GEOBENE

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IIASA - Side Event

Total Land-Use Impacts of Avoided Deforestation

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This document contains only preliminary results

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Outline

I. Introduction

II. Model

III. Scenarios

IV. Results

V. Policy implications

VI. Conclusion

I. Introduction

LAND – fixed production factor

competition between forestry and other land uses

→ AVOIDED DEFORESTATION impacts on

Global environment

Agricultural production

Bioenergy production

Synergies or conflicts between different environmental effects (GHG emissions, water consumption,…) and food production and GHG emissions.

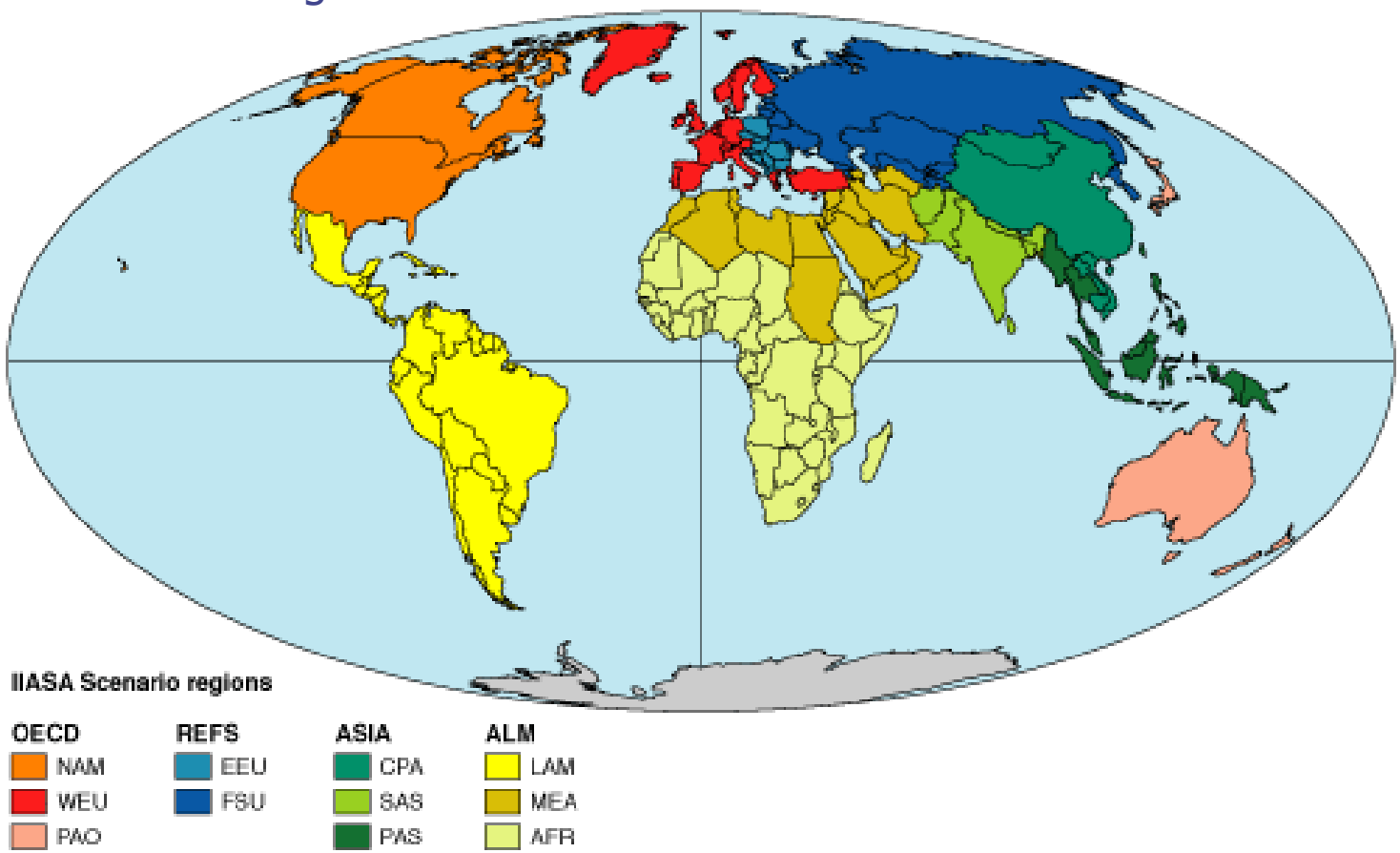
Integrated Forestry, Agriculture and Bioenergy model applied.

II. Model: GLOBIOM

Global Biomass Optimization Model

Coverage: the Earth

Basic resolution: 11 regions



II. Model: GLOBIOM

Biomass

3 land based sectors:

Forestry: traditional forests for sawnwood, and pulp and paper production

Agriculture: major agricultural crops (> 30)

Bioenergy: conventional or dedicated crops

Optimization Model (FASOM structure)

Maximization of the Social Welfare (PS + CS)

Partial equilibrium model: endogenous prices

II. Model: GLOBIOM

Resource constraints: Land

COMPETITION: Forestry x Agriculture x Bioenergy

Output:

production Q → land use, GHG, water use

consumption Q → undernourishment indicators

trade flows

prices

III. Scenarios

2030 estimated FOOD and WOOD demand

+

Substitution of **5% of total energy** consumption
according to IIASA A2r baseline scenario 2030 by **BIOENERGY**
(50% methanol)

