



# **Bioenergy and Food Security: synergies in biomass energy and food supply**

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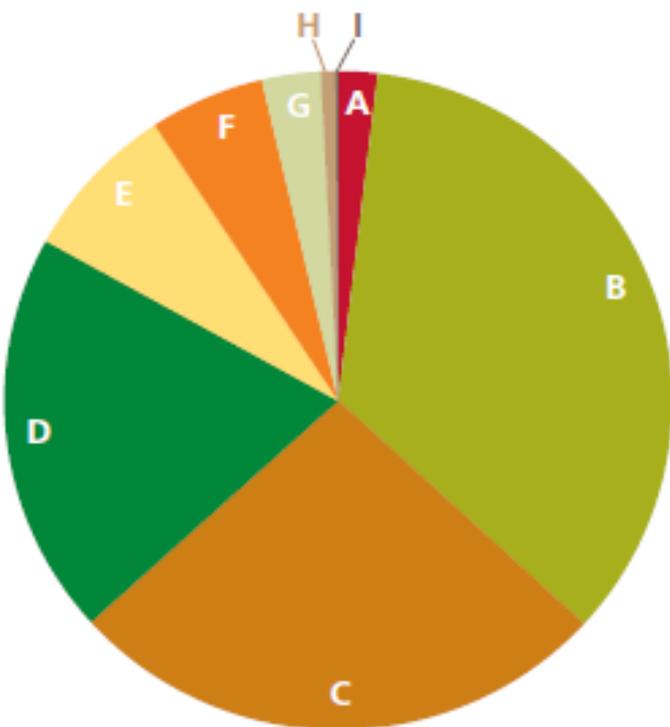
*Stockholm Environment Institute*

