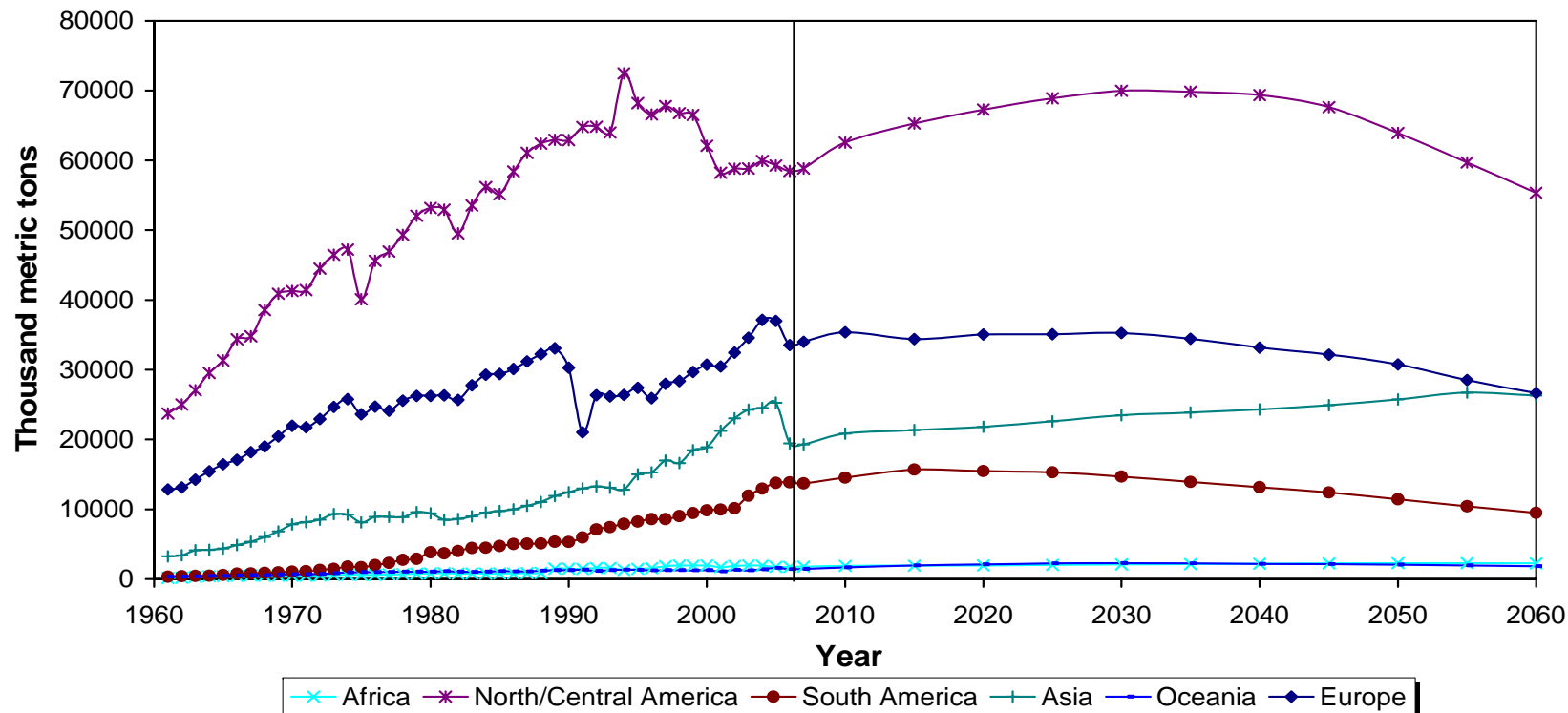
## ■ Sawnwood Production : B2



# Latest GFPM Projections

## ■ Chemical