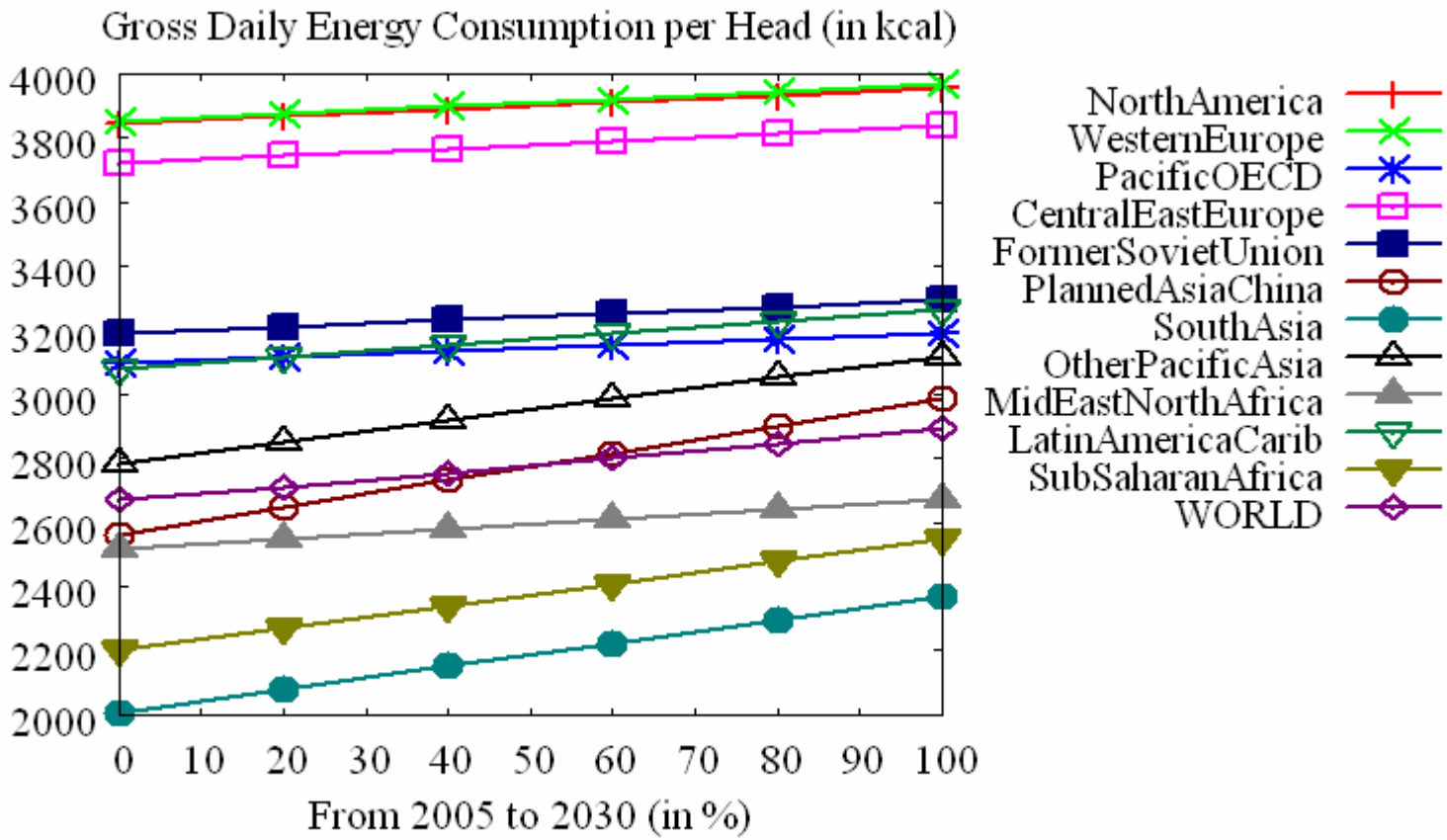
Variants

a) WITH DEFORESTATION

b) AVOIDED DEFORESTATION

+ 80% adjustment to ensure feasibility

III. Scenarios



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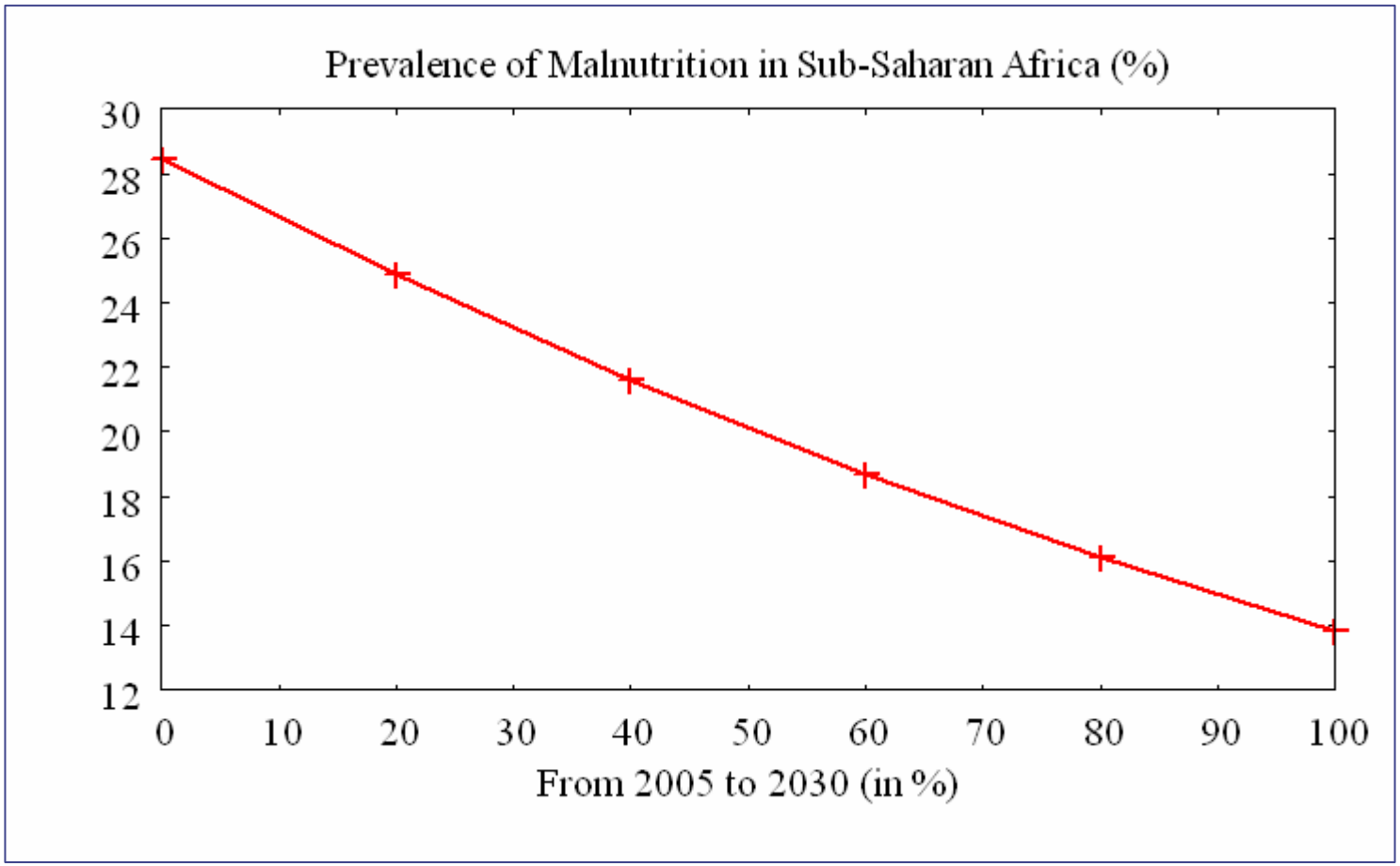

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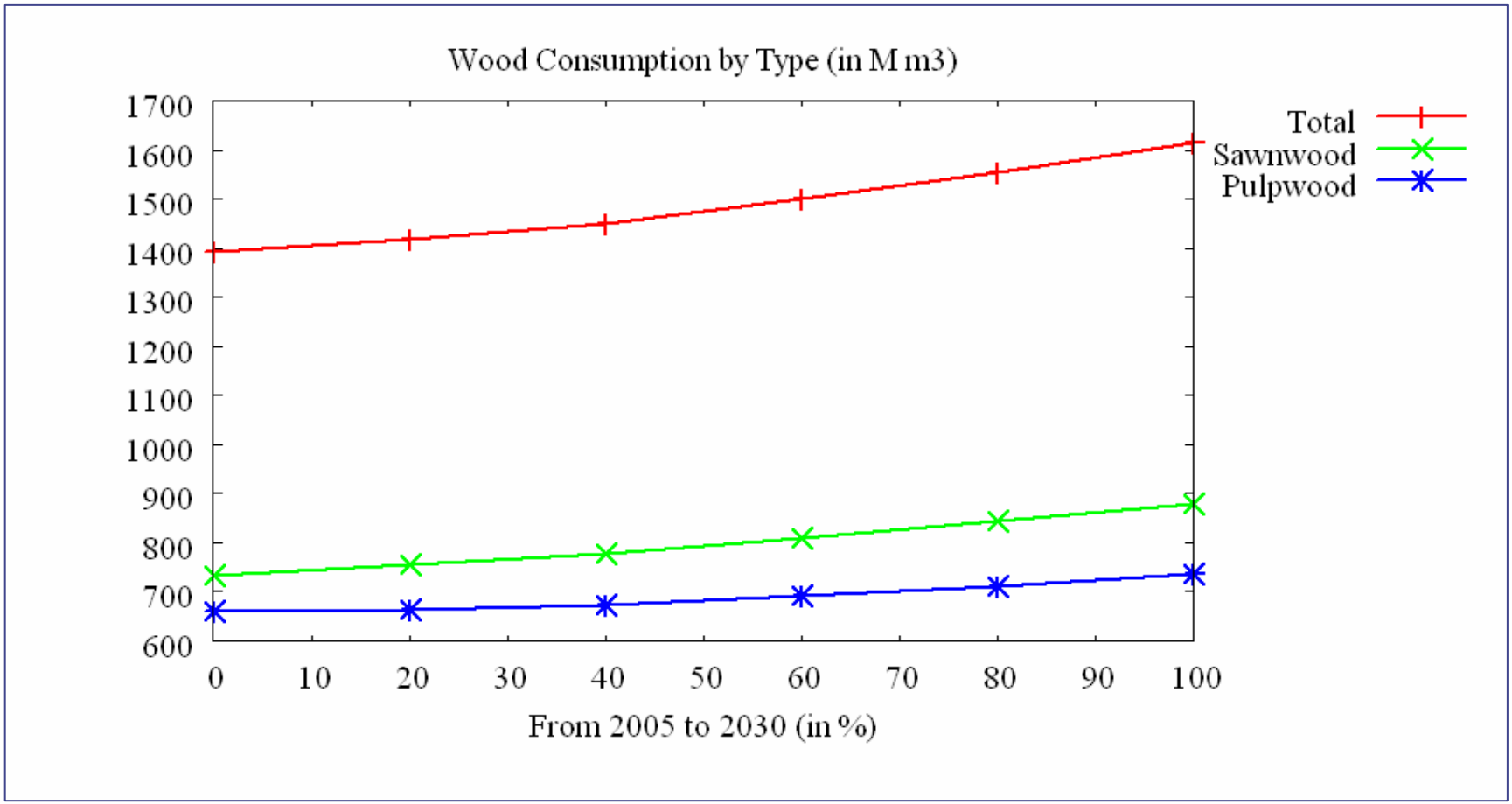