*FAPESP, Sao Paulo, Brazil, 14 April 2015*



# Location and number of undernourished population

2011-13

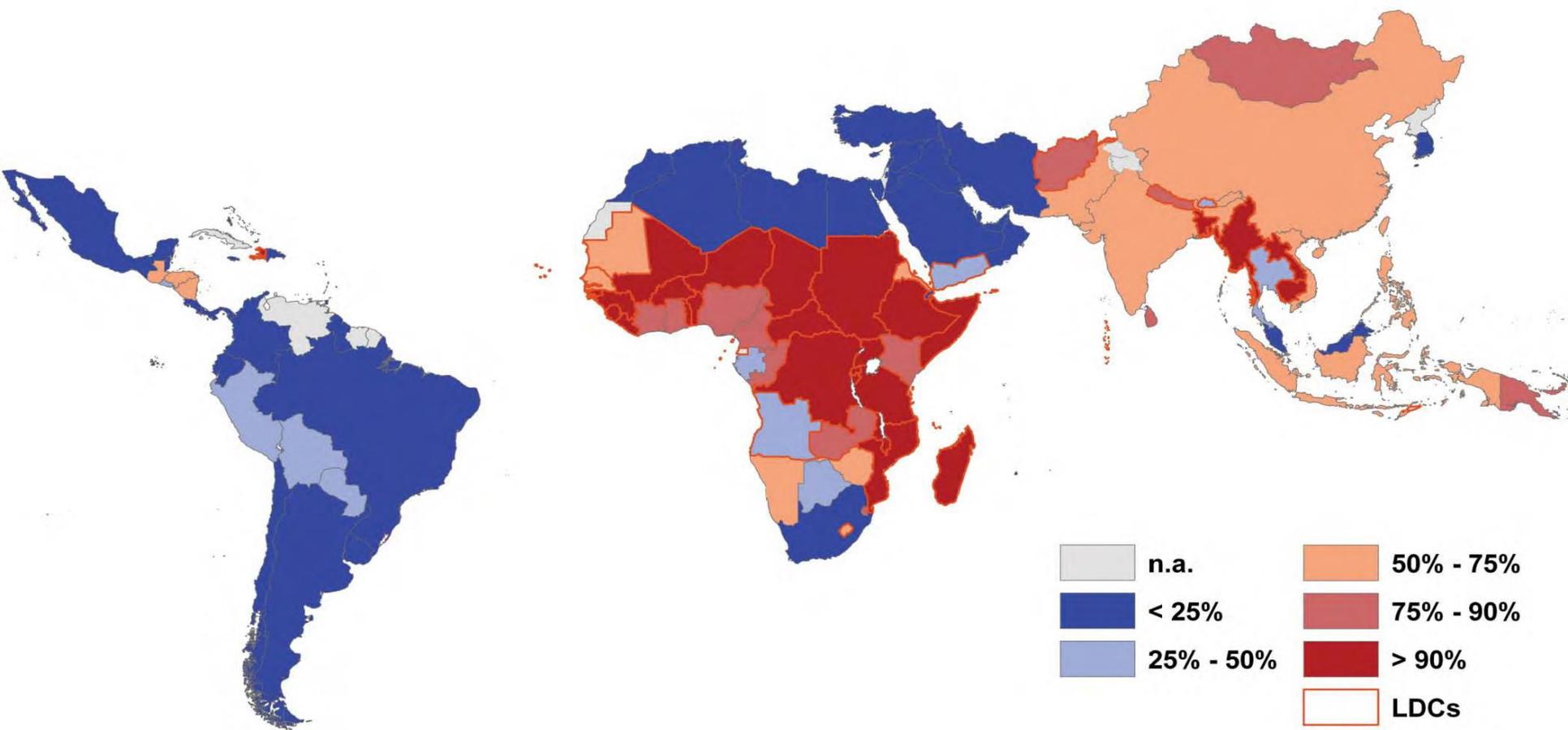


Total = 842 million

	Number ( <i>millions</i> )		Regional share (%)	
	1990-92	2011-13	1990-92	2011-13
<b>A</b> Developed regions	20	16	2	2
<b>B</b> Southern Asia	314	295	31	35
<b>C</b> Sub-Saharan Africa	173	223	17	26
<b>D</b> Eastern Asia	279	167	27	20
<b>E</b> South-Eastern Asia	140	65	14	8
<b>F</b> Latin America and the Caribbean	66	47	6	6
<b>G</b> Western Asia and Northern Africa	13	24	1	3
<b>H</b> Caucasus and Central Asia	10	6	1	1
<b>I</b> Oceania	1	1	0	0
<b>Total</b>	<b>1 015</b>	<b>842</b>	<b>100</b>	<b>100</b>

