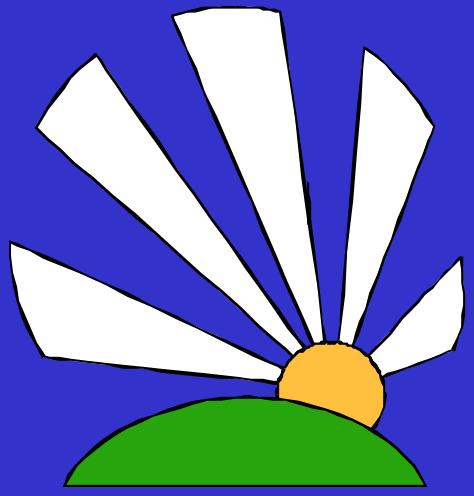
Opportunities to mitigate Greenhouse gas emissions in Latin American Agriculture



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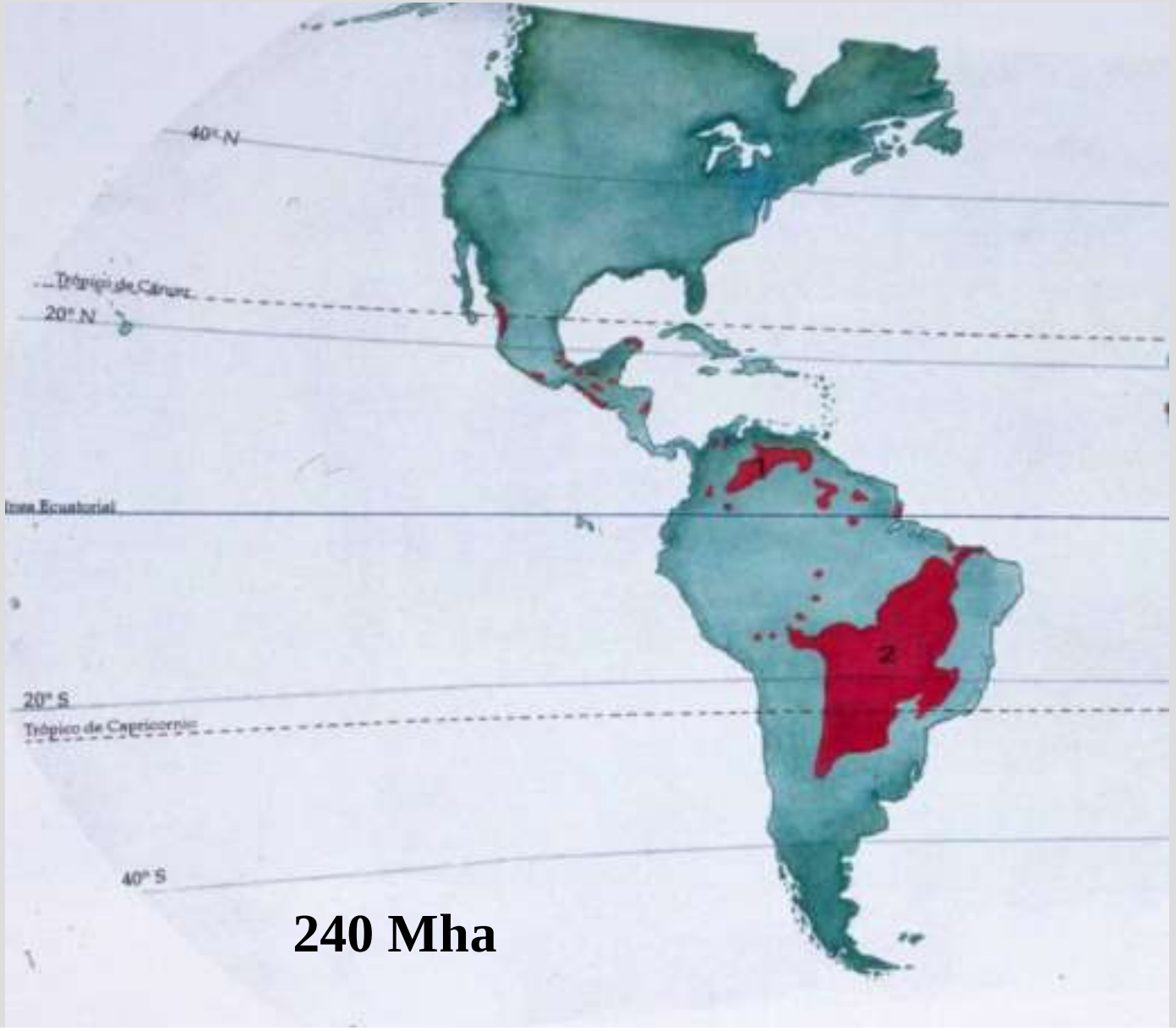
Bonn - June 19, 2004

