



Implications of Biofuel Development on Land and Water Use, Food Security and the Environment

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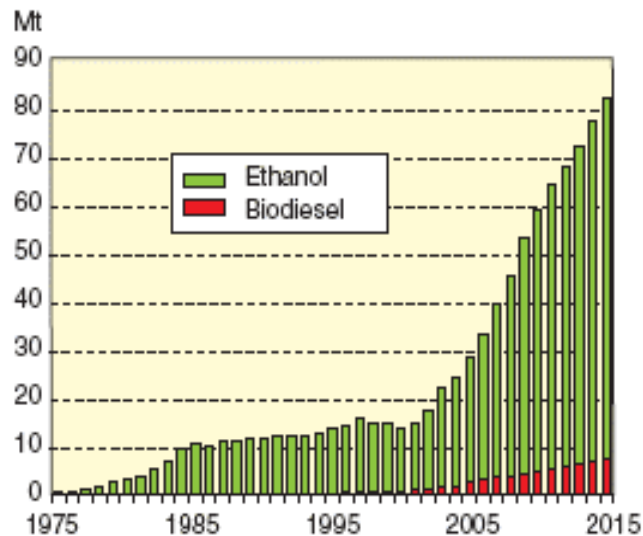


Background

- Explosive increase in the production and use of biofuels
- Global use of biofuels currently about 1.3% of total road transport fuel consumption
- Up to 11% deemed possible by 2050 (OECD)

Fig. 1

Trend in world biofuel production



- What will be the socio-economic impacts?
- What will be the impacts on the environment?



What are biofuels?

- **Biofuels:** liquid or gas transportation fuel derived from biomass.
- *First generation* biofuels are produced largely from food crop feedstocks and include, among others, crops such as sugarcane, cassava, maize and other starchy cereals for ethanol production, and palm oil, jatropha and rapeseed for biodiesel.
- *Second generation* biofuels are typically produced from agriculture and forestry waste, such as woodchips and straw and includes cellulosic conversion.
- Different biofuels vary widely in cost, performance and release of greenhouse gases.



Potential benefits of biofuels

- Biofuels are replenishable
- Reduced greenhouse gas emissions (?)
- Biofuels can increase farm income
- Biofuels can improve energy security
- Biofuels can create new jobs
- Biofuels are simple and familiar



Points of concern

- Competition for arable land between food and biofuel crops
- Increased food prices
- Rise in land values may lead to marginalized groups losing access; land tenure conflicts
- Increased demands on water supplies
- Deforestation; pressure on biodiversity
- Uncertain feedstock yields and environmental impacts



Different viewpoints within UN

“If we get it right, bioenergy provides us with a historic chance to fast-forward growth in many of the world’s poorest countries, to bring about an agricultural renaissance and to supply modern energy to a third of the world’s population.”

Jacques Diouf, Director-General, FAO

“It is a crime against humanity to convert agriculturally productive soil into soil which produces foodstuffs that will be burned into [as] biofuel.”

Jean Ziegler, UN Special Rapporteur on The Right to Food



Land-use issues

Globally, there is sufficient land and water to grow a substantial amount of biomass for biofuel production??

Global land surface and main land-use categories

Land-use category	(Gha)	Remarks
Agriculture	1.5	Includes grassland for intensive cattle farming
Pastures/grassland	3.5	More extensively managed
Forest	4.0	Includes natural – production forest
Unproductive	4.2	Includes (semi-)deserts, mountainous terrain and built-on areas.
Total	13.2	Global land-surface (excludes large ice sheets)



Land-use issues

- Concern over competition for land: biofuel crops versus food crops
- Tropical regions have a comparative advantage in growing feedstocks
- Non-food biofuel crops (e.g., jatropha) can be grown in marginal “wastelands”
- Increasing value of marginal lands poses risk that poor will be displaced by more powerful elite
- Regionally, there are shortages of both land and water
- China and India will account for 30 to 40% of the global energy demand by 2030, but have little land or water available for agriculture expansion



