Sustainable forestry in the 21st Century:
Challenges and Opportunities

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Genesis of ECPA - Dialogue

Multi-sectoral regional dialogue on energy and climate

Trinidad & Tobago 2009


Lima 2009


Washington 2010

Panama 2011

Partnership of stakeholders & medium for exchange of best practices

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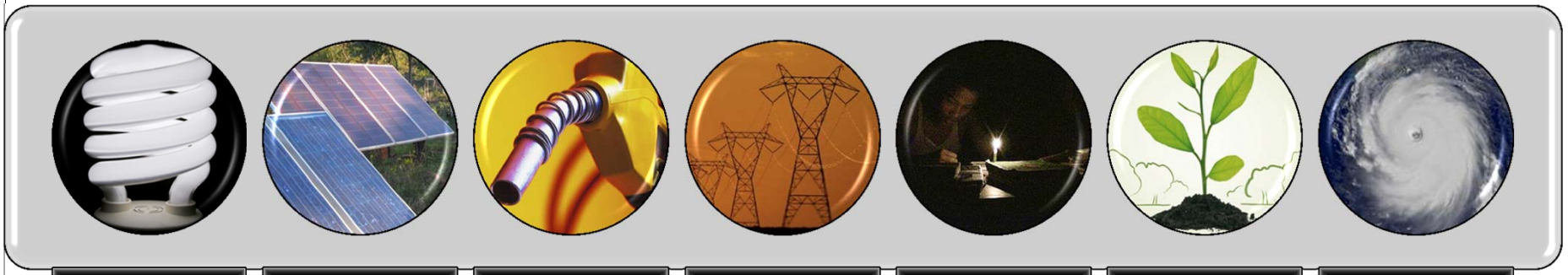
Seven pillars of ECPA



- Energy efficiency
- Renewable Energy
- Cleaner and more efficient use of fossil fuels
- Energy infrastructure
- Energy poverty
- Sustainable forests and land use
- Adaptation

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Presentation outline

- Historical & contemporary trends – implications for sustainable forestry
- Selected Forests-Environment-People interface issues
  - Production forestry
  - Environmental forestry
  - Carbon forestry
  - Forest governance
- Take home messages

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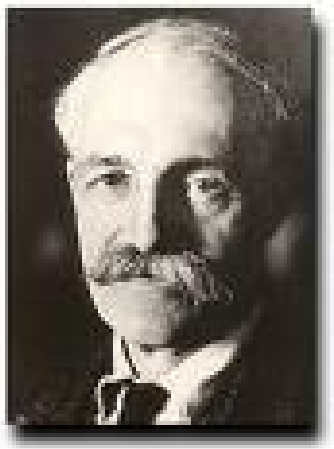
1. Values and philosophies

- Pinchot's economic value of forests
- Muir's intrinsic value of forests
- Leopold's land ethic and holistic view of conservation



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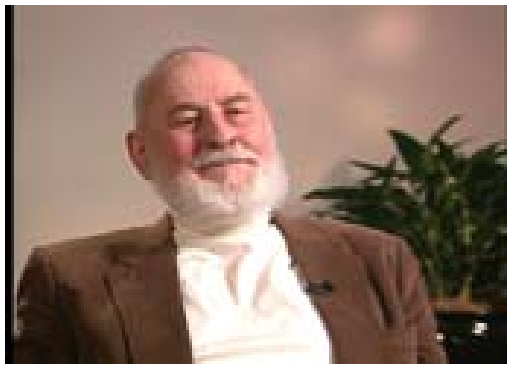
1. Values and philosophies

- Carson's work on environmental pollution

- Krutilla's multiple use management of forests



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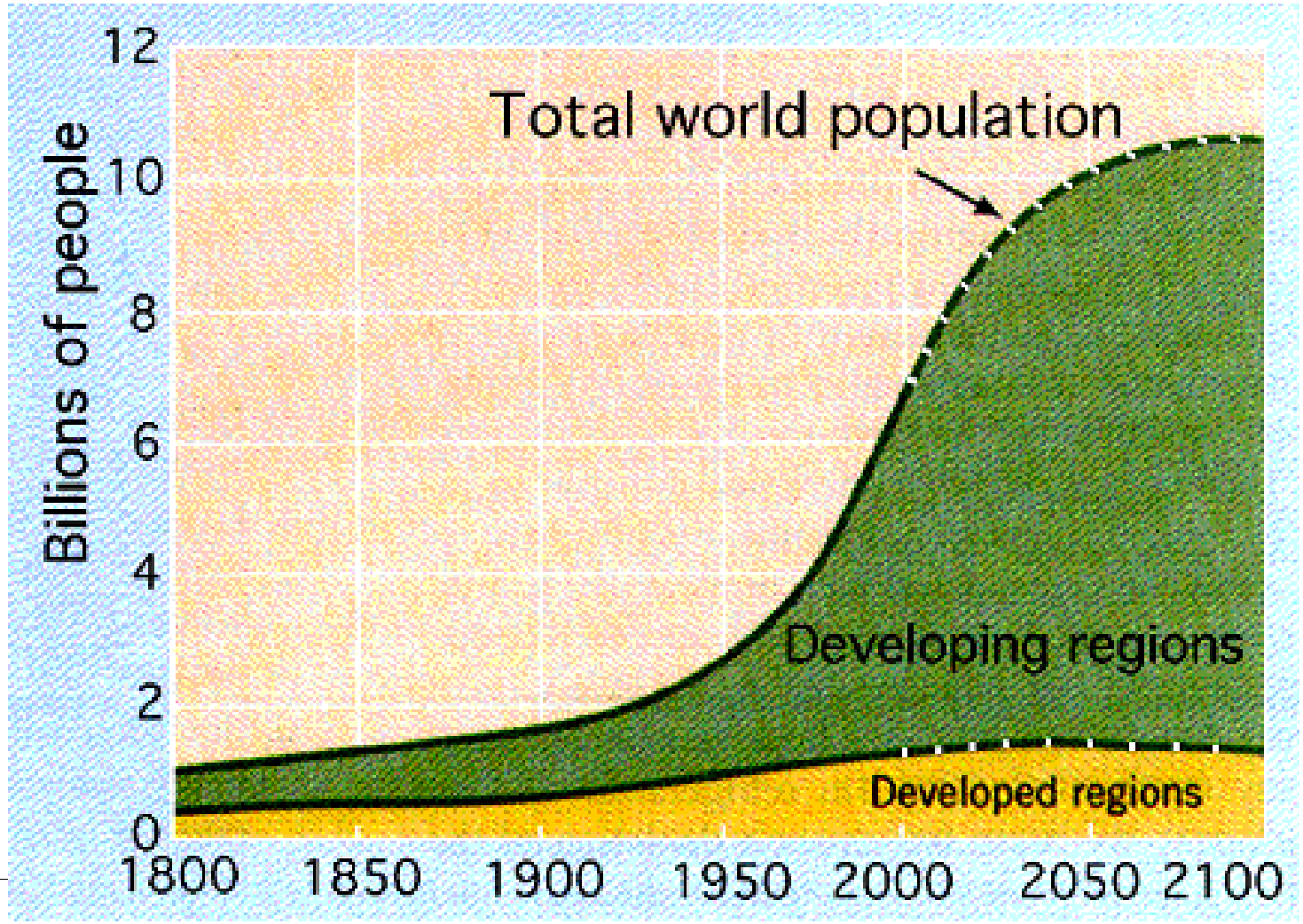
2. Population changes



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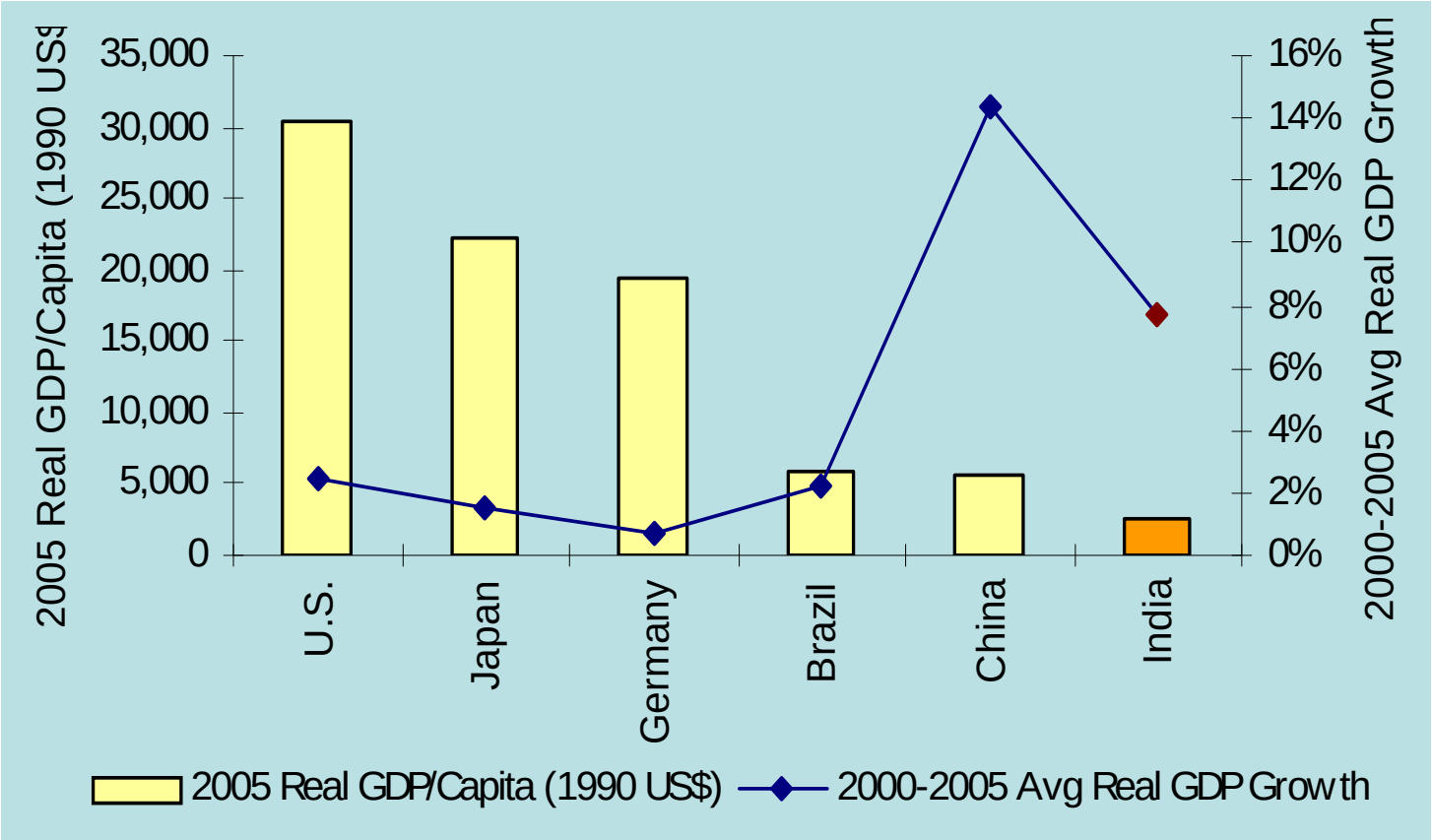
3. Economic growth - Implications



- Fastest economic growth in countries with lower GDP/capita; likely continue through 2020.

