

# POLICIES FOR THE SUSTAINABLE DEVELOPMENT OF BIOFUELS IN PAN AMERICA

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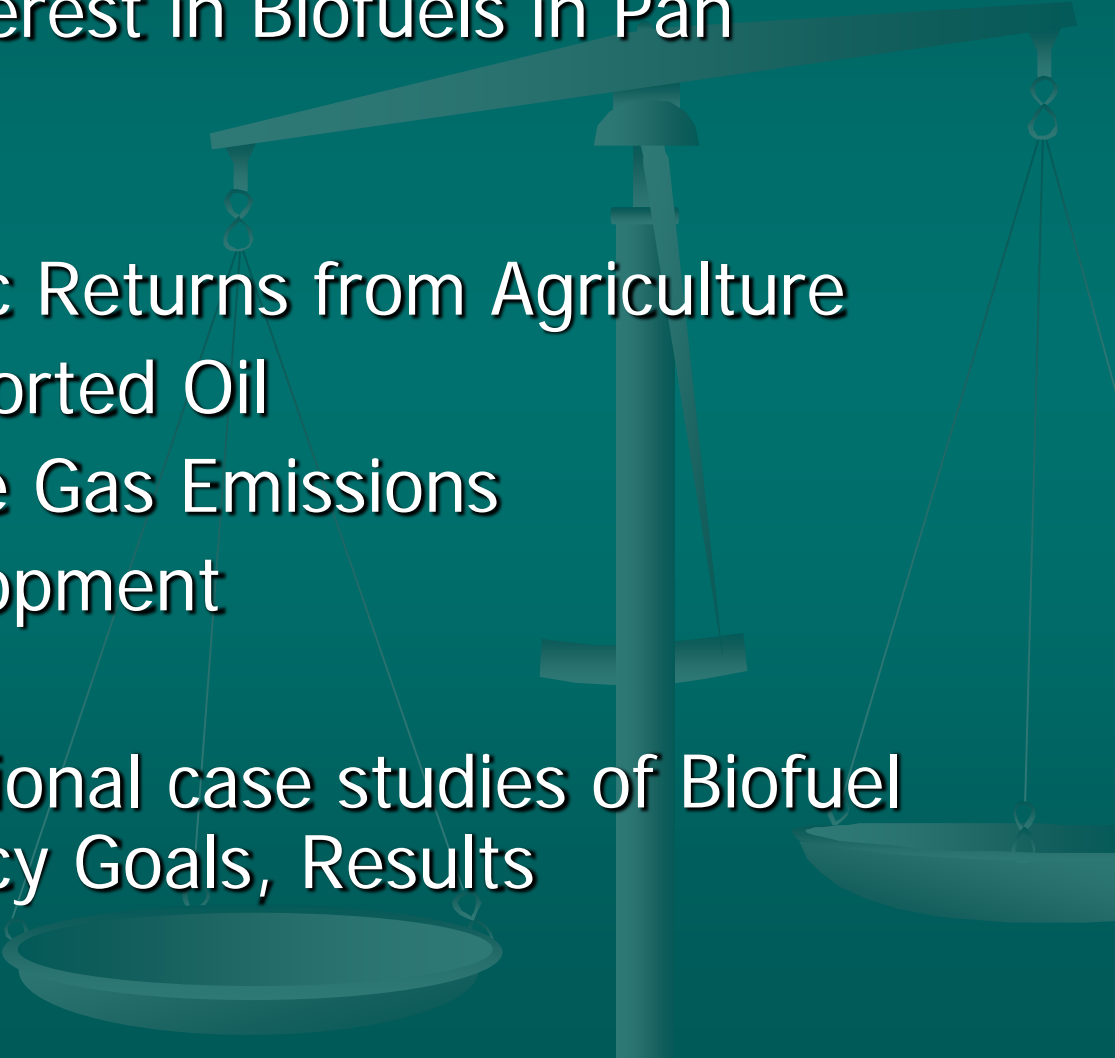
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# Introduction

