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Bio-energy for achieving MDGs

Environmental and Socio-Economic Issues in Bio-Energy Development

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PRELIMINARY REMARK

This presentation is mostly based on

Biofuels production, trade and sustainable development: emerging issues

a report produced by Annie Dufey
September 2006
Environmental Economics Programme/
Sustainable Markets Group
IIED

INTRODUCTION

Relations between bio-energy and sustainable development are varied and complex:

Pros:
improved energy security
economic gains
rural development
greater energy efficiency
reduced GHG emissions

Cons:
expansion of agricultural frontier
deforestation and monocropping
water pollution
food security problems
poor labour conditions
unfair distribution of benefits

Positive impacts and trade-offs vary depending on the type of energy crop, cultivation method, conversion technology and area under consideration.

CONTENT

- **Environmental Issues**
- **Economic Issues**
- **Social Issues**

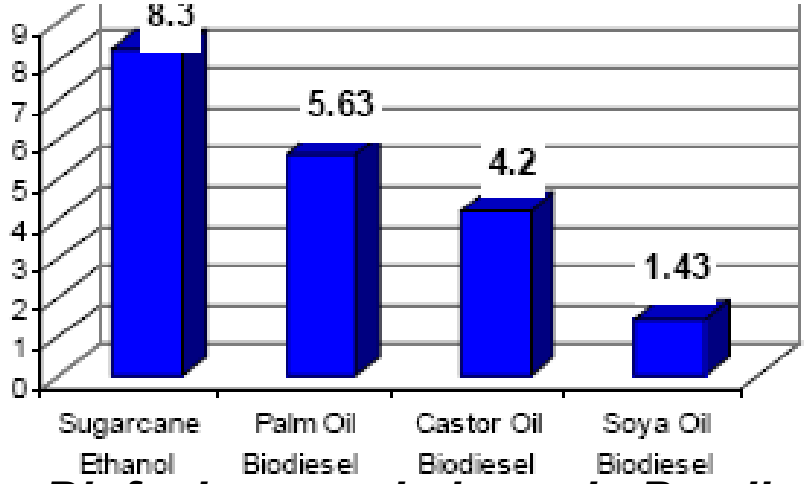
Environmental Issues

- Energy balance
- GHG emissions (pm)
- Air quality
- Impact on production systems
- Accrued pressure on production

Energy balance

Energy balance (EB): if Ep > Er, production is not viable

Consider the entire fuel cycle, from feedstock production to final consumption: 'well-to-wheels' approach



Biofuel energy balance in Brazil

Source: Dufey 2006

Energy balance depends on several factors:

- the crop (sugar cane, jatropha, and oil palm said to be the best)
- the conversion technology
- production conditions (soil fertility, water availability, remoteness)
- methodology used (with or without co/by-products)

Air quality

In LDCs household air pollution is a major killer of women and children

Crop-based biofuels can substitute to traditional forms of fuels usually used in the poorest countries, such as charcoal, fuelwood and paraffin

Intensive biomass production can harm air quality

In Brazil burning of sugarcane fields prior harvest contaminates Sao Paulo

In Indonesia, clearing fields for large-scale palm oil plantations provokes regional hazes

Source: *Wall Street Journal* online (Tues., December 5, 2006.

Impact on production systems

Intensified competition for land ►intensified pressure on environment
Monocropping and biodiversity loss due to large scale cultivation
Water consumption and reduced water flows
Water quality due to agrochemicals and sediment
Land degradation, due to monoculture and use of agrochemicals

OR

More environment friendly crops; use of less fertile/unproductive lands

?

The answer depends on
- the type of crop
- cultivation system
- soil types
- available technologies
- water availability

Sugarcane
Soybean
Maize
Oil Palm

Sugarcane
Jatropha
Trees
Grasses

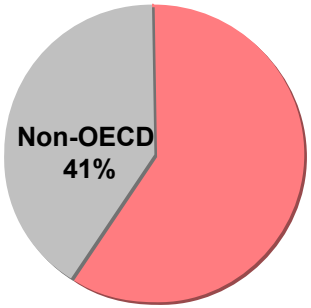
Policies will play a key role in orienting the impact of future biofuel and bio-energy crops on agriculture

Economic Issues

- Energy diversification
- Trade balance
- Costs
- Foregone revenue
- Added value

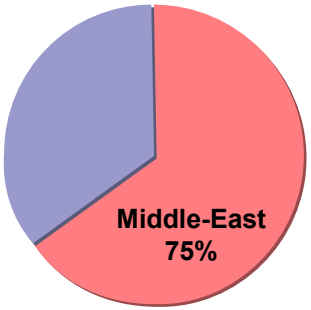
Energy diversification

Most LDCs are oil importers



world oil consumption

+



world oil supplies

Oil supplies are concentrated

+ high oil prices
+ future large demand from India and China

=

Greater energy security through a diversified energy portfolio is becoming a higher government priority