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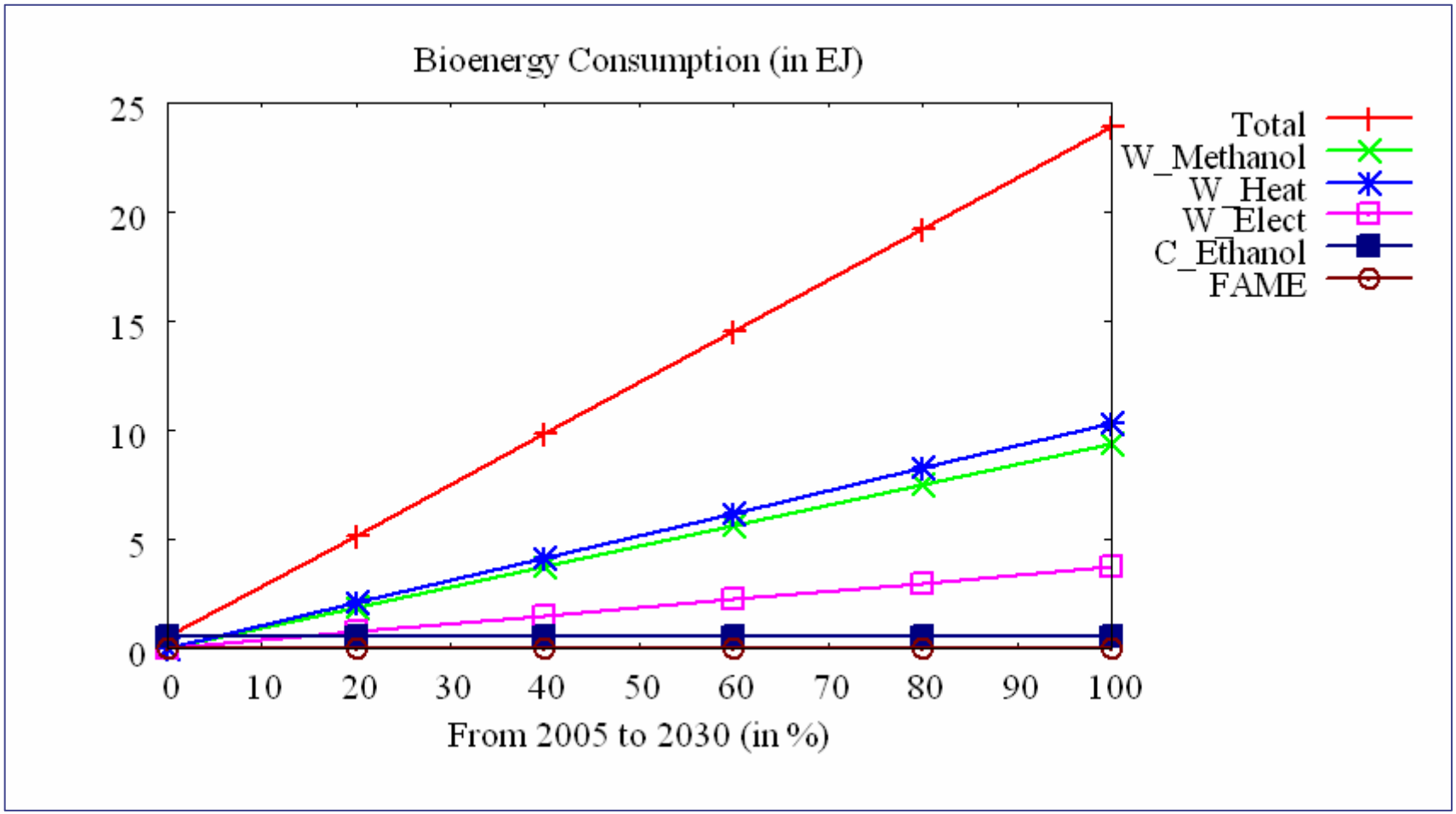
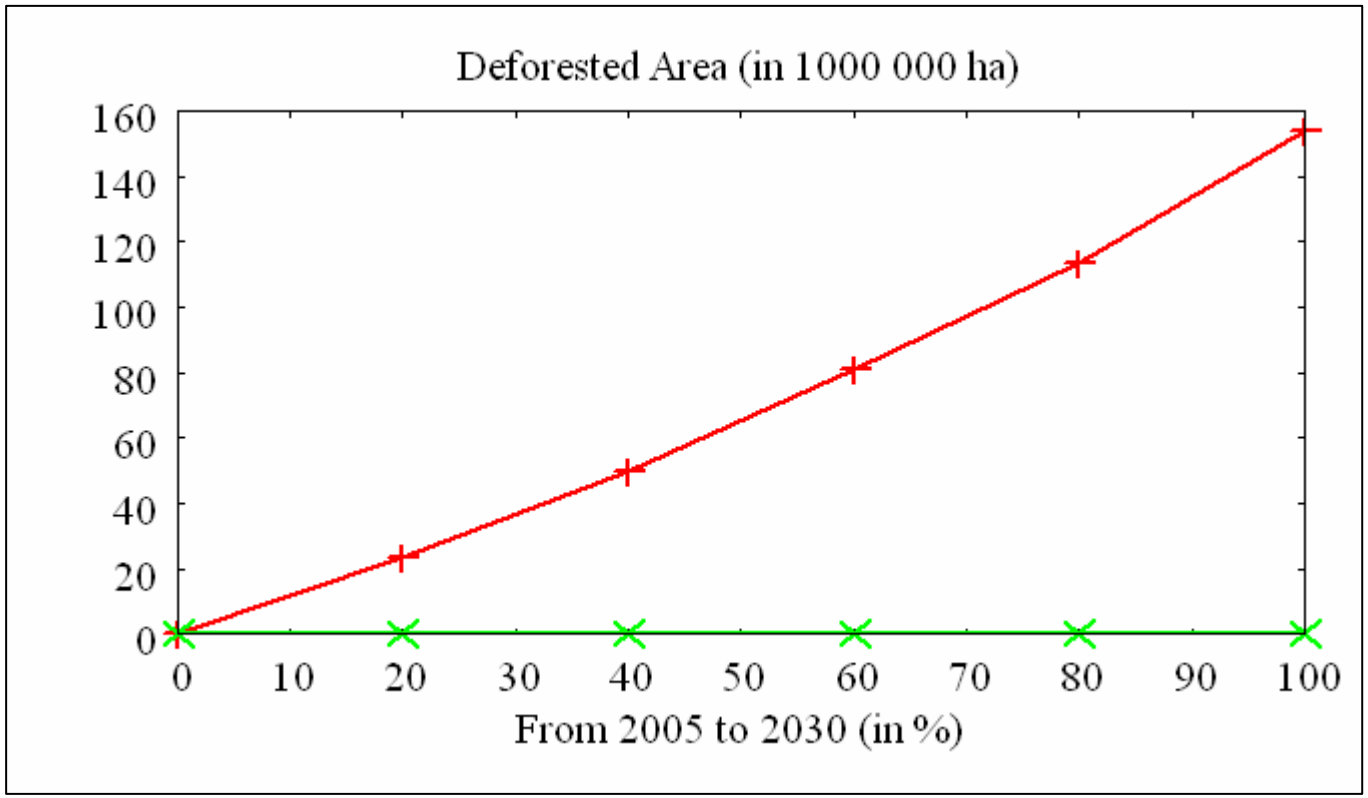
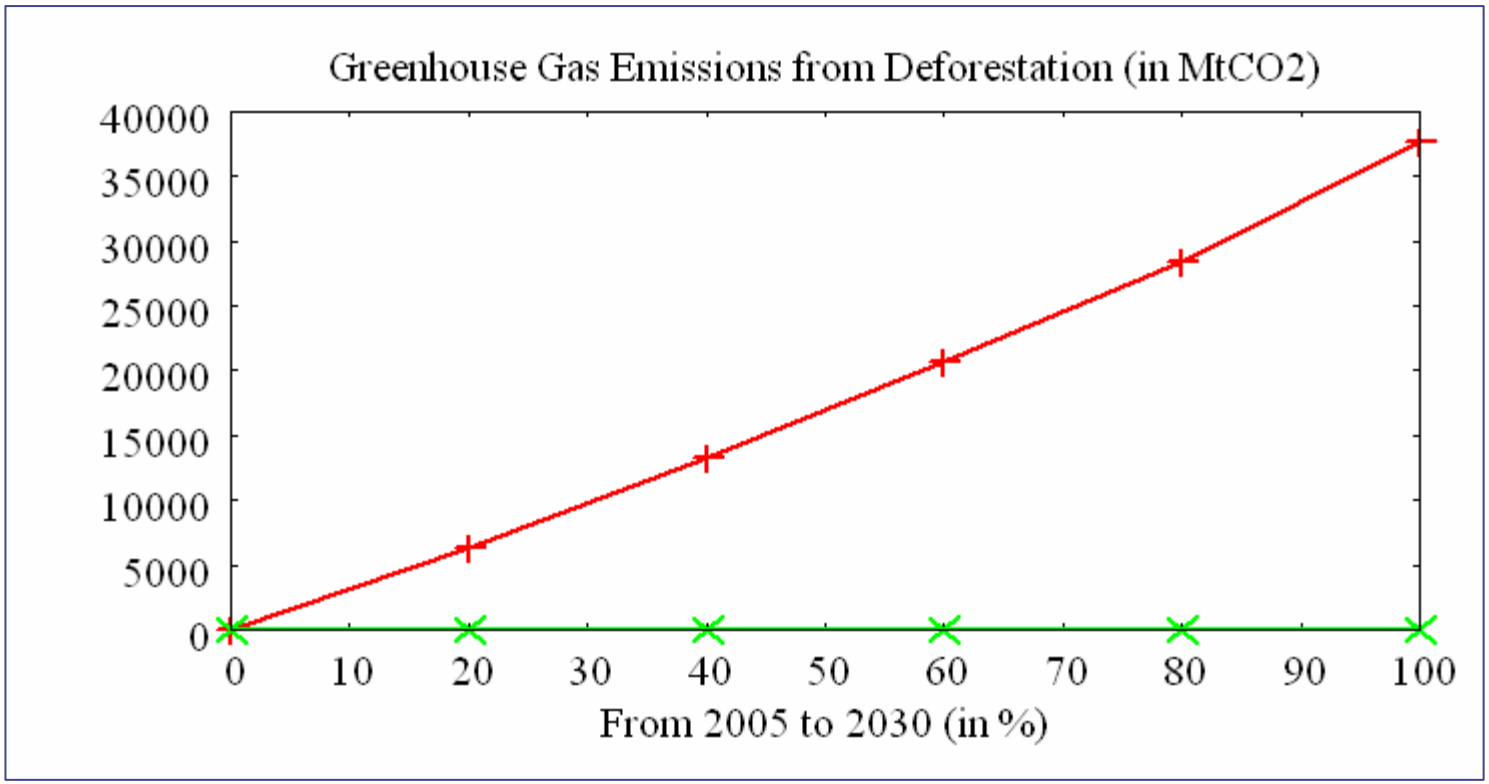