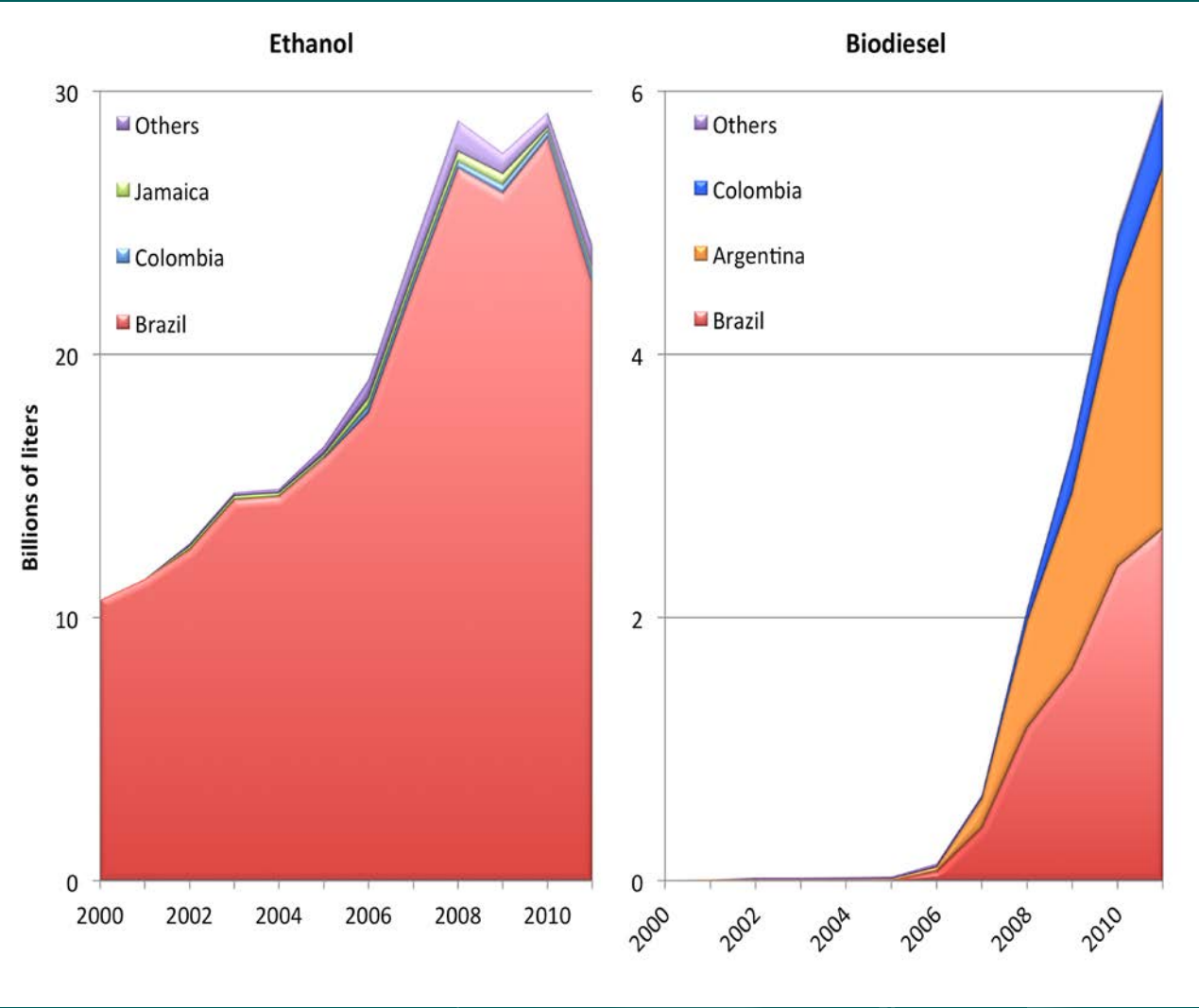
- Biofuel production greatly expanded during 2000-10, though output more stagnant since
  - U.S. & Brazil the world leaders, mostly w/Ethanol; less so Biodiesel (followed by Germany, Indonesia, France; Argentina)
- many concerns over Sustainability of Biofuels raised: use of Food (ie Maize) for Fuel, Land Use Changes, Greenhouse Gas Emissions, Water Use, Land Tenure, Labor & Human Rights, etc.

# Introduction - cont.

- Why increased interest in Biofuels in Pan America?
    - Increase Economic Returns from Agriculture
    - Alternative to Imported Oil
    - Lower Greenhouse Gas Emissions
    - Sustainable Development
  - We'll review 5 National case studies of Biofuel development, Policy Goals, Results
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# Biofuels Production in Pan America

- U.S. & Brazil began modern Ethanol industries in 1970s, today account for ~95% of Ethanol production in W. Hemisphere (~85% worldwide)
- Canada doubled Ethanol production in last few years; output elsewhere in region small
- Biodiesel Production → more recent & more competitive – Brazil, US, Argentina all close



# Biofuel Sustainability Governance

- proliferation of International Sustainability Standards for Biofuels & their Feedstocks → 6 adopted in Latin America, but many more ..
- most Certification Schemes done by non state actors, voluntary, performance self-reported (& thus not 100% credible), and:
  - with so many standards the Schemes somewhat inconsistent, confusing, and:
  - sustainability certification doesn't = sustainability!

# Food vs. Fuel, or Both? Regional Production, Cooperation & Trade

- Agricultural Sectors very important in Region
  - Maize – US & Brazil major producers; Mexico & Colombia large importers (Argentina also exporter)
  - Soybeans – US, Brazil & Argentina dominate
  - Sugarcane – Brazil dominates
  - Canola – Canada dominates
  - among these, only Maize a Staple; Soy Oil for Biodiesel doesn't conflict with Soybean Meal use
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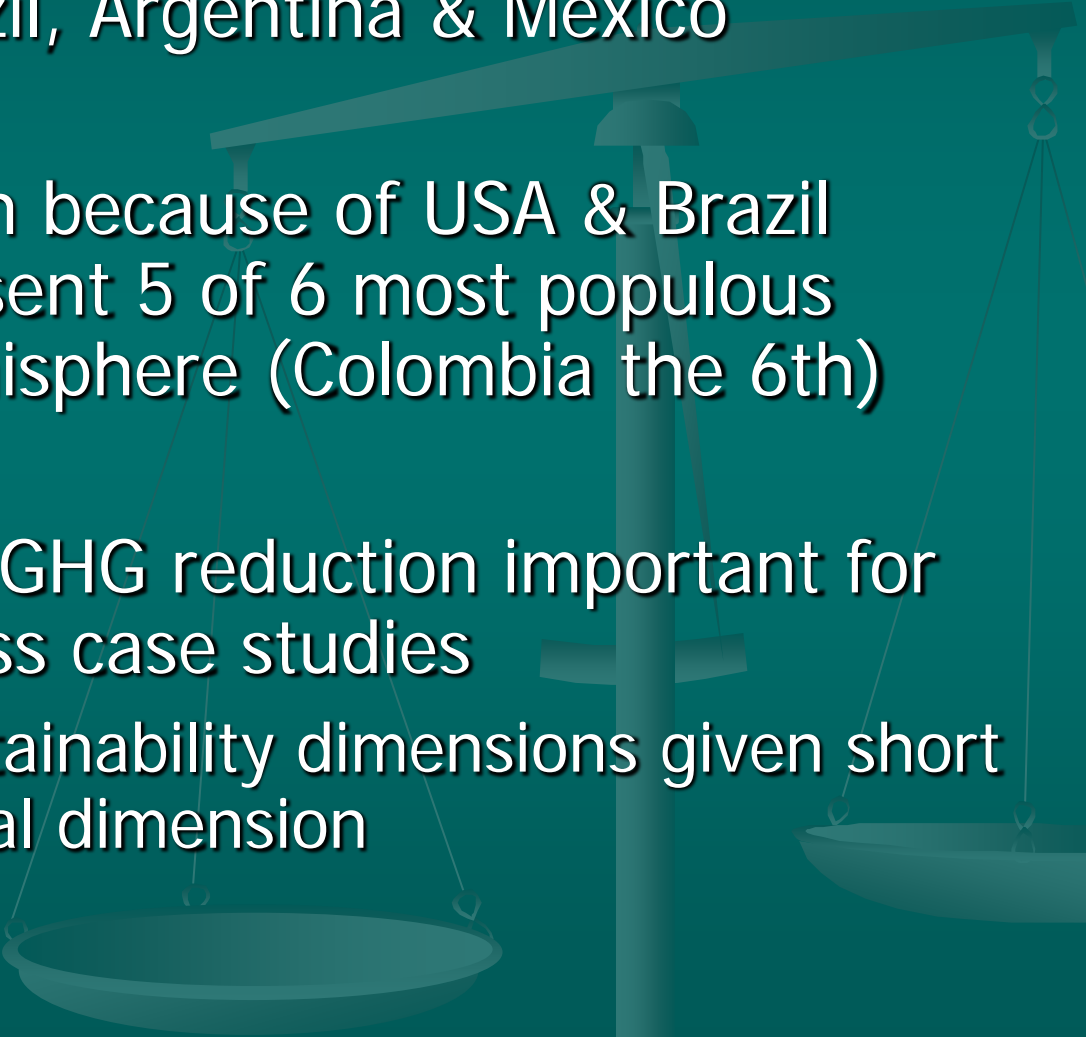