Agriculture and livestock intensification in Tropical savannas

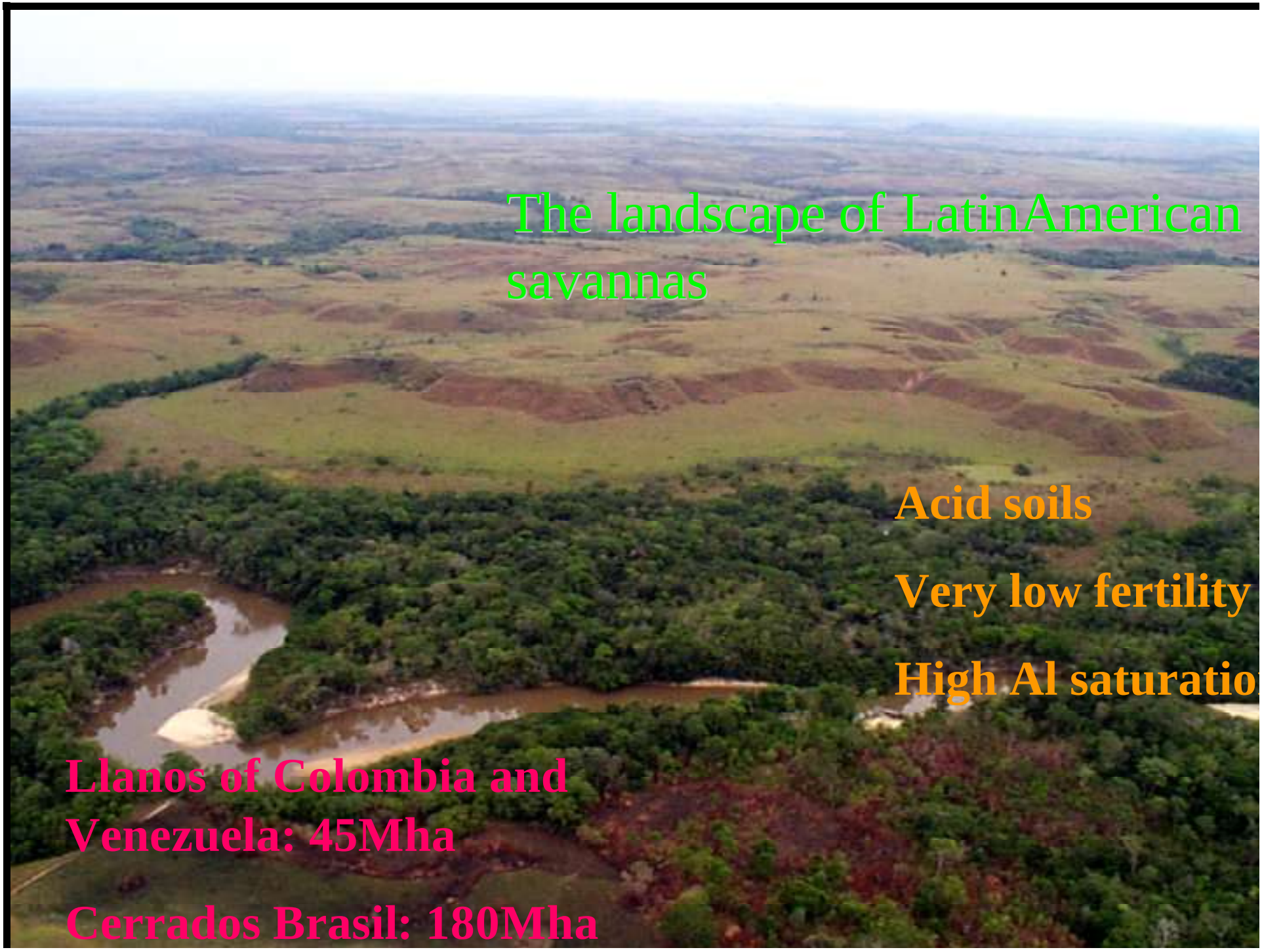
Restoration of degraded lands in the Amazon