Water Use Implications

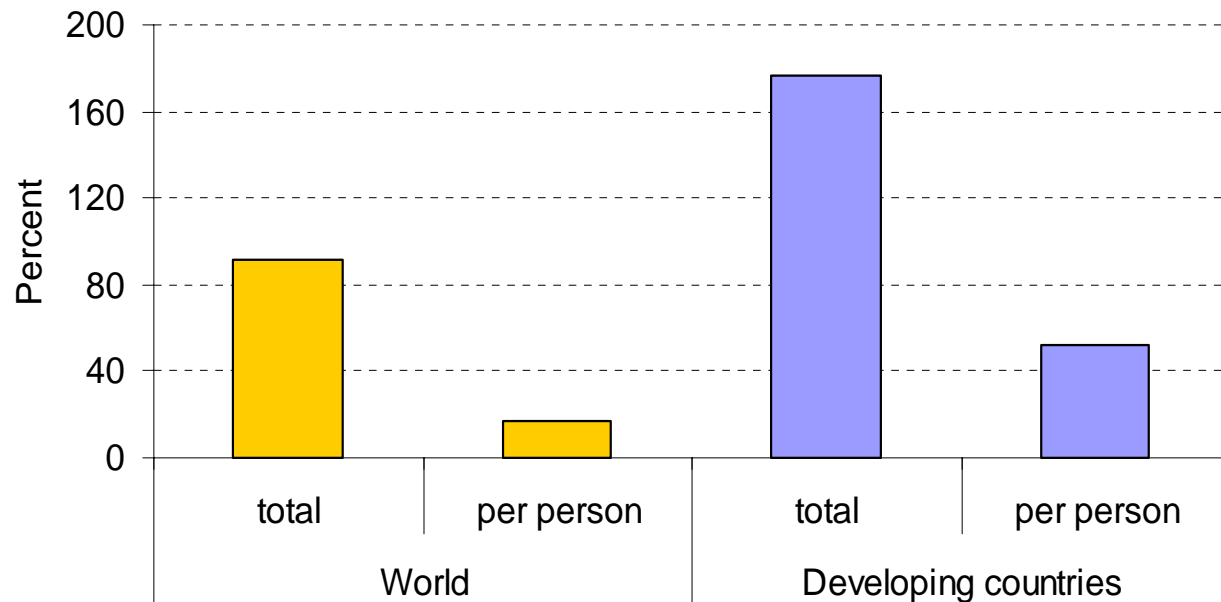
- Water scarcity is already a global reality
- Water consumption will increase in all regions
- Development of large-scale biofuel programs will stress not only water quantity, but also quality and broader ecosystems
- Biomass needed to produce one litre of biofuel evaporates between 1000 and 4000 litres of water



Biofuels and food security

- The BIG question for many!
- The good news is that the world has done very well in the past 30 years

Growth in gross food production 1970-2000



Biofuels and food security

- Biofuels will likely have both positive and negative impacts on food security
- Rising commodity prices = potentially positive for producers, but negative for consumers, especially urban poor
- Price increases anticipated in major biofuel feedstock markets (sugar, corn, rapeseed, palm oil and soybean) – all of which also consumed as food
- Likely that food prices will rise after many years of decline (estimated at 20-50% over the next 10 years)
- Much of the increase is due to factors other than diversion to biofuel production (e.g., increased transportation costs due to rising costs of fossil fuels)
- Serious risk for low-income food deficit countries (food importers)



Environment

- Many of world's poor are highly dependent on the natural environment (e.g., concerns over clearing forests for biofuel plantations and subsequent impacts on forest-dependent people)
- Environmental impacts of large-scale plantations and processing plants (pesticides, chemicals, runoff)
- Some bioenergy crops (e.g., jatropha) can be used to improve soil and land



Not all biofuels created equal

- Cellulosic ethanol and biodiesel can substantially reduce GHG as compared to gasoline and mineral diesel.
- However, conventional biofuel technologies deliver GHG reductions of less than 40% of fossil-fuel alternatives.
- When soil acidification, fertilizer use, biodiversity loss and toxicity of agricultural pesticides are taken into account, overall environmental impacts of biofuels can exceed those of fossil fuels
- In October 2007, Nobel Laureate Paul Crutzen published findings suggesting the release of Nitrous Oxide (N_2O) among some biofuels can contribute as much or more to global warming than fossil fuels.



Outlook

- Second-generation technologies (production of cellulosic ethanol) are expected to relieve pressure on land base... but when these development and what feedstocks shifts accompany them have yet to be determined
- Much is still unknown about the cultivation and yields of various biofuel feedstocks (e.g., jatropha, pongamia); producers would be wise to be cautious



Safeguarding and supporting vulnerable groups

- Protect access and strengthen tenure over land and resources
- Integrate biofuels with food and feed farming; encourage diversification
- Increase research and development oriented toward small-scale producers
- Ensure access to credit, land and productive inputs
- Support farmers in organizing cooperatives and other structures that help achieve competitive scale of production and marketing
- Develop and adopt social and environmental standards (certification) for recognized sustainable biofuels production
- Facilitate partnerships and market access (e.g., out-grower schemes and contract farming)



Conclusion

- Biofuels development and positive/negative impacts on rural communities and the environment need to be analyzed within a variety of contexts
- It does appear, however, that biofuels offer certain benefits and that the sector's expansion will continue for the immediate future
- There is a need for policies that protect vulnerable groups from adverse impacts, while ensuring that they receive equitable benefits from sector expansion



Thank you!

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