# Food vs. Fuel Cont.

- U.S. & Brazil promote Biofuels industries in other countries in W. Hemisphere as means to cut GHG Emissions & promote Sustainable Development
- existing Regional Economic & Political Fora can be used to promote Sustainable Biofuels:
  - MOU between U.S. & Brazil on Biofuels (2007; amended in 2008, 2011)
  - Caribbean Basin Initiative & U.S.-Caribbean Basin Trade Partnership Act (1983; 1989; 2000)

# 5 National Case Studies

- USA, Canada, Brazil, Argentina & Mexico
    - Why these? Chosen because of USA & Brazil dominance; represent 5 of 6 most populous nations in W. Hemisphere (Colombia the 6th)
  - Feedstock choice, GHG reduction important for sustainability across case studies
    - however: other sustainability dimensions given short shrift, esp. the Social dimension
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# 5 National Case Studies

- 3 feedstocks dominate in Pan America: Maize (Corn), Sugarcane, Soybean Oil
- Maize presents largest conflict with staple Food needs, Sugars & Oils less so
- U.S. EPA has estimated GHG reductions:  
Ethanol → Maize -21%, Sugarcane -61%;  
Biodiesel → Soy -57%, & Palm Oil – 11-17%

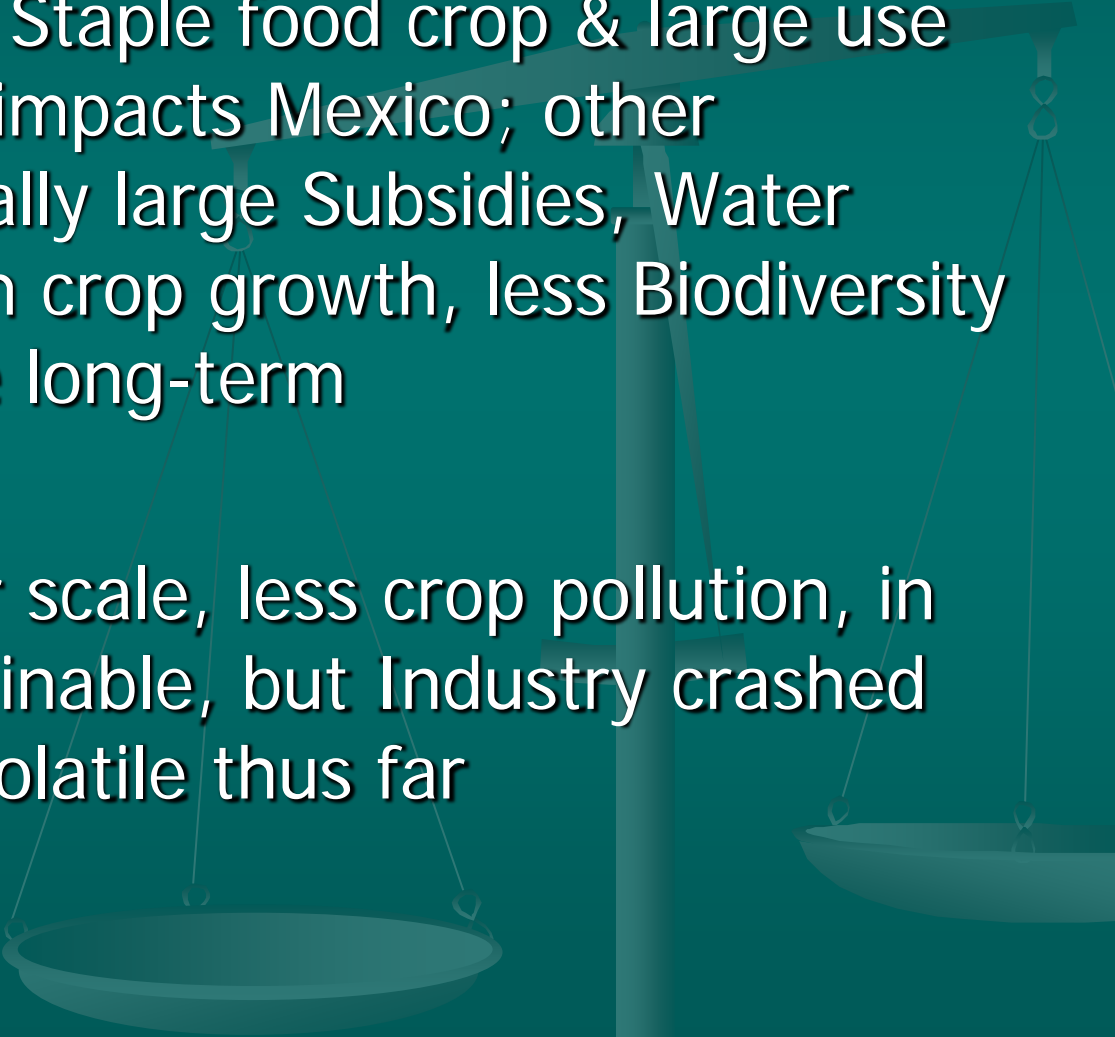
# United States Case

- **Biofuel Policy Goals:**
    - Increase Energy Security
    - Help achieve Oil Independence
    - Benefit farmers (+ GHG cuts a focus since 2007)
  - Ethanol initial focus; 98% dependent on Maize, mostly from 6 farm states, historically subsidized (main subsidy since 1979 ended in 2012)