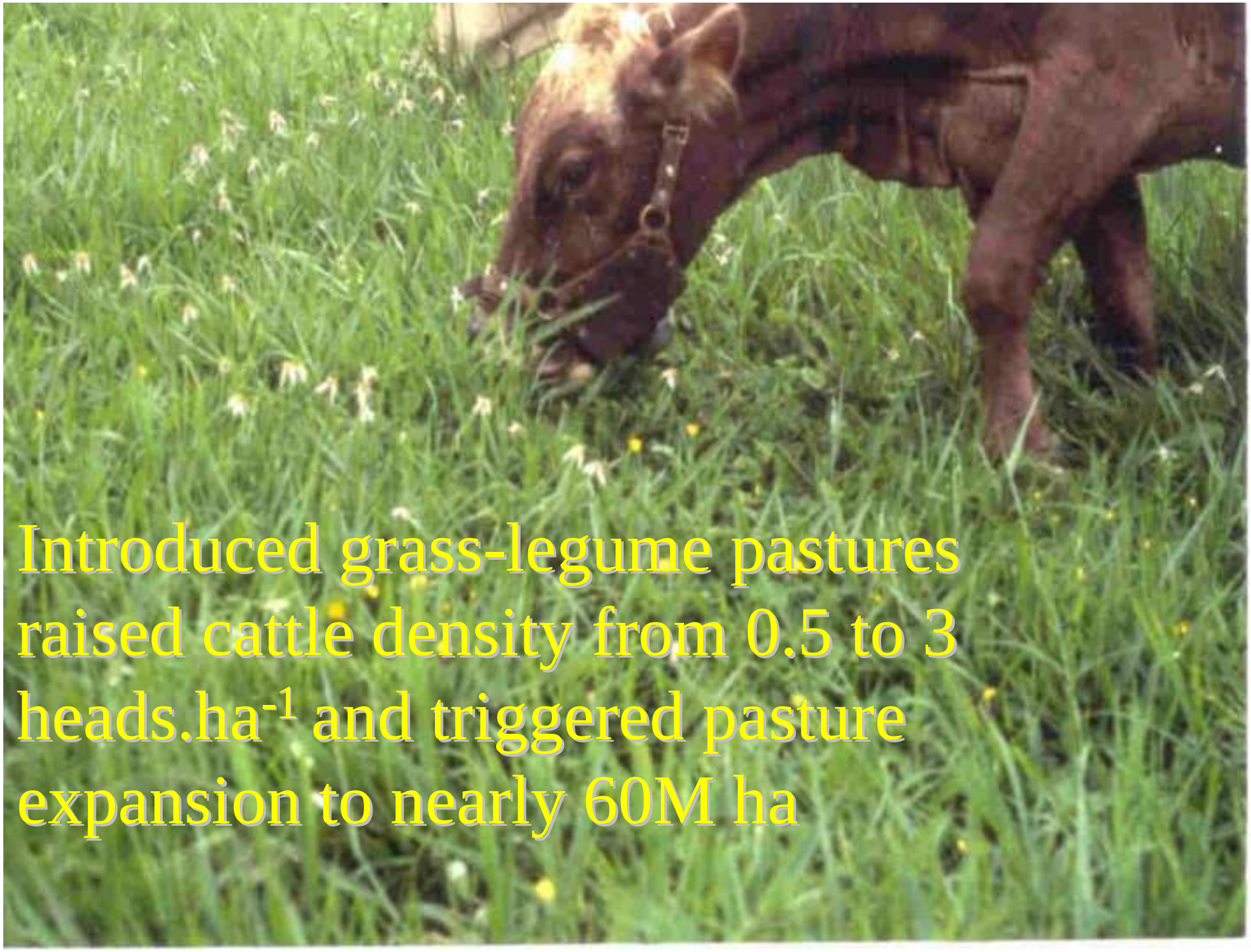
Green harvest management on Sugar cane

Native Savannas in America

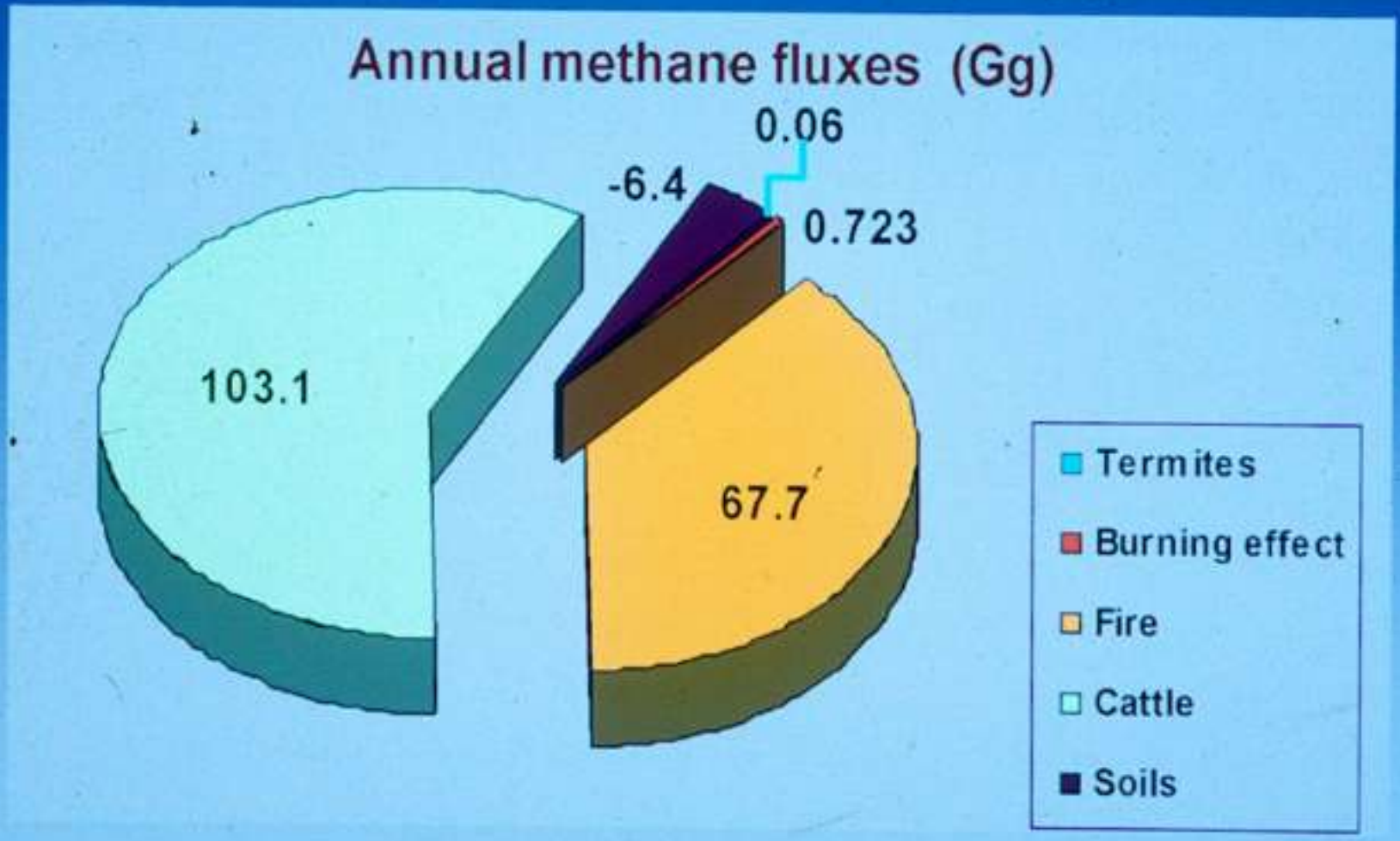


240 Mha

