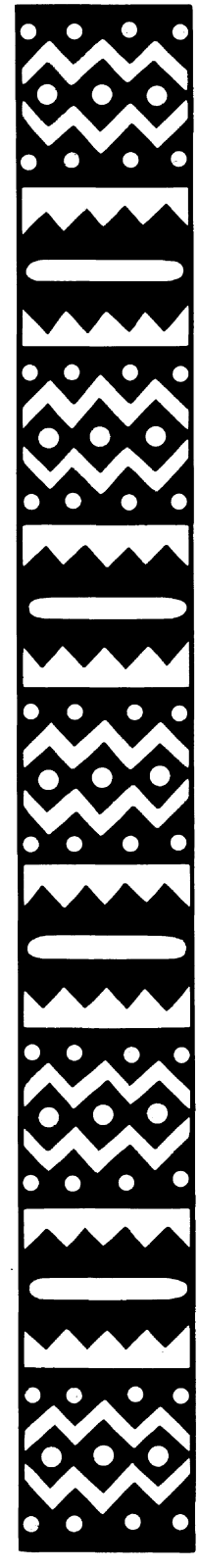
Fuelling exclusion? The biofuels boom and poor people's access to land

Lorenzo Cotula, Nat Dyer & Sonja Vermeulen

iied

FAO FIAT PANIS

Fuelling exclusion? The biofuels boom and poor people's access to land



Lorenzo Cotula, Nat Dyer & Sonja Vermeulen

Published by

iied

International Institute for
Environment and Development

and

Food and Agriculture Organization
of the United Nations

FUELLING EXCLUSION? THE BIOFUELS BOOM AND POOR PEOPLE'S ACCESS TO LAND

Lorenzo Cotula, Nat Dyer and Sonja Vermeulen

For copies of this publication, contact IIED. Email: newbooks@iied.info
IIED Order No: 12551IIED
Citation: Cotula, L., Dyer, N., and Vermeulen, S., 2008 FUELLING EXCLUSION? THE BIOFUELS BOOM AND POOR PEOPLE'S ACCESS TO LAND, IIED, London.
ISBN: 978-1-84369-702-2

Cover photos:
Top: Jatropha production in Bhavnagar, Gujarat, India © Joerg Boethling/Still Pictures.
Bottom: Workers on palm plantation, Ghana © Maya Pejic/Still Pictures

Design: Smith+Bell (www.smithplusbell.com)
Printing: Russell Press (www.russellpress.com)
Printed on: Greencoat Velvet 200 gsm and Greencoat Velvet 100 gsm

ACKNOWLEDGEMENTS

The authors would like to thank Paul Munro Faure, David Palmer, Paul Mathieu, Paolo Groppo, Adriana Herrera, Olivier Dubois, Mikka Torhonen, Robert Bailey, Annie Dufey, Megan MacInnes, Rachel Warren, Derek Nicholls and Julian Quan for providing useful suggestions, materials and/or comments on earlier drafts of this study. Steven Haw of Soltenviva (www.soltenviva.com) reproduced the diagrams and cross-checked the text. The authors remain responsible for the views expressed here, and for any omissions and errors.

ABOUT THE AUTHORS

Lorenzo Cotula is Senior Researcher in Law and Sustainable Development at the International Institute for Environment and Development (IIED), based in the UK. His work focuses on the role of law in sustainable development, particularly in the areas of land rights, investment, governance and human rights.

Nat Dyer is a consultant for the International Institute for Environment and Development (IIED), based in the UK. A political scientist by training, he is currently working on land/natural resource rights and the role of law in sustainable development, particularly in East and West Africa. He previously worked for UNESCO in Senegal.

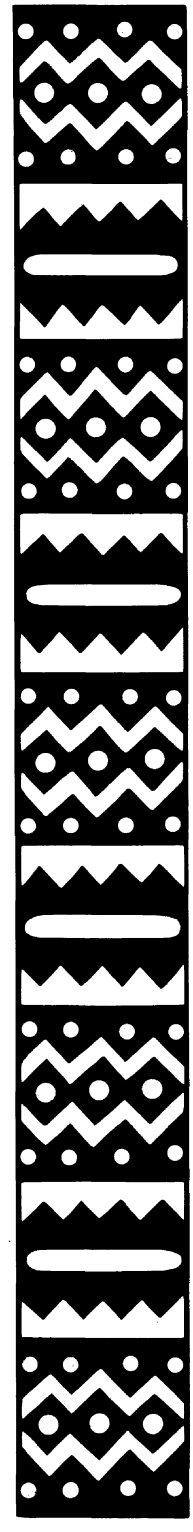
Sonja Vermeulen is Programme Director, Business and Sustainable Development, at the International Institute for Environment and Development. Her work on how private sector practice affects environment and development includes a focus on sustainable production of biofuels and other commodities.

