Energy and food: Facts, figures and impacts

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Agenda

- GHG emissions in the production and use of ethanol from sugarcane in Brazil
  - The expansion since 2002
  - LUC , ILUC effects by Isaias Macedo
- Prospects of the Sugarcane Expansion in Brazil: Impacts on Land Use Allocation and Changes by Rodrigo Lima
- The energy and food debate by Peter Zuurbier.

Energy and food

- Is there sufficient land for food ?
- Is there land available for biomass for biofuels?
- What are the impacts on food prices?

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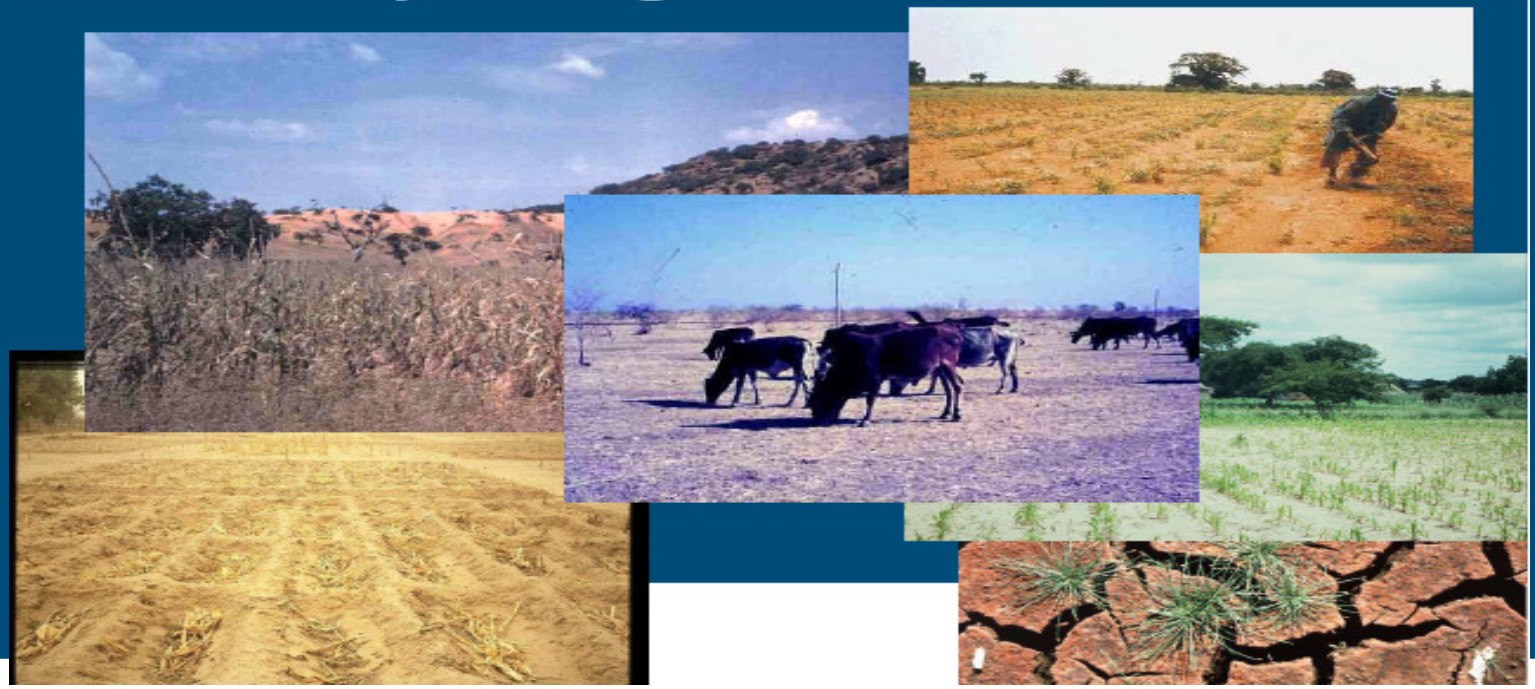
Production for biofuels and food demands land

Land use options depend on socio-cultural values, water availability, plant nutrition, biodiversity, soil quality and economic