Pulp Production : A1B

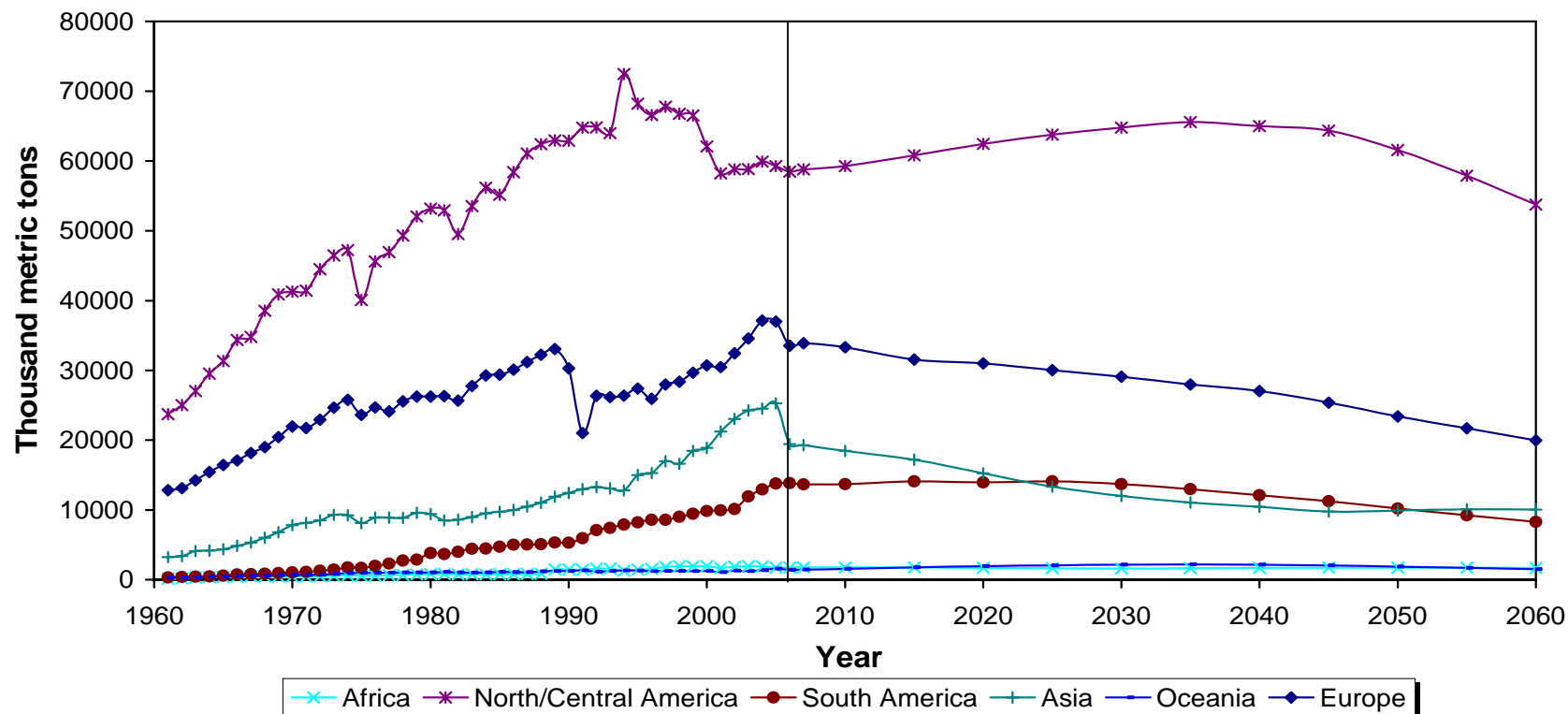
Production of Chemical and Semi-chemical Pulp