  - Ethanol mandated varying levels since 2005 Renewable Fuel Standard, amended in 2007, greatly increasing standard through 2022
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# U.S. – cont.

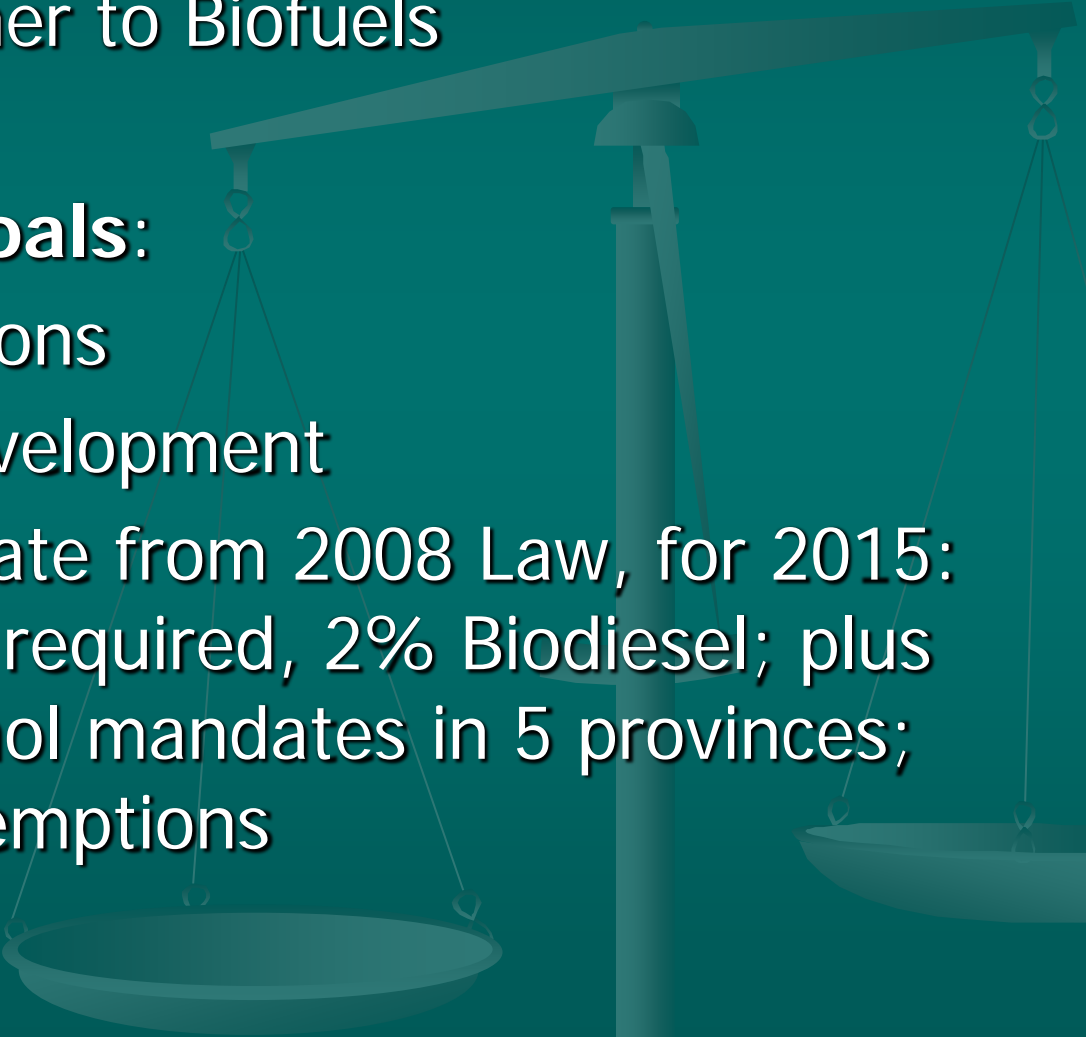
- Biodiesel: little production before 2005
- Feedstock mostly from Soy Oil & Yellow Grease, most from 4 states (TX, IA, MO, IL) & subsidized
  - Biodiesel Mandated & shift toward Cellulosic Biofuels mandated by U.S. 2007 law but occurring slowly!
- **Biofuel Policy Results:** Mixed; Large Production since 2007-08, but some down years; other factors matter too, e.g. MTBE Phase-out, Market & Financial Conditions

# U.S. – cont.

- Ethanol – Maize is Staple food crop & large use as fuel negatively impacts Mexico; other problems: historically large Subsidies, Water Use, Pollution from crop growth, less Biodiversity  
→ not Sustainable long-term
  - Biodiesel – smaller scale, less crop pollution, in theory more Sustainable, but Industry crashed in 2008-10, thus volatile thus far
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# Canada Case

- Canada a late comer to Biofuels
  - **Biofuel Policy Goals:**
    - reduce GHG emissions
    - rural economic development
  - Federal RFS Mandate from 2008 Law, for 2015:  
5% Ethanol blend required, 2% Biodiesel; plus  
5% to 8.5% ethanol mandates in 5 provinces;  
also excise tax exemptions
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# Canada – cont.