Land requirements depend on substitution, yield improvements and use of by-products

Productivity of marginal lands



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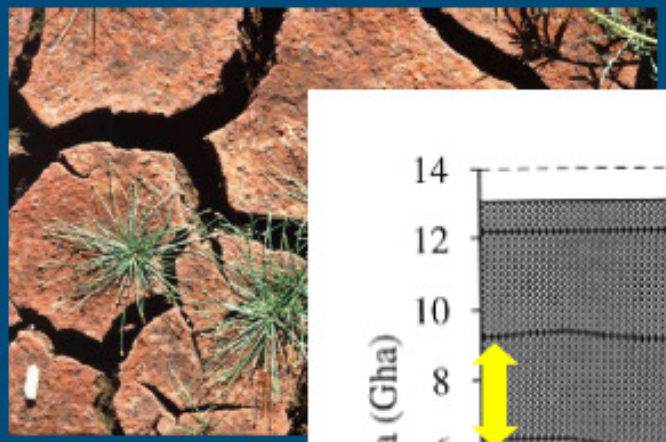
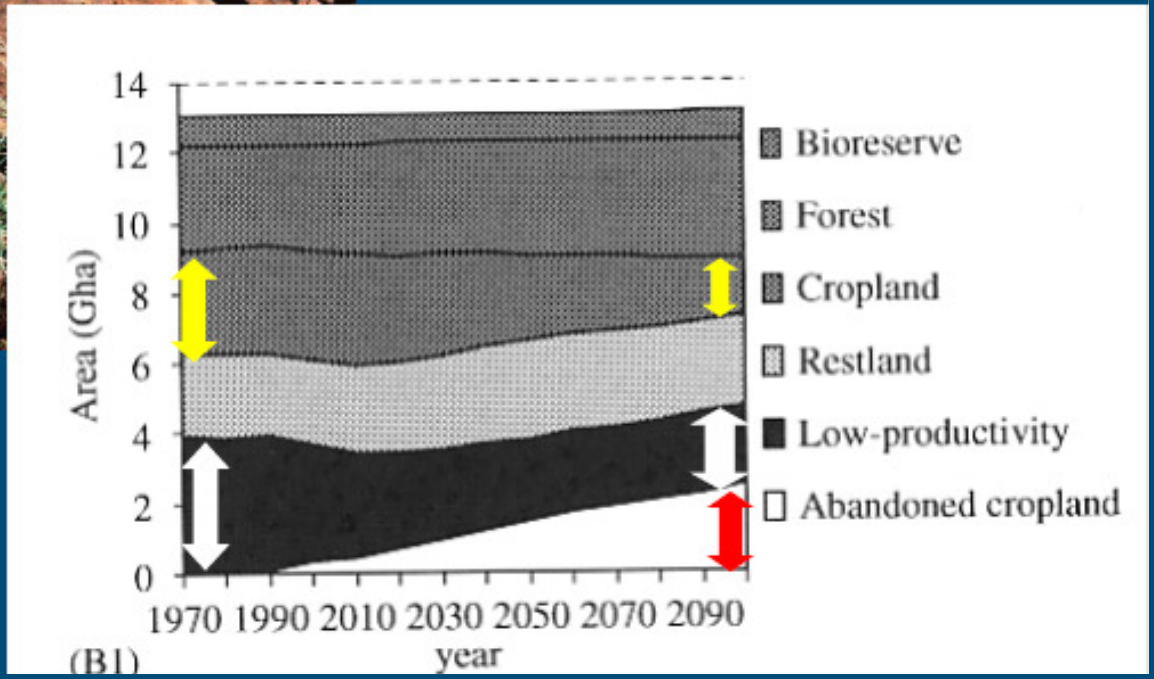
Planet's surface

Land use category	Gha	Remarks
Agriculture	1.5	incl. grassland intensive cattle farming
Pastures/grassland	3.5	for extensive cattle farming
Forest	4.0	nature + productive forestry
Others	4.2	(semi-)deserts, mountains, urban areas
Total	**13.2**	