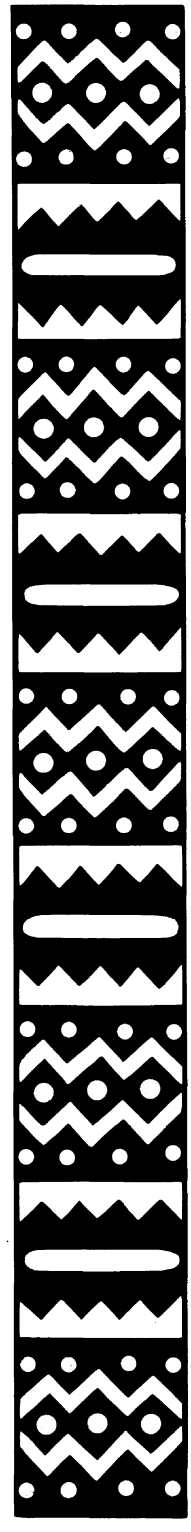
LIST OF ABBREVIATIONS

ABN	African Biodiversity Network
APIX	*Agence Nationale Chargée de la Promotion de l'investissement et des Grands Travaux* (Senegal)
ATI	Appropriate Technology International
BP	British Petroleum
CAMEC	Central African Mining and Exploration Company
CDM	Clean Development Mechanism of the Kyoto Protocol
CER	Certified Emissions Reductions
CPI	*Centro de Promoção de Investimentos* (Mozambique)
DED	German Development Service
DFID	Department for International Development
EPFL	*École Polytechnique Fédérale de Lausanne* (Switzerland)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
IDB	Inter-American Development Bank
IEA	International Energy Agency
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
INCRA	National Institute of Colonisation and Agrarian Reform (Brazil)
INTERPI	Land Institute of Piauí (Brazil)
NGO	Non-governmental organisation
MFC Nyetaa	Mali Folkecenter Nyetaa (Mali)
Mtoe	Million tonnes of oil equivalent (a unit of energy). One toe (tonne of oil equivalent) is the amount of energy released by burning one tonne of crude oil, approximately 42 gigajoules.

MST	*Movimento dos Trabalhadore Rurais Sem Terra*, Brazilian Landless Rural Workers' Movement
OECD	Organisation for Economic Co-operation and Development
ORAM	*Organizacao Rural de Ajuda Mutua*, Rural Organisation for Mutual Help (Mozambique)
PNPB	National Programme for the Production and Use of Biodiesel (Brazil)
PNVEP	*Programme National de Valorisation Energétique de la Plante Pourghère* (Mali)
PROALCOOL	*Programa Nacional do Álcool* (Brazil)
RSPO	Roundtable on Sustainable Palm Oil
RTRS	Roundtable on Responsible Soy
STF	Smallholder Task Force
TIC	Tanzania Investment Centre (Tanzania)
UN	United Nations
UNDP	United Nations Development Programme
WTO	World Trade Organization

CONTENTS





EXECUTIVE SUMMARY

Recent years have witnessed a rapid and accelerating expansion of bioethanol and biodiesel production. This expansion is driven by government targets for biofuel substitution in energy budgets for transport, driven in turn by concerns about high oil prices, prospects for rural development, export opportunities and means to mitigate climate change. Projections suggest that biofuel production is likely to continue expanding in the coming years.

Parallel to these developments, the policy debate about the merits and demerits of biofuels is growing and changing rapidly. Important concerns such as the ability of biofuels to mitigate climate change effectively, the role of biofuels in the recent food price hikes, and the social and environmental impacts of biofuels have been voiced in policy circles as well as in the media and in public opinion at large.

This study contributes to these debates through examining the current and likely future impacts of the increasing spread of biofuels on access to land in

producer countries, particularly for poorer rural people. The study draws on a literature review, and on intelligence and information provided by key informants by email or telephone. It aims to pave the way for future empirical research on the links between the spread of biofuels and access to land, through developing a conceptual framework for such research and through taking stock of data available in the literature.

The study finds that biofuels can be instrumental in bringing an agricultural renaissance that revitalises land use and livelihoods in rural areas. Price signals to small-scale farmers could significantly increase both yields and incomes, securing real, long-term poverty reduction in countries that have a high dependence on agricultural commodities. Large-scale biofuels cultivation could also provide benefits in the form of employment, skills development and secondary industry.

However, these possibilities depend on security of land tenure. Where competing resource claims exist among local resource users, governments and incoming biofuel producers, and where appropriate conditions are not in place, the rapid spread of commercial biofuel production may result - and is resulting - in poorer groups losing access to the land on which they depend. In these contexts, the spread of commercial biofuel crop cultivation can have major negative effects on local food security and on the economic, social and cultural dimensions of land use.

These processes are increasingly documented by a growing body of evidence on the negative impacts of large-scale commercial biofuel production for access to land, drawing on contexts as diverse as Africa (e.g. Tanzania, Mozambique), Latin America (e.g. Colombia, Brazil), and Asia (e.g. India, Indonesia, Papua New Guinea).

Promising approaches also exist, but they have so far received less attention. In some contexts, smallholders have been able to use and even consolidate their land access through seizing the opportunities offered by biofuel feedstock cultivation, whether for income generation or for local energy self-sufficiency. Large-scale and small-scale biofuels production can co-exist and even work together in synergy to maximise positive outcomes for rural development – and secure land rights for smallholders can provide an asset in their negotiations with larger players.

Documenting this "successful" experience, and analysing the conditions that made it possible, the spread of costs and benefits among local land users, investors and government, and the extent to which such experience can be replicated elsewhere, can help build and disseminate better practice.