- Similar feedstock profile to U.S., although no Soy use; Ethanol mostly from Maize, some Wheat; Biodiesel from Grease & Canola Oil
- **Biofuel Policy Results:** rapid Ethanol production growth last few years (mostly Ontario), mandate not met yet w/large U.S. imports; Biodiesel production minimal; No conflict with Food Production or water use, some environmental concerns
- NOT Sustainable yet, but better potential than U.S.

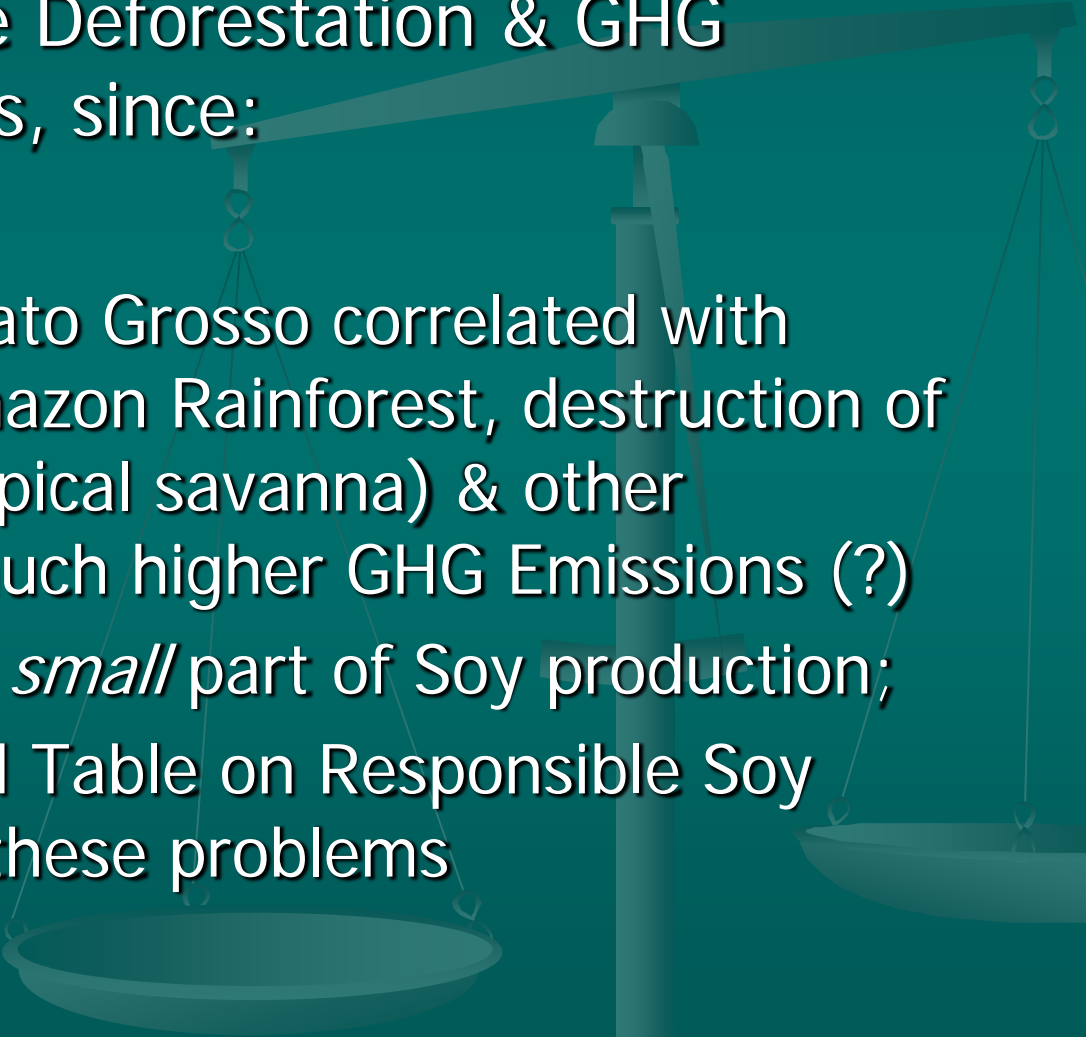
# Brazil Case

- **Biofuel Policy Goals:**
  - since 1975: goal of independence from foreign oil
  - (GHG emissions cut a focus since 2008)
- Old industry, revived during '70s Oil Crisis
- Ethanol was initial focus as well:
  - historical subsidies, but mostly eliminated since late 1990s
  - blending mandate from Proalcool program since 1975; currently 18-25%, reduced from 25% in 2011

# Brazil – cont.

- Ethanol ~100% Sugarcane
  - Ethanol production - efficient & low cost
- Ethanol largely Sustainable when considering GHG, Feedstock, Land Use Change, Socioeconomics
  - *However*: some social concerns raised, e.g. some violations of workers' rights in North & NE
- Biodiesel: ~80% Soy, rest from fats, various oils
  - Blend Mandates - 2% from 2003-08, 5% 2010 onward