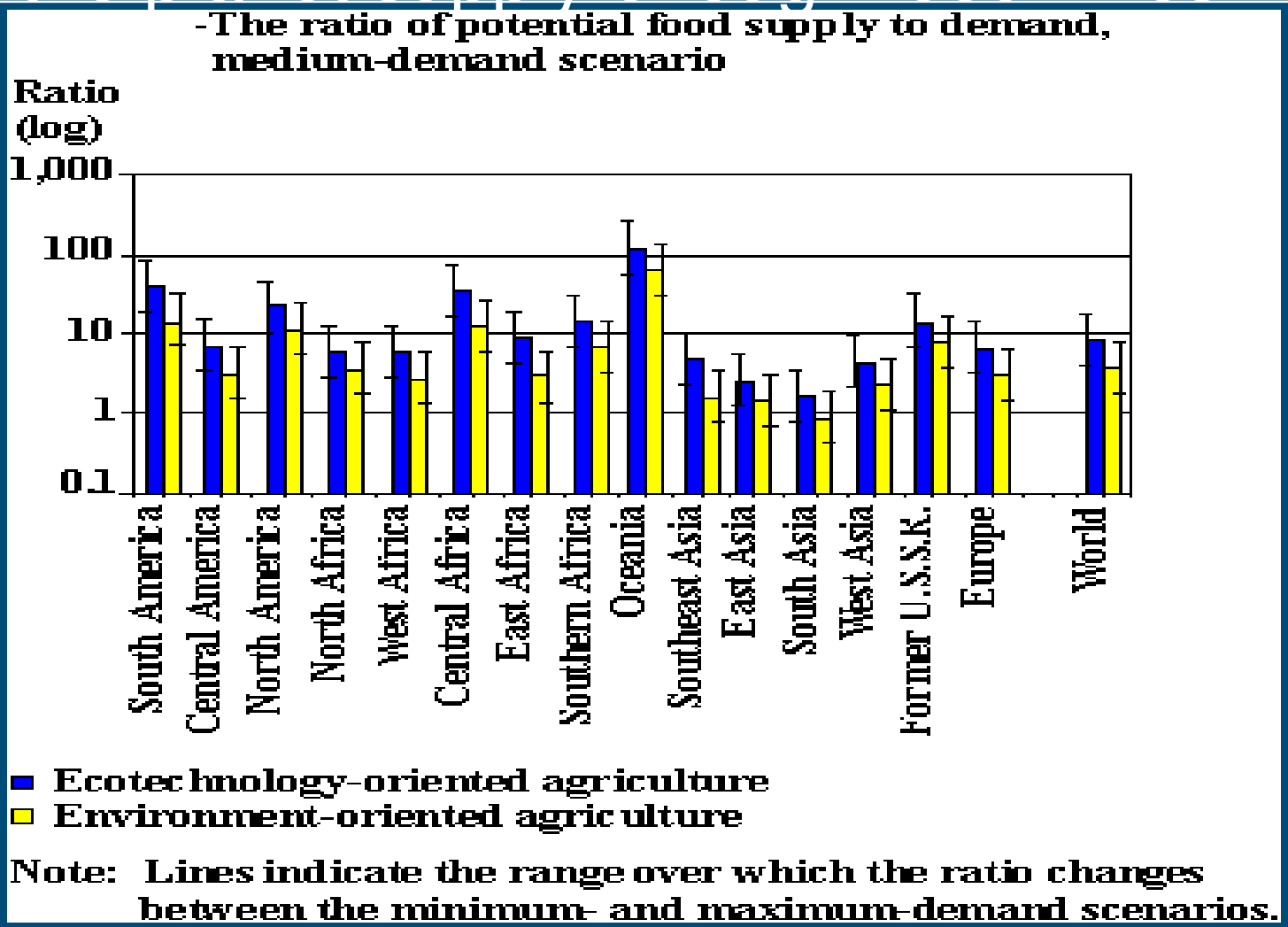
Are there land use options? Yes!

Land availability





Can the planet supply enough food? Yes!