Preliminary experience provides pointers for policy and practice by governments and the private sector at local, national and international levels:

- Governments must develop robust safeguards in procedures to allocate land to large-scale biofuel feedstock production where they are lacking and – even more importantly – to implement these effectively. Safeguards include clear procedures and standards for local consultation and attainment of prior informed consent, mechanisms for appeal and arbitration, and periodic review.

- Large-scale privately owned plantations are not the only economically viable model for biofuels feedstock production. Producers' associations, governments and investors may want to explore alternative business models such as joint equity in production and processing. Policy instruments based on financial incentives can help provide for inclusion of small-scale producers in the biofuels industry.

- Clearer definitions of concepts of idle, under-utilised, barren, unproductive, degraded, abandoned and marginal lands (depending on the country context) are required to avoid allocation of lands on which local user groups depend for livelihoods. Similarly, productive use requirements in countries in which security of land tenure depends on active use (*mise en valeur*) need to be clarified so as to minimise abuse.

- Land access for rural people requires policy attention not only to land tenure but also to the broader circumstances that determine land use and agricultural economics. Relevant policy areas include taxation and subsidies, regional and international trade, and standards for environment and labour.

- International policy arenas are also influential on the impacts of biofuels expansion on land access. Certification criteria, such as those under development by the EU, should incorporate free prior and informed

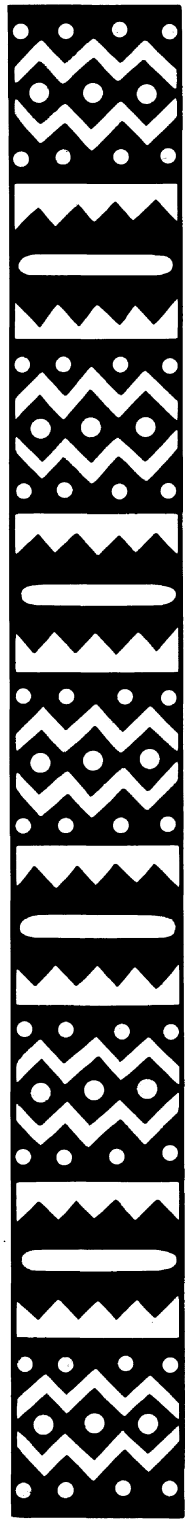
consent, based on secure land tenure of local residents, as a fundamental requirement, disallowing production on contested land. Attention may need to be given to eligibility rules regarding land use change under the Clean Development Mechanism of the Kyoto Protocol and its successor. International governance of trade and investment will continue to be a major determinant of the economic potential of different forms of land use in producer countries.

- Policies, laws and institutions matter - but in contexts characterised by strong power asymmetries they are likely to achieve little if they are not accompanied by sustained investment in building people's capacities to claim and secure their rights.

- Local, national and international NGOs and civil society organisations have a continued role to play in holding governments and industry to account regarding their promises on protection of land access and food security to specific communities and more generally.

Finally, "biofuels" is a catch-all term for a set of very different crops and cropping systems, end-products, policy goals (e.g. commercial production versus energy self-sufficiency), business models (different combinations of ownership and benefit-sharing among large-scale and small-scale operations) and local contexts - all of which significantly affect land access outcomes. A better understanding of this diversity will promote a more balanced and evidence-based debate.

I. INTRODUCTION



1.1. CONTEXT AND PURPOSE OF THIS STUDY

Biomass has been used for energy since the early days of humanity. Today, 52% of the population of the developing world, including 575 million people in sub-Saharan Africa, rely on traditional biomass, particularly fuelwood and charcoal, for their household energy (IEA, 2006). But recent years have witnessed a massive and growing expansion of a particular form of biomass-based energy: liquid biofuels. Although bioethanol and biodiesel still account for a very small share of global energy consumption in Western countries – the equivalent of 1% of total consumption of fuel for road transport – that share is growing fast (IEA, 2006). In addition, the wider implications of biofuels constituting even a small share of global energy consumption – for instance, in terms of land use – may be very significant.

As the industry grows, so does the debate over the merits and demerits of biofuels. Contentious issues include the ability of biofuels to mitigate climate change effectively, the role of biofuels in recent food price hikes, and the threat of biofuel production to natural ecosystems. A number of major reviews in recent years (e.g. Kojima and Johnson, 2005; Worldwatch Institute, 2006; UN-Energy, 2007) have provided detailed and balanced analyses of the likely impacts of biofuels on local and global economies, society and environment. Food security is highlighted as a major concern.

Food security has multiple dimensions – availability, access, stability and utilisation – and a key determinant of all of these is how access to land is distributed and controlled within society (FAO, 2007). Land means much more than provision of food, however. Land also has major historical, political, cultural and spiritual significance. But the more detailed reviews have so far tended to discuss land only briefly, and largely in terms of food security.

This study aims to open up discussion of the way in which biofuels are likely to impact on access to land. Many observers and activists have raised concerns that the spread of biofuels may result in loss of land access for poorer rural people in localities that produce biofuel crops. However, since liquid biofuels are a relatively new phenomenon in most countries (with exceptions such as Brazil and Zimbabwe), there is as yet little empirical

evidence. This study aims to pave the way for future empirical research on how the biofuels boom affects land access, by raising key issues, presenting a basic conceptual framework and presenting a suite of (primarily anecdotal) evidence from around the world.