# Brazil – cont.

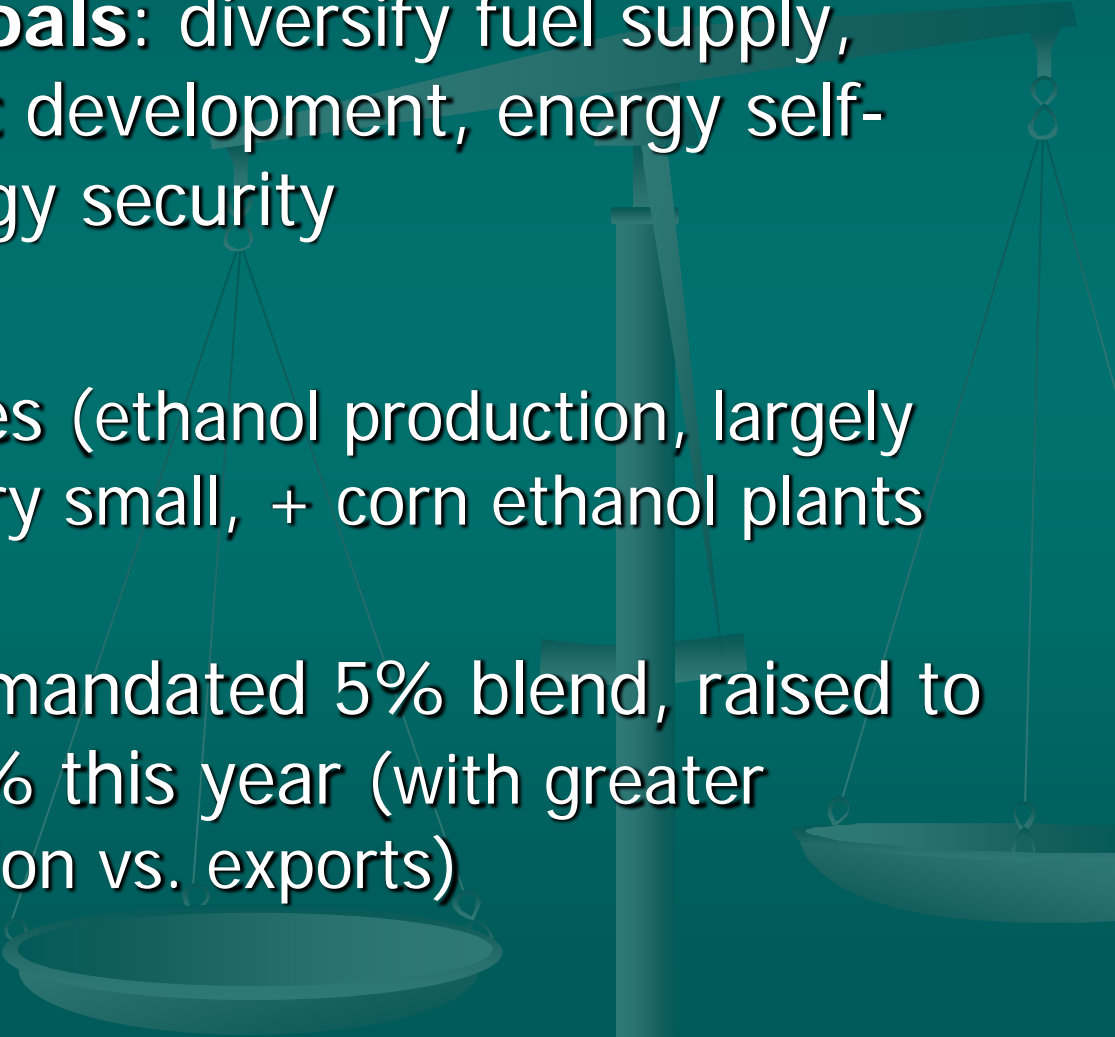
- Biodiesel has more Deforestation & GHG emissions concerns, since:
    - Soy expansion in Mato Grosso correlated with Deforestation of Amazon Rainforest, destruction of Cerrado forests (tropical savanna) & other Ecosystems, thus much higher GHG Emissions (?)
    - But: Biofuels only a *small* part of Soy production;
    - Task Force & Round Table on Responsible Soy created to address these problems
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# Brazil – cont.

## ■ Biofuel Policy Results:

- Ethanol: largely Successful, since (flexible?) Blend Mandates met & Brazilian oil imports minimal since 2007); *However* : Ethanol imports from U.S. have been large since 2011
- Biodiesel: 5% Blend Mandate being met, though Sustainability Concerns persist;  
300+ Sustainability Certifications issued (mostly soy oil, less so sugarcane ethanol)

# Argentina Case

- **Biofuel Policy Goals:** diversify fuel supply, promote economic development, energy self-sufficiency & energy security
  - Biodiesel dominates (ethanol production, largely from sugarcane, very small, + corn ethanol plants since 2013)
  - 2006 Biofuel Law mandated 5% blend, raised to 7%, 8%, then 10% this year (with greater domestic consumption vs. exports)
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# Argentina – cont.

- Biodiesel feedstock ~99+% soy oil (the rest from used vegetable oil)
  - **Biofuel Policy Results:**
    - Biodiesel has met goals, though production way down in 2013 as market adjusts to cutoff from EU, but up again in 2014; Ethanol production a little short of mandate
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# Argentina – cont.