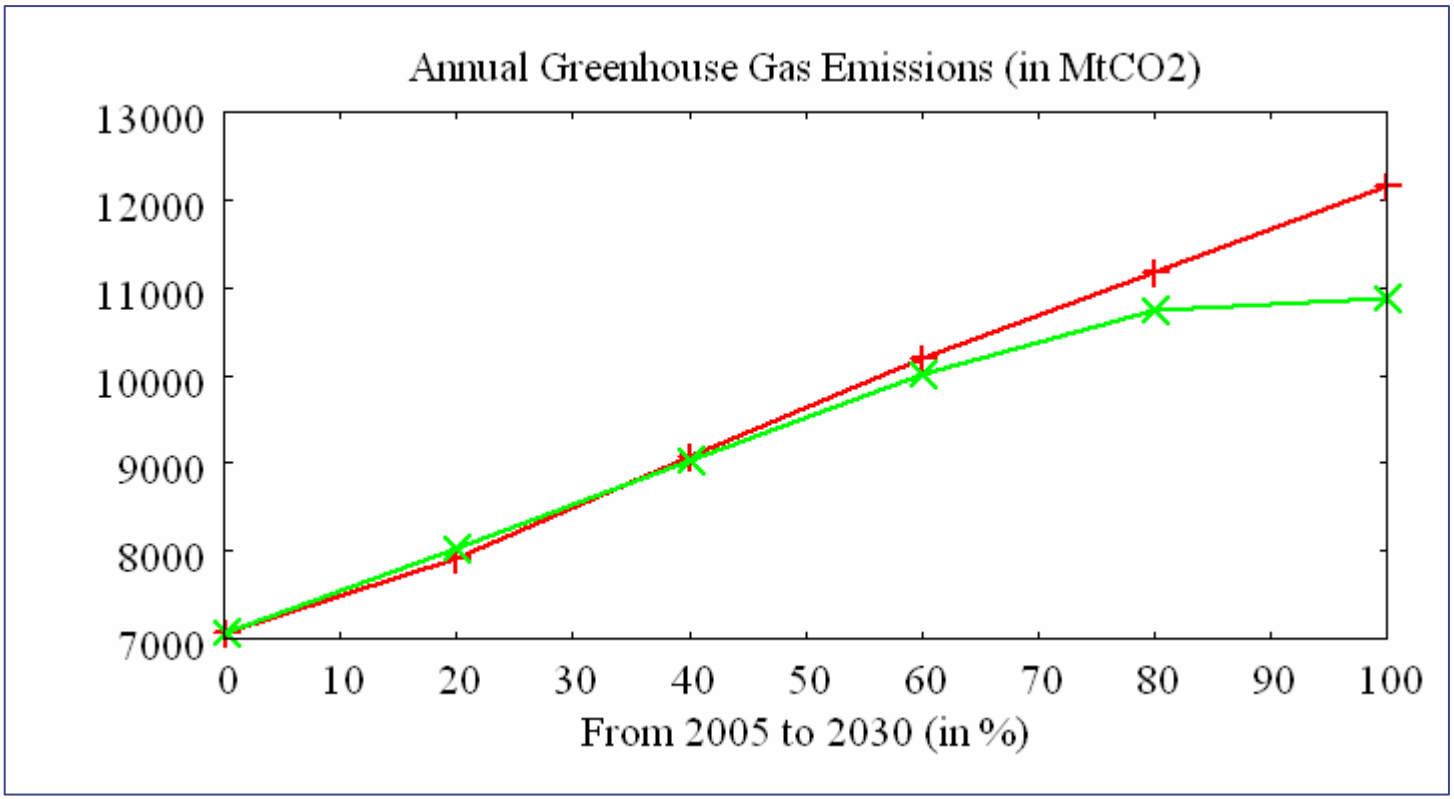
IV. Results


Deforested Area (in 1000 000 ha)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

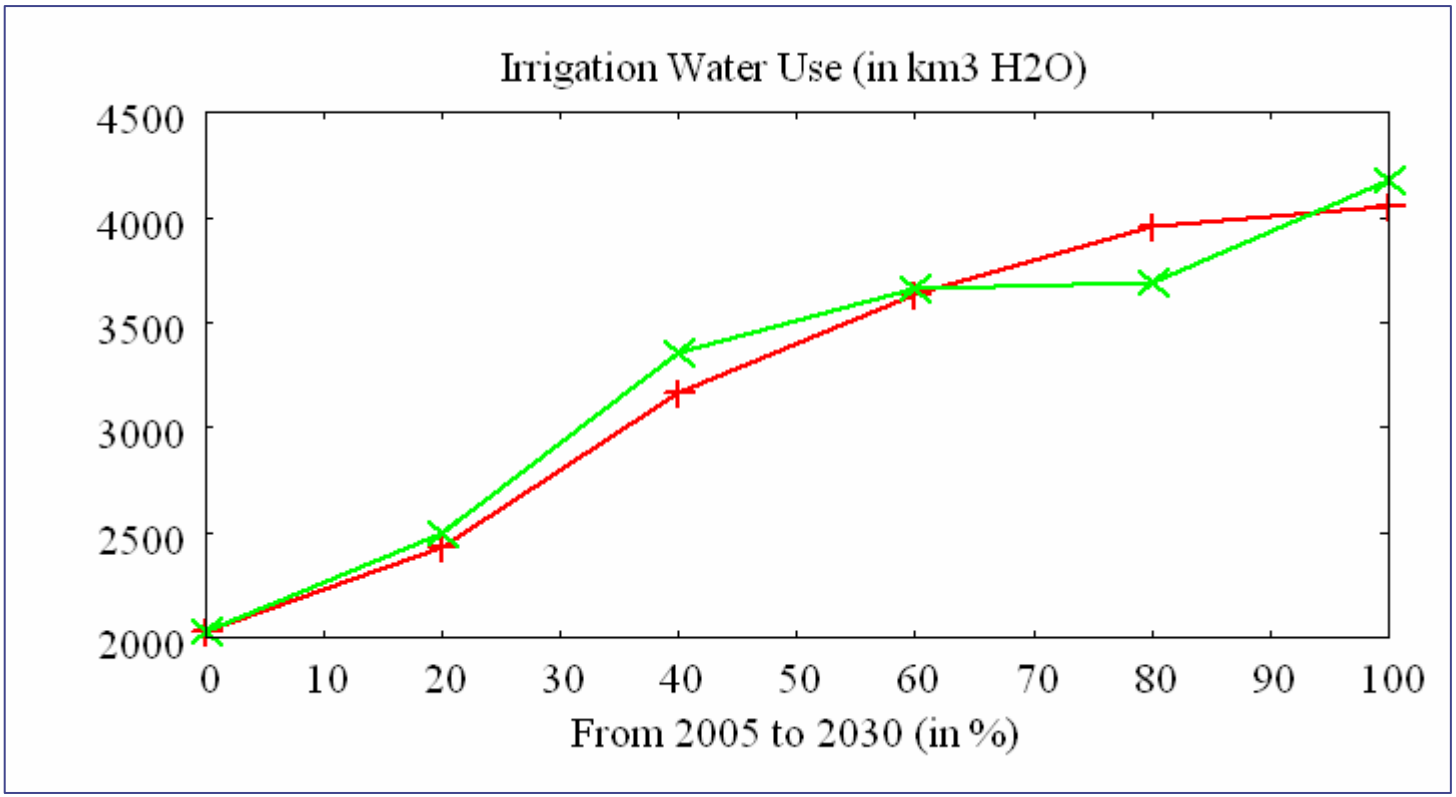
IV. Results


Greenhouse Gas Emissions from Deforestation (in MtCO2)
40000
35000
30000
25000
20000
15000
10000
5000
0
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