Source: Roberts (2007) in "The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007

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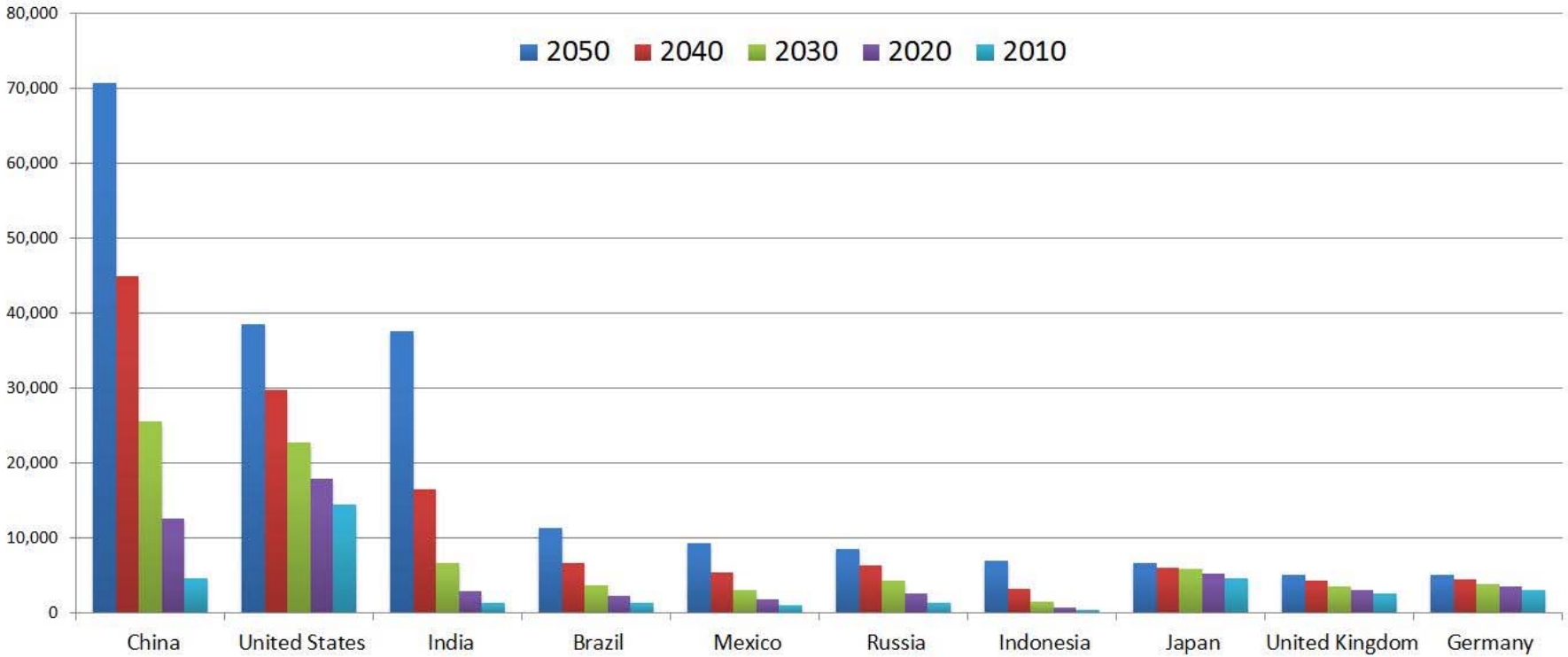

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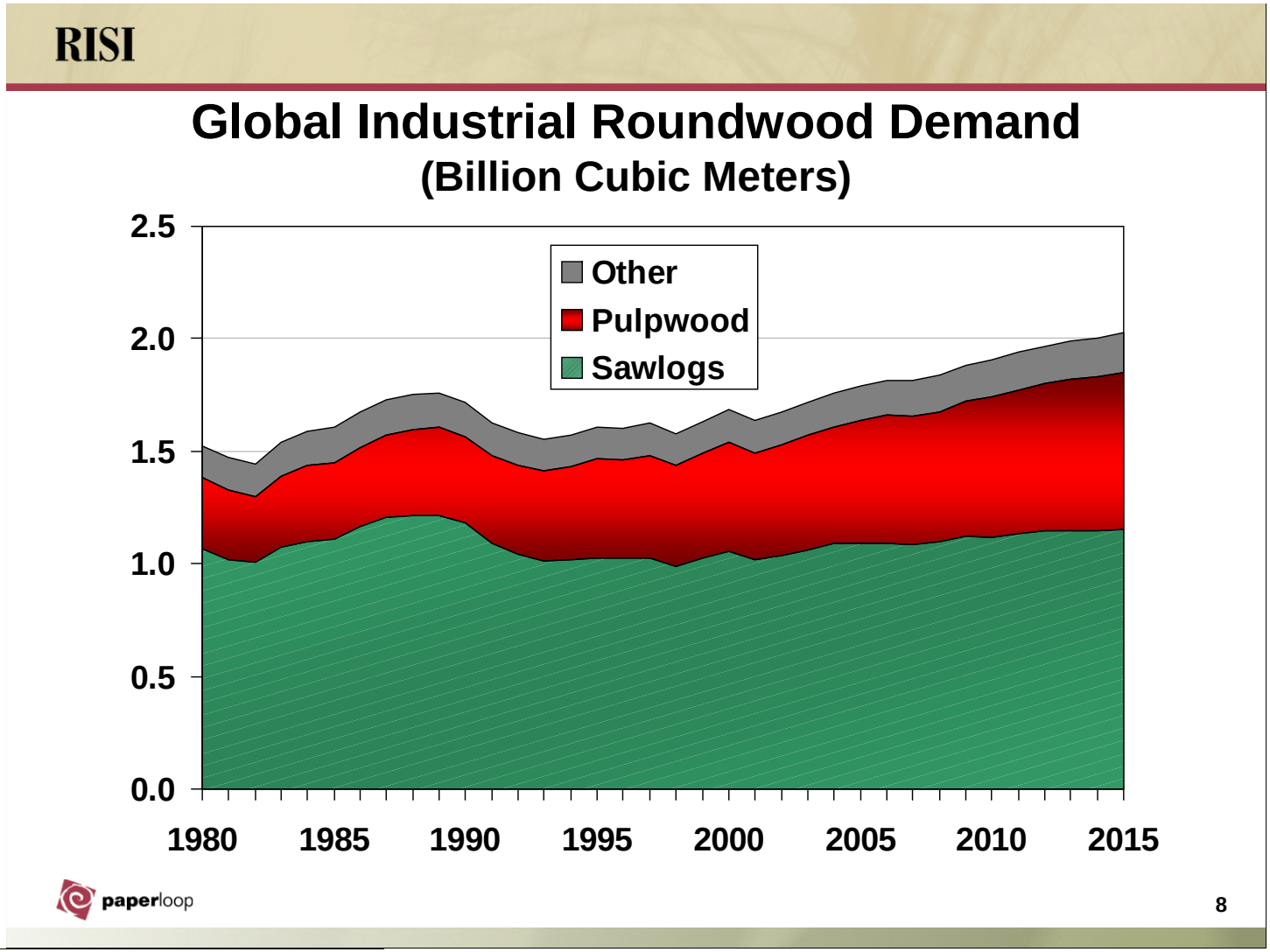
4. Industrial roundwood demand increase



Source: Keith Balter, Senior Vice President RISI (2005) presentation to NCSSF

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5. Maslow's hierarchy of needs: Public preferences for sustainable forestry

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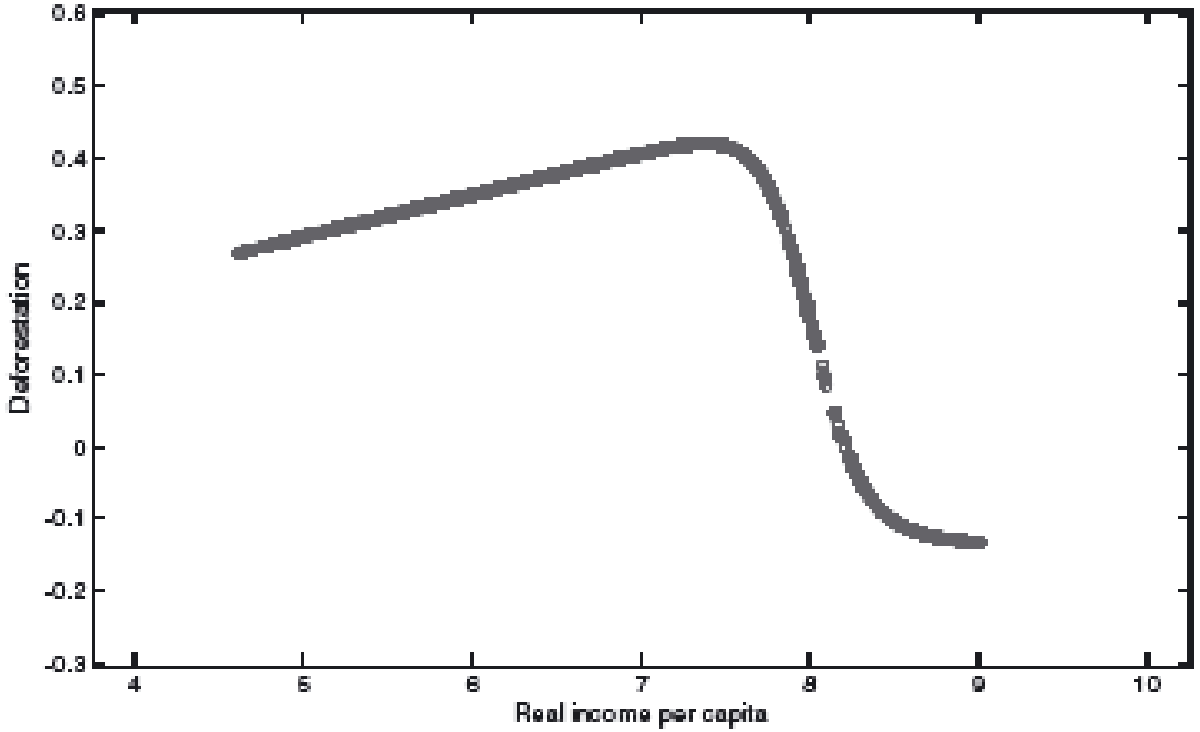
Environmental Kuznets Hypothesis



The relationship between deforestation and real income exists for 52 developing countries during the 1972–2003 period suggests the evidence of the EKC hypothesis for deforestation is apparent. Data indicate that the turning point was around US$3,021. *Chiu (2012) in Canadian Journal of Agricultural Economics 60: 177-194*

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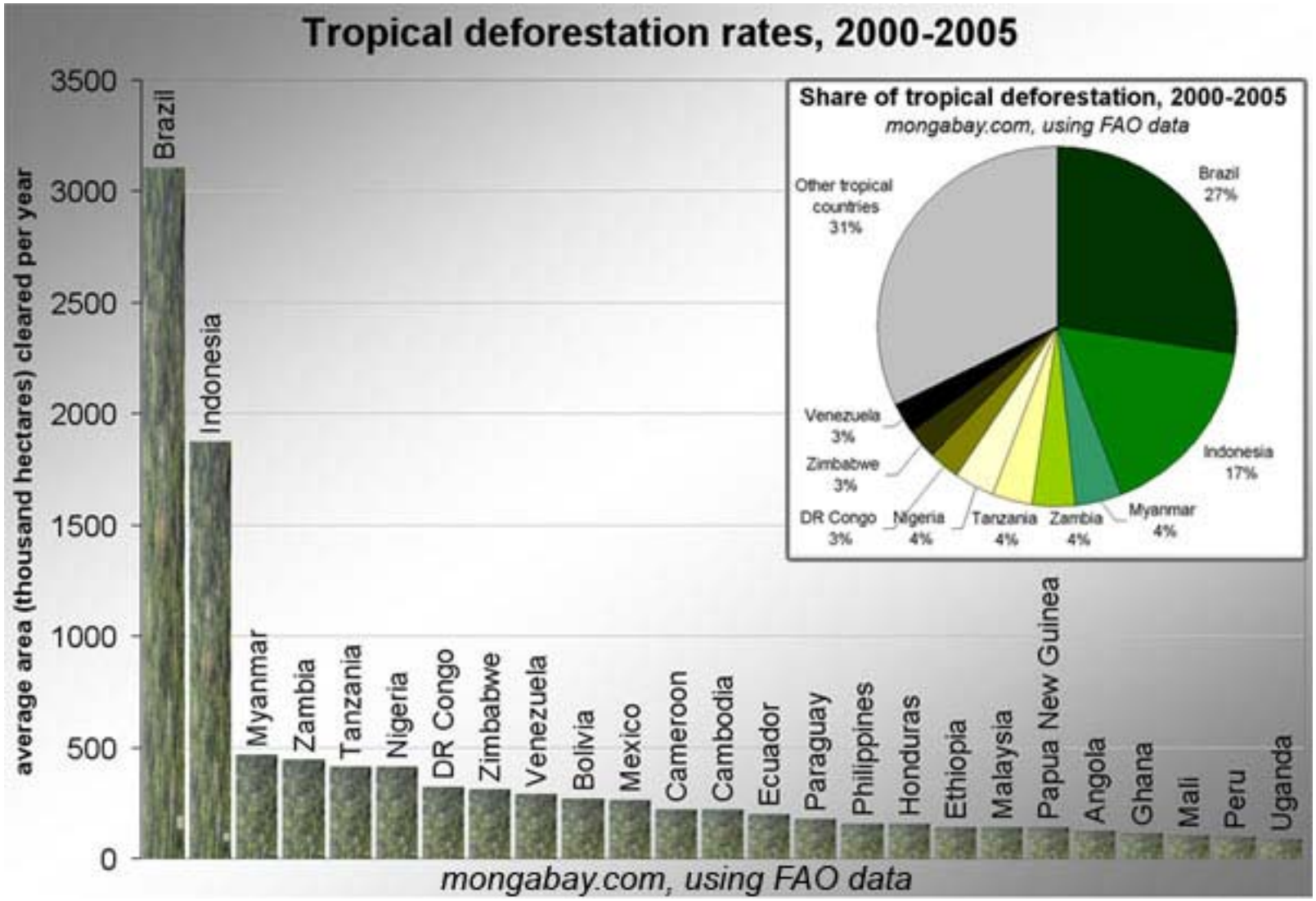
Deforestation



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Amazon deforestation decrease