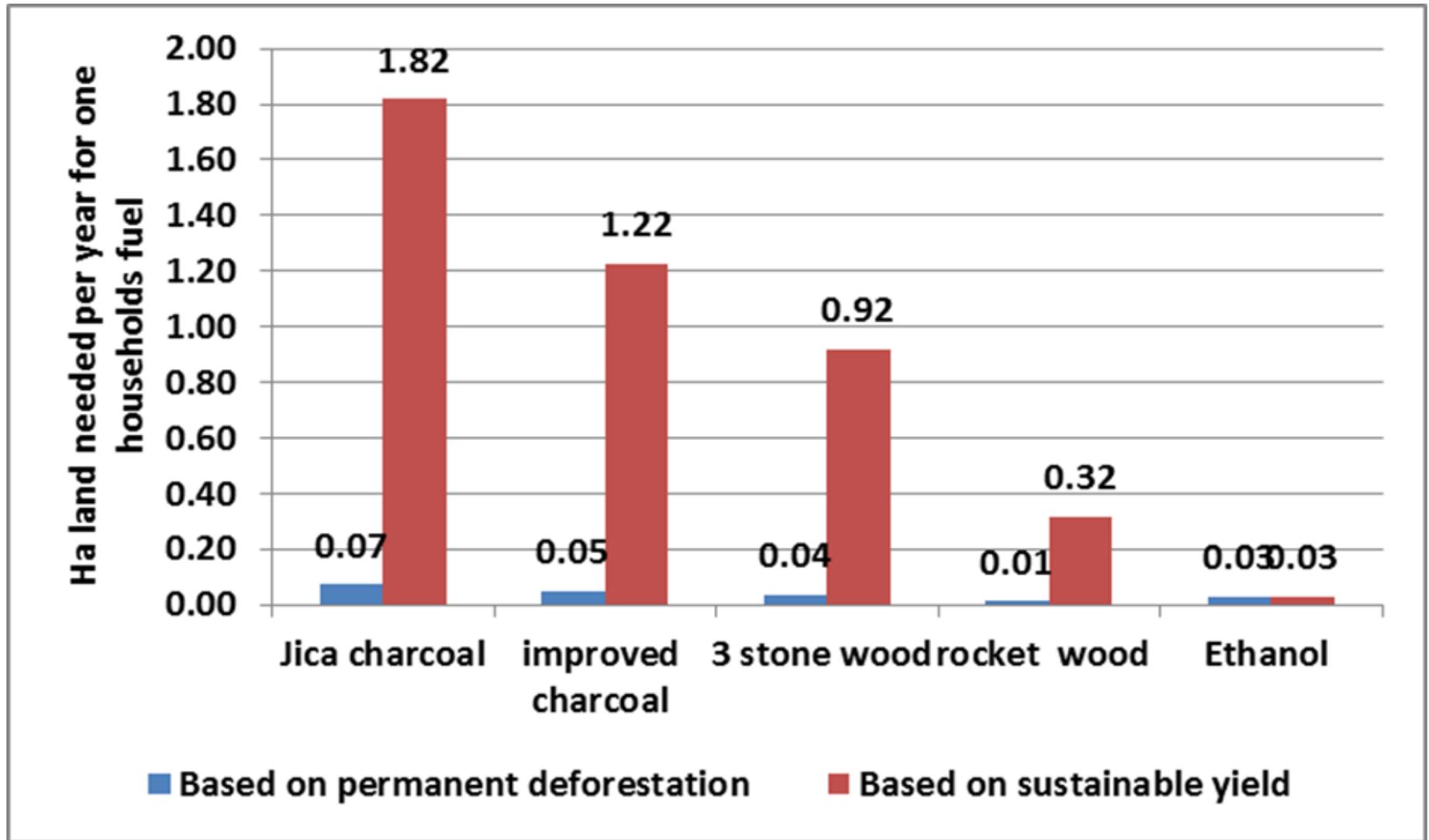
Source: FAO, 2013

# Share of population that relies on traditional biomass and lacks access to modern energy services (note the correlation with food insecurity)