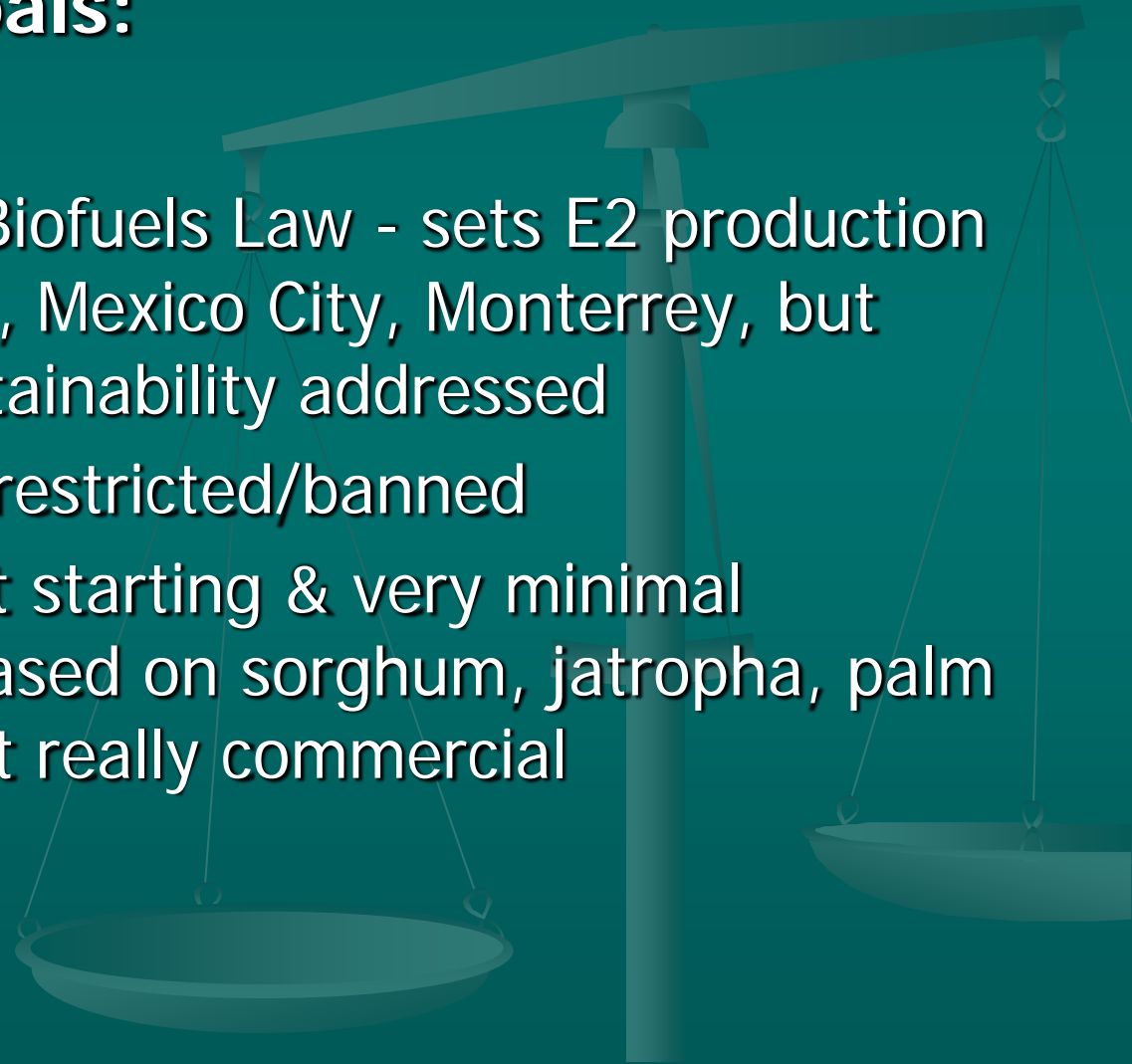
- Sustainability? Biodiesel production from Soy Oil a Co-Product so doesn't interfere with Food
- 80%+ of Soybean production uses No Till Agriculture & has Low GHG Emissions

~88 Sustainability Certificates issued, yet still some Sustainability questions, *since*: Land Use Change may causes Deforestation (poor enforcement); high use of Glyphosphate Pesticide; production on fragile areas; some problems w / Land Rights & Rural Development

# Mexico Case

## ■ Biofuel Policy Goals:

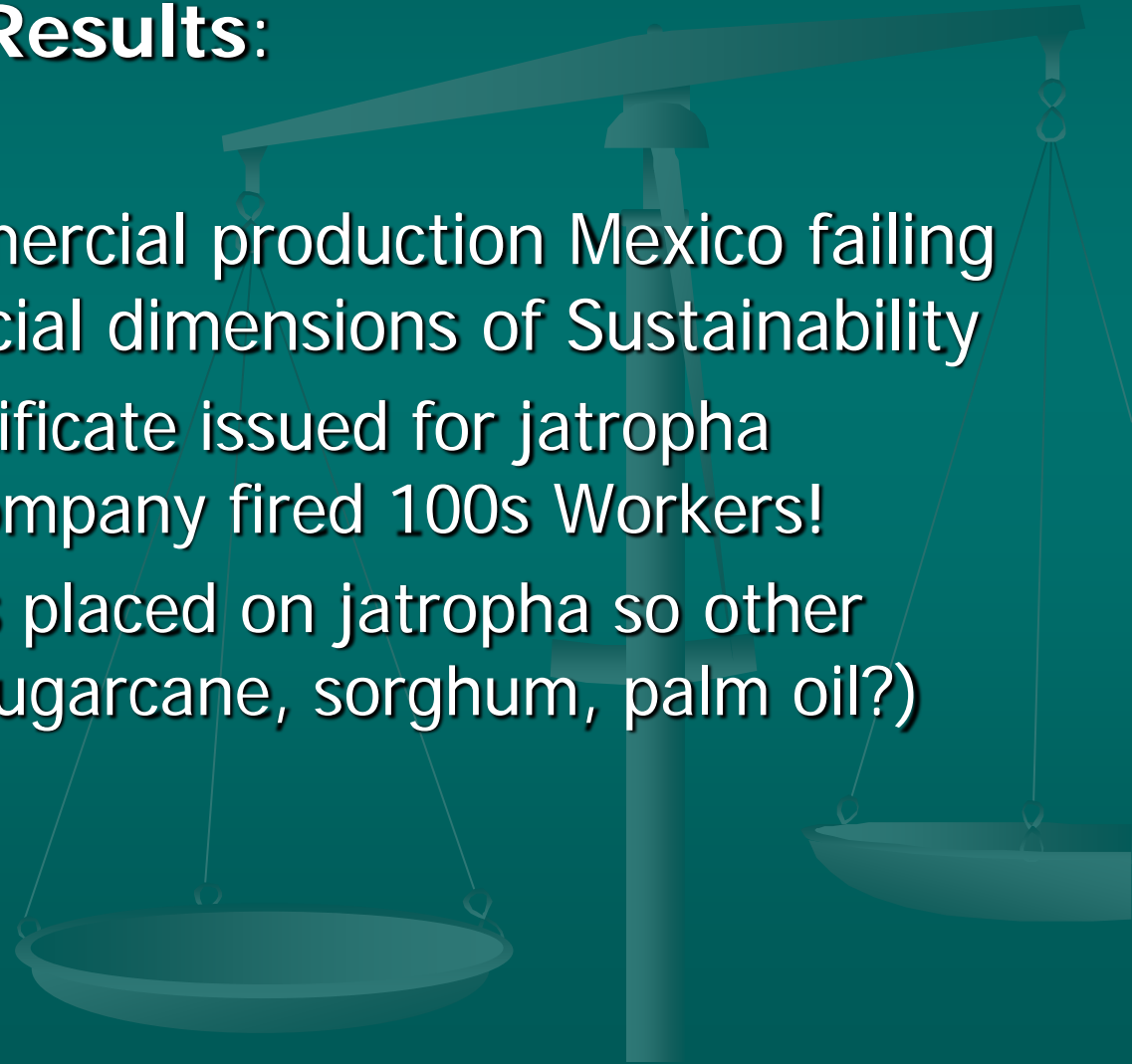
- addressed by 2008 Biofuels Law - sets E2 production goal for Guadalajara, Mexico City, Monterrey, but NOT mandated; sustainability addressed
- domestic Maize use restricted/banned
- biofuels industry just starting & very minimal production so far (based on sorghum, jatropha, palm & cooking oils) & not really commercial