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Biomass for biofuels

- “The production of biomass for energy (whether for transport fuels or other purposes) constitutes a key nexus between the different societal and environmental functions of the available global **land area** (whether as cropland, forests or other land uses).” OECD, 2008

Global production biofuels

- Global production of biofuels amounted to 62 billion litres or 36 million tonnes of oil equivalent (Mt)4 in 2007 - equal to about 1.8% of total global transport fuel consumption in energy terms.
- In its 2007 World Energy Outlook (WEO), the International Energy Agency (IEA) Reference Scenario projected that biofuels will meet 2.3 percent of world road-transport

  fuel demand by 2015 and 3.2 percent by 2030 and 26% by 2050 ("Energy Technology Perspectives 2008", IEA).
- Brazil and the United States together account for almost 90% of global ethanol supply.
- Brazil has replaced 50% of its gasoline consumption and the US has replaced 8%.
- Brazil opted for sugar cane.
- So what about land for sugar cane?

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Land for sugar cane on a global scale (FAOStat, 2008)

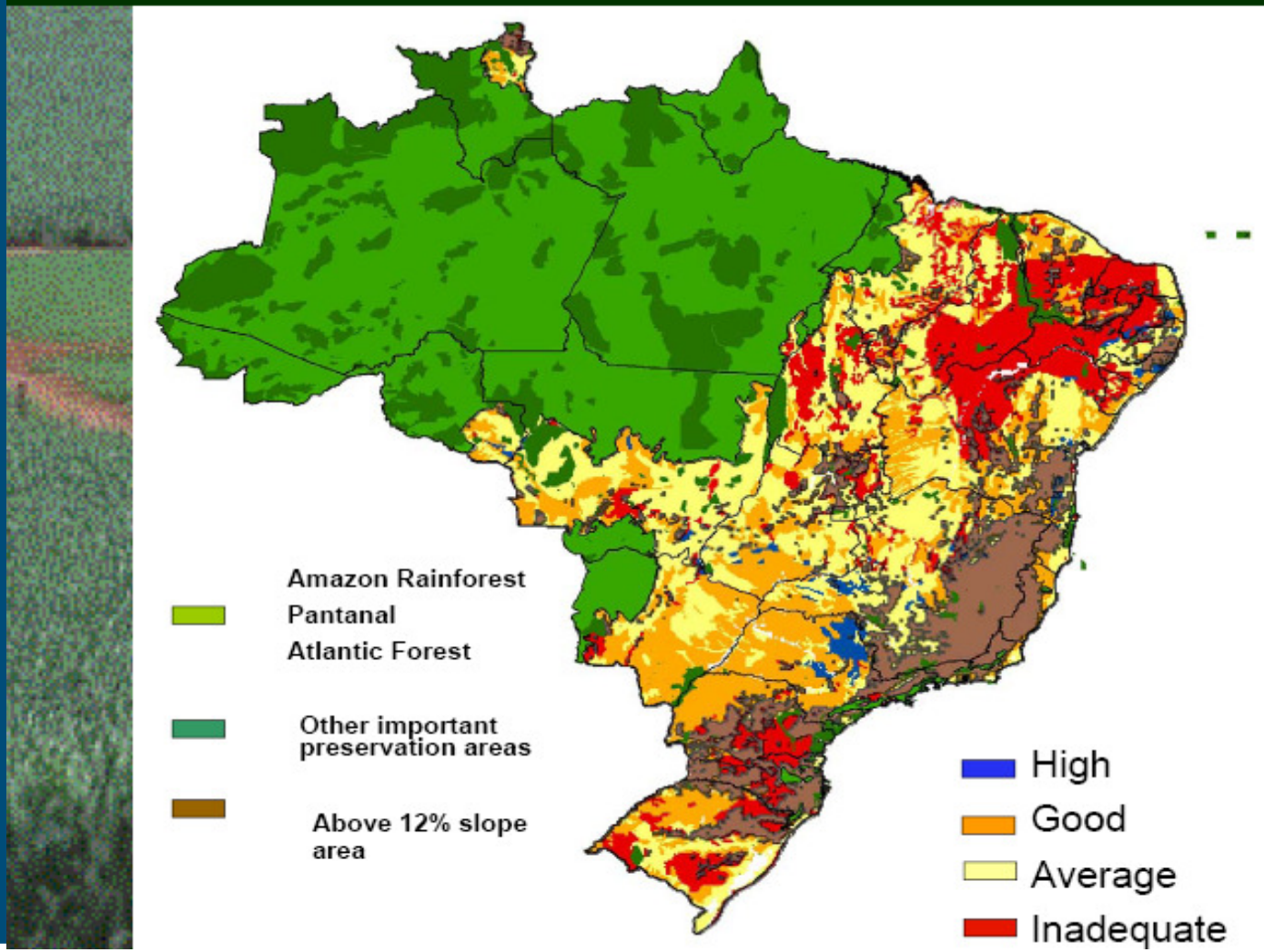
- Area harvested 2007: 21 mln ha
- Top four producers % cultivated land
  - Brazil 6,7 mln ha 4.4
  - India 4.8 mln ha 1.5
  - China 1.2 mln ha 0.6
  - Thailand 1.0 mln ha 0.4