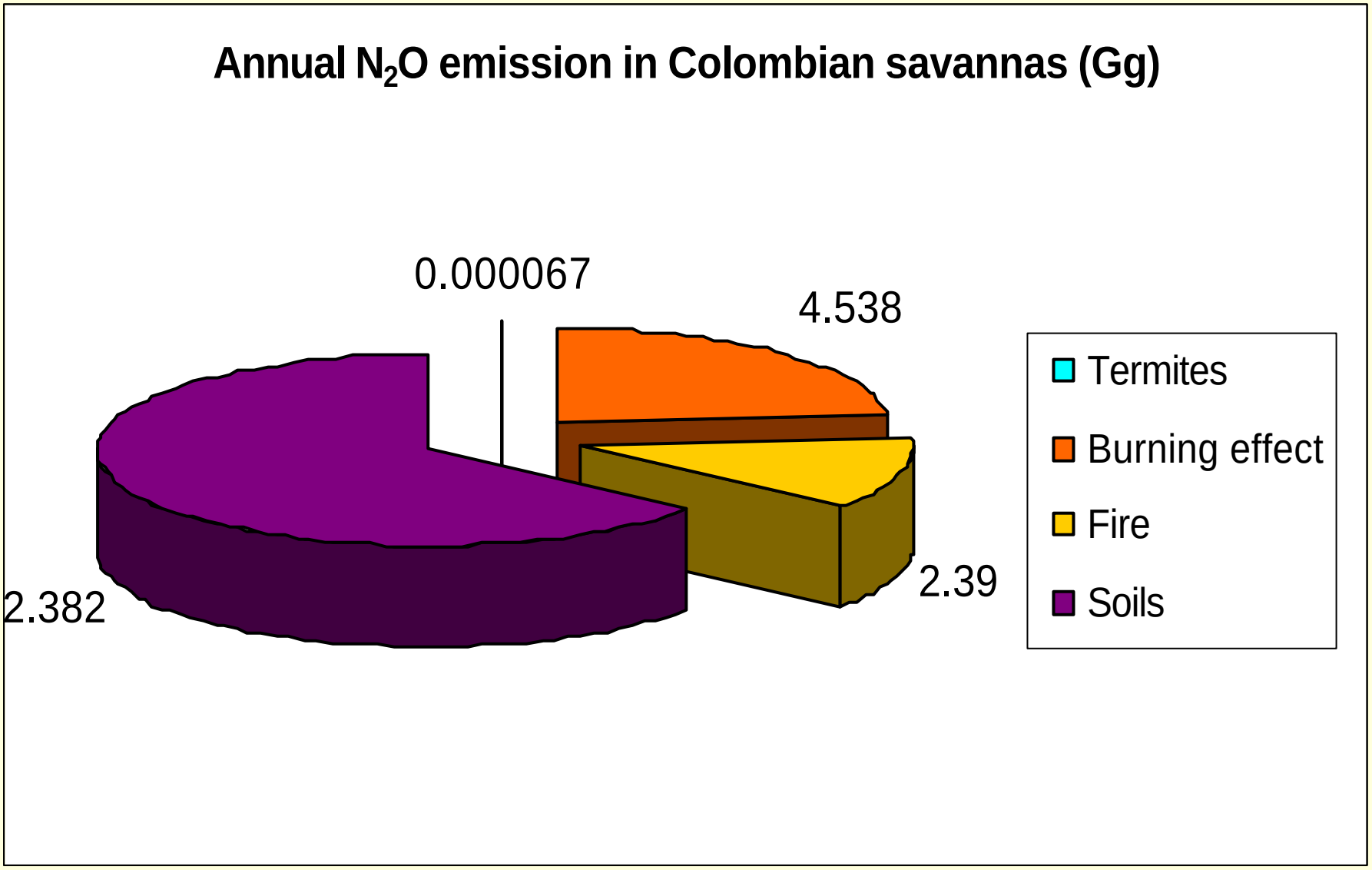

The landscape of LatinAmerican savannas
Acid soils
Very low fertility
High Al saturatio
Llanos of Colombia and Venezuela: 45Mha
Cerrados Brasil: 180Mha