Square kilometres of forest lost annually

2006	14,286
2007	11,651
2008	12,911
2009	7,464
2010	7,000
2011	6,418
2012	4,656

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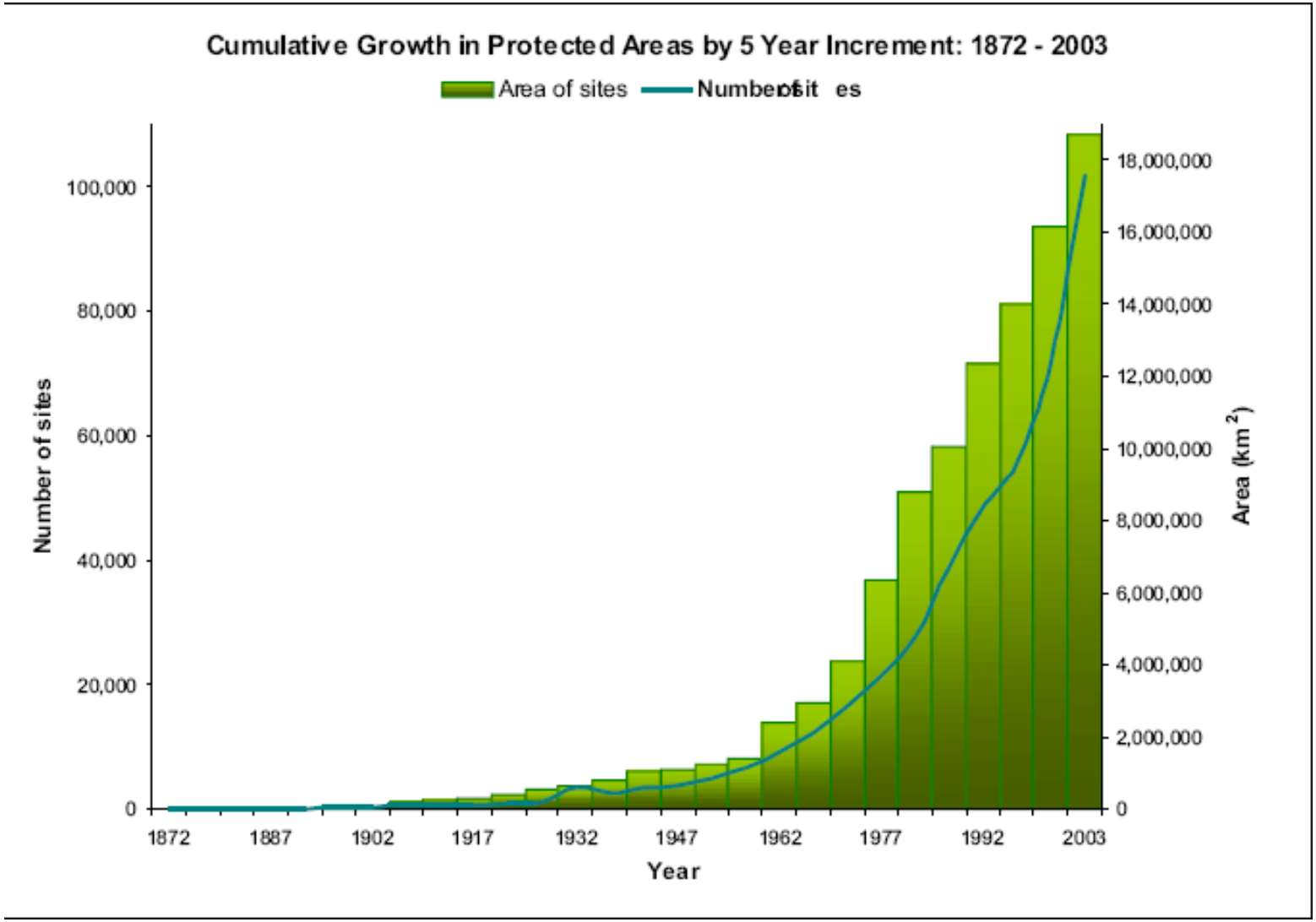
Protected areas – increase but more management challenges



Source: Conservationfinance.files.wordpress.com/2006/

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6. Technology changes - *Harvesting*

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6. Technology changes - *Products*

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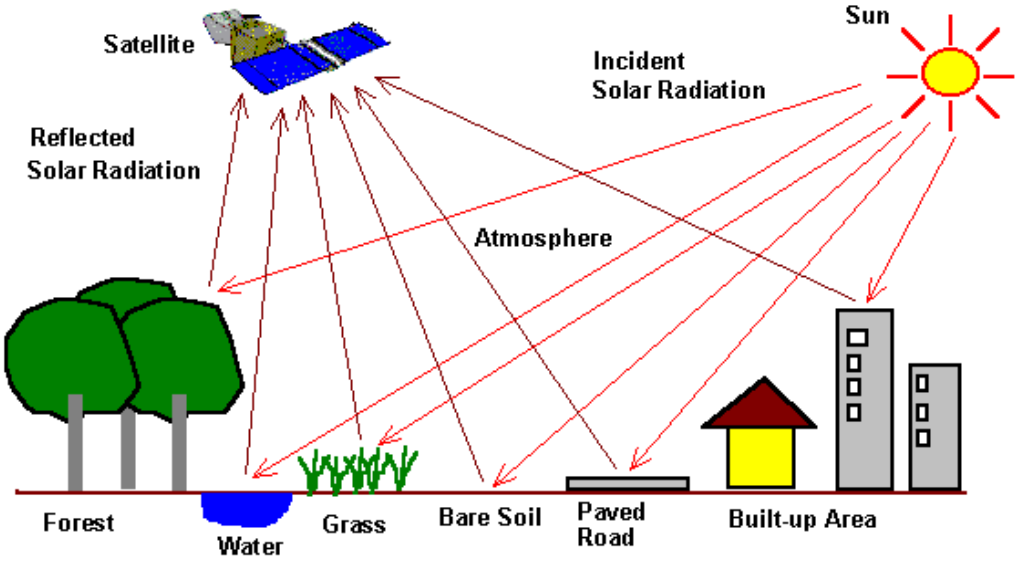
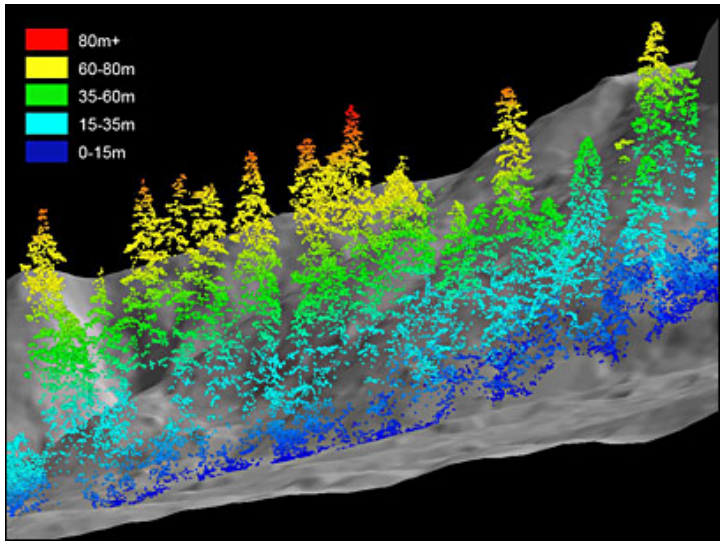
6. Technology changes - *Measurements*





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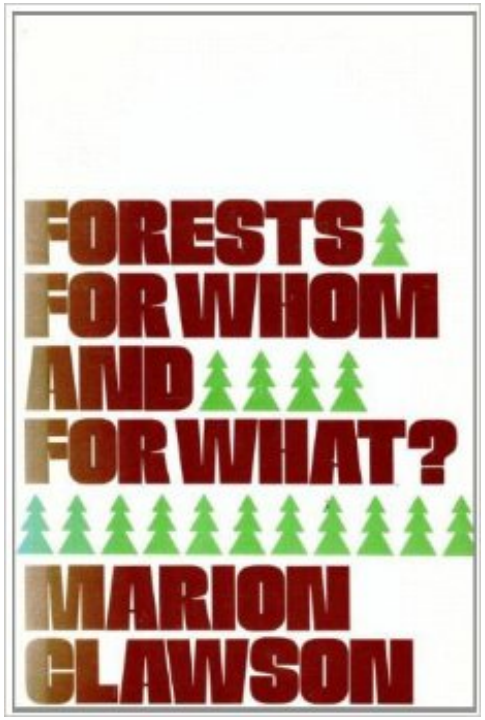
- **For whom?** – Industry or communities; domestic or international? Current generation or future generation?
- **For what?** Timber or ecosystem services; Wood products or bioenergy?
- **How?** Intensive or extensive forestry; plantations or natural regeneration; public or community or private management

- ***Determining optimum mix is a moving target!***



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Production forestry:
Forest plantations and biotechnology

Forest productivity - increase

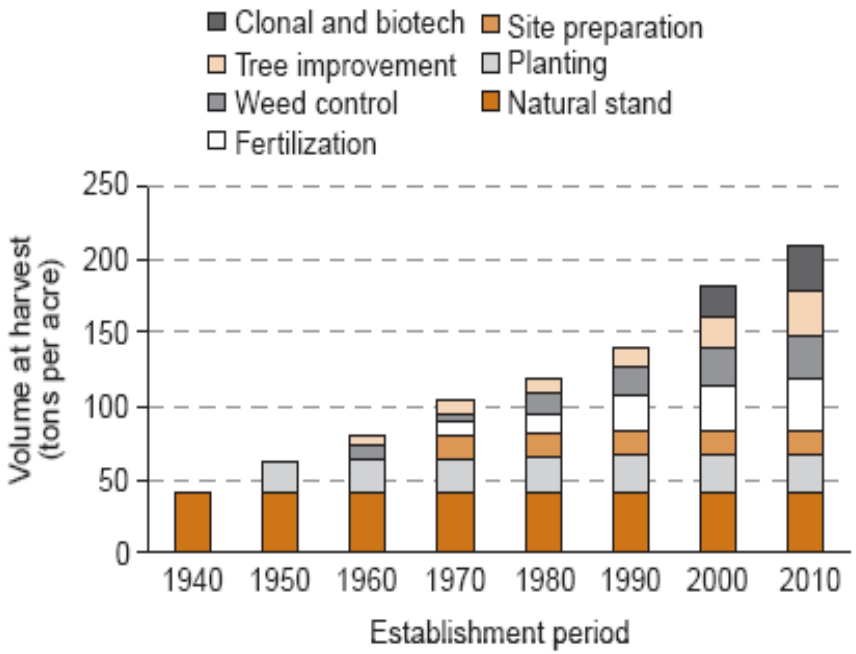

Figure 8.3—Estimated contributions of intensive management practices to productivity in pine plantations in the Southern United States from 1940 through 2010.

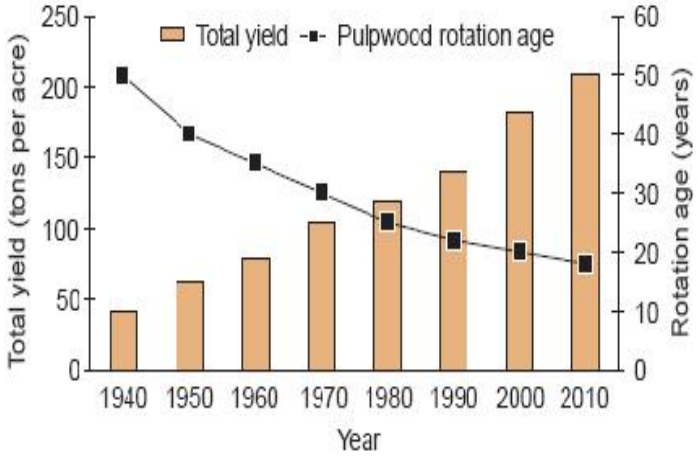

Figure 8.2—Estimated total yield and pulpwood rotation age in pine plantations in the Southern United States from 1940 through 2010.

Source: Fox, Jokela, and Allen (2004)

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Genetics and biotechnology: Short rotation plantations for pulp, lignocellulose, and saw timber

Pine:

Poplars:

Eucalyptus:

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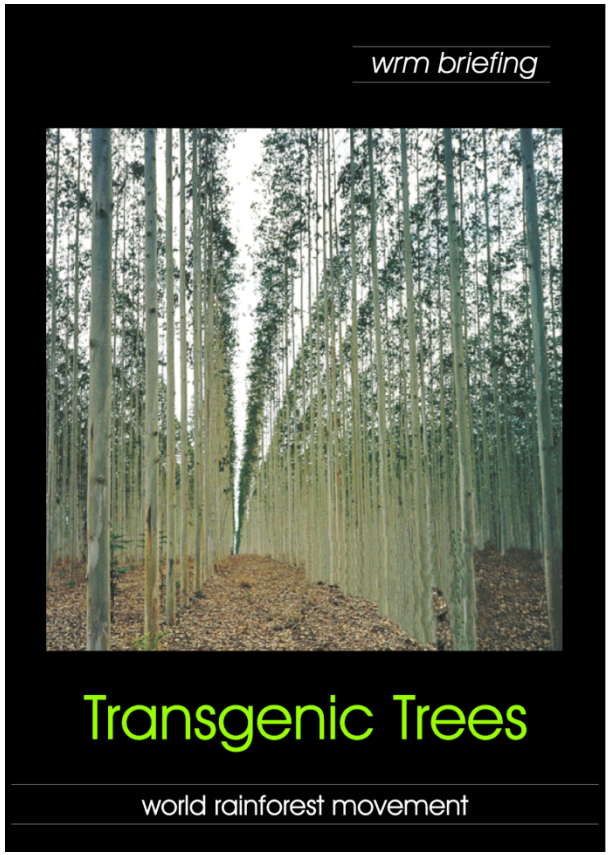
What about GMO's?