Potential area and production of rain-fed sugar cane on a global scale (Fischer ea, IIASA in: Zuurbier, van de Vooren 2008)

	production 2007	Of **current cultivated** land very suitable	suitable
Area harvested	21 mill ha	28.3 mln	91.9mln
Top four producers			
Brazil	6,7 mln ha	5.0	19.6
India	4.8 mln ha	0.7	2.9
China	1.2 mln ha	1.6	4.1
Thailand	1.0 mln ha	0.1	0.6
Africa	1.6 mln ha	6.8	20.6

And think of the not yet cultivated land !

POTENTIAL FOR SUGAR CANE PRODUCTION: SOIL AND CLIMATE - WITHOUT IRRIGATION



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First conclusions

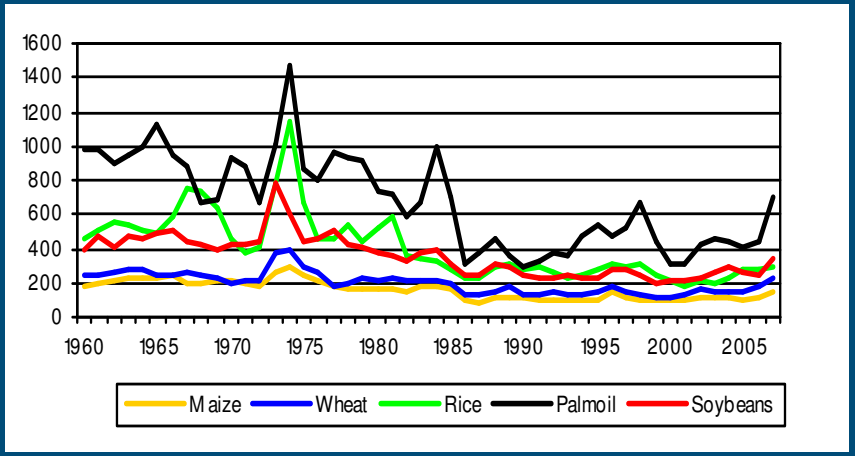
- Food, feed and biomass demand land.
- There is a potential for expansion of land for production of rain-fed sugar cane.
- Globally there is a large potential for expansion of rain-fed sugar cane for bio-ethanol and bioenergy.
- Impacts of expansion of land for sugar cane ethanol: what are the concerns?

The Food-fuel price debate

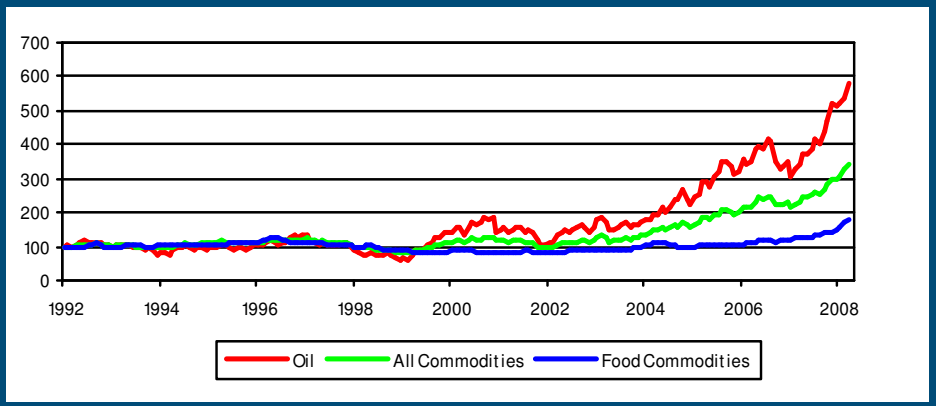
- Arguments:
  - biofuels compete with food
  - in terms of land use
  - resulting in higher food prices