Introduced grass-legume pastures raised cattle density from 0.5 to 3 heads.ha-1 and triggered pasture expansion to nearly 60M ha

Contribution of various components to annual emission of GHG in Colombian savannas



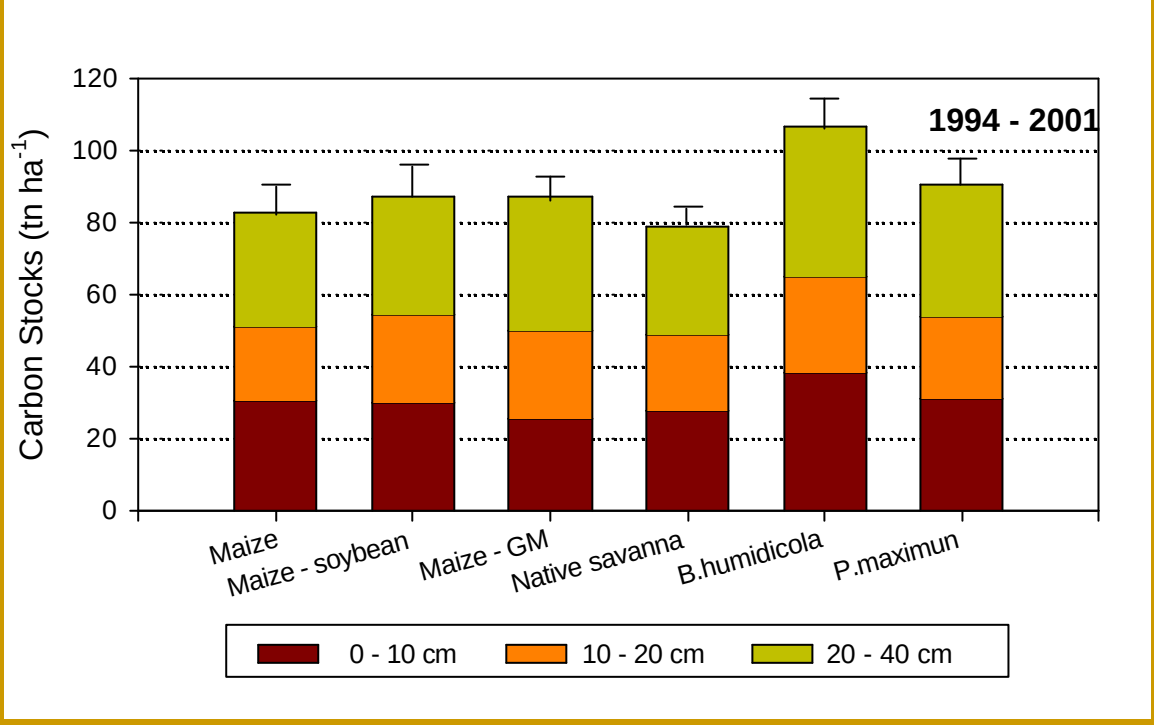
Source: Rondon, 2000



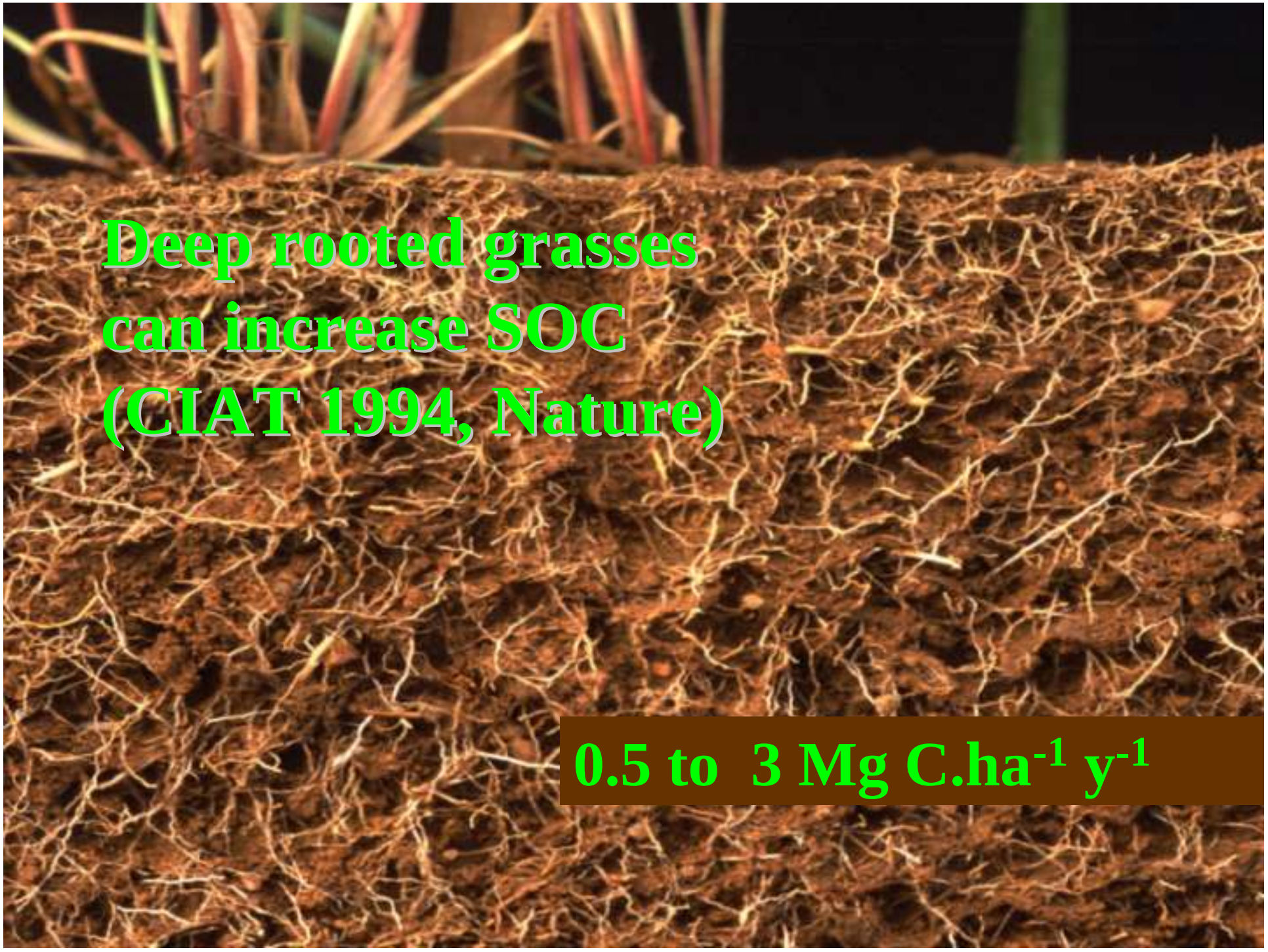
Source: Rondon, 2000

Soil carbon stocks under a long term experiment

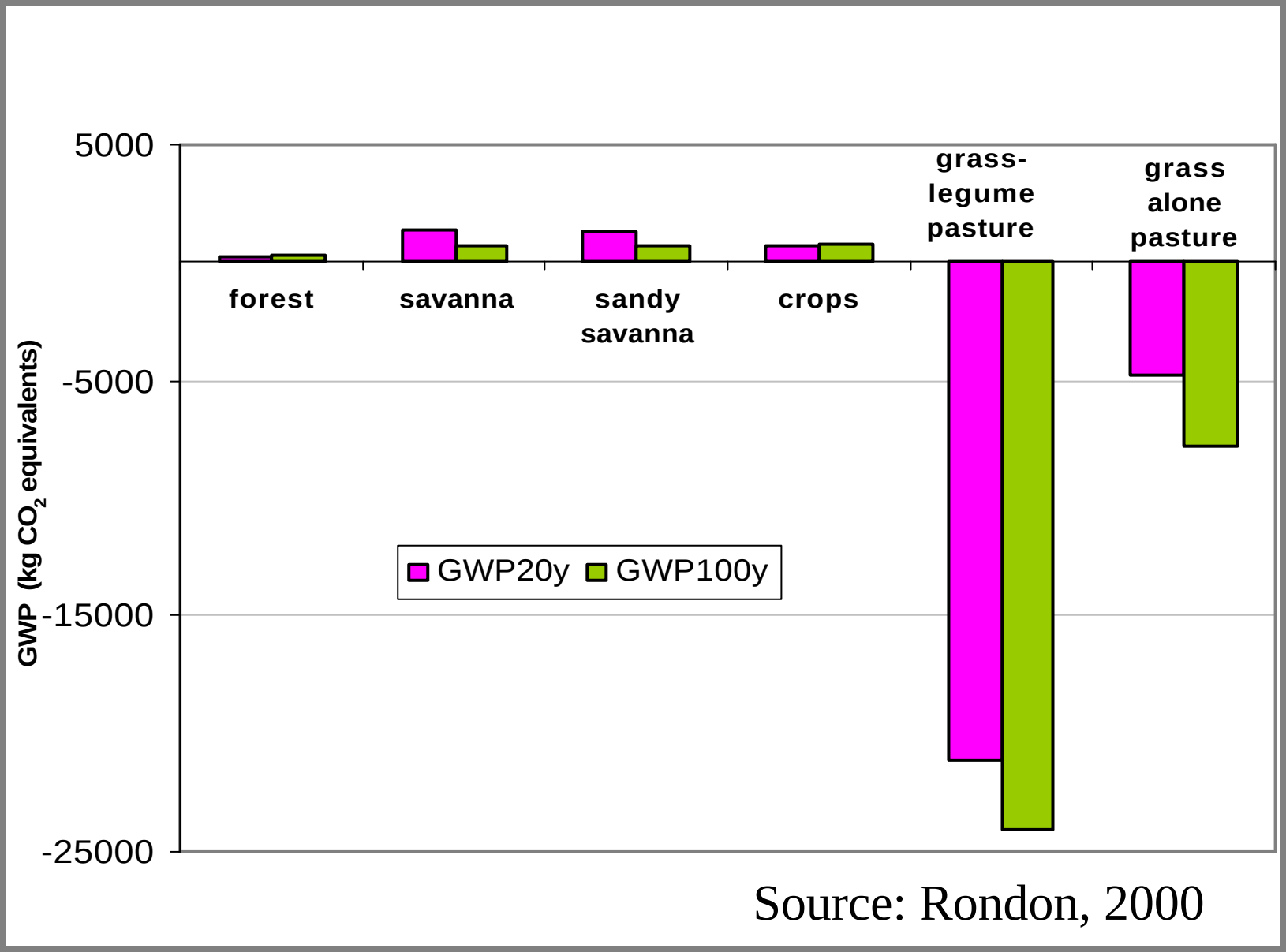
Carimagua, Colombian Llanos: Maize-based systems



Rondon et al, unpublished data.