- "Genetic modification" involves artificial insertion of a gene to change a particular trait
- Examples: improve freezing tolerance in Eucalyptus, alter lignin content for bioenergy in poplars, improve disease resistance in American chestnut



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Challenges to deployment of GMO trees?

- **Regulatory**
  - Will the gene get into to native relatives?
  - Will the GM tree potentially escape and outcompete native species?
- **Social**
  - Opposition revolves around ‘unnatural’ quality of GM plants, and uncertain outcomes

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Environmental forestry:

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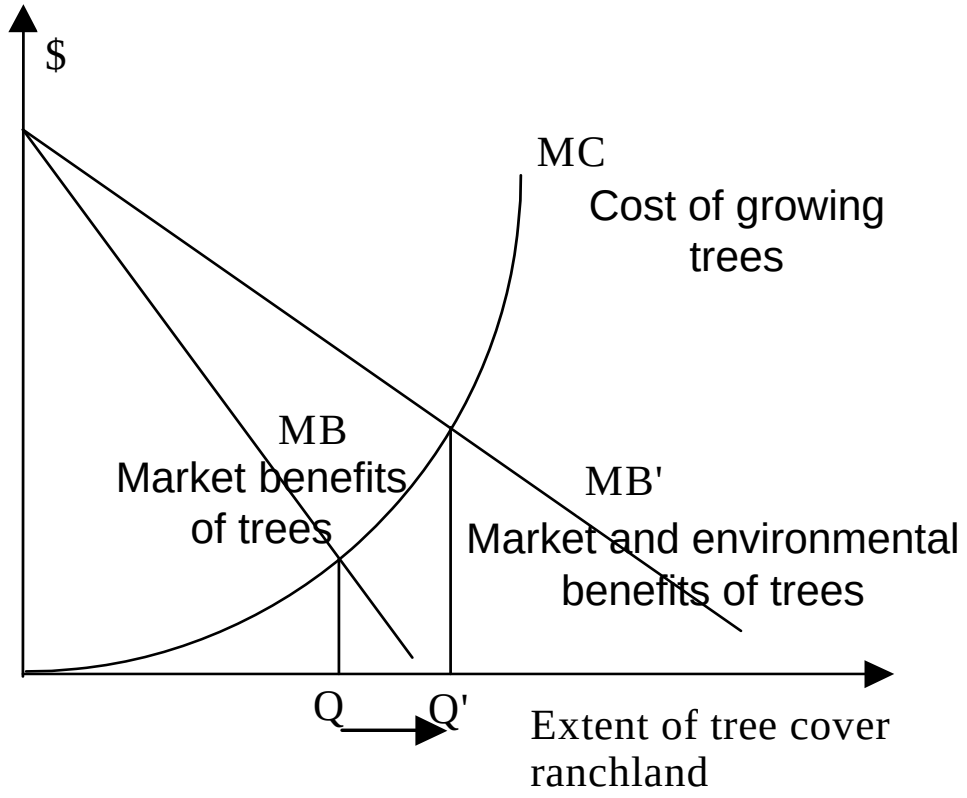
Environmental forestry:

Economic rationale

- Polluters pay & cleaners reward principles
- How can we bring them into market setting?
- Who has the right to pollute and who has the right for clean environment?



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Public Payments: NYC Watershed

- Drinking water supply for >6 million people
- Conservation of forests and agricultural lands
- Invest $30-50 million per year in conservation vs. $7+ billion in capital & operating costs (estimate 80%+ reduction in costs.

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Ecosystem services and land use practices in Chittagang, Bangladesh – (Rasul 2009)

Table 5 Performance of alternative land-use systems with biodiversity and carbon sequestration value.

	Annual Cash Crops	Horticulture	Agroforestry	Farm Forestry
Net financial benefits (NPV) (US$/ha)[a]	942.50	608.36	388.40	523.21
Net soil loss/gain (tons/ha)[a]	-84.15	-3.05	5.00	5.00
Economic loss/gain due to soil loss (US$/ha)[a]	-443.67	-6.09	26.35	26.35
Biodiversity index[b]	0.00	0.30	0.60	0.40
Biodiversity services (US$/ha)	0.00	121.5	243.00	162.00
Carbon sequestration[b]	0.00	0.40	0.50	0.80
Carbon sequestration services (US$/ha)	0.00	162.00	202.50	324.00
Total economic benefits (NPV) (US$/ha)	498.33	873.77	860.25	1,035.56

[a] Figures are derived from the third row of Table 4

[b] Indices of biodiversity and carbon sequestration are from Pagiola et al. (2004). For details, see Pagiola et al. 2004 and Pagiola et al. 2007.

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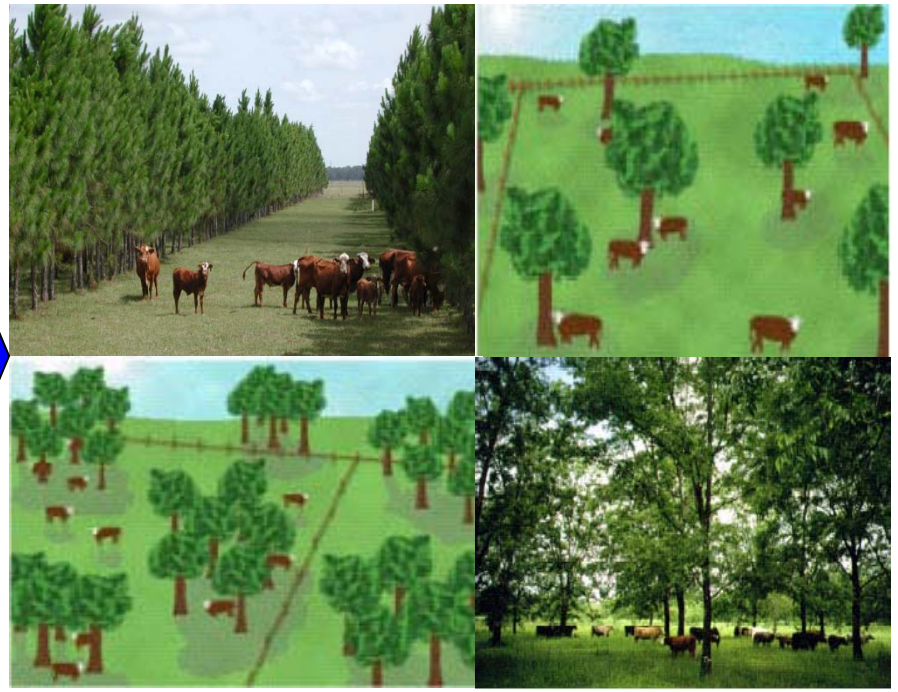
Ranching to silvopasture in Florida: Can we produce green beef?

Traditional ranching



Silvopasture

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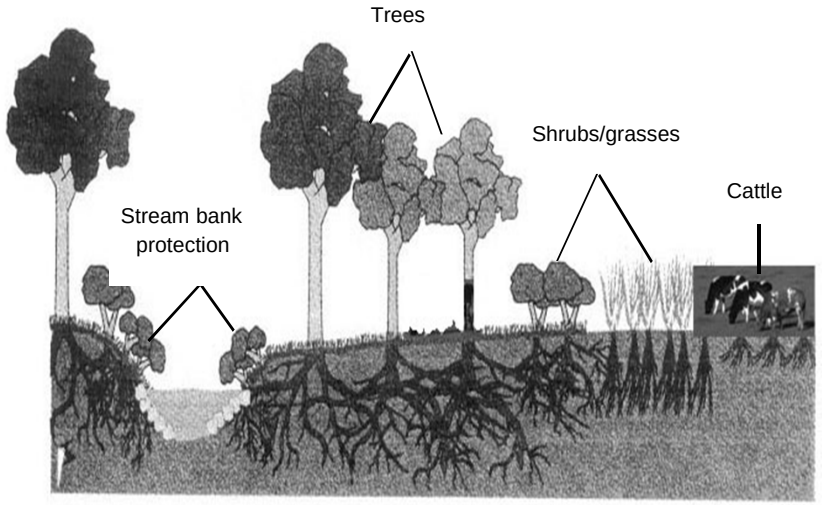
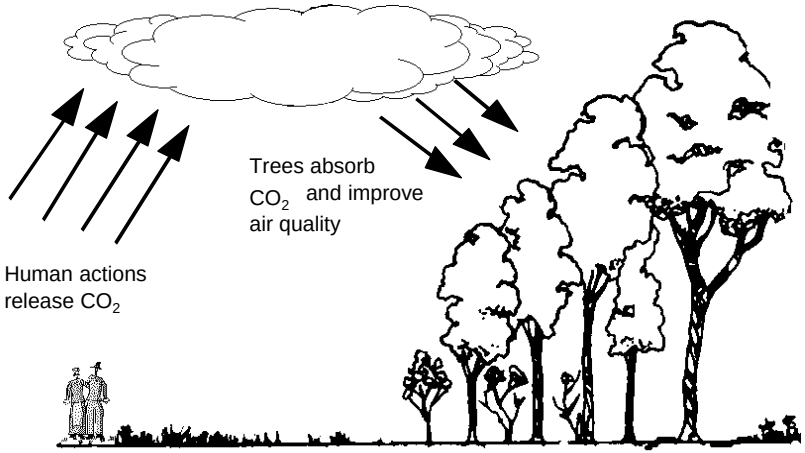
Environmental benefits of agrforestry

- Reduce pollution runoff
- Carbon sequestration
- Improve wildlife habitat (biodiversity)
- Others …



1. Runoff reduction



2. Carbon sequestration

3. Habitat protection

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Willingness to accept & pay to adopt silvopasture in Florida

- Mean willingness to accept
  - 9.32 per acre /year
  - With 6.06 million acres of ranchland, the total cost would be - $56.45 million
- Public willingness to pay
  - $137 per household
  - $924 million for 5 years

Shrestha and Alavalapati 2004

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Carbon forestry

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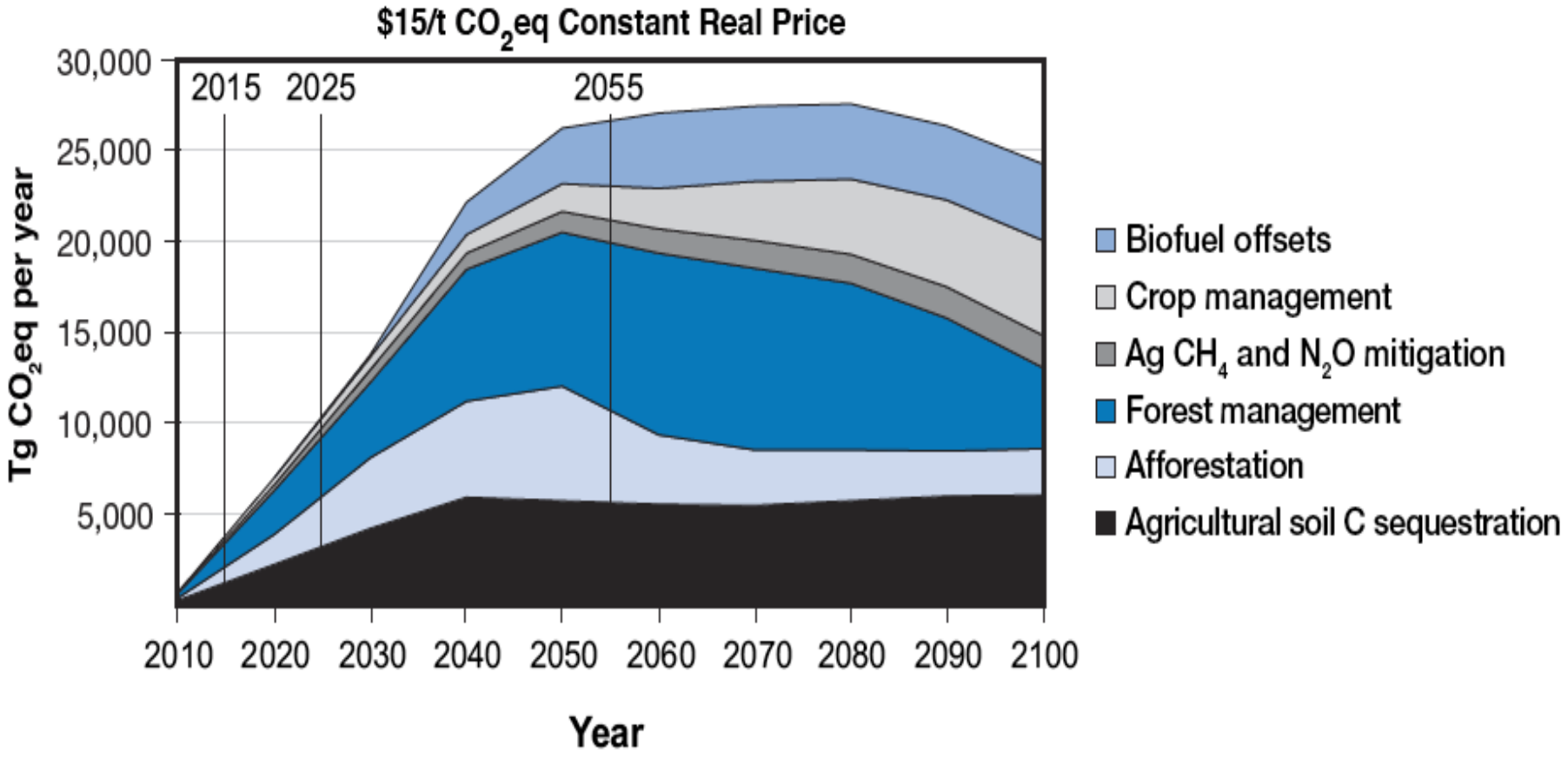
GHG mitigation potential from agriculture and forestry