The recent nature of the biofuels debate, coupled with the scarcity of empirical research on the linkages between the spread of biofuels and land access, raise challenges for a desk-based study on this issue. Owing to these circumstances, we relied on internet-based grey literature, on newspaper articles and on personal communications (telephone calls and face-to-face conversations) to a greater extent than in many research efforts. As a result, the findings of this study can only be considered as preliminary, and as a stepping stone for more in-depth research. Preliminary experience however does provide some pointers for policy and practice by governments and the private sector, which are outlined in the concluding chapter.

The impacts of the spread of biofuels on land access for poorer groups are likely to be similar to those generated by the spread of other cash crops in the past. Indeed, some biofuels feedstocks, such as palm oil and soy beans, are already major cash crops for fodder, food and cosmetics. The key difference with the current biofuels boom is that biofuels lie at the interface between the agriculture and energy sectors. Therefore, not only are biofuel crops likely to be much more highly regulated than other agricultural commodities, government consumption targets are creating an artificial demand that is unprecedented among cash crops, and which is likely to persist beyond the usual length of a "commodity boom" cycle. Nonetheless, commonalities enable us to learn from recent and historical experiences with rapid expansion of commodity crops.

As part of its paving the way to more research and debate on these issues, the study aims to promote greater exchange between biofuels and land tenure specialists. In order to do this, it seeks to be accessible for both sets of readers: those working on biofuels who have no specific background in land access issues, and those working on land access who have no specific expertise on biofuels. As a result, some of the conceptual and introductory parts may appear elementary to the relevant specialist. Box 1 presents definitions and discussion of the key terms used through the text.

BOX 1: KEY TERMS

Biofuels are liquid fuels manufactured from biomass. They are used mainly for transport or heating. They can be produced from agricultural products, and forest products, or from the biodegradable portion of industrial and municipal waste. Bioethanol and biodiesel account for more than 90% of global biofuel use. Biofuels are made from biofuel feedstocks, plant or animal materials that may be produced especially or may be by-products or wastes from other industries.

Bioethanol is a distilled liquid produced by fermenting sugars from sugar plants and cereal crops (e.g. sugarcane, maize, sugarbeet, cassava, wheat, sorghum). A **second generation** of bioethanol – lignocellulosic – makes use of a range of lignin and cellulose materials such as short-rotation wood coppices and energy grasses. Bioethanol can be used in pure form in specially adapted vehicles, or blended with gasoline.

Biodiesel is produced from organic oils, usually from the oily fruits of crops such as rapeseed, sunflower, soya, castor, oil palm, coconut or jatropha, but also from animal fats, tallow and waste cooking oil. A **second generation** of biodiesel technologies synthesises diesel fuels from wood and straw. Like bioethanol, biodiesel can be used in pure form in specially adapted vehicles or blended with automotive diesel. A **third generation** of biodiesel technologies will use oils from algae.

Access to land is broadly defined as the processes by which people, individually or collectively, are *able* to use land, whether on a temporary or permanent basis. These processes include participation in both formal and informal markets, land access through kinship and social networks, including the transmission of land rights through inheritance and within families, and land allocation by the state and other authorities (e.g. customary institutions).

Land tenure refers to the arrangements (rules, institutions and processes) through which people gain legitimate access to land, they use land and participate in the benefits deriving from it, and they hold, manage and transact it. These arrangements involve diverse sets of **land rights** – from outright ownership to a range of other land holding and use rights (leasehold, usufruct, servitudes, grazing rights, etc), which may coexist over the same plot of land. Land rights may be held by individuals or groups (e.g. private property) or by the state (ownership, trusteeship, etc). They may be based on national legislation, on customary law or on combinations of both.

Land *access* is therefore broader than land *rights* in a legalistic sense. Land rights do determine access, not only rights of full ownership but also a much wider range of entitlements (e.g. various types of use rights). But access to land is also shaped by social relations, including control over markets, capital

and technology, by relations of power, authority and social identity, and by relations of reciprocity, kinship and friendship. These factors may entail a disconnection between having a legal *right* to use land and being *able* to claim and enjoy that right in practice (Ribot and Peluso, 2003; Cotula, forthcoming).

Security of land rights refers to the extent to which land users can be confident that they will not be arbitrarily deprived of their land rights and/or benefits deriving from these. This confidence includes both objective elements (nature, content, clarity, duration and enforceability of rights) and subjective elements (the land users' perception of the security of their rights).

On the other hand, **land use** is "characterised by the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it" (FAO, 1999). "Land use concerns the products and/or benefits obtained from use of the land as well as the land management actions (activities) carried out by humans to produce those products and benefits".

The report is organised as follows. The next section provides a short overview of trends in – and drivers of – biofuels production. Chapter 2 maps out the anticipated links between the spread of biofuel crops and land access. Chapter 3 discusses available evidence concerning these links, while the final Chapter 4 draws some conclusions and suggests ways forward.

1.2. THE BIOFUELS BOOM: DRIVERS AND TRENDS

Government policy has been the key driver of the expanding market for biofuels. Governments all over the world – including those in China, India, Brazil, the US and the EU – have enacted mandatory targets for use of biofuels in transportation fuels, creating guaranteed market for biofuels for decades to come. Government policies have also provided financial incentives to the private sector (e.g. subsidies and tax breaks; see Jull *et al.*, 2007 for a detailed global review of recent legislation). Legislation on biofuels is becoming the norm rather than the exception: 27 of 50 countries surveyed in 2007 had enacted, or had under consideration, mandatory requirements for biofuels to be blended with traditional transport fuels, and 40 had legislation to promote biofuels (Rothkopf, 2007).