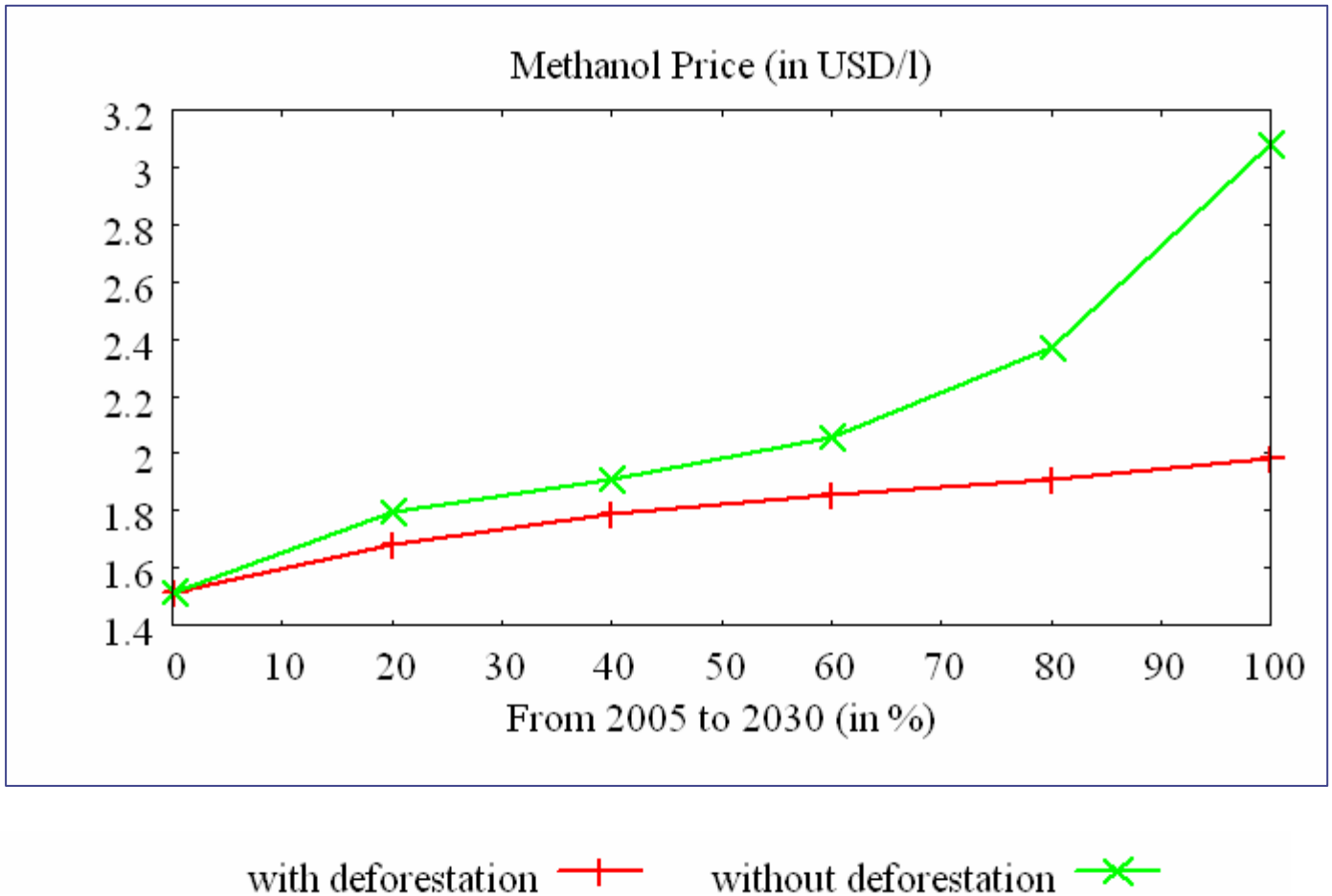
IV. Results


Annual Greenhouse Gas Emissions (in MtCO2)
13000
12000
11000
10000
9000
8000
7000
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

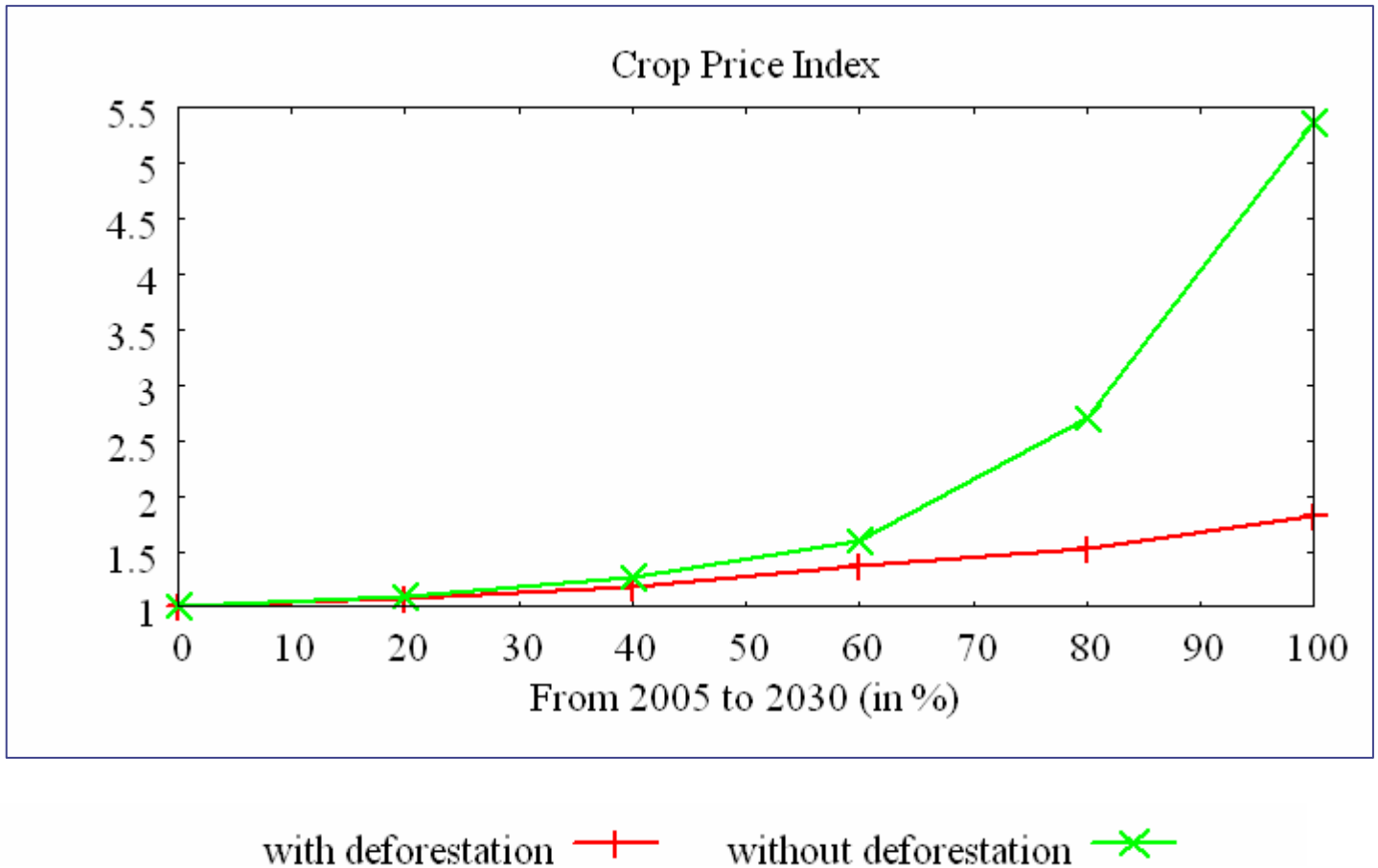
IV. Results


Irrigation Water Use (in km3 H2O)
4500
4000
3500
3000
2500
2000
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