# Latest GFPM Projections

## ■ Chemical Pulp Production : A2

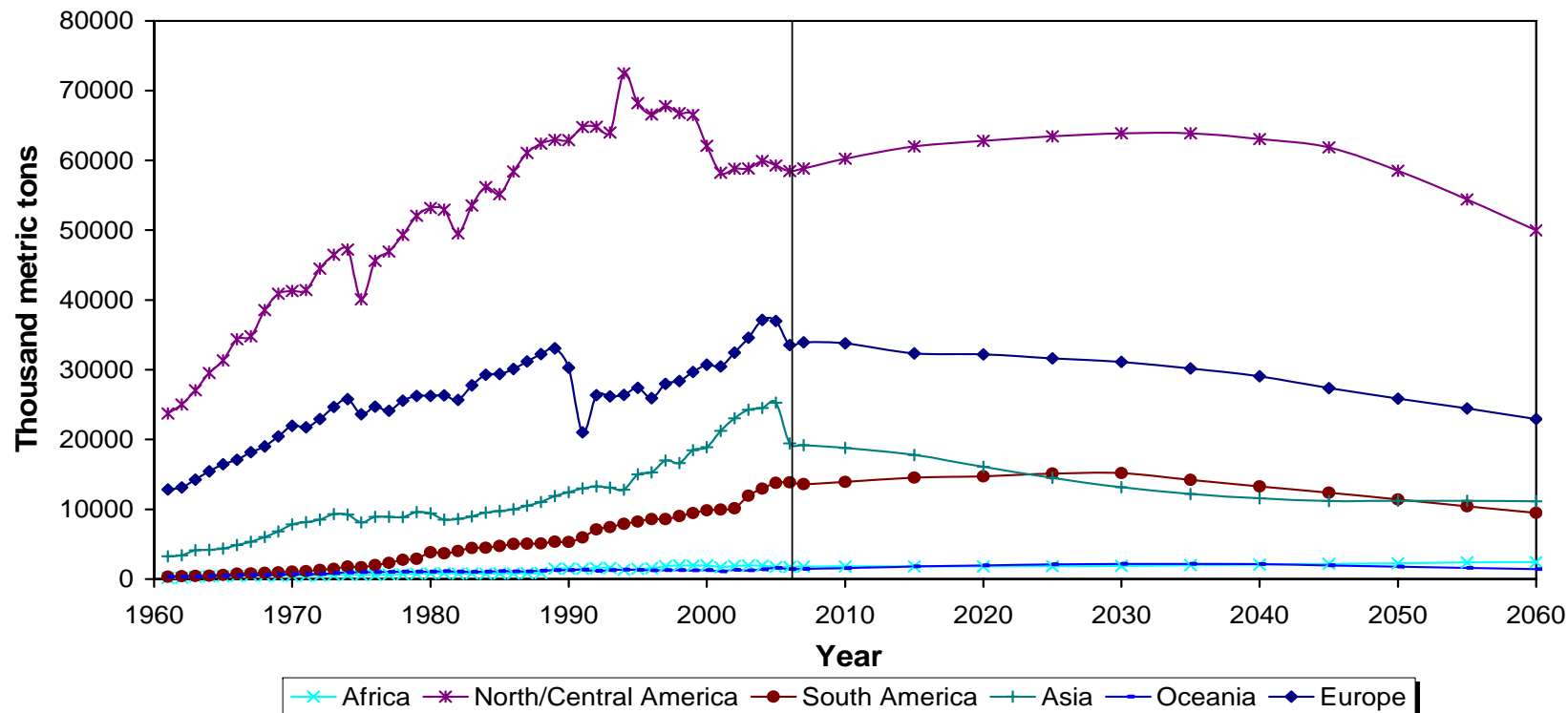
Production of Chemical and Semi-chemical Pulp



