

# Impact of Climate Change Mitigation **Policies on Food Consumption Patterns**

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## CONTEXT

# More food to feed future population

• **Population**: from 6.1 in 2000 to 8.4 billion in 2030 ▶ +50% of average increase in agricultural production towards 2030 with strong shift in consumption patterns

# conflicts with

# **GHG emissions from agriculture and LUC**



(Alexandratos, 2006)

▶ +27% meat per capita, +17% milk and dairy per capita

Expected land use expansion effect

▶ +6 to 30% expansion up to 2050 (depends on demand and technology) (Smith et al., 2010)

### Mitigation in agriculture: Opportunity or false solution ?

• For 20 USD / t:

- -30% in agricultural activities (Smith et al., 2008)
- ▶ -50% in forest anthropogenic emissions (Kindermann et al., 2008)



# How can mitigation objectives

conflict with food security considerations?

# The supply side of GLOBIOM...

Bottom-up grid-based land use optimization model



# INTEGRATED







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- Dried beans - Chick Peas	- Barley - Corn - Millet - Rice - Sorghum - Wheat	- Groundnuts - Palm oil fruit - Rapeseed - Soybeans - Sunflower	- Cassava - Potatoes - Sweet Potatoes	- Sugar cane	- Beef meat - Sheep meat - Pig meat - Poultry meat	- Milk products - Eggs	- Cotton	- Sawn wood - Wood pulp

Nested LES-CES functions (Brown and Heien, 1972) Substitution effect (own and cross price elasticities) Non linear Engel curves (income elasticities)

### **COMPARING EFFECTS OF THREE MITIGATION POLICIES**

### (1) Reduction of deforestation, (2) Bioenergy deployment, (3) Less methane emissions from livestock



Europe North South South Asia Africa China Others	Cropland Grassland	Forest Natural land Short Rotation				-20		
Lurope North South South Asia Africa - China - Others		Diantations	MIG_FOR	MIG_BIOF	MIG_CIL	Milk and Bovine Pig meat Eg	gs Poultry Ovine	Vegetal Meat Total
America America Milddle East South-East		Plantations				dairy meat	meat meat	calories calories calories
Asia						dan y meat	meat meat	

#### WHY DIETS ACROSS REGIONS MATTER? **Consumption per capita in the livestock mitigation scenario**

■ Bovine meat ■ Ovine meat ■ Pig meat ■ Poultry meat ■ Eggs ■ Milk and dairy



### CONCLUSIONS

Linkage between systems allows to better understand the impact of supply oriented policies on demand with the benefit or a refined bottom-up description

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- The impact of mitigation policies reflect the hierarchy of mitigation costs: preventing deforestation appears potentially better if not considering co-benefits of cattle intensification
- Impacts are very differently distributed depending on the policies: the most crop oriented could put at risk the poorest sensible to crop prices whereas meat based would impact more specific regions

#### REFERENCE

Valin, H., Havlík, Petr, Mosnier, A., Obersteiner, O. (2012) "Impacts of Alternative Climate Change Mitigation Policies on Food Consumption under various Diet Scenarios", Paper presented at the 14<sup>th</sup> GTAP Conference, 2012, Geneva.

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More on the model: www.globiom.org Contact: valin@iiasa.ac.at

