



Bioenergy, sustainability and trade-offs: can we avoid deforestation while promoting bioenergy?

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Quantifying and managing land use effects of bioenergy
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THINKING beyond the canopy



Partners

- Center for International Forestry Research (CIFOR)
- Joanneum Research (JR), Austria
- Universidad Nacional Autónoma de México (UNAM), Mexico
- Council for Scientific and Industrial Research (CSIR), South Africa
- Stockholm Environment Institute (SEI)

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Objectives

- **Sustainable bioenergy development** that
 - benefits local people in developing countries;
 - minimises negative impacts on the local environment and rural livelihoods; and
 - contributes to global climate change mitigation.
- **To produce and communicate policy relevant analyses** that can inform governments, corporate and civil society decision making related to bioenergy development and its effects on forests and livelihoods.



Research Focus

1. Investments in feedstocks and biofuel production
2. Governance systems for biofuels
3. Social and environmental impacts of bioenergy development
4. Governing biofuel finance
5. Carbon accounting methods
6. Policy-science dialogue

Drivers of the biofuel 'boom'

- Energy (in)security and the high cost of fossil fuels
- Mitigating global warming by reducing GHG emissions
- National/regional commitments to stimulate the rural economy

- 3 major players – USA, Brazil and European Union
- China's bioenergy potential: 1 billion tons of Miscanthus biomass p.a. – 100 Mha degraded land

Biofuels and deforestation

- Biofuels may cause direct and indirect deforestation
 - Indirect only through modelling, no consensus yet but impacts are not negligible
- Estimating deforestation and biofuel production accurately is difficult
 - Expansion of biofuel production is very recent in many tropical areas
 - Lack of standard definitions on deforestation and updated datasets
- Biofuel feedstocks are produced for both food/fodder and fuels (e.g. soy, oil palm, sugarcane)
 - Proportion devoted to each use varies with market conditions
 - Poor correlation between the location of biofuel plants and plantations
- Different ways to allocate the deforestation burden
 - As a share of the total mass produced (biofuel; cake for fodder, food)
 - As a proportion of the total economic value
 - By total area cleared for the feedstock

Feedstock Investments

Feedstock	No. of countries	Total investment (US\$ billion)		Range of investments per country (US\$ million)	
		Total in all countries	Estimated share for biofuel	Total range	Of which for biofuel
Jatropha	7	0.18 - 0.29	0.18 - 0.29	3 - 200	3 - 200
Oil palm	6	19 - 28	0.76 - 1.12	1 - 15,000	0.04 - 600
Soybean	2	1.7 - 2.1	0.27 - 0.34	200 - 1,800	32 - 288
Sugarcane	5	4.3 - 5.3	0.77 - 0.95	20 - 5,000	3.6 - 900
Totals	20	25 - 36	2.0 - 2.7	1 - 15,000	0.04 - 900

- Total investments in past 10 years: US\$ 25 -36 billion
- Of which for biofuel: US\$ 2.0 - 2.7 billion
- Mostly in oil palm and sugarcane

Biofuel Investments

Based on feedstock	No. of countries researched	No. of countries with biofuel investments	Total biofuel investment (US\$ billion)	Range of investments per country (US\$ million)
Jatropha	7	1	0.01 - 0.02	14 – 18
Oil palm	6	3	1.2 - 1.6	150 - 1,000
Soybean	2	1	0.7 - 0.9	700 – 900
Sugarcane	5	2	3.8 - 4.2	8 - 4,200
Totals	20	7	5.7 - 6.7	8 - 4,200

- Total investments: US\$ 5.7 – 6.7 billion
- Two-thirds in sugar-based ethanol
- One-third in biodiesel from soy and palm oil
- No investments yet in biodiesel from jatropha

Biofuel Policy Frameworks

Country	Laws and Policies	Government Perspectives	Biofuel Blending	Incentives
Ghana	Draft Bioenergy Policy (2010), SNEP (2006)	Oil prices, FDI, rural development	None	None specific to biofuels
Zambia	Draft Biofuel Strategy (2008)	Oil prices, FDI, rural development	None	None specific to biofuels
Indonesia	Biofuel Policy (2006) Biofuel Law (2008)	Oil prices, reduce pump price subsidies, diversification, rural development	20% biodiesel and ethanol by 2020	Consumer subsidy, various tax benefits
Malaysia	National Biofuel Policy (2005) Biofuel Industry Act (2007)	Oil prices, reduce pump price subsidies, diversification	5% biodiesel	R&D
Mexico	Biofuel Promotion and Development Law (2008)	Substitute MTBE	2% ethanol blend in Guadalajara in 2011	Subsidies and inputs under ProArbol
Brazil	National Agroenergy Plan (2005), Biodiesel Law (2008), etc.	Oil prices, climate change, rural development	20-25% ethanol, 5% biodiesel	Concessionary loans, price controls, tax reductions, R&D

Governance Systems for Biofuels

- **Role and effectiveness of government intervention in promoting domestic production capacity and uptake**
 - Maintain supplies for domestic use (pricing, incentives, single-use feedstocks and progressive export tax)
 - Importance of government support both on the production and consumption side (Brazil)
- **Role and effectiveness of government intervention in maximizing benefits of large-scale investments and minimizing costs of sector development**
 - *Environmental protection*
 - *Smallholder participation*
 - Enhancing smallholder productivity and market access
 - *Land tenure security*
 - Stimulating investments in suitable and available land