# Latest GFPM Projections

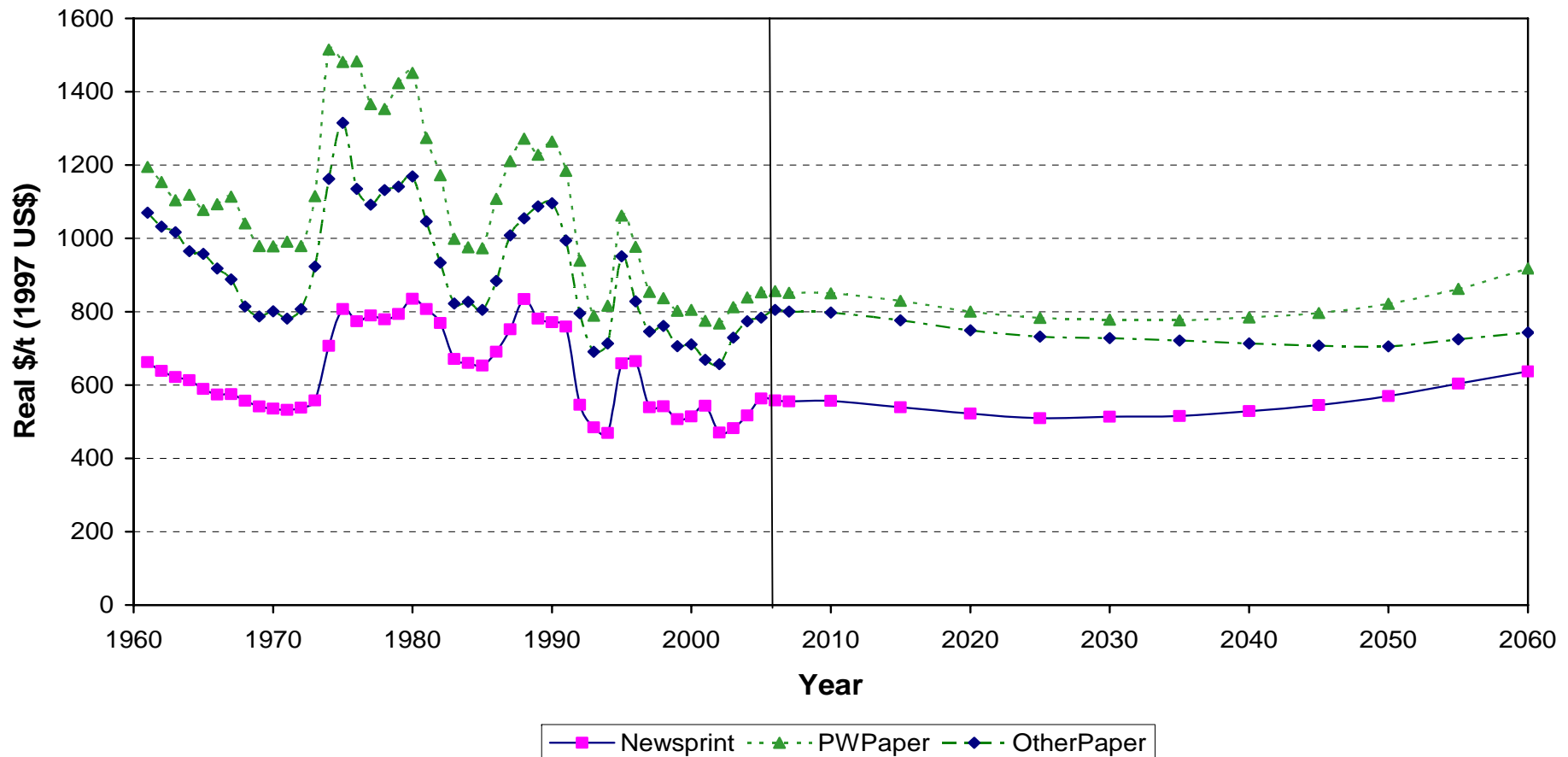
## ■ Chemical Pulp Production : B2

Production of Chemical and Semi-chemical Pulp



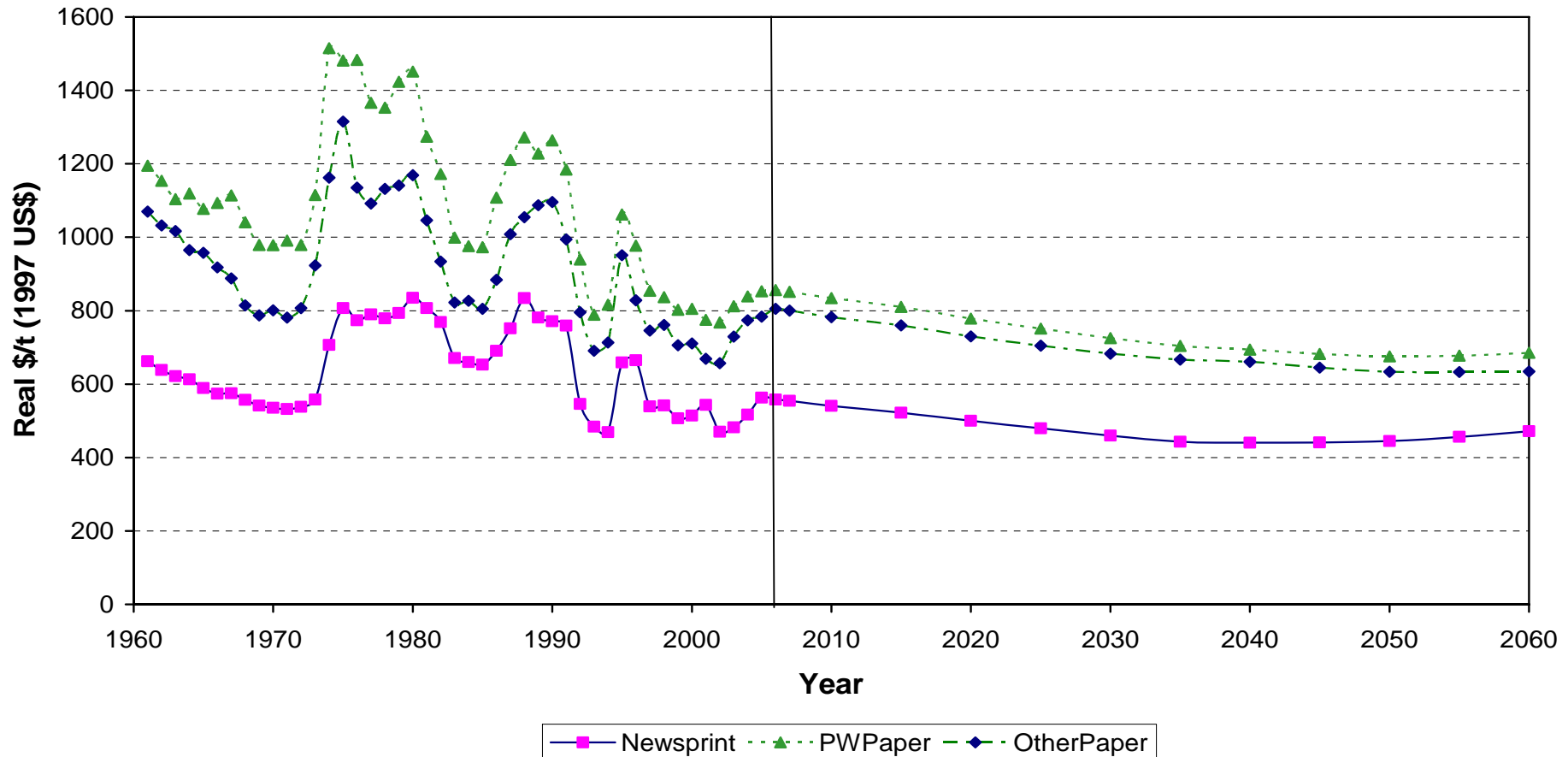
# Latest GFPM Projections

## ■ Paper