Governments are not always explicit about their reasons for promotion of biofuels. Mitigation of climate change is often presented as a key policy

goal, but there are growing doubts on the efficacy of biofuels in reducing carbon emissions, largely because of the impacts of large-scale land use change (e.g. Searchinger *et al.*, 2008 and Fargione *et al.*, 2008). More compelling reasons for governments to pursue a switch from oil to biofuels are threefold (Dufey *et al.*, 2007):

- Energy security: with oil at over US$100 per barrel and future supplies uncertain, countries are seeking alternative energy sources to increase long-term energy security and reduce energy import bills.

- Rural development: a new and profitable land use will provide better opportunities and long-term security for farmers and employees, plus – if processing facilities are near to farms – for value-addition to profit rural areas.

- Export development: for countries with favourable endowments of land, labour and trade conditions, biofuels are an opportunity to develop new export markets and improve the trade balance.

In response to policy signals, the industry is expanding rapidly. Biofuels production comprises, crudely, production of the feedstock followed by manufacture of the liquid biofuel. For second generation biofuels, feedstocks will comprise wastes from the forestry and agrifood industries (e.g. wood offcuts, crop residues), other domestic and industrial waste products (e.g. waste paper, household rubbish) and purpose-grown grasses and coppice woods. Thus the feedstocks of second generation biofuels are low-cost – but the manufacturing processes require sophisticated technologies, largely still under development. First generation biofuels, by contrast, rely on relatively simple manufacturing processes, suitable even for small-scale implementation in remote villages, but need feedstocks that are high in fats (for biodiesel) or sugars/carbohydrates (for bioethanol). Second generation biofuels are beginning to come on-stream with pilot plants in Japan and the US, but for the time being most biofuels will be first generation.

Production of the feedstock and manufacture of the biofuel can occur a substantial distance apart. Oil palm kernels, for instance, are partially processed in onsite mills in Malaysia and Indonesia, then shipped in large quantities as crude palm oil to biorefineries in the Netherlands and Germany,

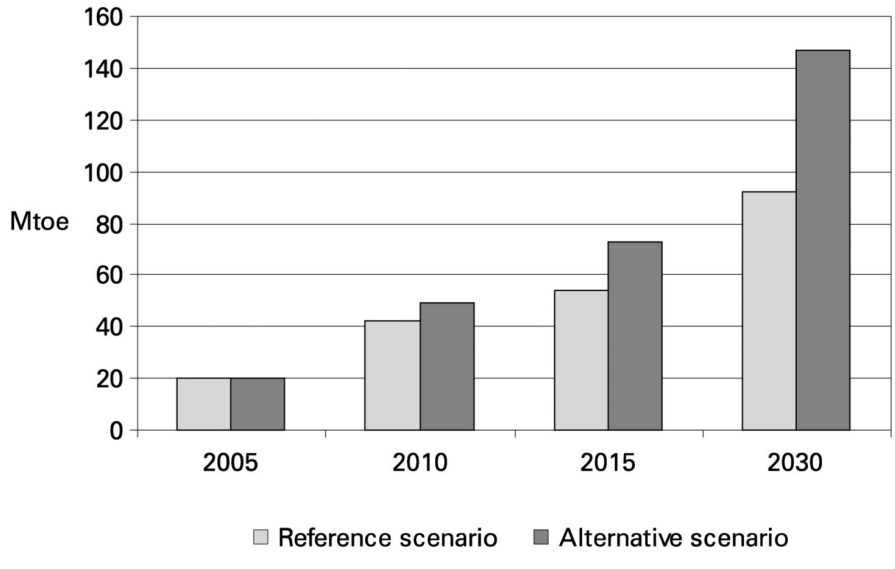
where biodiesel is manufactured. But transport can be a prohibitive cost. For a bulk crop such as sugarcane, used to manufacture bioethanol, there is little point in exporting the unprocessed feedstock. These factors explain the prevailing global patterns of biofuel production. The countries that produce most bioethanol are Brazil, where 45-55% of the national sugarcane crop is used as biofuel feedstock, and the US, where, pushed by strong federal governmental support, bioethanol production has recently surpassed that of Brazil (F.O. Licht, 2008). European countries are currently the leading manufacturers of biodiesel, processing vegetable oils from locally grown crops (e.g. oilseed rape), but increasingly reliant on imported feedstocks (e.g. crude palm oil imported from Indonesia and Malaysia).

Production is established and expanding rapidly in many other countries with more recent or less prominent biofuels tradition. Zimbabwe began manufacture of bioethanol to supply a 5% mix in road fuel in the early 1980s, following the lead of Brazil's already well-established industry. China and India began production of bioethanol in 2000, and are now the third and fifth largest global producers respectively (F.O. Licht, 2008). China's 2006 production was up to 2,000 million litres, while India manufactures 300 million litres annually (Worldwatch Institute, 2006:6). India is also investing heavily in jatropha cultivation for biofuels (Gonsalves, 2006). Malaysia and Indonesia, major producers of oil palm, are now expanding into biodiesel manufacture. Malaysia is the leading producer of biodiesel in Asia, with five biodiesel plants already in operation and another 91 given government approval (F.O. Licht, 2008:157).