The reality

1. Changes in commodity prices give a differentiated picture



Development of World Agricultural Prices, 1960–2007, USD/ton, in constant USD (1990) (WB, 2008)



Index of Oil, Food and All Commodities, 1992-2008, January 1992=100
IMF, 2008

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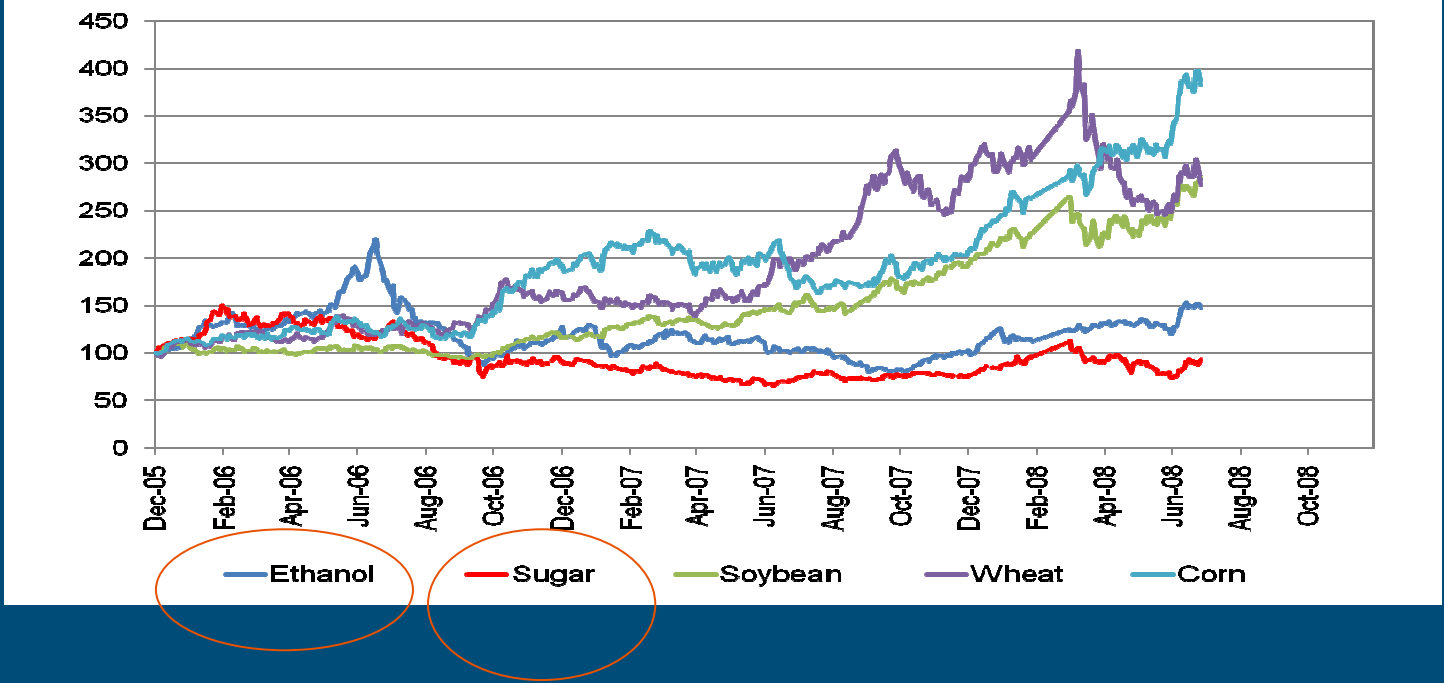
DAILY FUTURE PRICES OF DIFFERENT COMMODITIES SHOW WHAT HAPPENED WITH SUGAR AND ETHANOL

Base 100 in Dec. 2, 2005



Source: CME. Group Exchange.