Deep rooted grasses
can increase SOC
(CIAT 1994, Nature)
0.5 to 3 Mg C.ha-1 y-1

Global Warming Potential of various land use systems in Colombian Llanos



Source: Rondon, 2000

Maximum potential to sequester carbon in soils and reduce GHG emissions

Conversion of native vegetation to well managed pastures or tree plantations

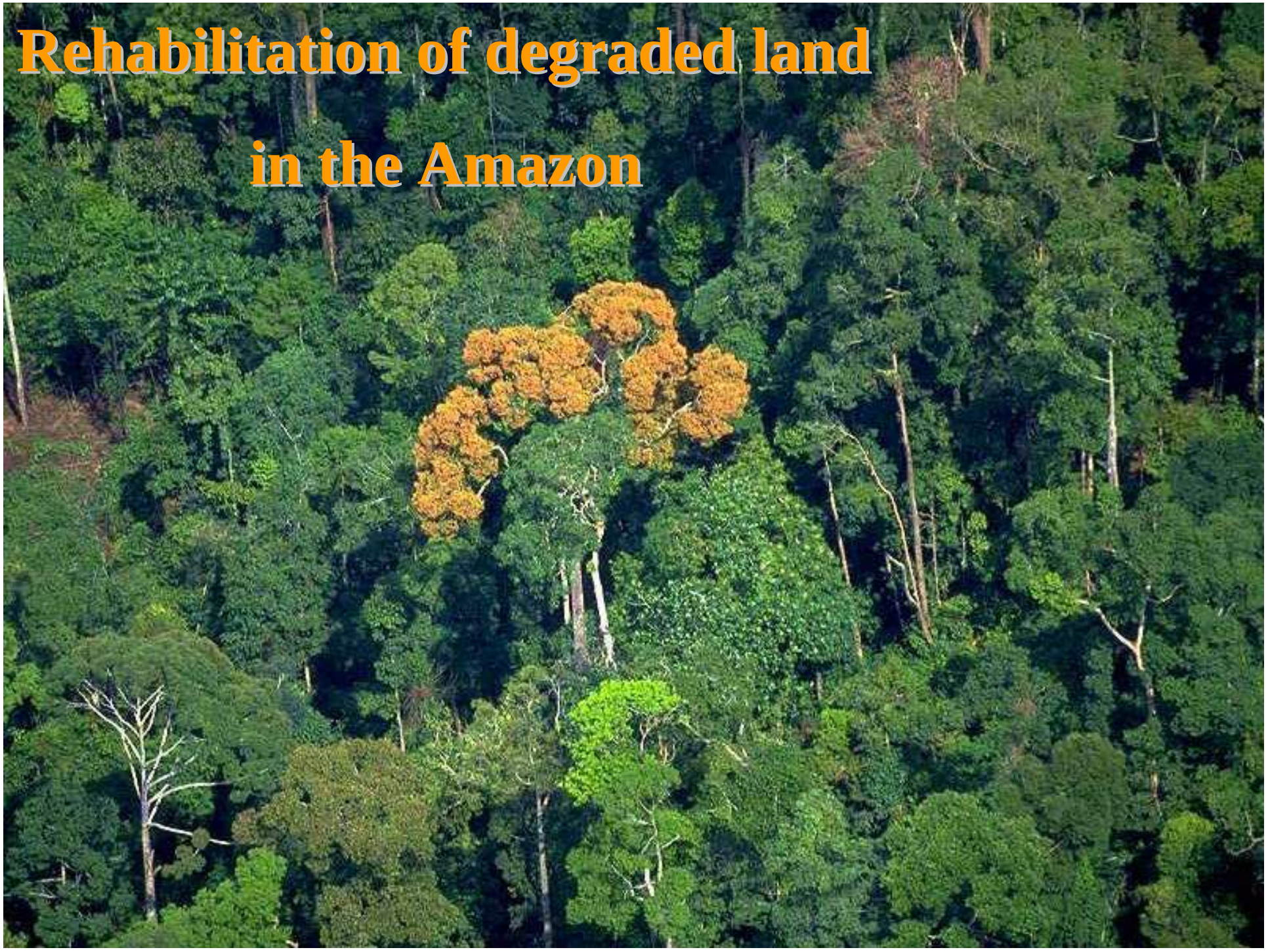
Maximum gain in $C_{equivalents}$: 700Tg C (±120)

Expected changes in net C $_{equivalents}$ under anticipated land use changes in the Llanos to year 2025

	Area (Mha)		Net change in SOC stocks relative to savannas
	Now	year 2025	Tg C
Native savanna vegetation	21.6	14.6	0
Gallery forest	6.4	6.4	0
Pastures	14.4	19.6	97.7
Crops	2.2	3.4	-1.2
Planted trees	0.9	1.5	27.0
Total	45.5		**123.2**

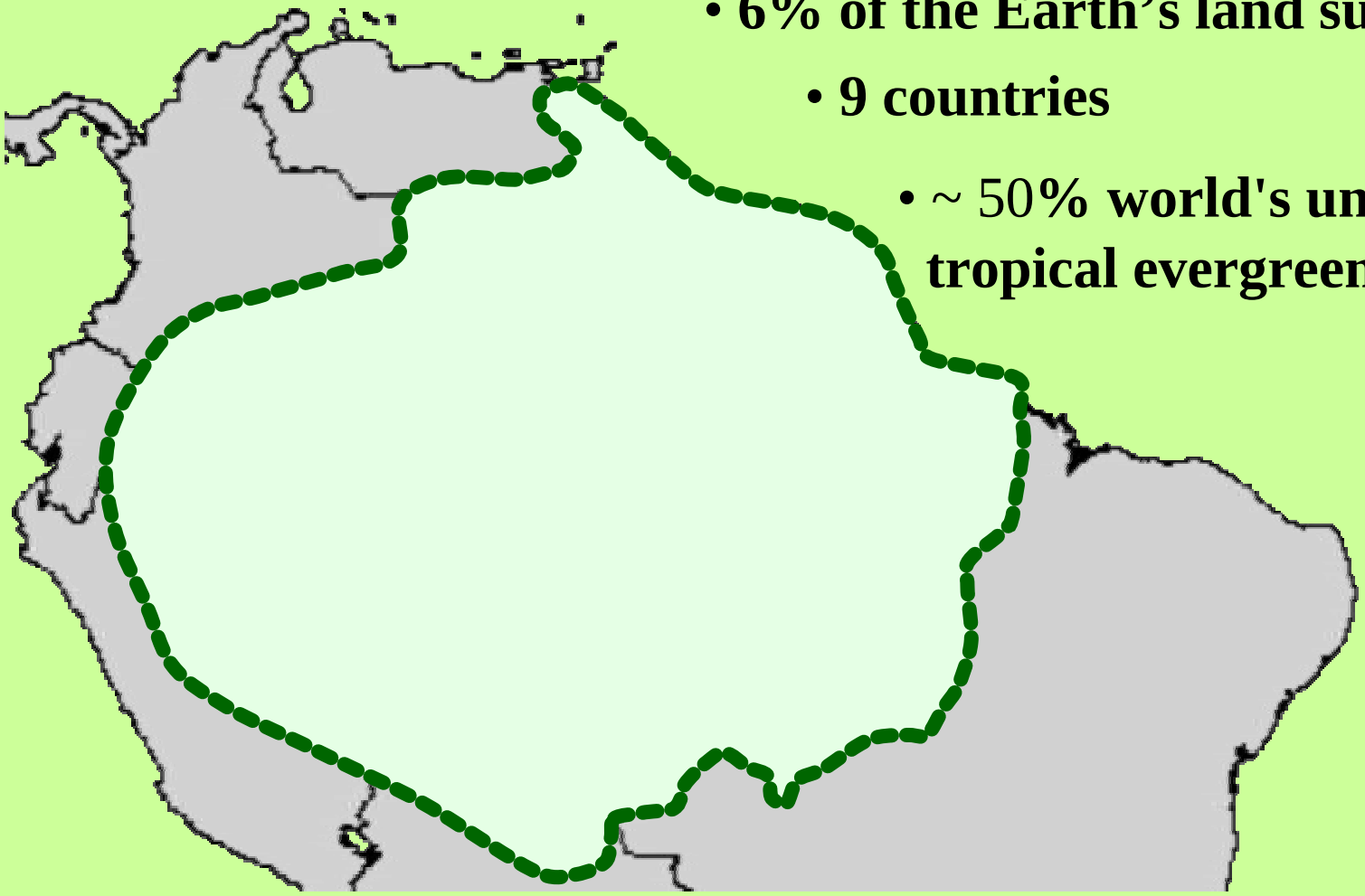
Estimates in land use from historical national trends and Agricultural development policies (MADR, MAF)