Source: IEA, 2014

# Estimated land use for different Household energy options



Source: von Maltitz, 2014

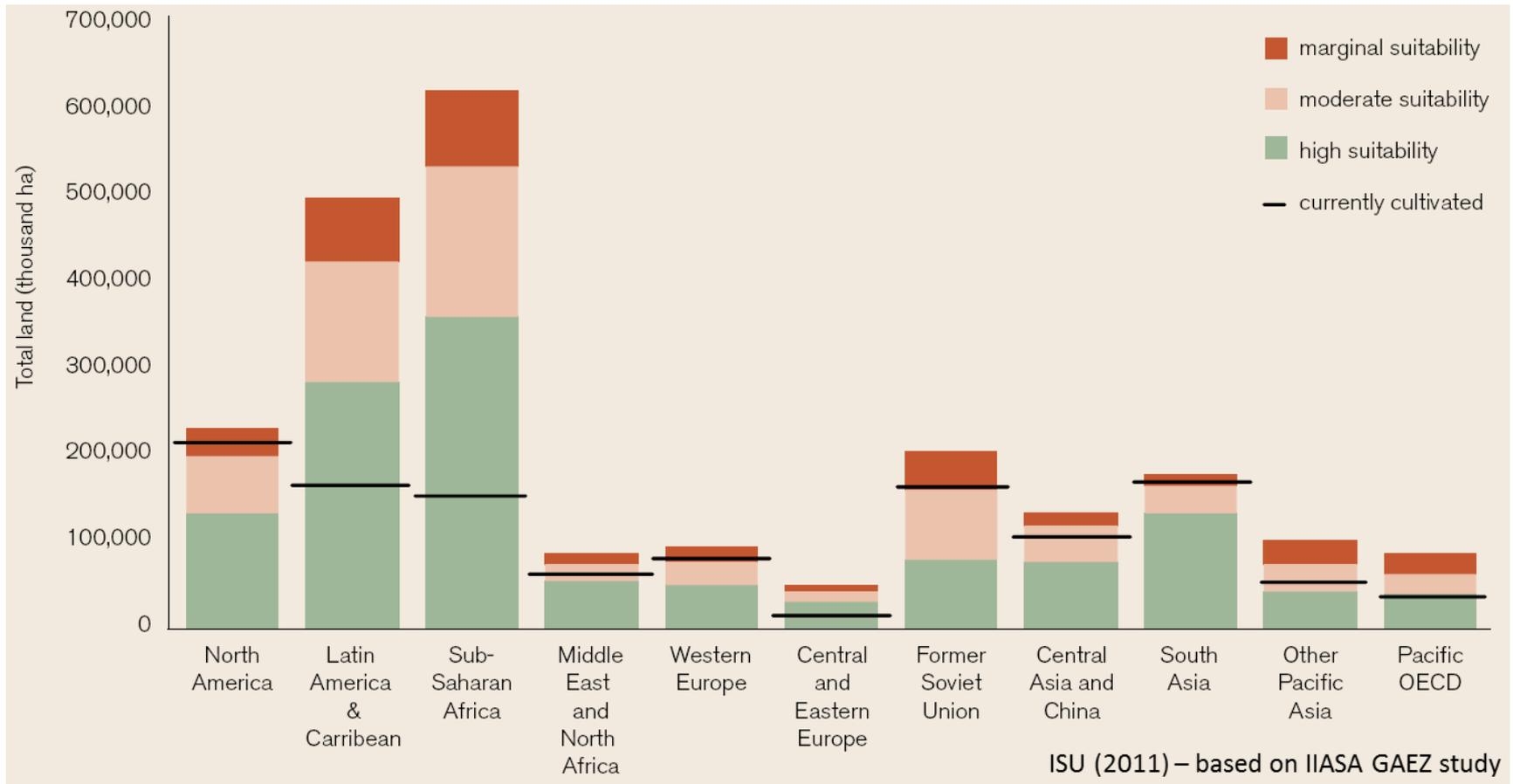
**Modern bioenergy to be accompanied by agricultural improvements – NOT necessarily MORE biomass, but using AVAILABLE biomass more efficiently and effectively; AVOID slash/burn agriculture and pre-harvest burning (e.g. sugarcane)**