The future will see accelerating growth in production of feedstocks and manufacture of bioethanol and biodiesel using first generation technologies. For example, in Brazil, biofuel production (mainly bioethanol) is predicted to rise to 44,000 million litres by 2016, an increase of 145% on the country's 2006 output (OECD-FAO, 2007: 20). Likewise, bioethanol production in China is expected to reach 3,800 million litres per annum by 2016, an increase of 250% on 2006 output (OECD-FAO, 2007:20).

In Africa, several governments have made moves to promote biofuels production. In South Africa, the government plans to invest US$437 million in five biofuel projects, and a conglomerate of commercial maize farmers plans to build eight ethanol plants (GRAIN, 2007:40). In Ghana, the

FIGURE 1. PREDICTED BIOFUEL PRODUCTION 2005-2030



Source: IEA (2006:394-395)

government pledged US$2 million to assist a large-scale jatropha cultivation scheme in the centre of the country (GRAIN, 2007:38). Sugar cane and cassava in Nigeria, jatropha in Tanzania and Kenya, and palm oil in Cameroon have also been attracting significant investment from both public and private sectors (GRAIN, 2007).

The Indian government is implementing a National Biodiesel Mission with the aim of kick-starting the country's biodiesel production in two phases. Phase I (2003-2007) involves the cultivation of the cultivation of 400,000 ha of jatropha, and a series of jatropha oil extraction and biodiesel plants. The ambitious Phase II aims to provide 20% of India's diesel requirements by 2012, which is estimated to require the cultivation of 14 million ha of jatropha (Gonsalves, 2006:22, 40). Production of biodiesel from jatropha is focused in the southern state of Andhra Pradesh. Naturol Bioenergy Limited (NBL), a joint US-Austrian private venture, has been granted 120,000 ha in the state for jatropha cultivation (Gonsalves, 2006:30). NBL's first biodiesel plant in Kakinadad, Andhra Pradesh started commercial production in October 2007 (with a capacity of 100,000 tonnes per annum).

On the global level, IEA (2006) has predicted trends under a Reference Scenario, based on the assumption that current national biofuel policies will remain in place, and an Alternative Policy Scenario, which takes into account enhanced policies to stimulate the biofuel industry (such as subsidies for producers and consumers, support for the car industry, increased research and development spending, and reduced barriers to trade). Under the Reference Scenario, biofuel production to 2030 is predicted to rise sharply from 20 Mtoe (2005) to 54 Mtoe by 2015 and to 92 Mtoe by 2030 (Figure 1). Under the Alternative Policy Scenario production rises even more steeply to 73 Mtoe (2015) and to 147 Mtoe (2030). This represents an annual biofuels growth rate of 6.3% in the Reference Scenario, and of 8.3% in the Alternative Policy Scenario. While biofuels currently meet 1% of global demand for transport fuel, this share is set to rise to 4% in Reference Scenario and to 7% in Alternative Policy Scenario by 2030.

1.3 LINKING THE BIOFUELS BOOM, FOOD SECURITY AND ACCESS TO LAND

Biofuels production may offer income-generation opportunities in rural areas. By generating income, biofuel production may help improve prospects for food security – namely, by enabling farmers to purchase food on the market. It may also offer an opportunity for farmers – traditionally squeezed by low agricultural prices – to get better terms of trade; and for countries having abundant land areas but poor in other natural endowments to pursue new development opportunities. In addition, biofuel production may help poorer countries and communities move towards energy security and mitigate the negative impacts of high oil price – and, through that, help promote food security.

On the other hand, biofuels production may compete with food crops and have significant negative impacts on food security – the so-called "food versus fuel" debate. Recent hikes in world food prices have not been caused primarily by biofuels – rather, the main drivers have been weather-related shortfalls, reduced global stocks and increased demand for food and fodder from growing economies (e.g. in Asia). However, competition between biofuels and food, as an end-use of the same crop (e.g. maize, sugarcane) or as alternative land uses (e.g. oil palm versus food crops), may increase

pressures over world food prices over the next few years. Several studies predict significant future increases in world food prices due to demand for feedstocks for biofuel production (e.g. IFPRI, 2006; OECD-FAO, 2007). These concerns are particularly relevant for large-scale commercial biofuel production, which tends to take place on lands that would be suitable for food production.

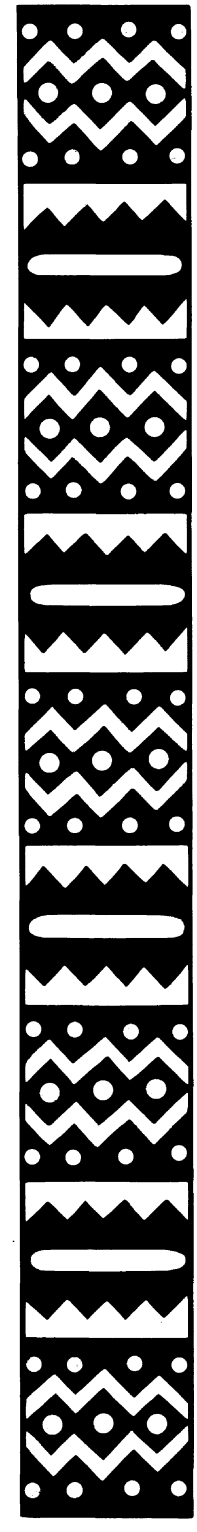
Rising food prices are likely to have negative effects on access to food for poorer and more vulnerable groups. It is for this reason that the UN Special Rapporteur on the Right to Food, Jean Ziegler, provocatively condemned the growing use of biofuels as a "crime against humanity"[1]. These pressures are likely to be exacerbated by the strong demographic growth and the rising urbanisation common in African, Asian and South American countries. Demographic growth increases pressure on food supply. Urbanisation makes growing shares of the population dependent on food supply from rural areas. In turn, this increases vulnerability to hunger and malnutrition among poor urban consumers, as well as among poorer farmers, who tend to be net food consumers rather than net food producers (Dufey *et al.*, 2007).