IV. Results

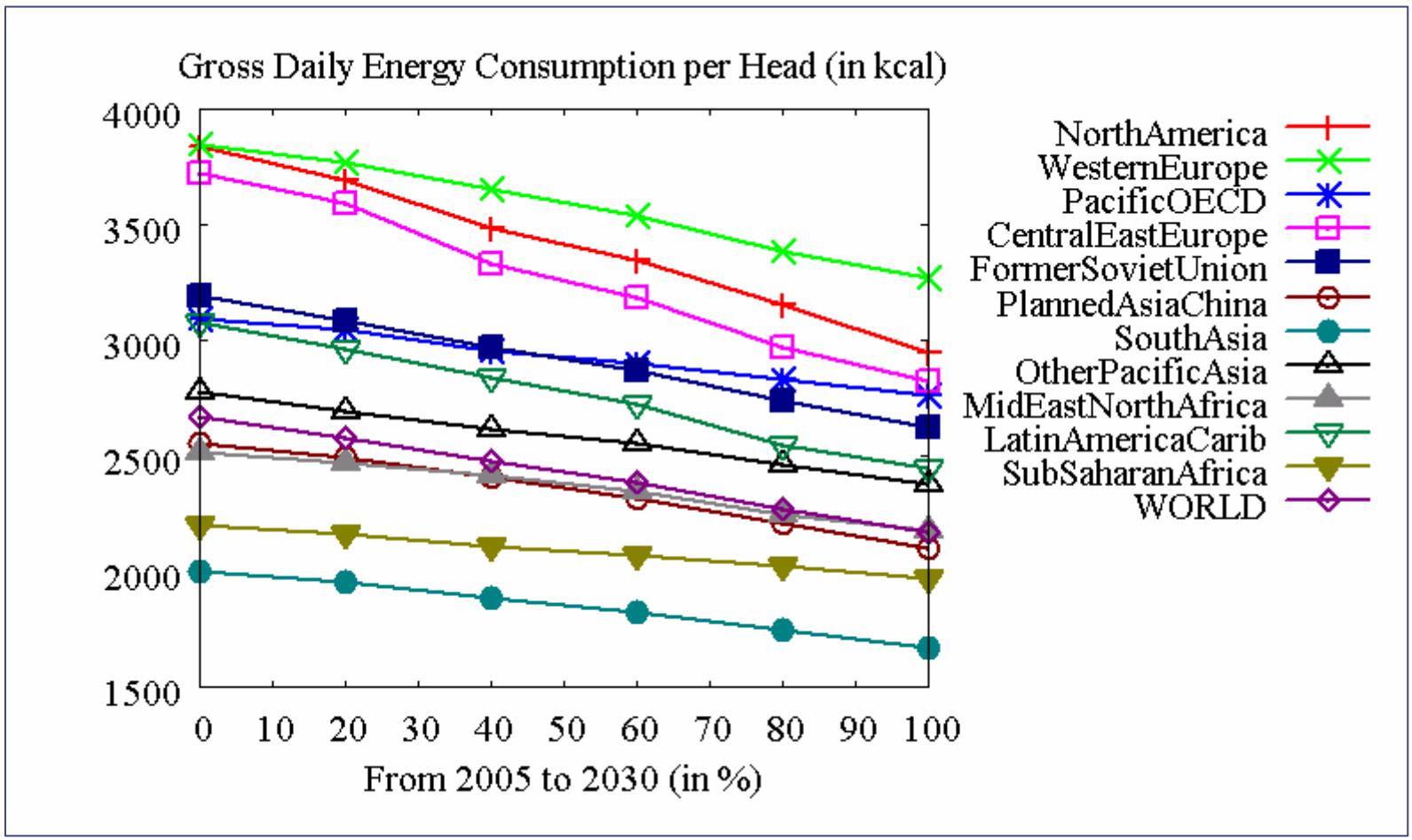

Methanol Price (in USD/l)
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

IV. Results


Crop Price Index
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0
10
20
30
40
50
60
70
80
90
100
From 2005 to 2030 (in %)
with deforestation
without deforestation