# Food Wastes and Losses and Energy connections

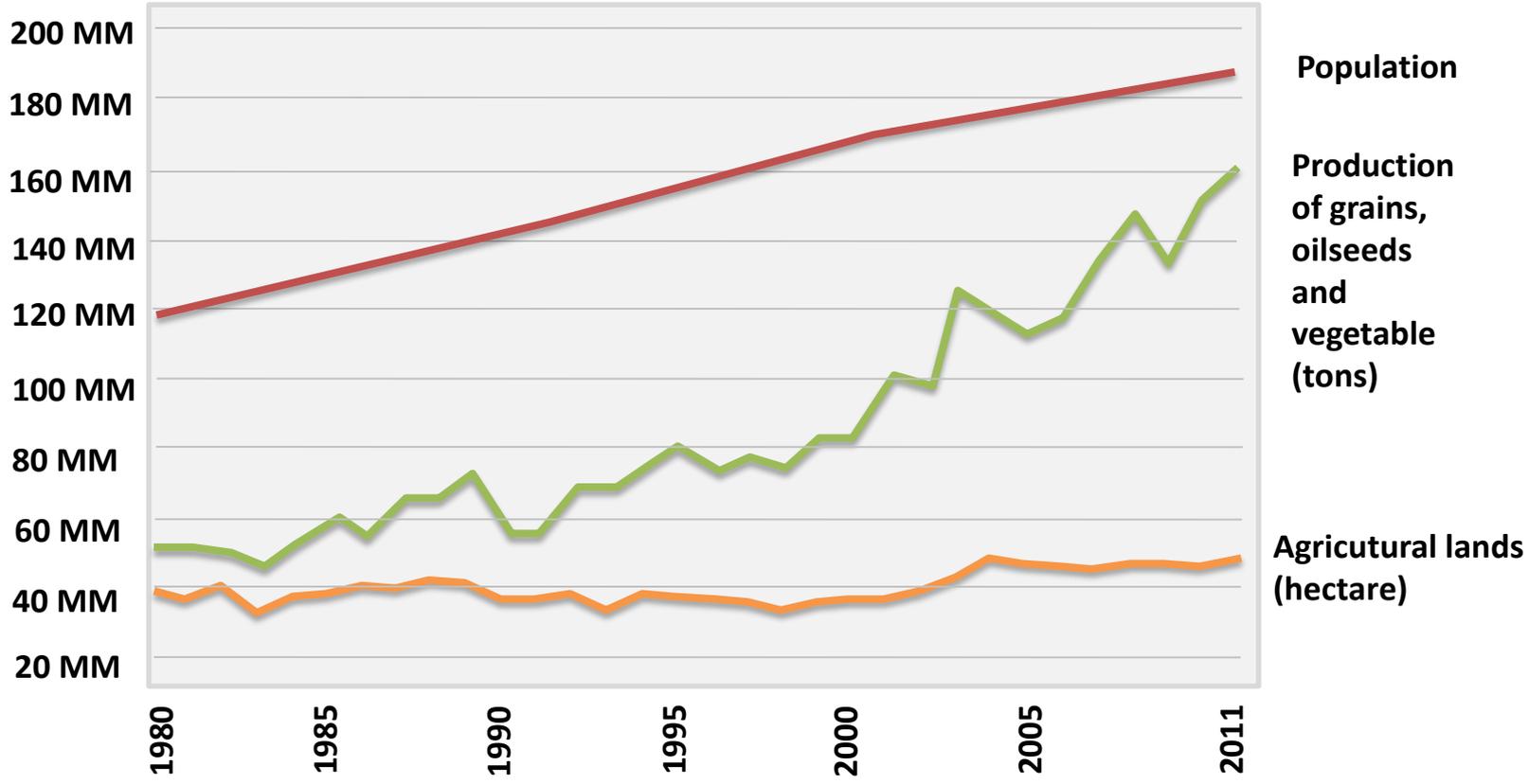
- Food waste and losses are estimated at a staggering value of **one trillion USD** annually.
- In developed countries, mainly a post-consumer problem
- In Least Developed Countries, waste occurs in **pre-consumer** stages: harvest, production, processing, transport, storage
- In some areas, losses can be 50% or more
- Lack of energy access causes losses due to spoilage
- Lack of energy for transport creates distribution problems
- Bioenergy wastes and residues can be utilised alongside food supply chains, creating multiple use of same supply chains
- Local availability of bioenergy provides low cost energy in rural areas where modern fuels are unavailable.

# Global Land Use and Availability of cultivable lands



- Latin America & Caribbean and Sub-Saharan Africa are the only two regions where substantial amounts of suitable land may still be 'available'.
- Must also note that there are many areas of degraded and poorly utilised lands, whose rehabilitation would expand availability.