One of the impacts on food security is through impacts on access to land for people who depend on land-based agricultural livelihoods. Policy and market incentives to turn land over to biofuels production will tend to raise land values. While in some cases this could give new opportunities to poor farmers, it could also provide grounds for displacement of poorer people from land. As biofuels begin to push up prices of food and people are hence most in need of land for production, poor people's access to that land is liable to be weakened.

It must also be noted, however, that land access is not just a means for food production and a mechanism for food security. In many parts of the world, land is a source of political power, a basis for complex relations of alliance and reciprocity, and a central component of social identity. Securing land access for poorer groups is a challenge that overlaps significantly with, but is not subsumed within efforts to promote food security.

1. BBC News, 30 November 2007 (www.bbc.co.uk).

2. ANTICIPATED IMPACTS OF BIOFUELS ON ACCESS TO LAND



2.1 CONCEPTUALISING IMPACTS OF BIOFUELS EXPANSION ON ACCESS TO LAND

The spread of commercial planting of biofuels crops, whether for export or for internal markets, has significant implications for land use and access in producer countries. These implications reflect complex relations among the diverse production systems for the cultivation of biofuels, on the one hand, and diverse land access relations, on the other. This chapter maps out these relations and outlines the impacts on land use and land access that might be anticipated given current projections and trends.

Figure 2 opposite synthesises the analysis in a single diagram. While visual representations may help clarify concepts and linkages, they also inevitably entail a simplification of complex issues. In this case, the diagram provides a basis for examining each of the linkages from biofuel expansion through to land access impacts in turn: first the relationship between increased demand for biofuels and increased demand for land, then the effects of increasing land demand on land access, and finally the set of mediating factors that affect outcomes for land use and land access. The remainder of this chapter explores these questions and issues.