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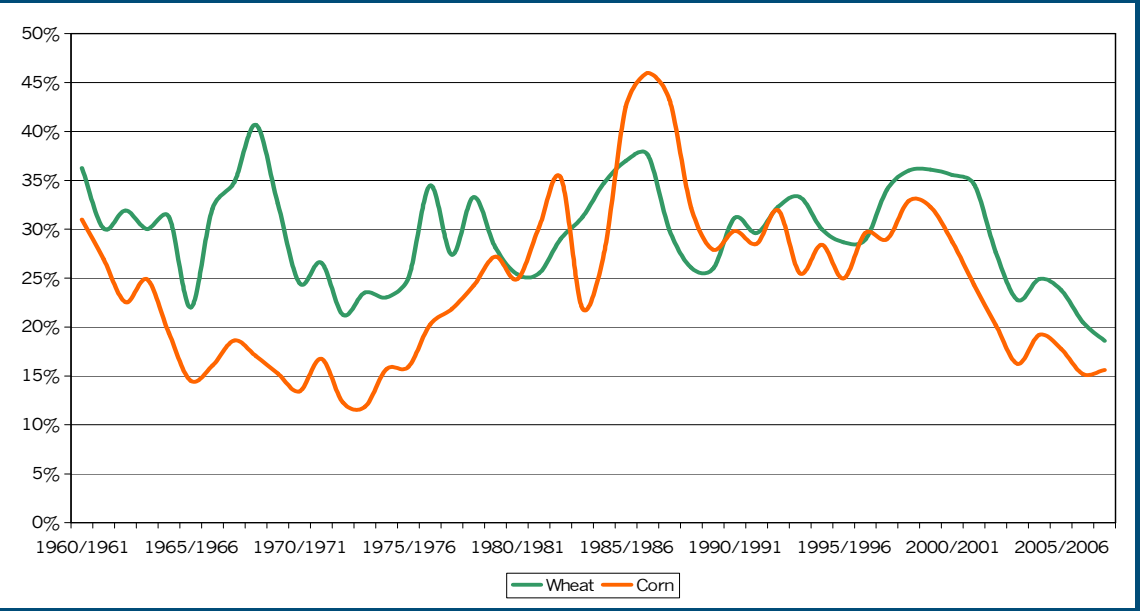
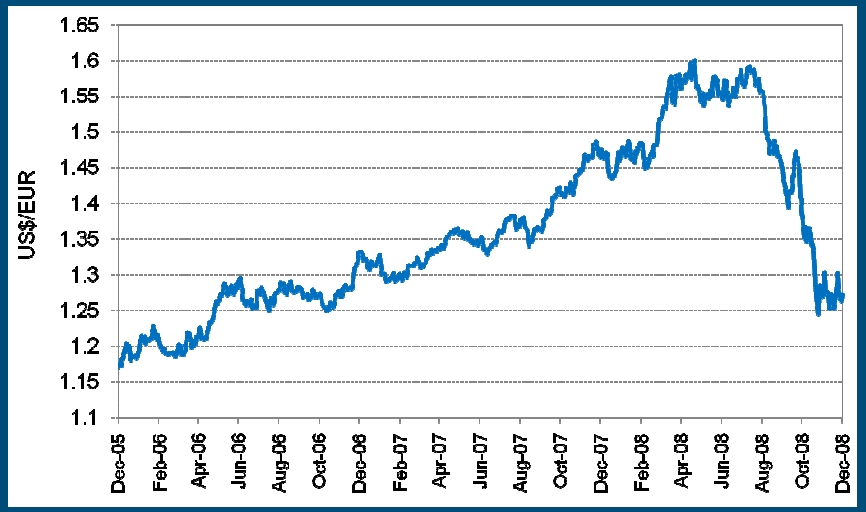
Contributing factors

1. Lower stocks and expectation of decreasing supply with a steady increase in demand in Asia due to higher incomes, next to lower harvest elsewhere.



Contributing factors

- 2. Appreciation of dollar: World prices are denominated in dollars and the dollar depreciated against most currencies.