# Brazilian Agricultural Evolution

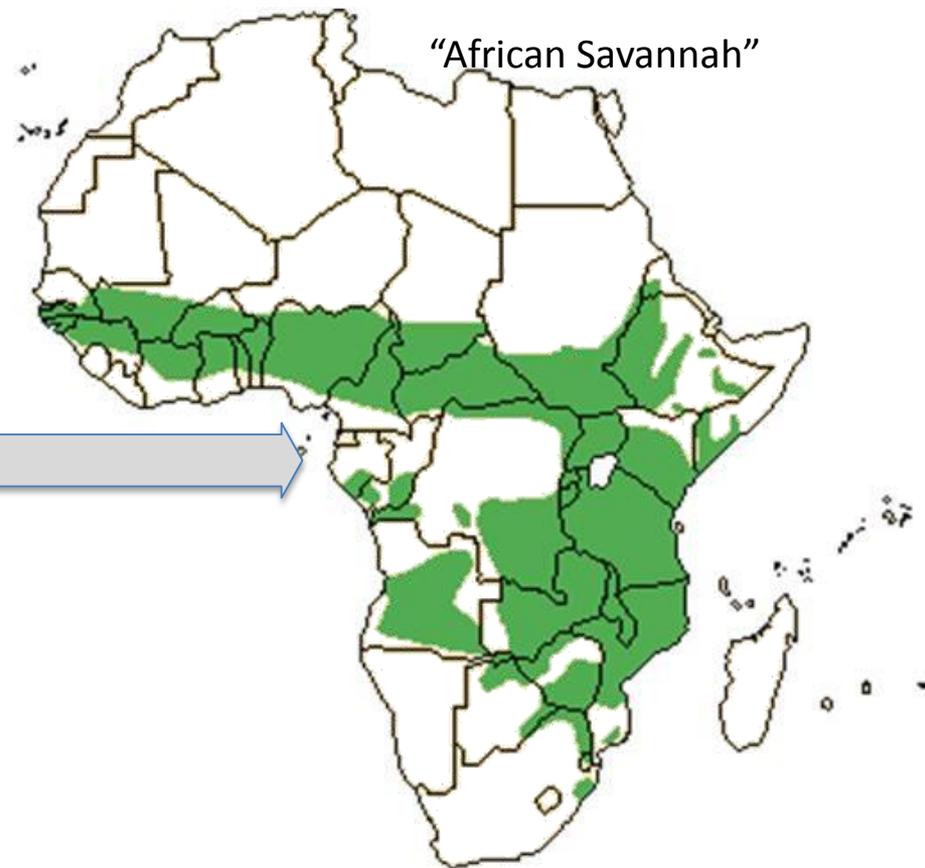


# South – South technology transfer and international cooperation on sustainably developing agriculture and bioenergy: example of “Brazilian Savannah” and African Savannah

Cerrado: “Brazilian Savannah”



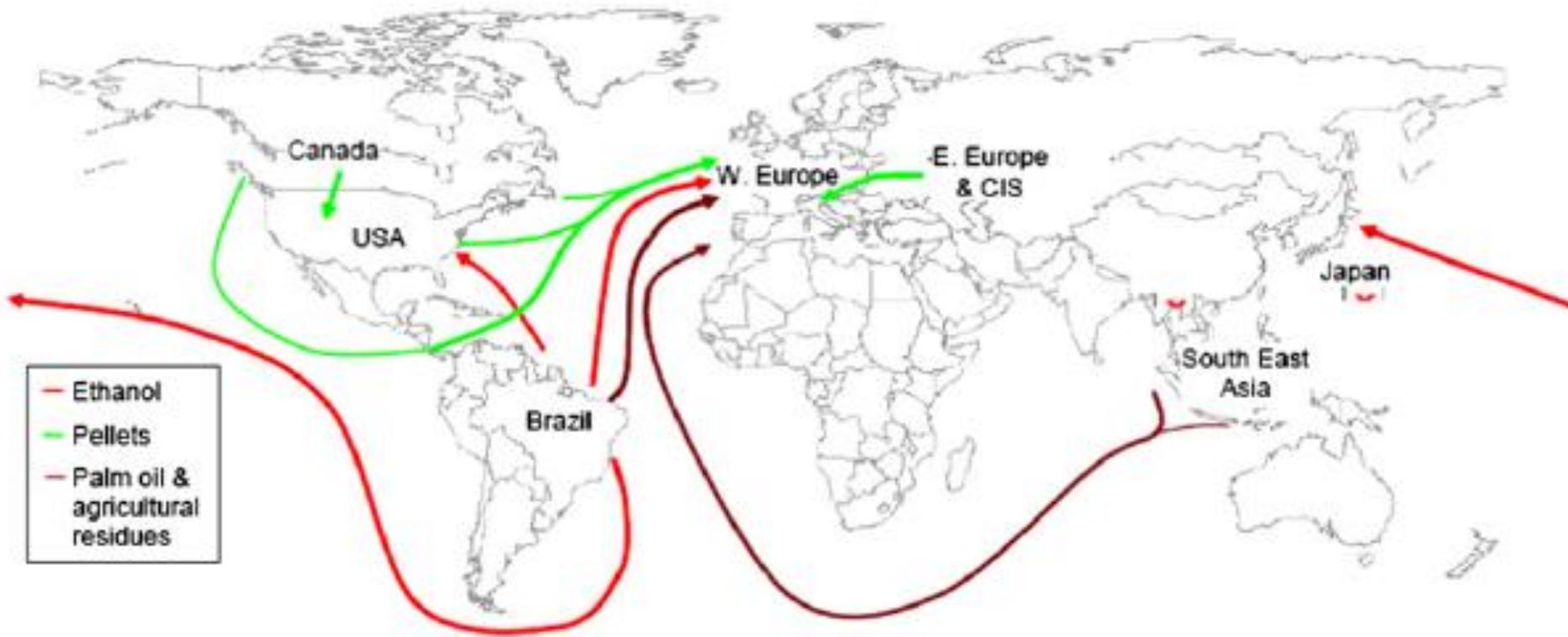
“African Savannah”