Source: ***from US EPA*** **2005**

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Carbon markets – Forestry

Table 1: Comparison of 2011 and 2012 Forest Carbon Markets' Transaction Volumes, Values, and Average Prices, All Markets

MARKET*	Volume		Value		Average Price	
	2011	2012	2011	2012	2011	2012
Voluntary OTC	16.7 M	22.3 M	$172 M	$148 M	$10.3	$7.6
California / WCI	1.6 M	1.5 M	$13 M	$12 M	$8.1	$8.2
Australia CFI	-	2.9 M	-	$38 M	-	$13.3
Voluntary Total	18.3 M	27 M	$185 M	$198 M	$9.2	$7.7
CDM / JI	5.9 M	0.5 M	$23 M	$0.6 M	$3.9	$1.1
NZ ETS	-	0.2 M	-	$1.9 M	-	$7.9
Other	1.5 M	0.6 M	$29 M	$15.6 M	$19.7	$25.3
Compliance Total	7.3 M	1 M	$51.5 M	$18.1 M	$7.2	$10.5
Grand Total	25.6 M	28 M	$237 M	$216 M	$9.2	$7.8
Primary Market	21 M	22 M	$143 M	$137 M	$8.1 M	$7.5
Secondary Market	4.9 M	6.3 M	$54.7 M	$57 M	$12.1 M	$9.8

Source: Ecosystem Marketplace 2013

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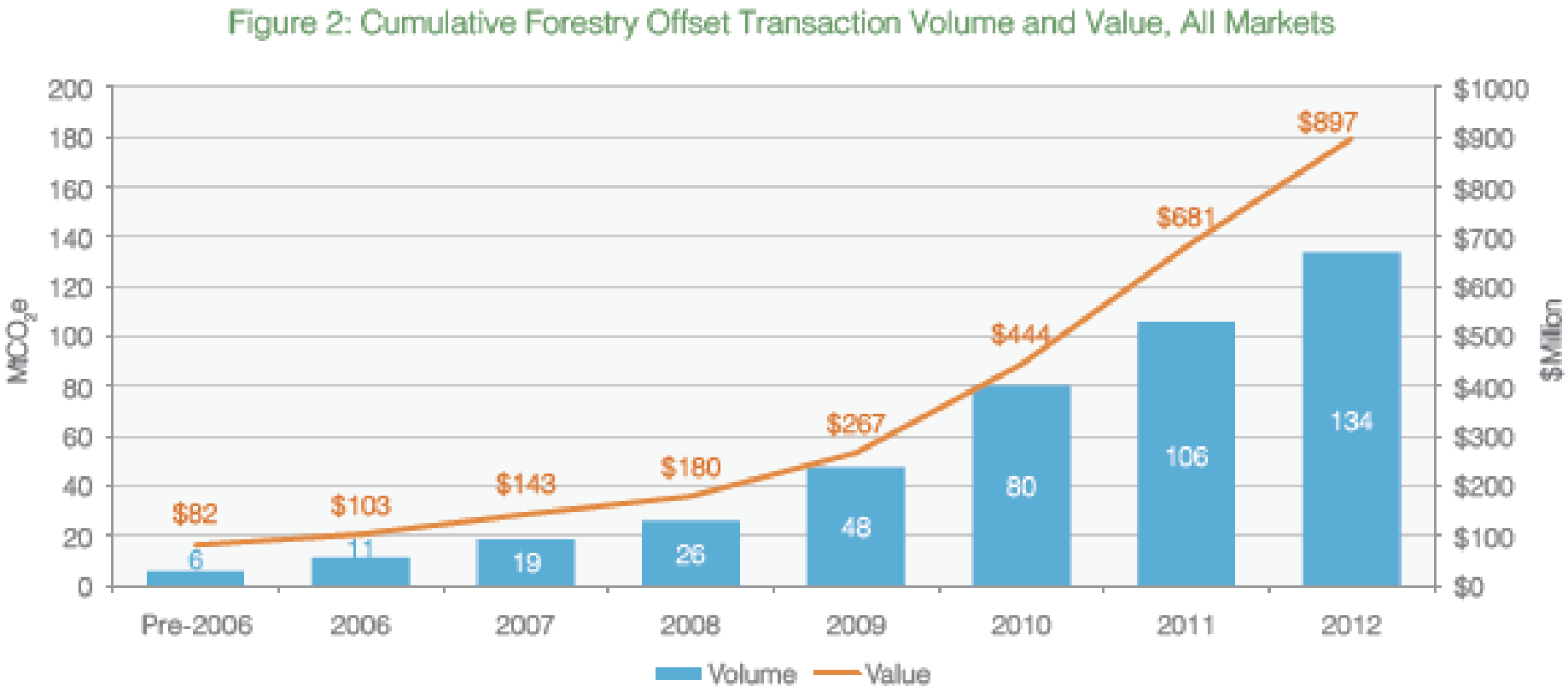
Carbon markets – Forestry



Source: Ecosystem Marketplace 2013

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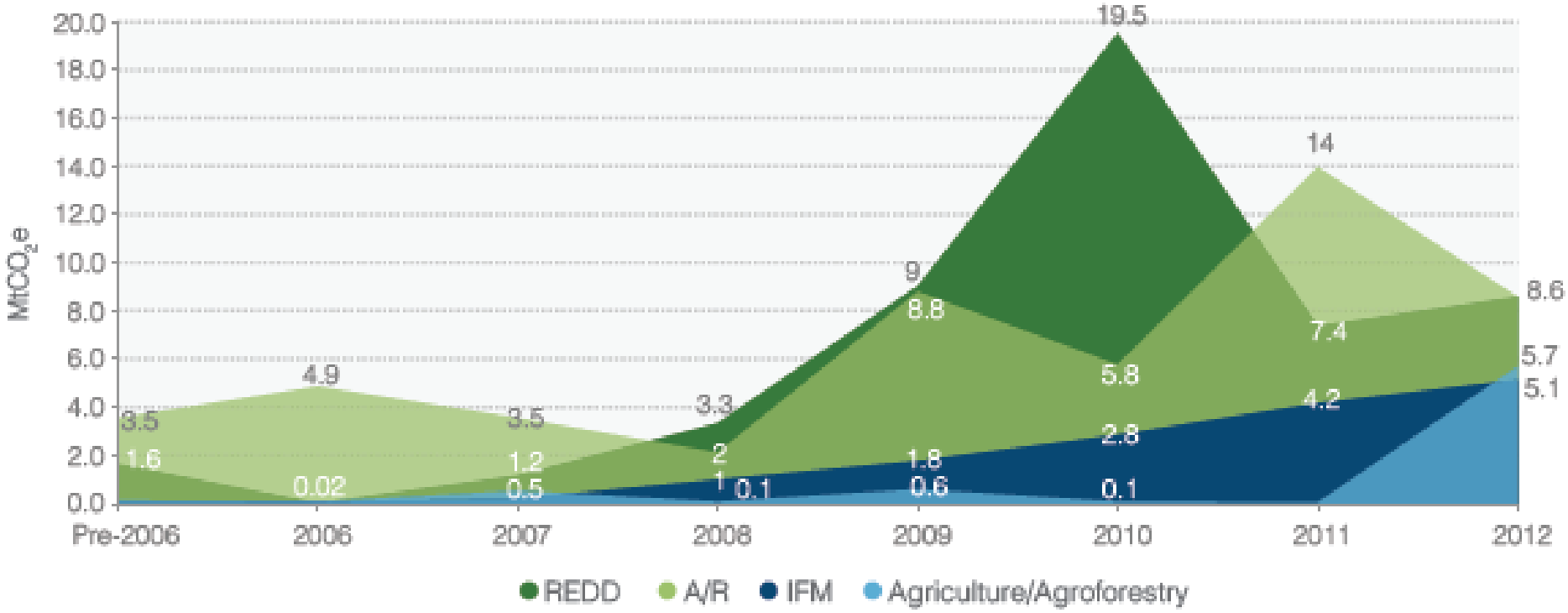
Carbon markets – Forestry

Figure 4: Transacted Offset Volumes by Project Type, All Markets, Historical



Source: Ecosystem Marketplace 2013

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REDD+: Guyana-Norway partnership

Under REDD+, Norway will pay Guyana for forest climate services up to US$250 million by 2015. To date Guyana has earned US$115 million in payments for climate services.

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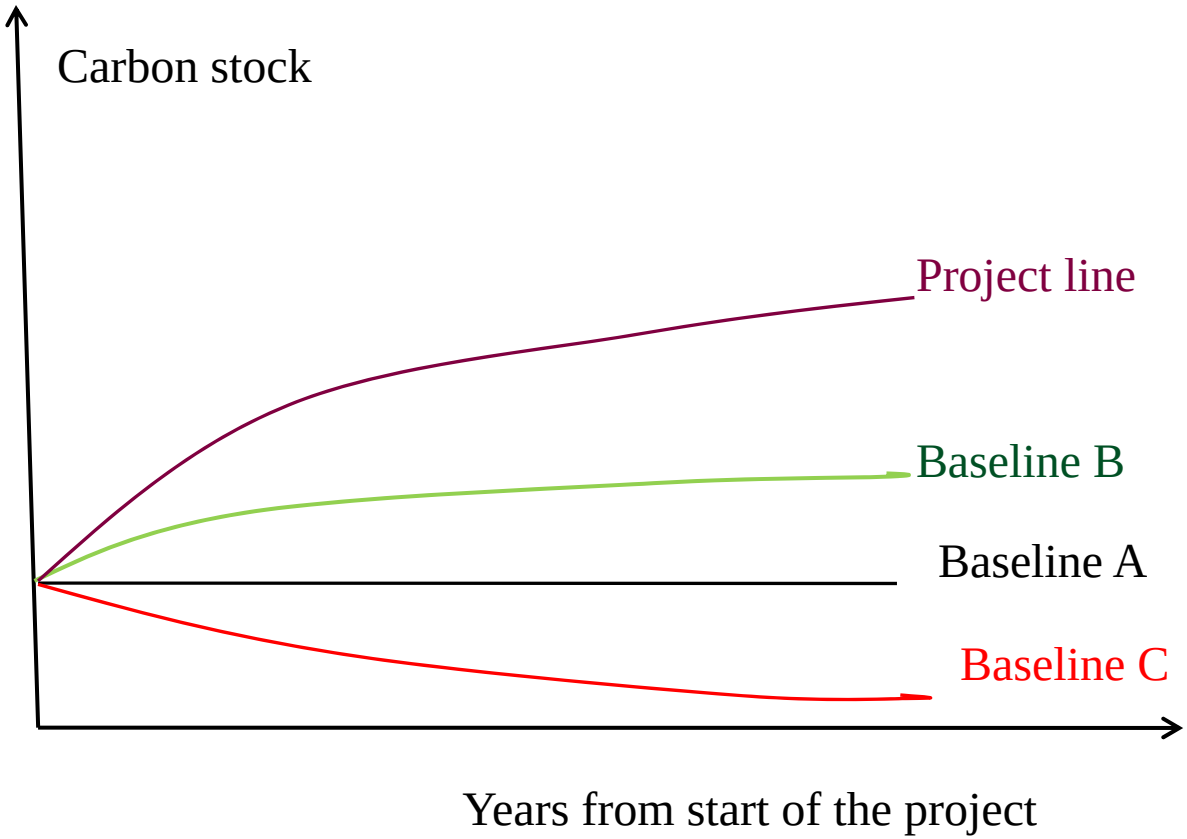
Forest carbon credits: Issues