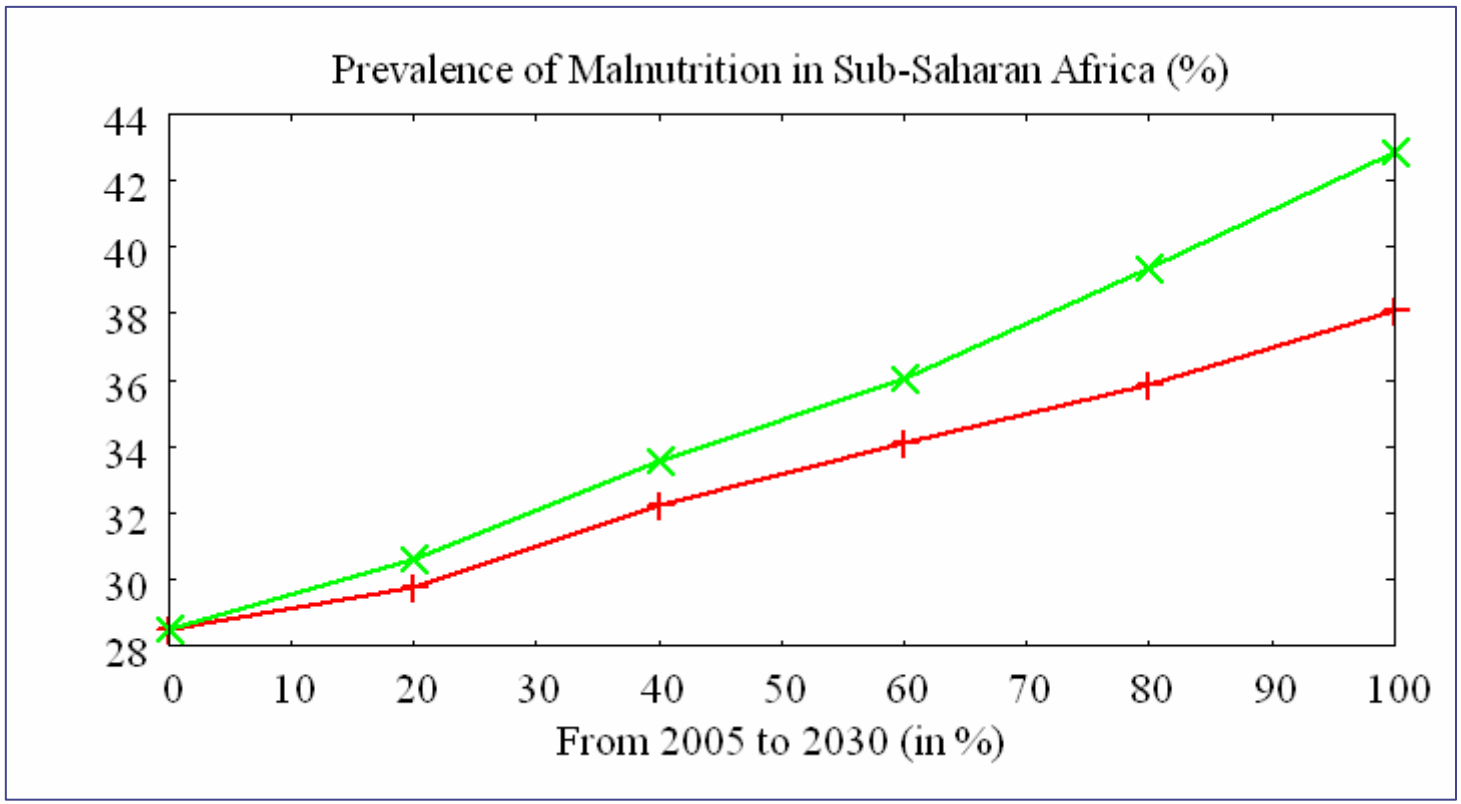
IV. Results

Endogenous food demand



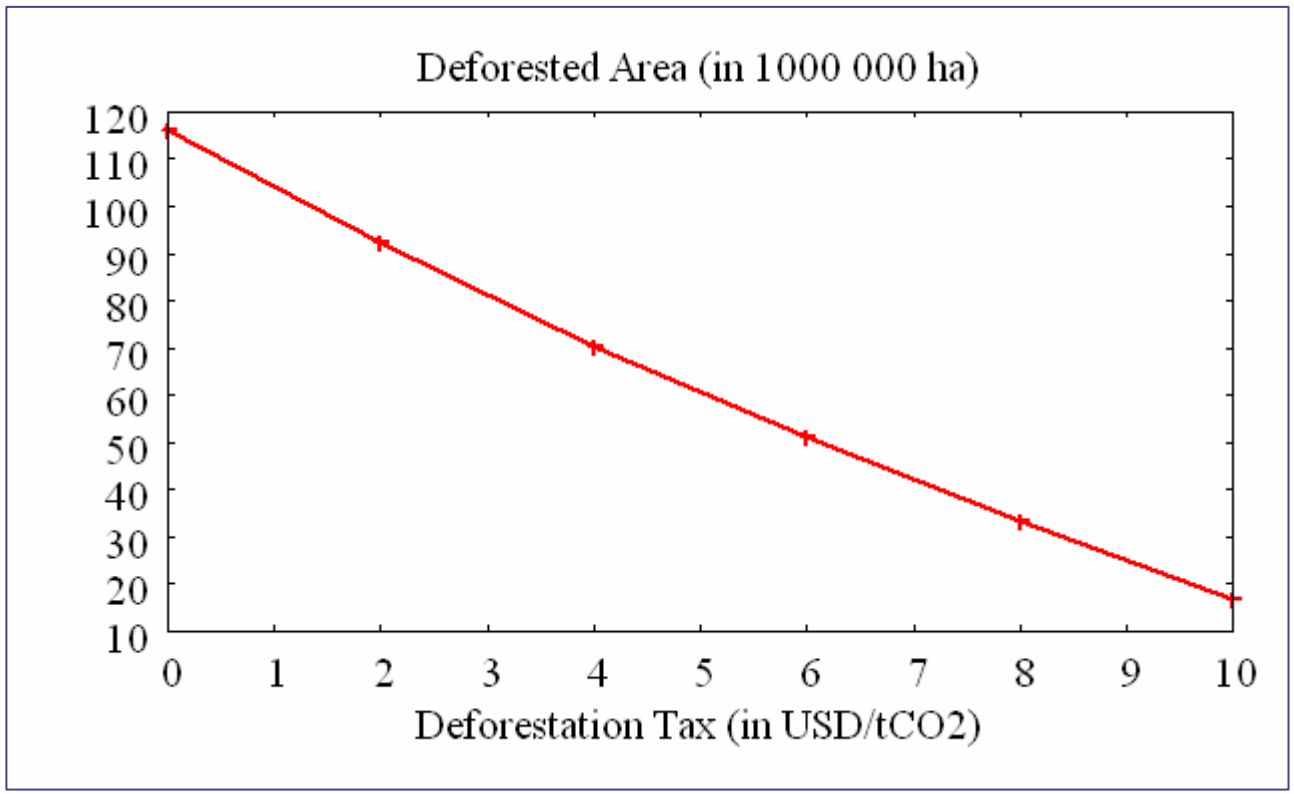
IV. Results

Endogenous food demand



V. Policy implications

CO2 based deforestation tax



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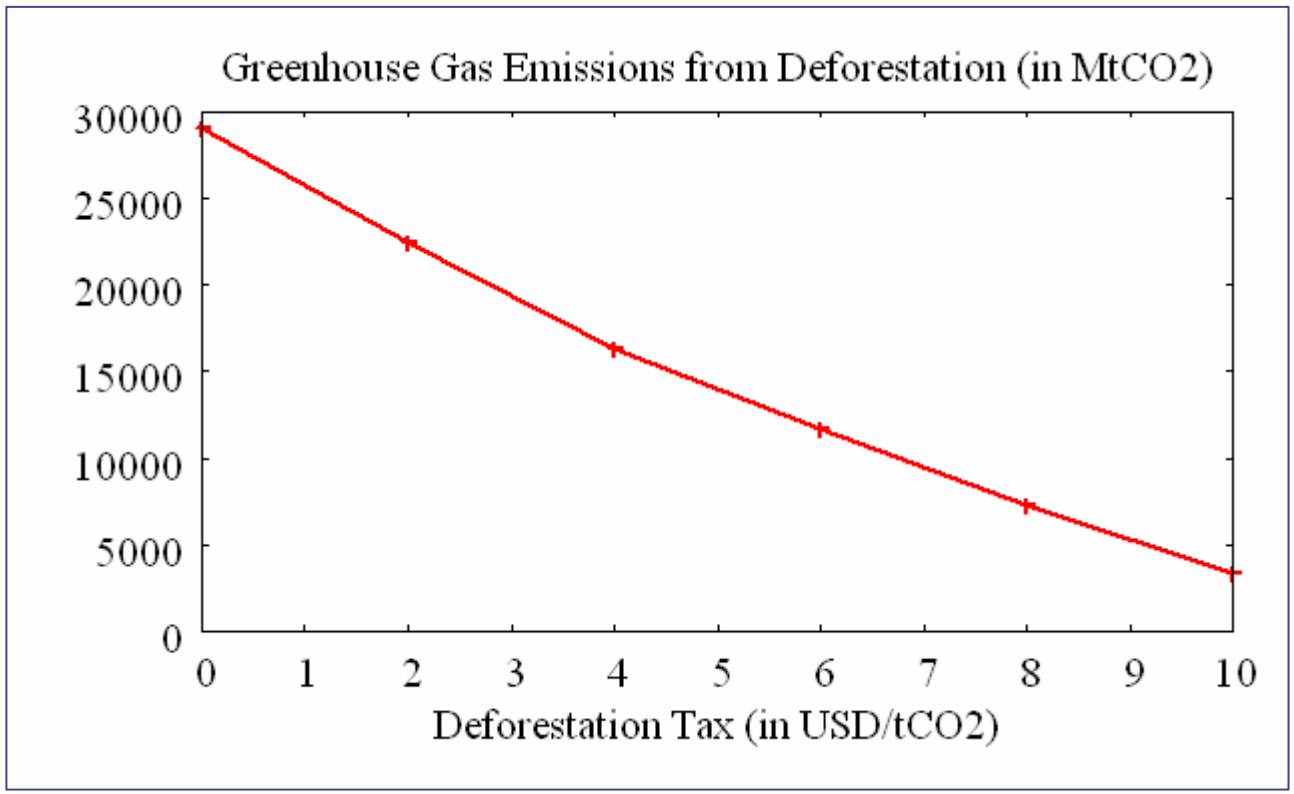

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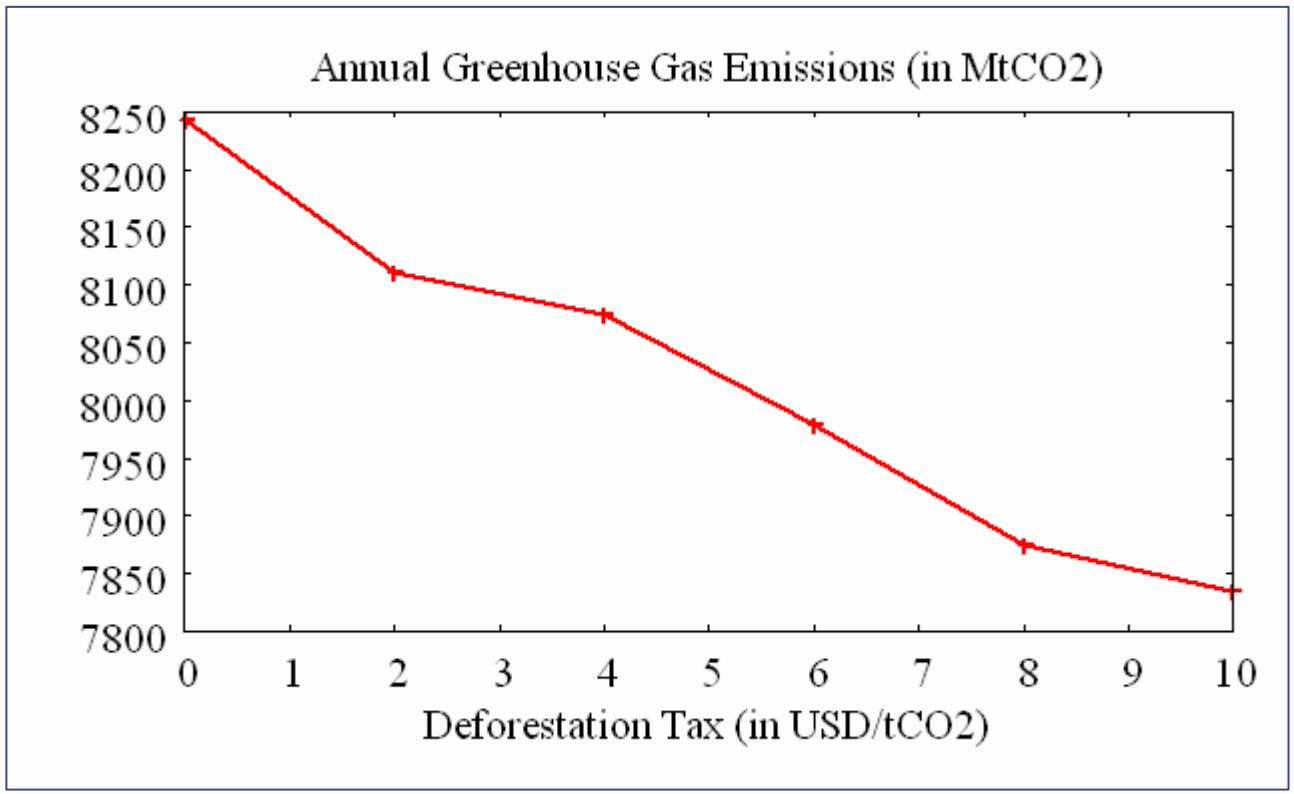