Trade balance

Domestic biofuel production helps replace oil imports and improve trade balance

In Brazil, for instance, it has been calculated that the replacement of gasoline by bioethanol saved some US$ 43.5 billion between 1976 and 2000 (US$ 1.8 billion/year)

If the poorest developing countries can save foreign currency through reduction of oil import cost, increased resources become available for development needs

Costs

Large-scale development of biofuels as higher economic costs compared to conventional fuels

But, economic costs differ according to the type of biofuel, the country of provenance and the technology used

Tropical crops are competitive for bioethanol production but

- high levels of agricultural support in ICs may undermine the benefits biofuels can provide for most cost-efficient developing countries
- alternative fuels traded in large quantities could drive down oil prices in the medium to long term

So, cost differentials need to be addressed through policy incentives (e.g. lower taxes), market incentives (carbon markets) and technology improvements

Foregone revenue

In LDCs biofuel production supported by public investment compete with other sectors for scarce financial resources

In Indonesia, domestic support to oil and gas was relieved in 5 years (price of fuel multiplied by 9)

Tax on imported oil is often a major source of governement income

Resulting revenue used for domestic support of other sectors and poverty alleviation programs through safety nets

Need to assess the foregone revenue against the potential benefits

Added value

Demand for bio-energy generates a new demand for agricultural products

Potential benefits:
Volatility of commodity prices is reduced
Rises in commodity prices
Reduction of commodity surpluses
New opportuity for agricultural value added

But lack of local technological capacities, investment could encourage developing countries to export the raw material (ex. feedstock and unprocessed crude oil and molasses) while the final biofuel conversion takes place in the importing country

Social Issues

- Fuel versus Food
- Employment
- Equity

Fuel versus Food

Thesis 1:
Large-scale biofuel production will lead to food security problems, especially in the poorest developing countries

Argument:
Greater demand for biofuels will lead to land being drawn away from other purposes including food production. This could lead to food shortages and higher food prices for consumers.

Examples:
- In China conversion of corn production induces soaring pork meat prices
- Malaysia and Indonesia set 40% of oil palm plantation for biofuel production
- Philippines government acknowledges pressure of biofurl on food

Fuel versus Food

Thesis 2:
Large-scale production of biofuels does not imply food security trade-offs.

Argument:
- **Enough land available to accommodate bioenergy production because biofuels will not totally displace oil-based fuel.**
- **Possible synergies between fuel and food production as some crops can be grown on very degraded land too marginal for food crops and can even promote land restoration**
- **Food shortages and famine are related more to poor distribution, conflicts, shortage of jobs and disposable income to buy food than to agricultural production**

Fuel will essentially compete with food when:
- **food crops are used for fuel production**
- **fertile lands are grown with fuel crops**
- **value added is not locally distributed**

Employment

Bio-energy production has a positive impact on employment and livelihoods, when cultivation involves small-scale farmers and conversion takes place nearby the sources of biomass in rural areas

In China, the liquid biofuel programme is expected to create 9 million jobs leading to significant increases in income generation and rural development

Most bioethanol-related jobs in Brazil involve low skilled and poor workers in rural areas and the quality of the jobs is better because of lower seasonality and increasing wages over time.

But there are risks:

- Tariff escalation in ICs encourages export of raw or unprocessed material
- Large scale cultivation (soya, oil palm, jatropha) undermine employment effect
- Most profiable economic models disencourage pro-development practices

Policy choices are crucial

Equity

The possibility of international bio-energy value chains being controlled by upper segments agents raise the question of *equity* in the whole organising process

For example, Cargill and ADM control about 65 per cent of the global grain trade, will it happen to the trade of biofuel feedstocks?

Production process can easily be separated from conversion and transport process, extracting most of the value added off prodcution

Potential social benefits of bioenergy depend on the pro-poor/small farmer nature of the technology needed to produce it and to the technology used to convert it. Bio-fuel is but one option in using biomass and producing bio-energy (see Energy and Poverty presentation by CAPSA).

CONCLUSION

Environmental, economic and social impacts of bio-energy prodution depends on strategic choices oriented by policy orientations

Pro-poor renewable energy development is a matter of political will

The key issue is not what crop, what technology, but renewable energy, why? and for whom?

Propoor renewable energy development will be further discussed in

Powering Rural Poverty Alleviation with Renewable Energy

By UNESCAP CAPSA

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