- Additionality and baseline issues continue to pose challenges



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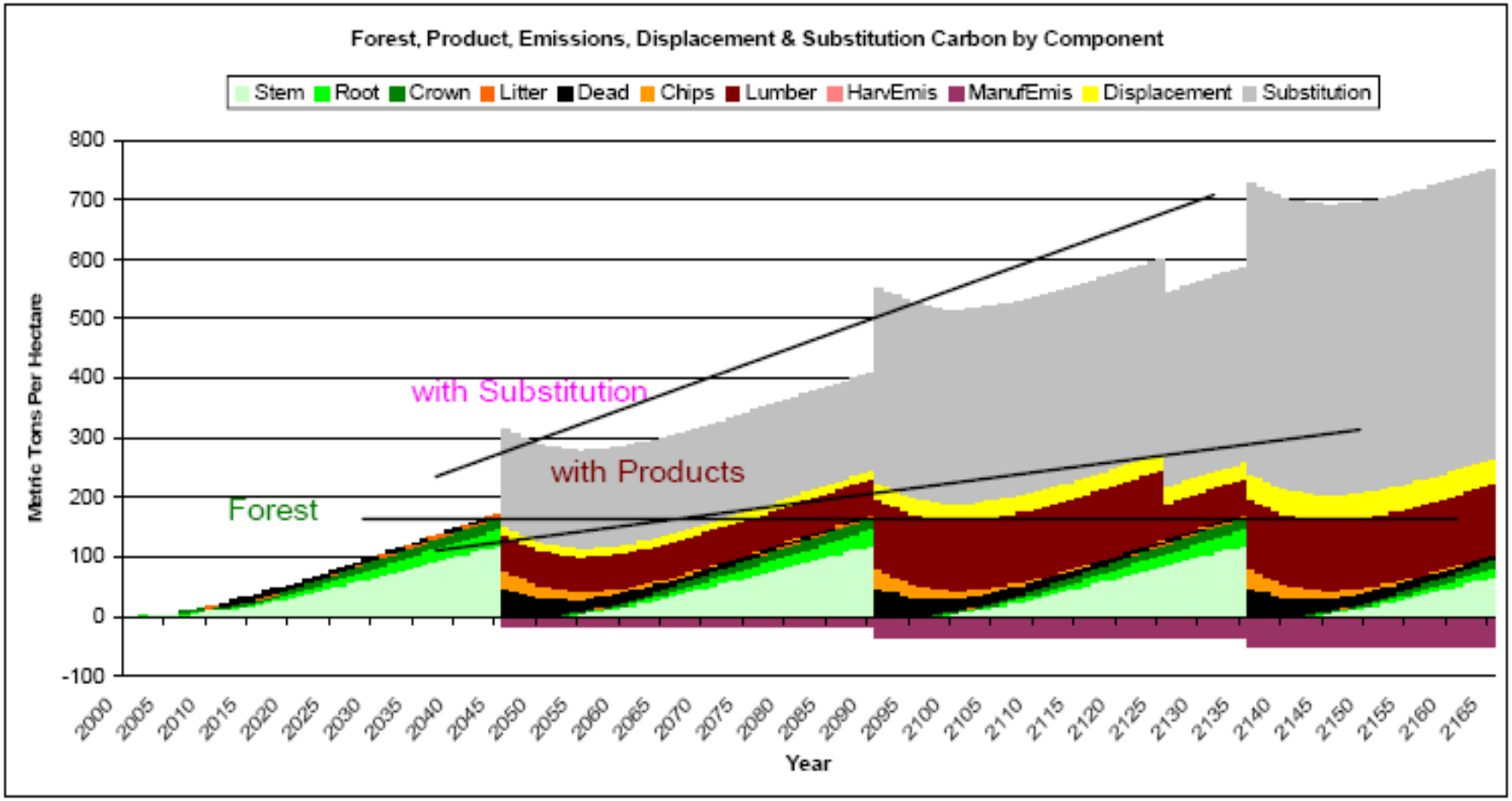
Forest carbon sequestration



Forests, products, and carbon emissions displacement (CORRIM 2004)

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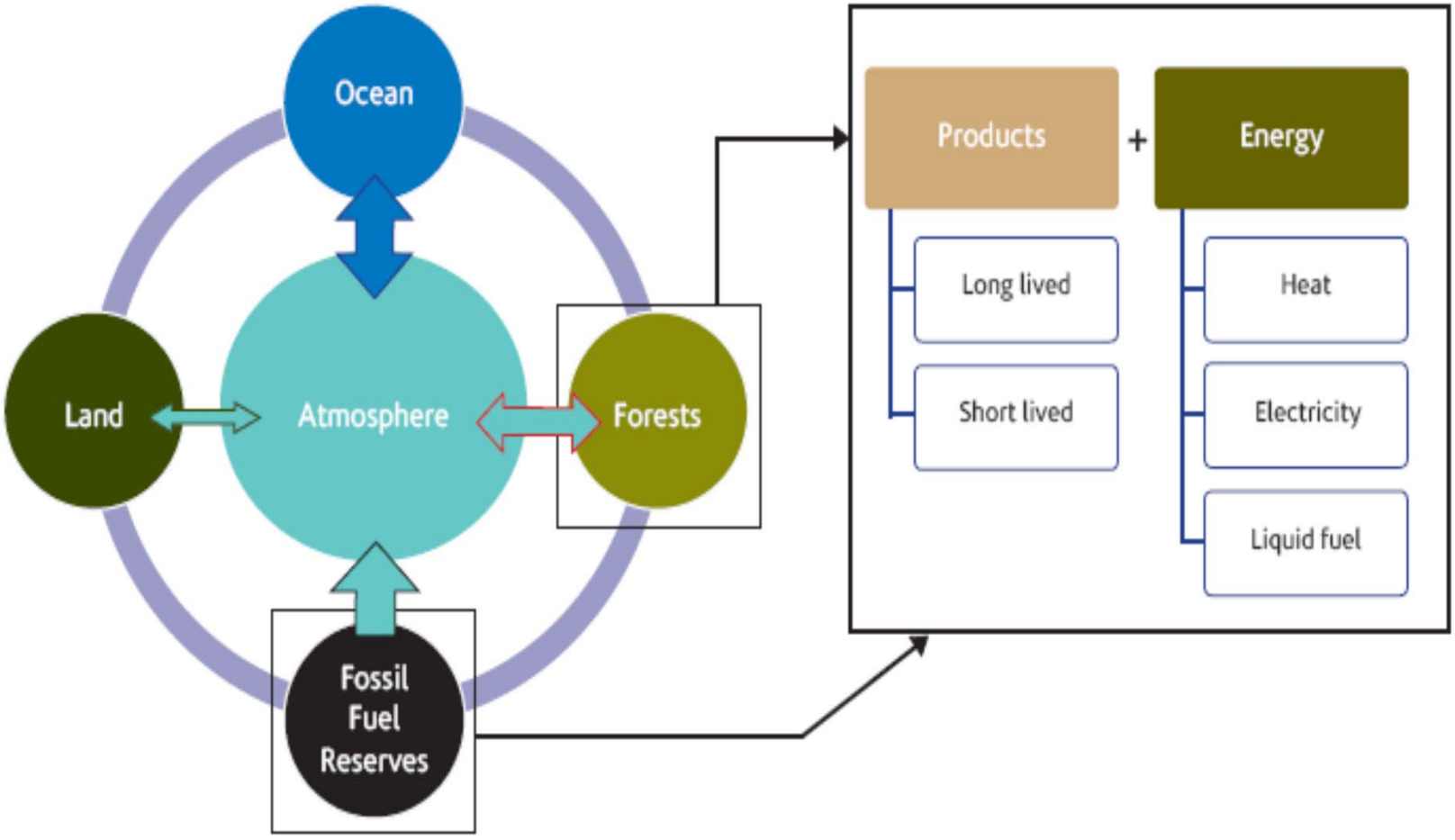
Forests & bioenergy - Carbon Cycle



Source: Adapted from Lippke et al. (2011).

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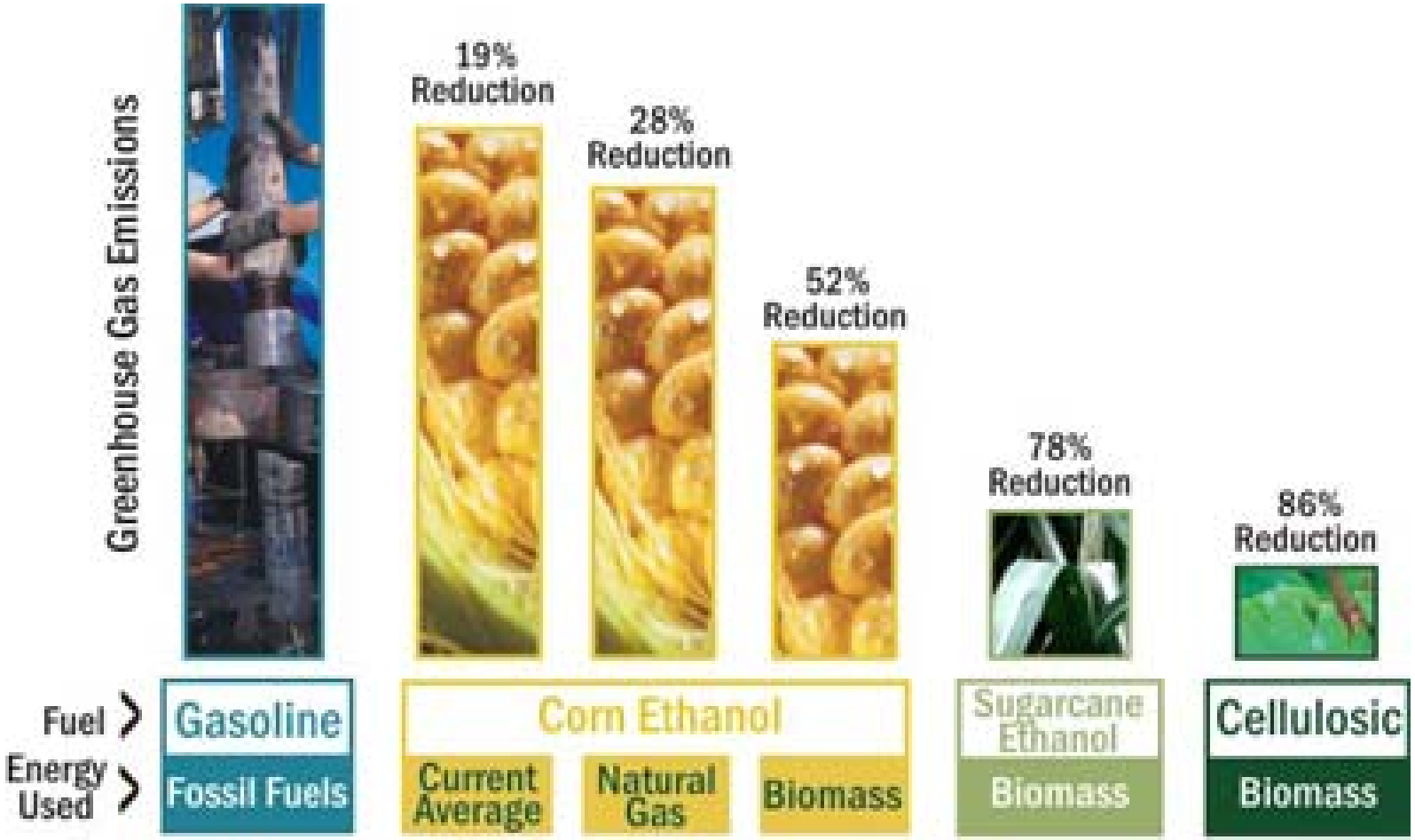
Reduction of GHGs emissions from ethanol



Source: Wang et al, *Environmental Research Letters*, Vol. 2, 024001, May 22, 2007

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Public's willingness-to-pay, as a premium, for wood based ethanol to realize environmental benefits?

WTP ($ premium per gallon) for woody biofuels at state level

Blend	AR	FL	VA
E10	0.56	0.58	0.50
E85	0.82	1.17	1.06

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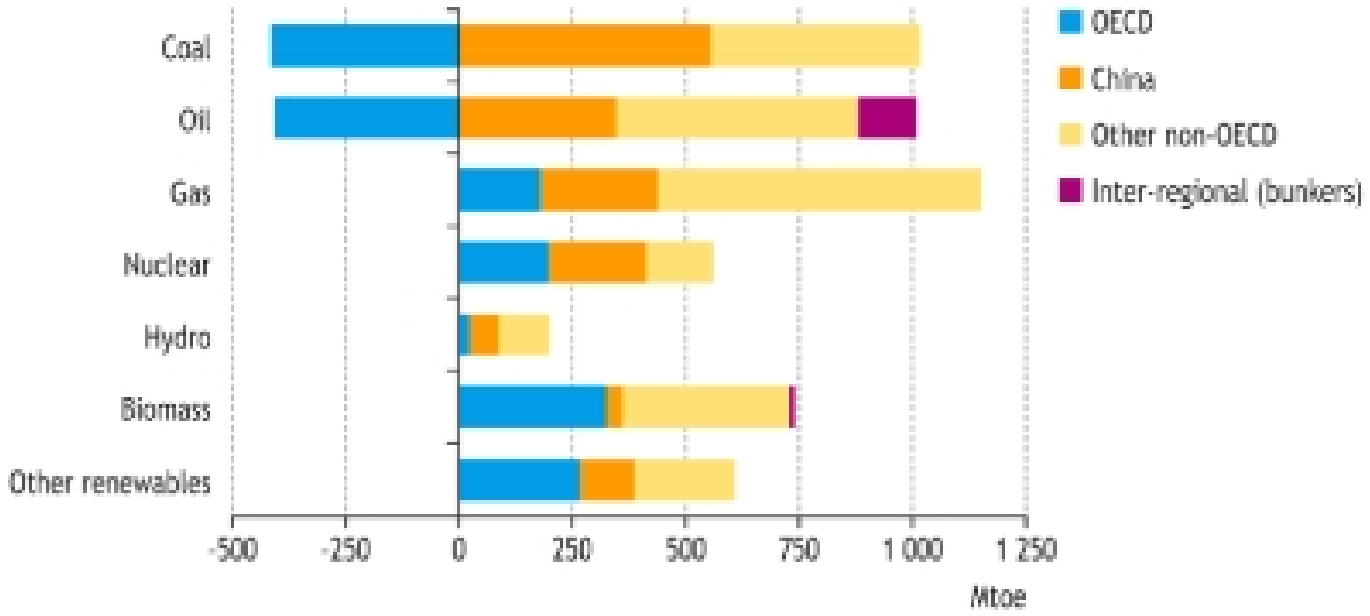
Emerging economies dominate the growth in demand for all fuels