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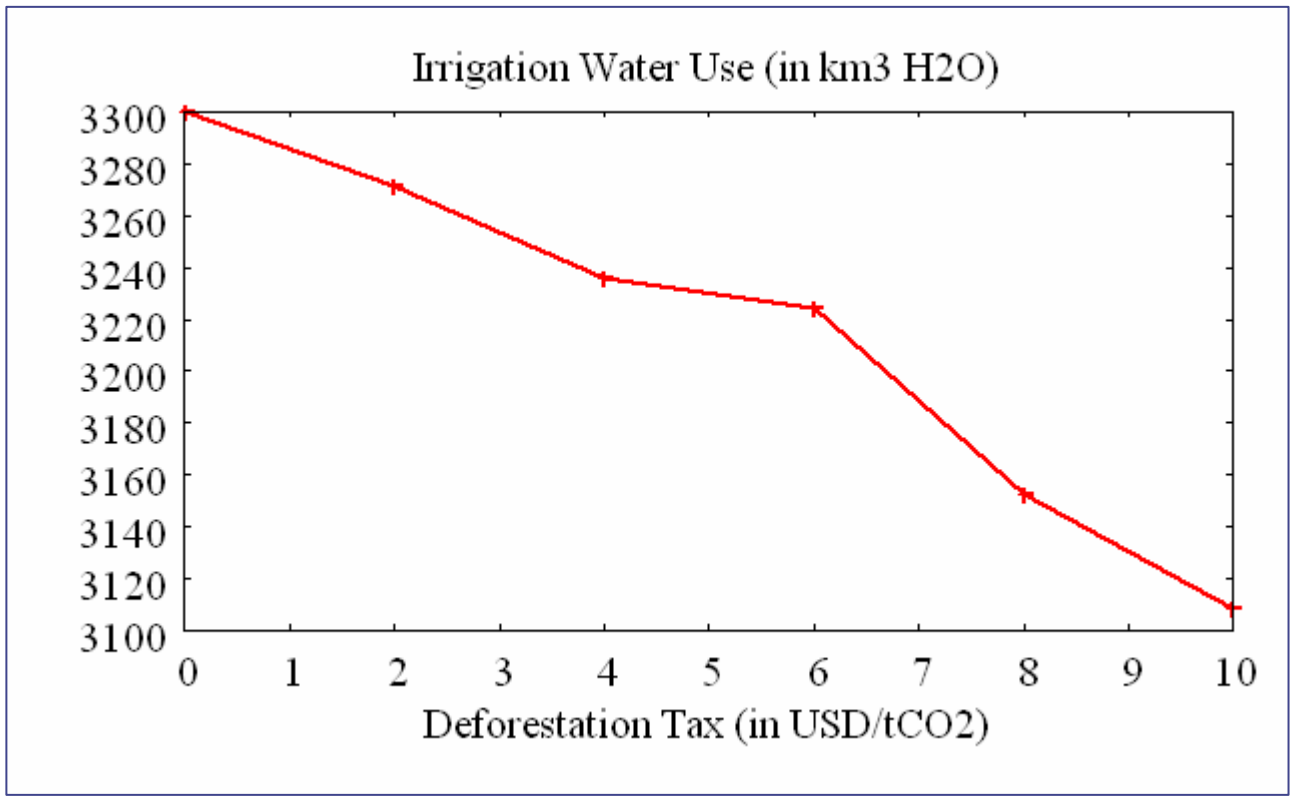

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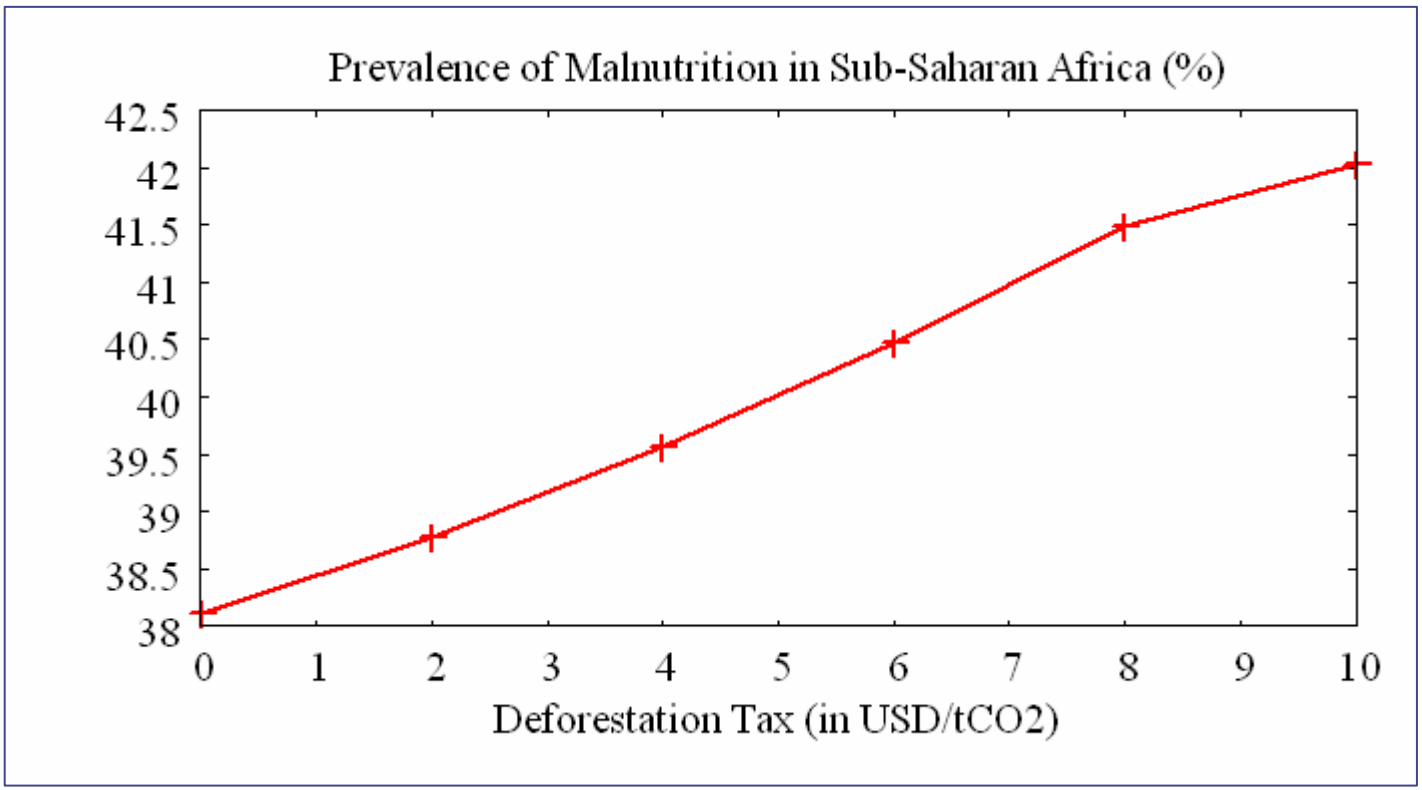

VI. Conclusion

- Avoided deforestation decreases GHG emissions but has also many other effects
  - SYNERGIES between environmental objectives (GHG, water use)
  - CONFLICT between GHG reduction and Food security
- Short-term (adaptation) objectives may be in conflict with long-term (mitigation) objectives.
- Integrated policy design necessary!