Rehabilitation of degraded land in the Amazon



Amazonian Tropical Rain Forest

- **7 million km^2**
- **6% of the Earth's land surface**
- **9 countries**
- **~ 50% world's undisturbed tropical evergreen forest**



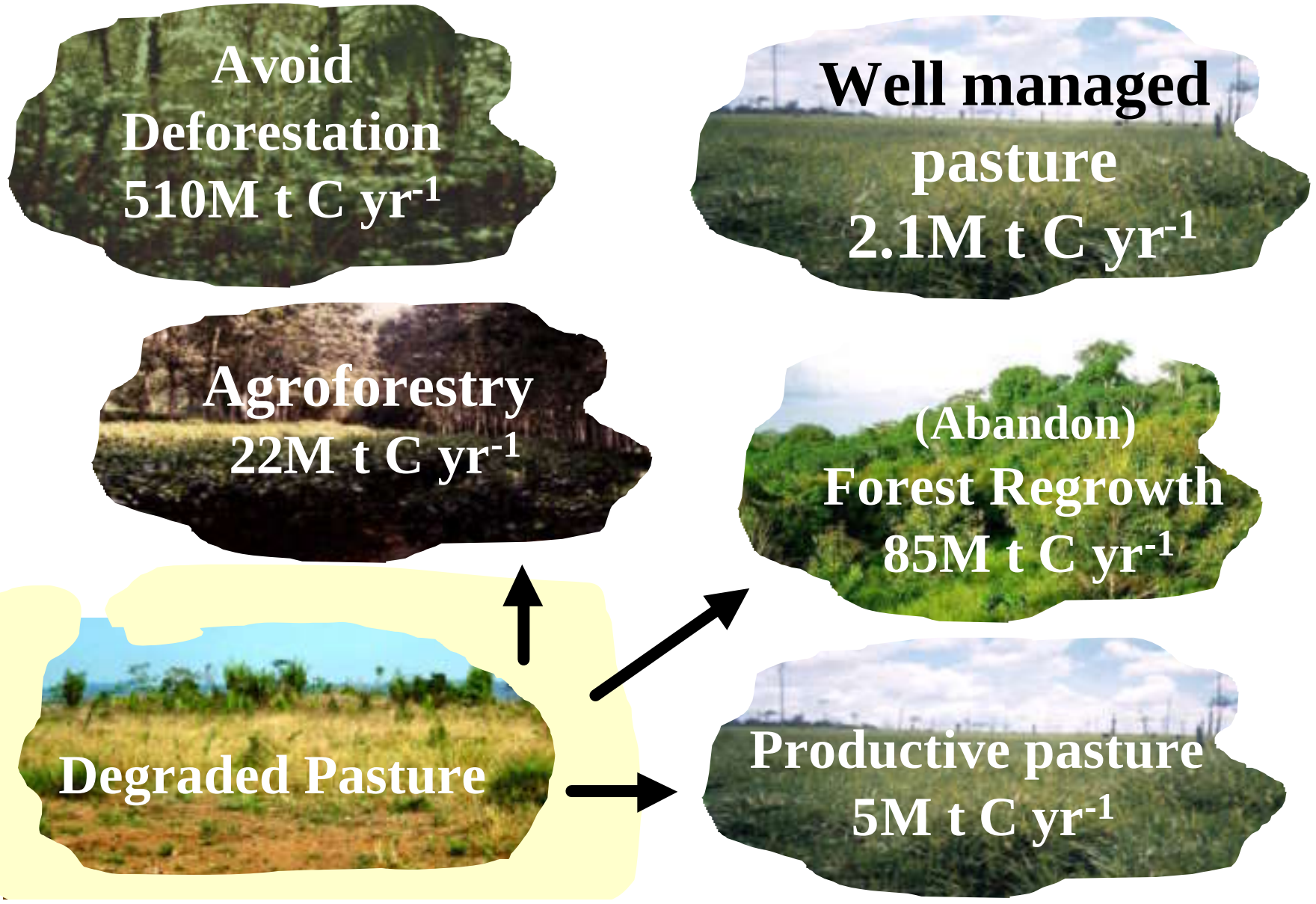
Accumulates **0.27 t C ha^{-1} yr^{-1}**
in the 0-30 cm soil depth

Cerri *et al*. (1999)