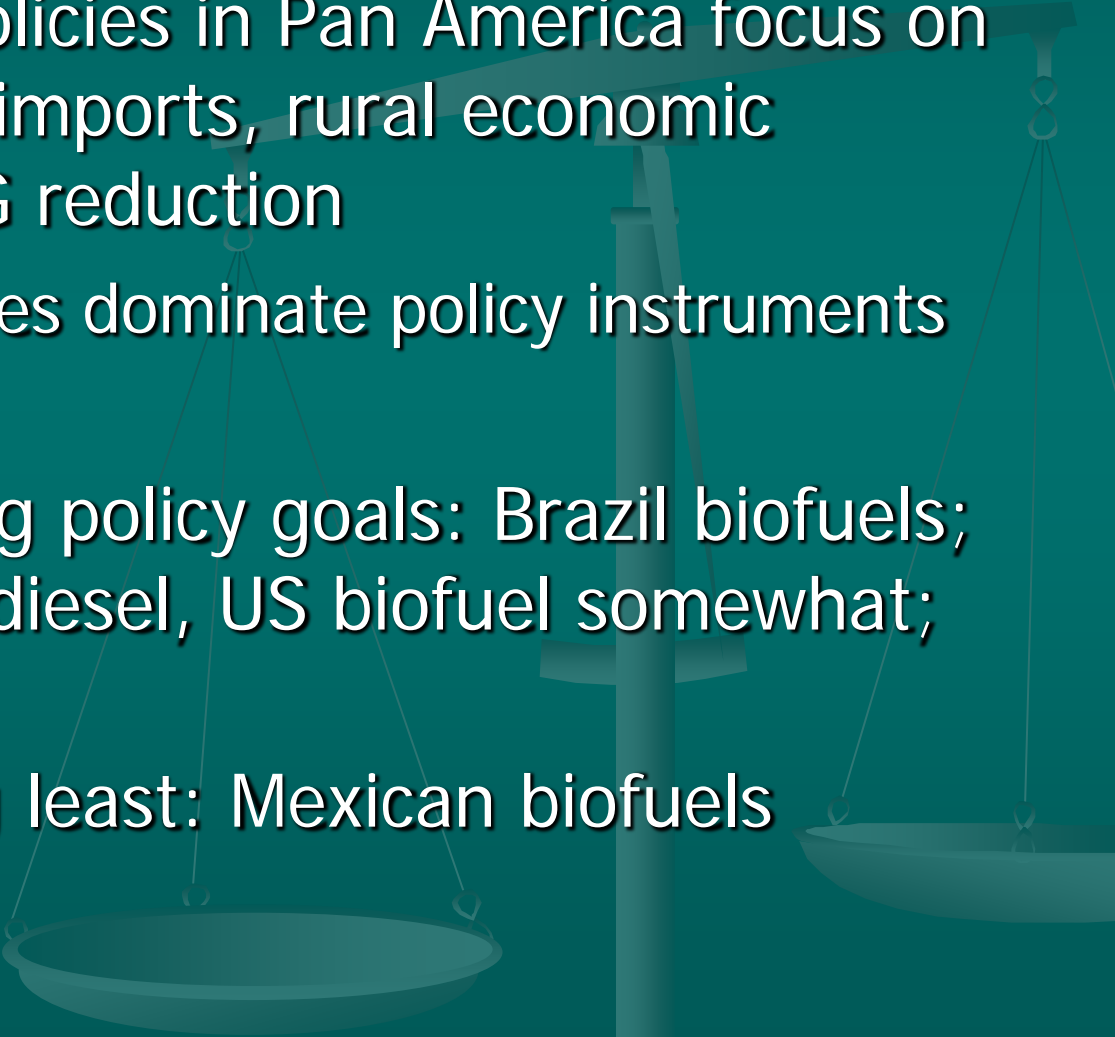
# Mexico – cont.

## ■ Biofuels Policy Results:

- given lack of commercial production Mexico failing on Economic & Social dimensions of Sustainability
- a sustainability certificate issued for jatropha production, then company fired 100s Workers!
- too much emphasis placed on jatropha so other crops needed (eg sugarcane, sorghum, palm oil?)



# Conclusions

- National Biofuel Policies in Pan America focus on cutting foreign oil imports, rural economic development, GHG reduction
    - Subsidies & Mandates dominate policy instruments
  - Programs achieving policy goals: Brazil biofuels; also Argentina biodiesel, US biofuel somewhat; Canada improving
  - Program achieving least: Mexican biofuels
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# Conclusions

- **Sustainability?**: Feedstock Choice, GHG Emissions, Deforestation, Soil Loss, Pollution, Land/Labor Rights, Subsidies all matter!
- Some Pan America nations have “potentially” Sustainable Biofuels programs: Brazil (ethanol) & Argentina (biodiesel) but improvements needed
- **Future Research Q:** How well are Sustainability Certification Programs working in practice? Statistical analysis of policies & certification on production/trade of biofuels