Contributing factors

3. Lowering prices did not give incentive for increasing productivity enhancing technologies
4. Governmental policies enhanced protectionism and higher prices.

Contributing factors

- 5. Higher oil prices

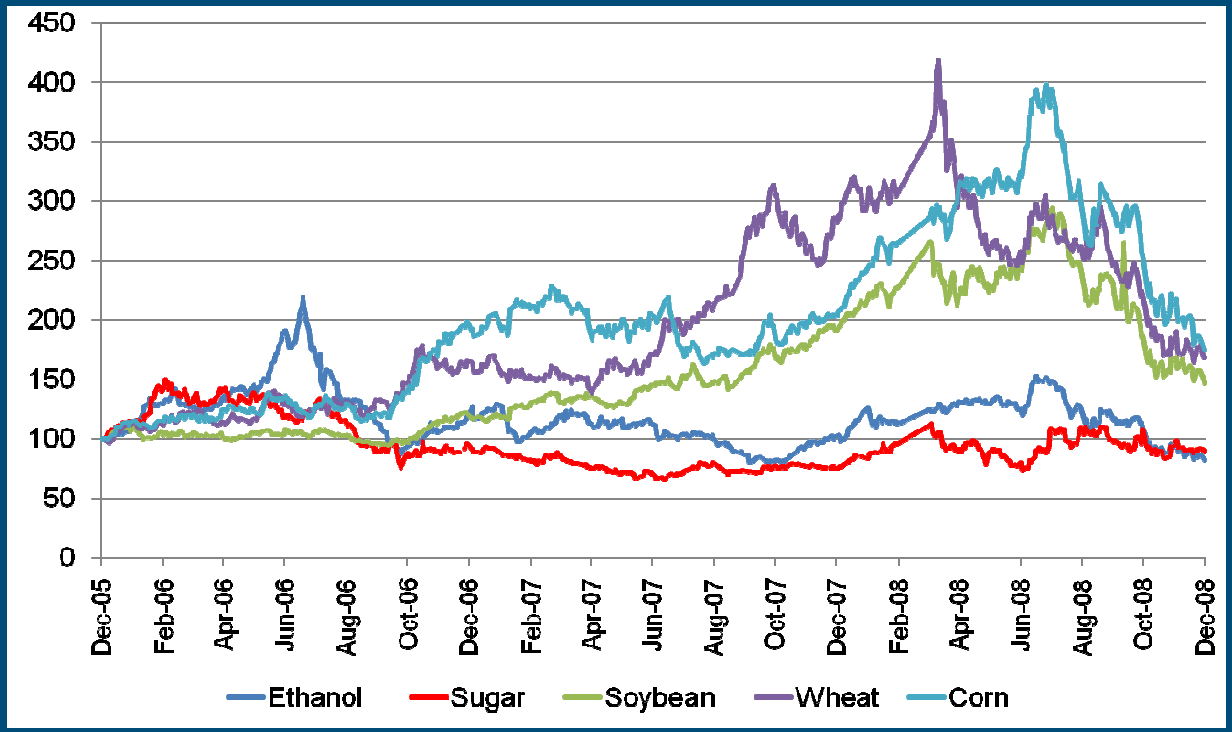
- Higher energy prices lead to higher food prices as costs (e.g. fertilizer, processing, and transport) increase. Higher transport costs induce higher price effects as distances increase.

Contributing factors

- 6. Growing volatility in food markets due to the fact that most of hedging is based on index funds and not anymore on the 'traditional' short and long hedging. This share is less than 10% in total market volume.
- 7. Based on all these factors: speculation on price development.

So, where are we now? DAILY FUTURE PRICES OF DIFFERENT COMMODITIES DECREASED! Oil prices decreased and dollar increased to most other currencies.

Base 100 in Dec. 2, 2005



Source: CME Group Exchange.

Conclusions

- Food, feed and biomass demand land
- There is a potential for expansion of land for production of rain-fed sugar cane
- Globally there is a large potential for expansion of rain-fed sugar cane for bio-ethanol & bioenergy.
- Food prices are not directly related to biofuel supply and demand.
- Because oil prices are crucial for the development of biofuels, climate change and environmental impacts have to be included in the equation.

Thank you for your attention

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