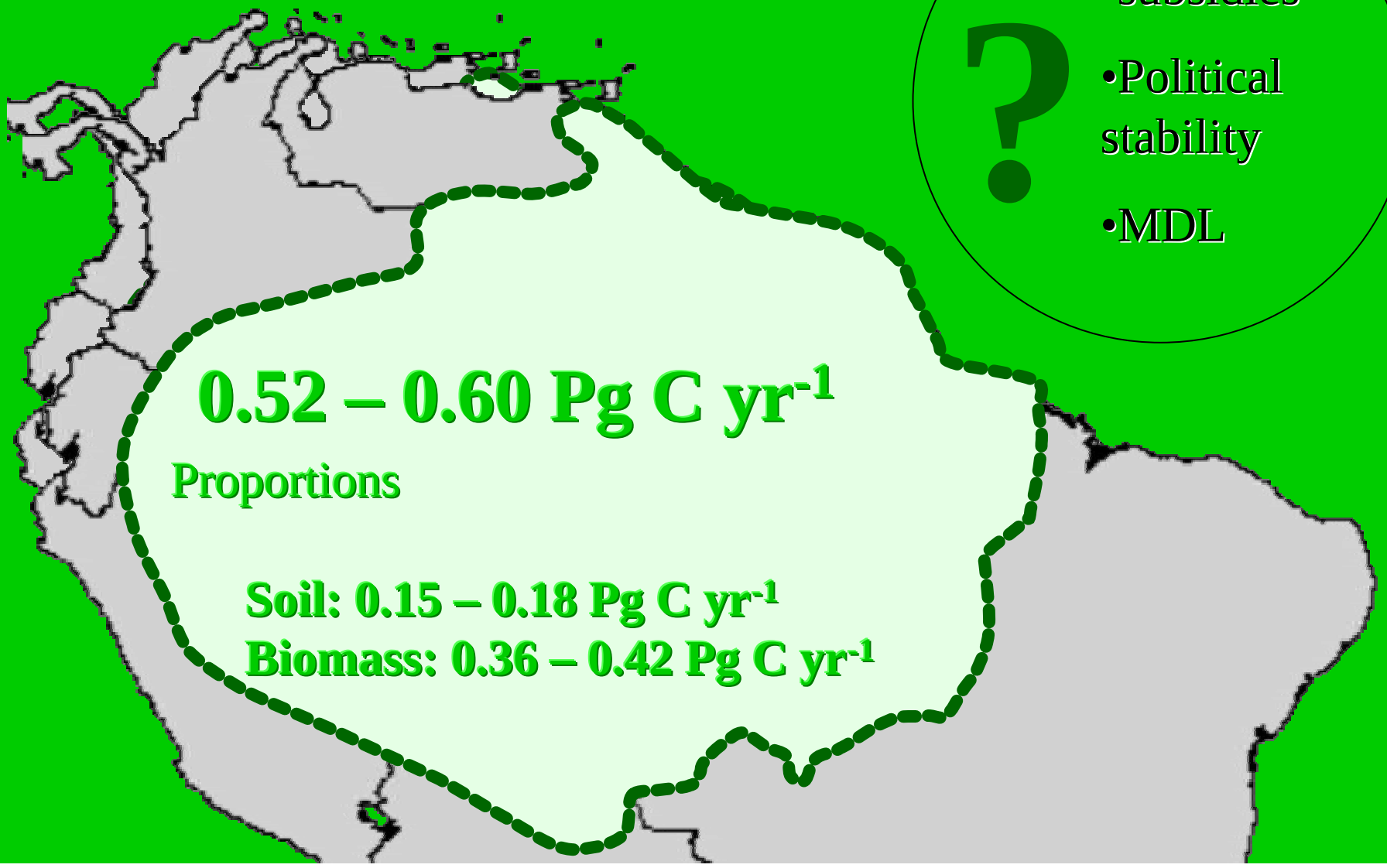
INPE, 2004

Dias-Filho et al. (2001)

Potential of Carbon Sequestration in the Amazon (Soil + Biomass)



Carbon sequestration Potential in Amazonian Tropical Rain Forest



0.52 – 0.60 Pg C yr^{-1}

Proportions

Soil: 0.15 – 0.18 Pg C yr^{-1}

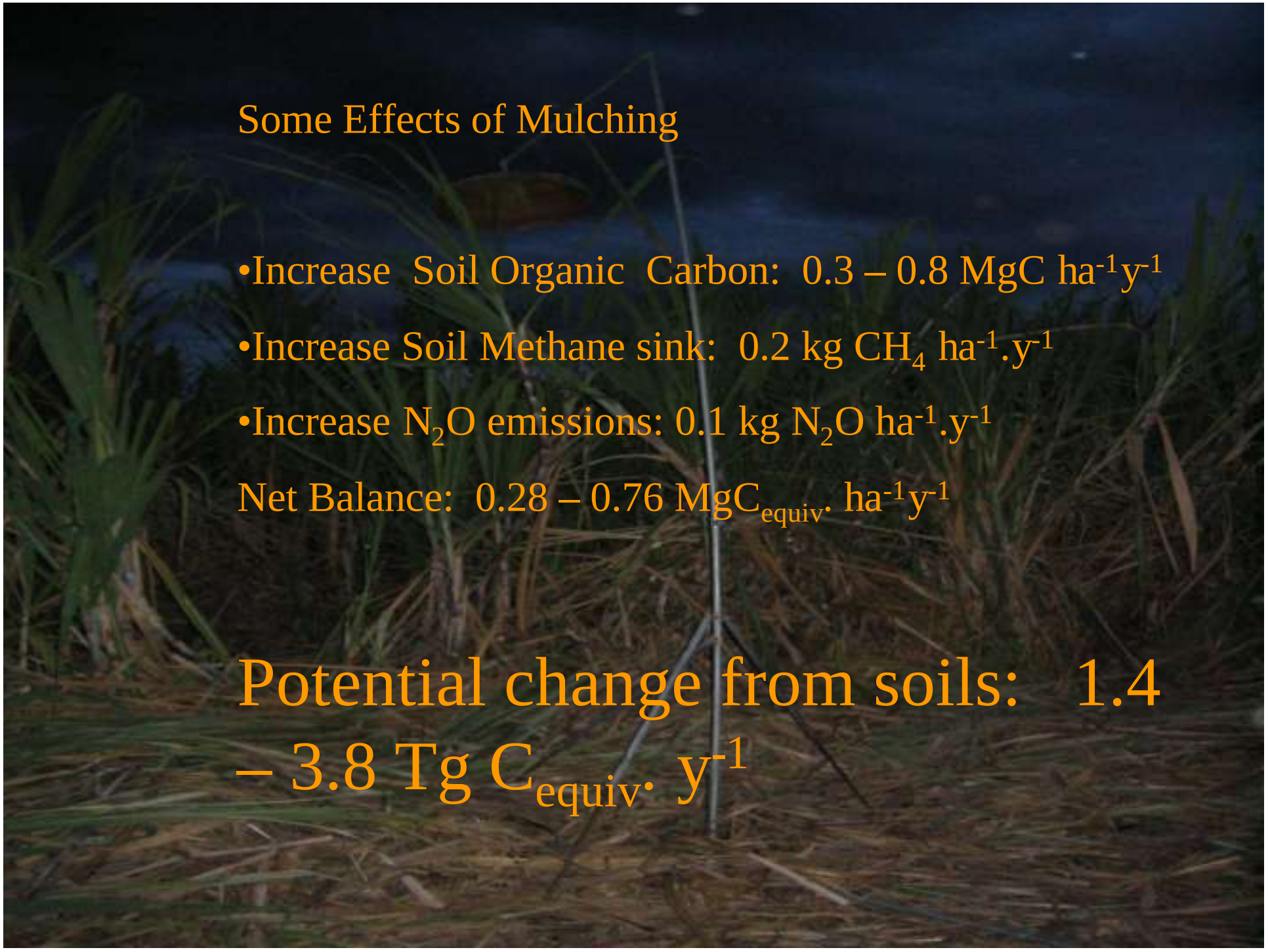
Biomass: 0.36 – 0.42 Pg C yr^{-1}

?

- ALCA
- subsidies
- Political stability
- MDL


Greening the harvest
of Sugar Cane
6 Mha in Brazil and Colombia


Net GHG emissions: 204 Tg C equiv. y-1
86% CO2; 7.1% CH4; 6.9% N2O



Some Effects of Mulching

- Increase Soil Organic Carbon: 0.3 – 0.8 MgC $ha^{-1}y^{-1}$
- Increase Soil Methane sink: 0.2 kg CH_4 $ha^{-1}.y^{-1}$
- Increase N_2O emissions: 0.1 kg N_2O $ha^{-1}.y^{-1}$

Net Balance: 0.28 – 0.76 MgC_{equiv}. $ha^{-1}y^{-1}$

Potential change from soils: 1.4 – 3.8 Tg C_{equiv}. y^{-1}


Other opportunities in the Agriculture sector
2004 3 21

Improved diets reduce net methane emissions from cattle


Expansion of
No Tillage
Agriculture

Improving water management in rice fields


Thank You!