and Paperboard Price: A1B



# Latest GFPM Projections

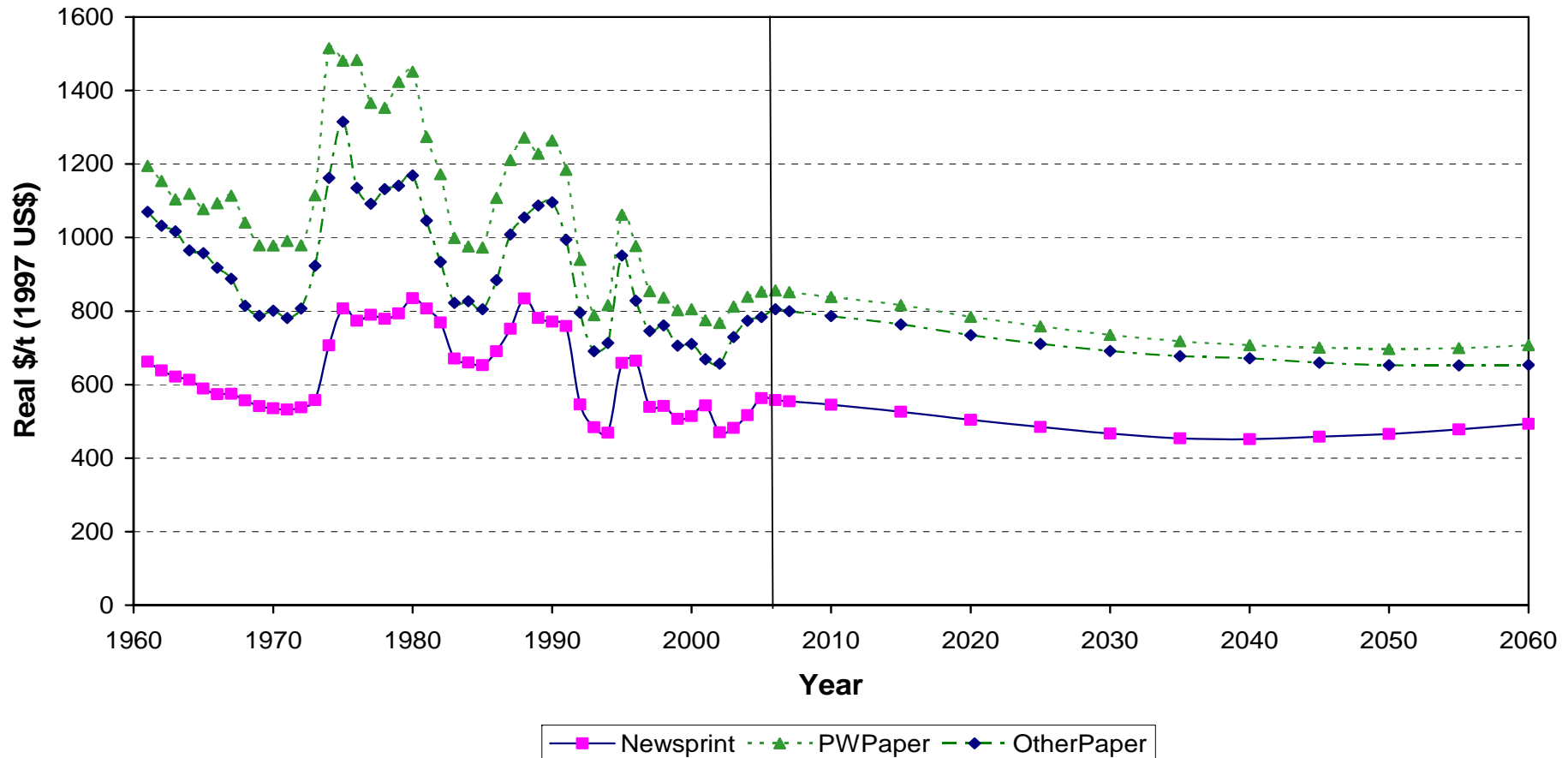
## ■ Paper and Paperboard Price: A2





# Latest GFPM Projections

## ■ Paper and Paperboard Price: B2



# Summary and Conclusions

- Projections finished by Summer 2010
- GFPM Preliminary projection figures and tables can be shared
  - Comments are welcome
  - Contact [jprestemon@fs.fed.us](mailto:jprestemon@fs.fed.us)



Mt Baker N.F., August 1955: M.H. Burl