# International Trade in key bioenergy products

\*\*TRADE creates new investment opportunities that cannot be obtained through AID

\*\*Why not buy biofuels from poor countries instead of continuing to buy oil from rich countries?



Source: Hoffman et al, 2013

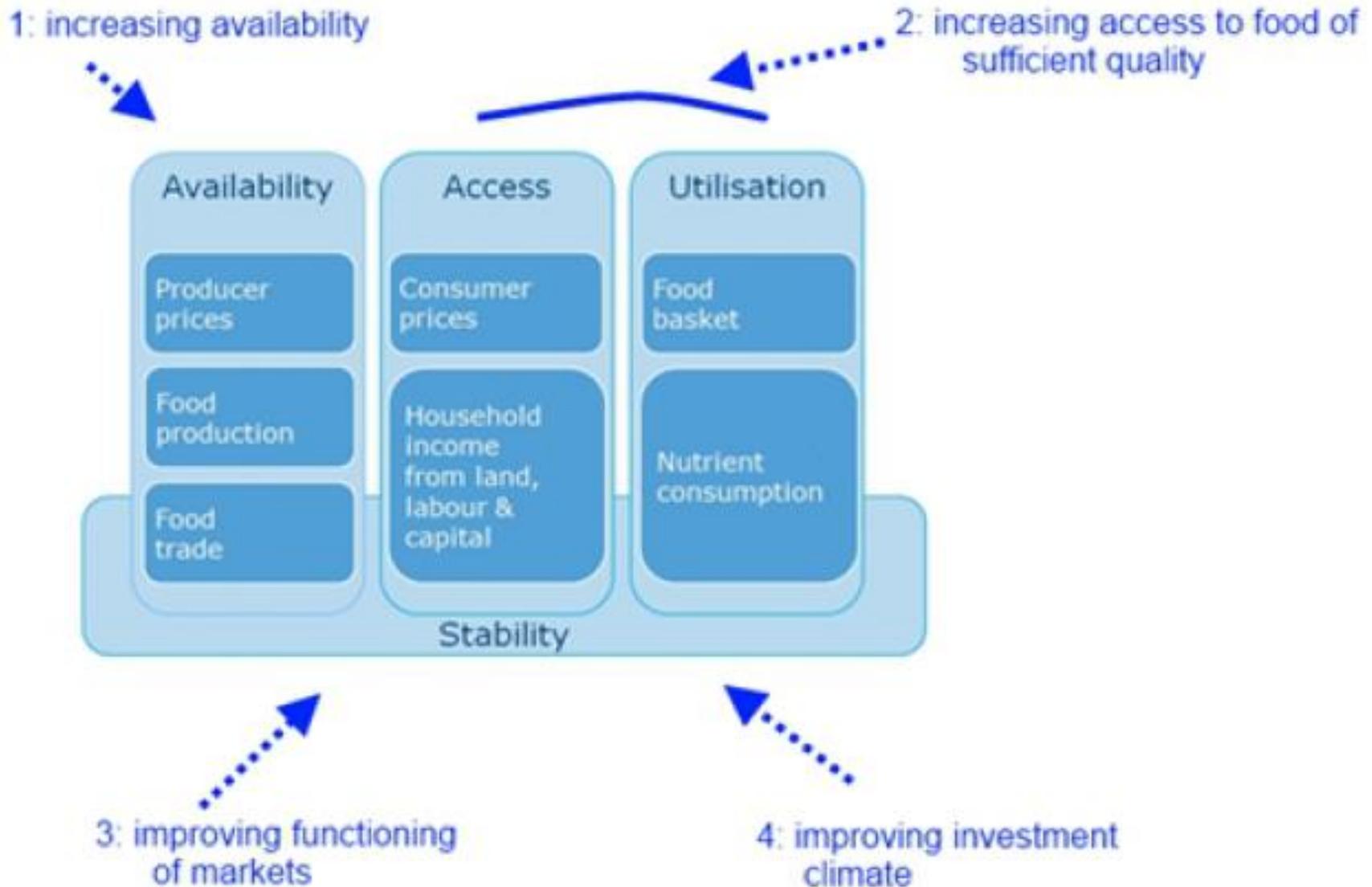
# Local vs. Global perspective??: Estimates/assumptions for physical bioenergy potential in 2050 (●=min/max)