World Energy Outlook

Incremental primary energy demand by fuel & region in the New Policies Scenario, 2008-2035



Demand for all types of energy increases in non-OECD countries, while demand for coal & oil declines in the OECD

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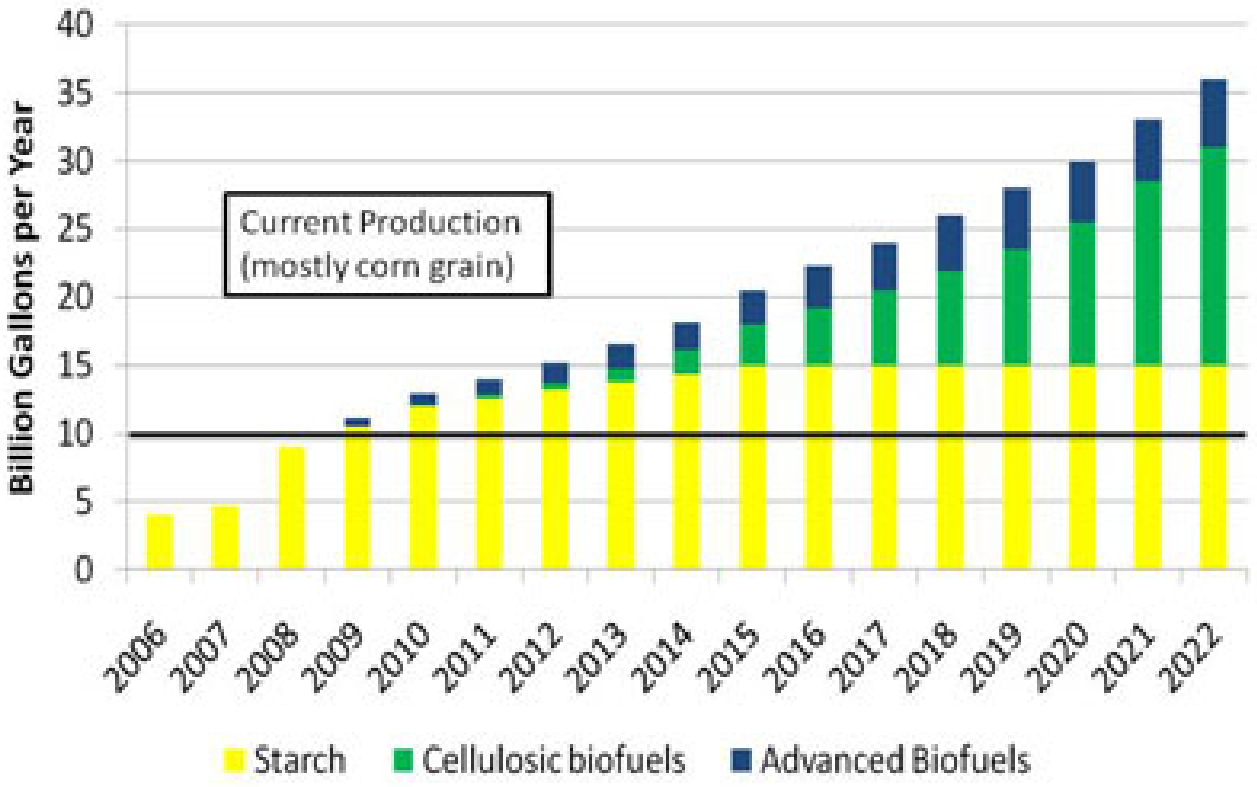
EISA 2007 RFS Mandate



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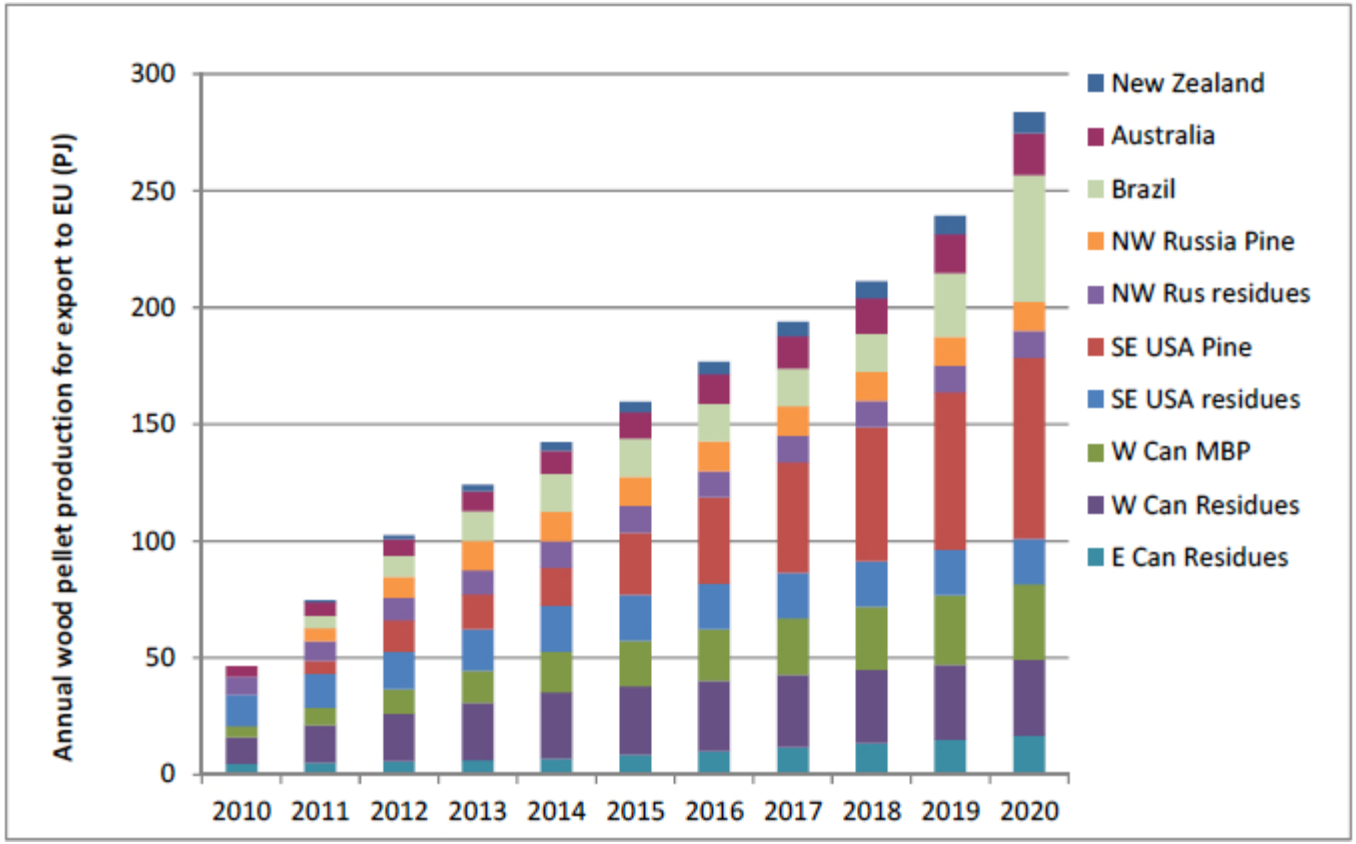
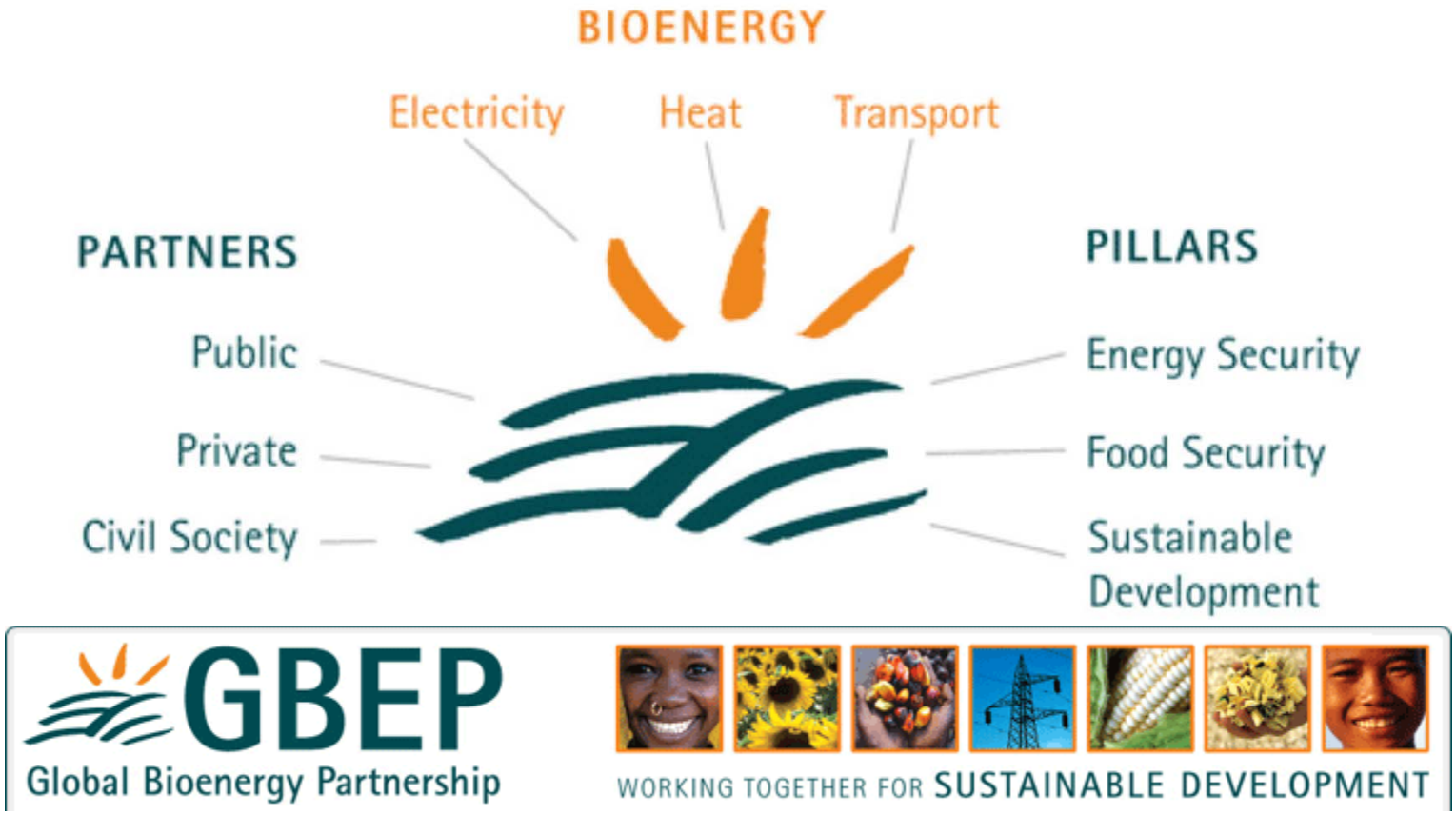
Wood pellet market



International institutions showed up to promote bioenergy



In the July 2005, the G8 +5 (Brazil, China, India, Mexico and South Africa) agreed to "... promote development and commercialization of renewable energy by launching a Global Bioenergy Partnership

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Forest governance

- State or public forest management
- Participatory forest management
- Community forest management
- Public-private partnership forest management
- Private forest management

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Public Forest Management:

India, Bangladesh, Pakistan for example

- The government manages resources directly through state forest departments
- Limited rights and benefits to community

- Citizens and communities are considered external to management
- Often strained relationships between the state and the people

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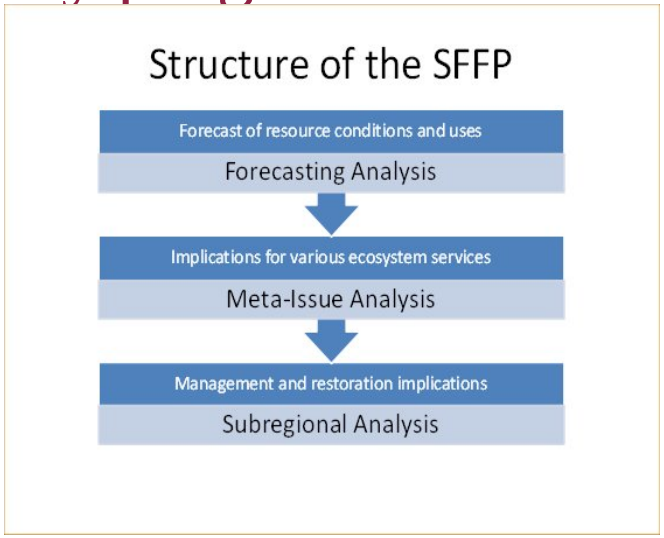
Participatory Forest Management:

USDA Forest Service and Social Forestry programs in India

- Public input is a mandate in for US Forest Service Plans
- State agencies oversees management and get input from public



- Often it becomes a long process
- State agencies often perceive this as a burden or loss of power

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Community Forest Management:

Nepal, India, Mexico

- Community has greater say in planning and management
- Community can frame local rules for management

- Community elites can become powerful
- Poor may not have much say in decision-making

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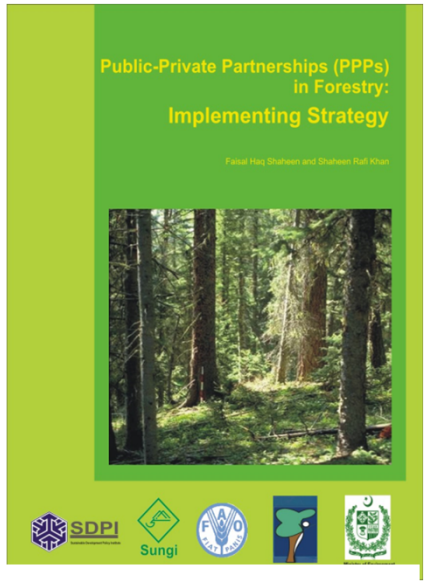
Public-Private Investment

- Forest Concessions – U.S., Canada & Brazil
- NTFP Marketing – Tendu leaves trade in India
- Management of recreation parks - U.S. Forest Service and private entities



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Private or Corporate Management:

New Zealand, TIMOs, State Development Corporations

- "Government may not be best to maximize profits" but can assist with research/education/outreach
- "Private/corporate may be effective to maximize profits"

- Might motivate private/corporate entities to explore innovative management and technologies

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Which type of governance –
No easy answer - *we need to investigate and develop science-based information for decision-makers*

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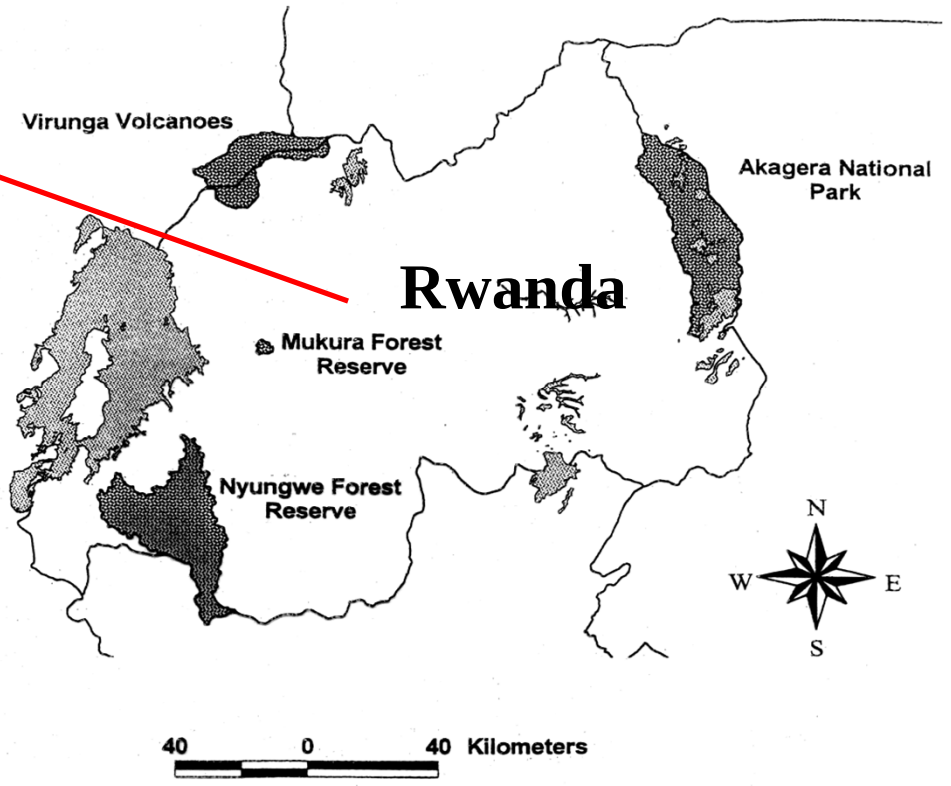

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SWOT Factors of CFM NFR

- **Strengths**
  - *S1 :Additional source of income*
  - *S2 :Management benefits*
  - *S3 :Favorable institutional set up*

Opportunities

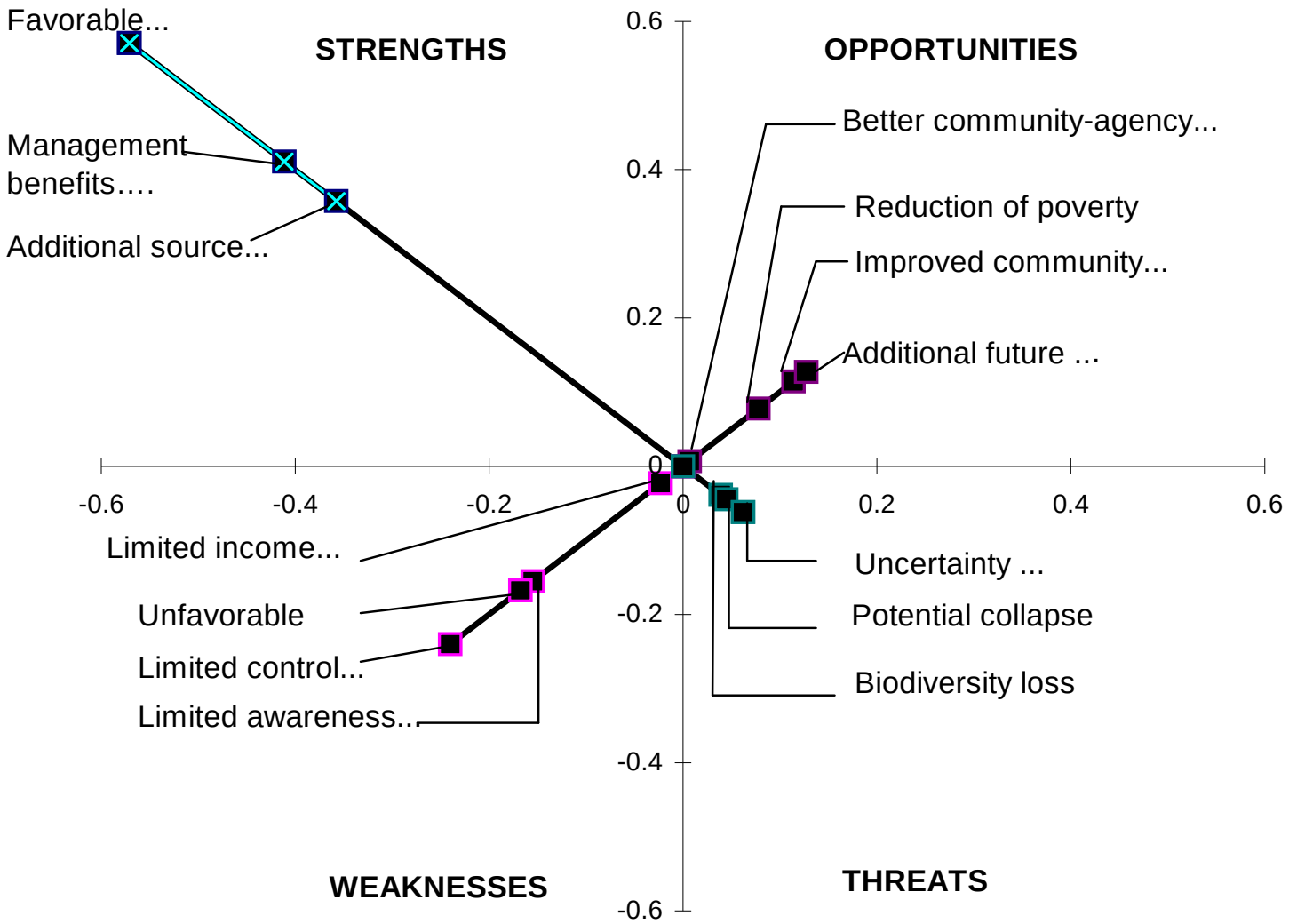
O1 :*Better community-agency relationship*.
O2 :*Reduction of poverty*.
O3 :*Improved community awareness*.
O4 :*Additional future benefits*

- **Weaknesses**
  - *W1 :Limited income generation*
  - *W2 :Limited awareness about conservation and development activities*
  - *W3 :Unfavorable traditions*
  - *W4 :Limited control by governmental control of on community actions*

Threats

T1 :*Biodiversity loss*.
T2 :*Potential collapse of CFM*.
T3 :*Uncertainty associated with high level decisions.*

Perceptions of Community for CFM – AHP analysis



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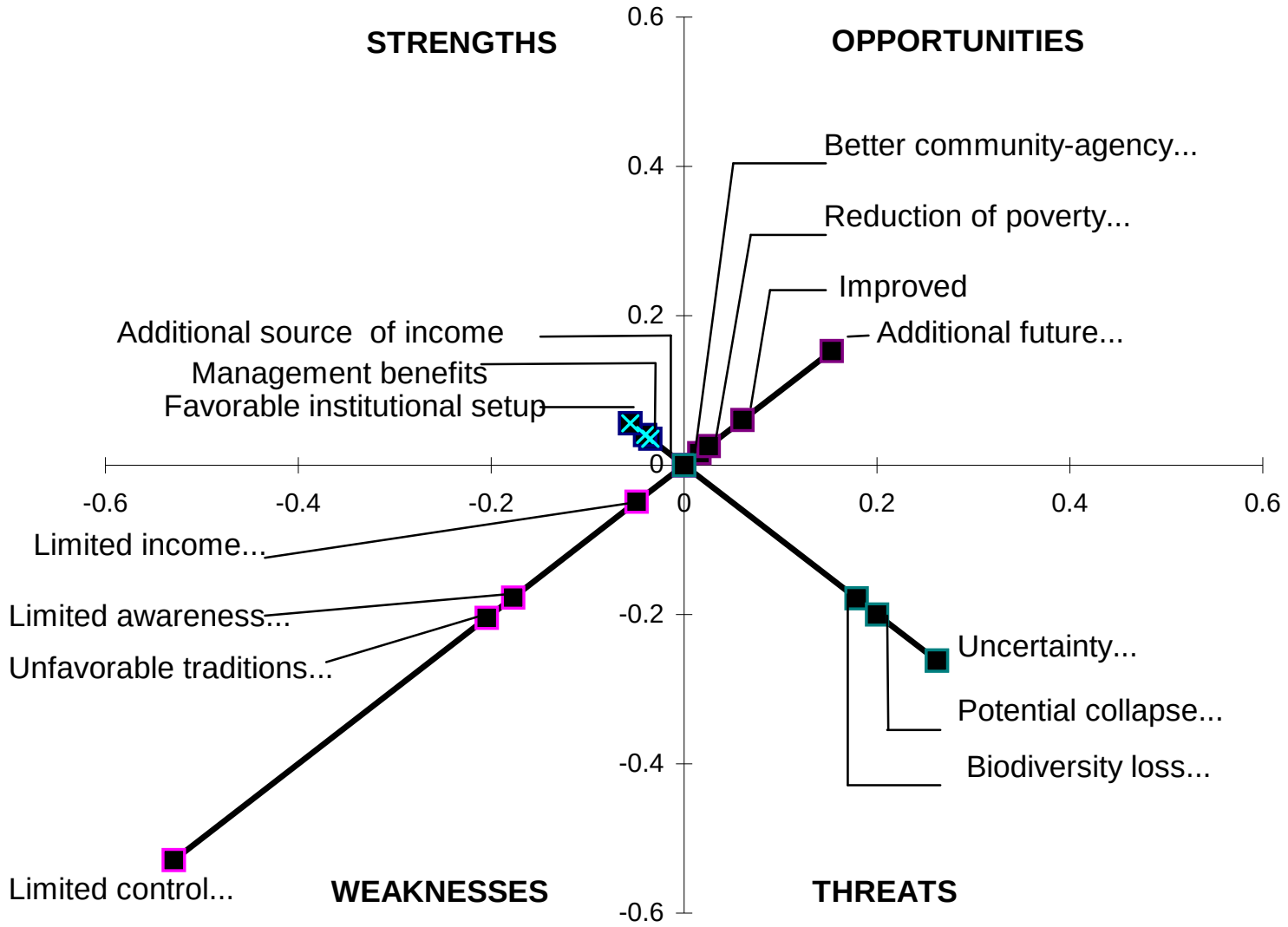
NGO's preferences for CFM – AHP analysis



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Sustainable forestry: Take-home messages

- Values, socioeconomic factors, technologies, and preferences are moving targets - continue to influence sustainable forestry
- Significant potential exists to increase forest productivity – public awareness/support is needed
- Inclusion of ecosystem services is important for sustainable forestry
- Forests and products can play a significant role in climate mitigation
- Hard to say which governance is best for sustainable forestry - Choice is a moving target.

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THANK YOU!!