Land Governance and Biofuels

Country	Characterization	Implications for customary rights	Form of Compensation
Brazil	Voluntary land markets with some land concentration	Forfeiture through sale mostly	Cash to former landowners
Mexico	LUC on industrial estates	None	N/A
Ghana	Long-term leasing of land by chiefs to investors with no downward consultation	Rights retained; discretionary authority suspended for 50-99 yrs.	Undisclosed one-off payments or shareholding
Zambia	Permanent transfer to statutory tenure by chiefs with limited downward accountability	Permanent loss of rights to investors or State	Government – none; Investor – various cash & in-kind but elite capture
Malaysia	99-yr leases of State land to companies	Permanent loss of rights ; some replaced w/formal titling of 'native land'	Entitled if acquire native customary rights
Indonesia	Transfer from State land (under customary use) to leasehold tenure (concessions)	Loss of rights to investors & State, of uncertain duration	Variable: cash (labor, land, forest products), plasma. Conflict over amount & distribution.

Deforestation from Industrial Plantations

Site	Start date	Concession area (ha)	Area developed (ha)	Area deforested (ha)	Forest type	% expansion displacing forest
Mato Grosso, Brazil	Various	Various	5 075 079 (2007)	540 000 (2001–2004)	Dry forest (<i>cerrado</i>)	≥11 % (~1.5-6.4% from biofuel)
Pru District, Ghana	2008	14 500	800 (by 2009)	368 forest + 248 fallow (by 2009)	Dry forest (forest–savannah transition)	46% (mature woodland); 77% (incl. fallow)
West Kalimantan, Indonesia	1994	13 605	5266 ^c (by 2009)	4949 (by 2009)	Secondary peat swamp forest	94%
Boven Digoel, Papua	1998	34 000	17 000 (by 2010)	11 300 (by 2008)	Humid tropical	≥ 66%

German, L. et al, forthcoming *Ecology and Society*

Socio-economic Impacts

■ Employment

- Livelihood improvements observed in several sites due to increased incomes and improved access to social services
- Mixed or negative impacts in others due to poor employment conditions, and not meeting promises or expectations
- Gains from regularity of income rather than amounts
- Generally low employment levels: 1 permanent and 1.5 temporary worker/500 ha (Brazil)

■ Land tenure

- Loss of agricultural and forest incomes from displacement of cropland and forest
- Additional labor burden due to increased distance of forests and greater dependence on purchased foodstuffs
- CSR practices and land compensation payments failed to benefit those most negatively affected

Sector Governance

- **Avoided Deforestation**
 - Stronger regulation of large-scale producers (policy orientations, bank credit lines, monitoring)
 - Support to increase smallholder yields
 - Critical importance of full carbon accounting
- **Protection of Vulnerable Groups**
 - Controlled expansion of outgrower schemes (legal literacy, contracts, proof of concept)
 - Protection of customary land users: *legal protection of rights + negotiation process inc. detailed/written description of benefits and their distribution*
- **Leveraging co-benefits**
 - Preferential hiring/benefits flows to customary rights holders and land losing households
 - Overcoming barriers to market entry by poorer households

Governing Biofuel Finance

- **Foreign investors could leverage sustainable investments in biofuels**
- **But most investors**
 - have not implemented a responsible investment policy, or
 - have investment policies of insufficient scope or quality
- **Collective policies for the financial sector**
 - Lack well-defined, principles, criteria and indicators; or
 - have clear criteria, but limited scope:
 - e.g. Equator Principles only apply to project finance



Governing Biofuel Finance

■ Which investors?

- Multilateral banks
- Private banks and institutional investors
- Foreign and domestic governments
 - Policies for aid, subsidies, development loans often unclear
 - No policies for investments by state-owned companies

■ Recommendations

- Sustainability criteria for all forms of foreign public finance
 - including investments by state-owned companies
- Pension funds
- Integrate sustainability issues in bank risk management
- Make sustainability reporting mandatory
- Stimulate financial sector to set up independent compliance and grievance mechanisms



Carbon Accounting Alternatives

- **Alternatives to current carbon accounting system for bioenergy are being considered**
 - Need to harmonize RED criteria with certification schemes
 - US – no reason to handle CO₂ from fossil fuel differently than that from biomass
 - Need to focus on full carbon accounting rather than definitional-based restrictions
 - Biofuels may not reduce emissions as compared to fossil fuels in the short term
- **Possible accounting systems:**
 - Bioenergy has no emission in the energy sector (0-combustion factor)
 - Bioenergy has an emission in the energy sector (1-combustion factor)
 - Bioenergy emissions follow the value chain
- **Advantages and disadvantages of all 3 and the choice depends on evaluation criteria**
- **Changing the accounting system alters the mitigation responsibility by nations**

Bird D.N. *et al.* 2011. Global Change Biology Bioenergy (in press).



Policy-science dialogue

- EC
 - June 2010 (ENV, RE and CLIM Directorates)
 - March 2011 (EU Green parliamentarians)
- UNFCCC
 - COP16 and COP17
 - SBSTA 34, Bonn
- South-South exchanges inc.
 - Indonesia 21-27 September 2011 (*cf.* flyer)
 - Ghana t.b.c.

Conclusions

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