Source	Potential of Residues and Wastes	Potential from dedicated bioenergy systems	Share of IEA (2012) forecast total	Key land use assumptions
Hoogwijk et al (2005)		311-657 EJ	31-66%	Use of abandoned agricultural lands
Smeets et al (2007)	50-100 EJ	215-1272 EJ	27-137%	Significant improvements in yields and reductions in pasturelands
WBGU (2009)	50 EJ	34-120 EJ	8-17%	Competition with land for food and feed; water scarcity; weak institutions
Haberl et al (2009)	119-135 EJ	160-270 EJ	28-41%	Ecological constraints
Van Vuuren (2010)	80 EJ	65-300 EJ	15-38%	Competition for land
Beringer et al (2011)	100 EJ	26-174 EJ	13-27%	Modest yield improvements; impacts of climate change and water scarcity
Chum et al (2011) IPCC SRREN	50-100 EJ	50-400 EJ	10-50%	Learning curves in agricultural technology; deployment constraints; competition for biomass

# Contributions of modern bioenergy to agricultural/rural development and supply chains

- Stimulates international investment and technology transfer;
- decreased price volatility, resulting from diversification of revenue sources from agricultural and forest-based commodities, reducing supply risks and increasing rural income, with associated benefits on farm income and investment;
- agricultural and land use infrastructure development through investments for biomass feedstock and bioenergy systems;
- rural economic development, supported by local energy availability and development of improved value chains, market linkages and infrastructure;
- providing a flexible, market-based system that can adjust the use of biomass for food or energy in times of abundance or scarcity.

# Contributions of modern bioenergy to food security



(Source: Shutes et al. 2013)

# Concluding Comments

- Enough food is produced globally; hunger and malnutrition are problems of **access, distribution** and **income**.
- Modern energy access, including bioenergy, can improve **food safety**
- Bioenergy improves **resource efficiency** by reducing and re-using wastes
- Bioenergy can improve **supply chain / infrastructure** for food products
- Bioenergy stimulates agricultural investments, creating long term **stability**
- Bioenergy infrastructure offers a dynamic and **flexible production** system, in which farmers can switch between energy, food and other bio-based products
- Bioenergy is both a **local** AND a **global** resource; bioenergy trade is ultimately not much different than other types of trade
- Bioenergy increases **access** to food by expanding livelihoods, thus increasing food security through higher income, education and improved infrastructure
- In order to achieve these identified benefits, **good governance** and **enabling policies** are crucial, both at local scales as well as national and global levels

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Thanks to FAPESP,  
SCOPE and the  
leadership of the report  
and this conference