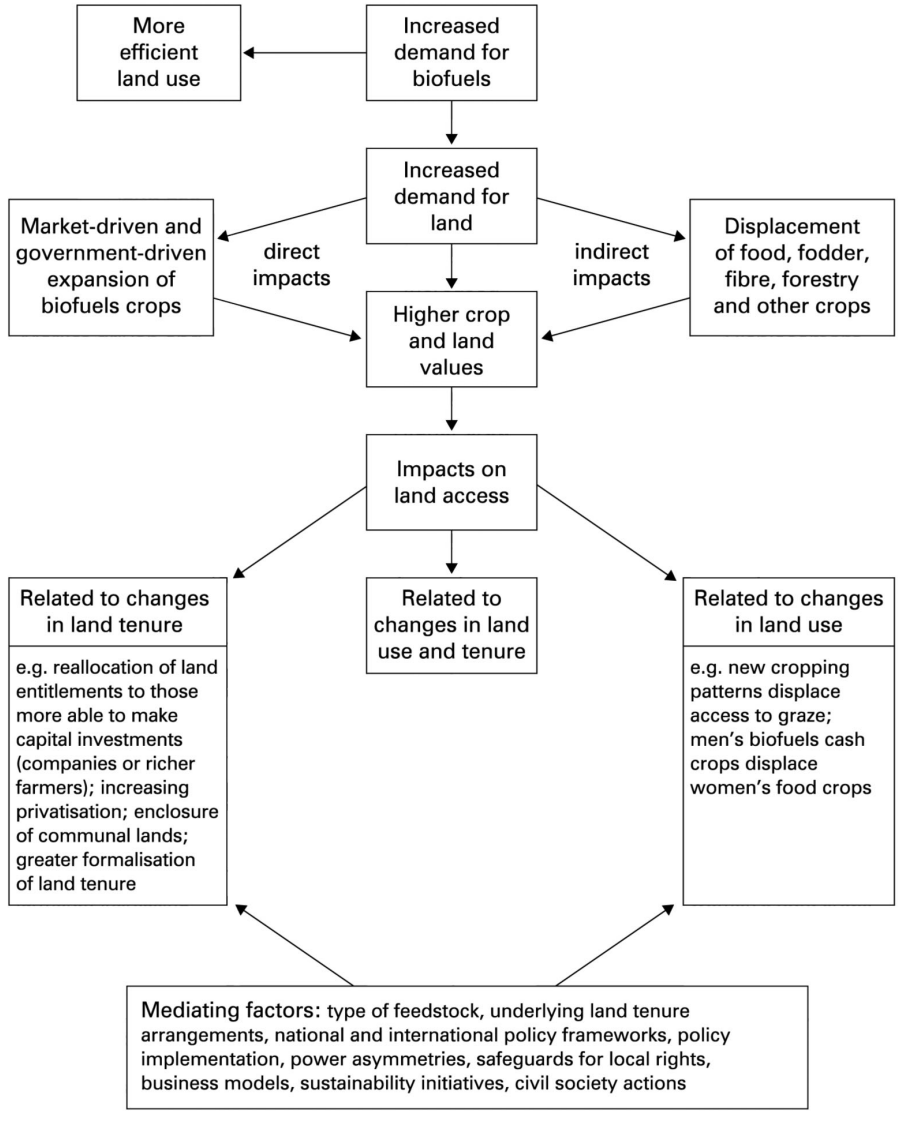
2.2 INCREASED DEMAND FOR BIOFUELS AND INCREASED DEMAND FOR LAND

Before considering impacts on access to land for poor people in rural areas, there is an underlying question of just how much land biofuel feedstocks may be expected to occupy in coming decades: the link between biofuels demand and land demand. The questions outlined below work through the key issues and the projections of agricultural analysts.

To what extent can increased demand for biofuels feedstocks be met by more intensive land use rather than more extensive land use?

The increased demand for biofuels can partly be met by technical improvements in production: more efficient processing and higher yields of feedstocks per unit area. When second generation and third generation biofuels become commercially available, they are likely to accelerate efficient land use, making better use of waste products, marginal land and space-saving technologies. Even for first generation biofuels, more intensive

FIGURE 2. CONCEPTUAL LINKAGES BETWEEN THE SPREAD OF BIOFUELS AND LAND ACCESS



land use, producing higher yields, could meet a proportion of the increased demand for feedstocks. During the Green Revolution of the 1970s, impressive yield increases of around 4% per year were achieved in Asia and Latin America, due largely to use of new varieties, irrigation and chemical fertilisers. By contrast, from the 1970s through to the 1990s cereal yields stagnated at around 1 t per ha in Africa, which was effectively bypassed by the Green Revolution (Dentzer and Rose, 1996). Today yields continue to grow globally, but at a much slower rate. Up to 2020, annual increases in cereal yields are expected to be about 1.3% globally, with 0.9% in developed countries and 1.7% in developing countries (Pinstrup-Andersen *et al.*, 1999).

Looking at biofuel feedstocks, we can expect yields of cereal feedstocks for bioethanol to increase at similar rates (1-2% per year). Non-cereal feedstock yields are likely to increase at lower or similar rates, depending on investments in technology and research (as most crops have lagged behind cereals in terms of yield increases). Perhaps among the more newly commercialised crops, such as jatropha, future yield increases might happen more rapidly. For example, D1 Oils plc's early plantings used locally collected seeds, but are now shifting to improved hybrid varieties (D1 Oils plc, 2008).

Clearly, we cannot rely on yield increases alone to supply the rapidly growing demand for biofuel feedstocks. In addition, gains in yields will not be spread equally. Africa did not benefit from the Green Revolution, with crop yields across the continent declining slightly during the 1970s and beyond. Yield increases are often confined to the large-scale farming sector, with small-scale producers unable to take advantage of new technologies and high cost inputs (though when they do have access, their yields are comparable with large-scale farms, as demonstrated by palm oil smallholders in Malaysia; Vermeulen and Goad, 2006). Climate change will cause additional uncertainties and variability in conditions for crop production.

For the purposes of this report, a final point worth noting is that intensification of land use can also have impacts on land access. Use of high-cost inputs (seeds, fertilisers, pesticides) may be associated with agribusiness contracts that are inaccessible to farmers who do not meet the entry criteria (e.g. large enough farm size, sufficient financial capital, master farmer certificate).

How much land is required to meet projected demand for biofuels feedstocks?

In 2006 an estimated 14 million ha of land was used for the production of biofuels and by-products, approximately 1% of globally available arable land (IEA, 2006:413). A number of analysts have since come forward with projections of future land needs for biofuel production. One recent study estimates that demand for maize-based ethanol from the US alone will put 12.8 million ha under maize in the US by 2016, thereby bringing 10.8 million ha new agricultural land into production, mainly in Brazil, China, India and the US (Searchinger *et al.*, 2008).

At the global level, according to IEA's "World Outlook 2006" projected growth in biofuel production to 2030 will require 35 million ha of land (2.5% of available arable land, approximately equal to the combined area of France and Spain) in the Reference Scenario (see Chapter 1), and 53 million ha of land (3.8% of available arable land) in the Alternative Policy Scenario (IEA, 2006:416). For comparison, a recent review of a range of economic estimates of future biofuels demand claims that even modest greenhouse gas regulations, combined with successful development of second generation biofuels, could lead to 1,500 million ha, equivalent to the current total global farmland, under biofuel crops by 2050 (Field *et al.*, 2007).

How much land is actually available to meet these needs?[2]

The Global Agro-ecological Assessment (Fischer *et al.*, 2002), based on satellite imagery, provides the most comprehensive survey of global agricultural potential. At the global level, 2,541 million ha of land have potential for cultivation: 2,541 million ha in the "very suitable" and "suitable" categories and a further 784 million ha in the "moderately suitable" category. A large proportion of the world's land surface is not cultivable due to being too dry, too cold, too steep, too nutrient-poor or a combination of these factors.

The proportion of the cultivable land that is actually under cultivation or under other land uses differs widely around the world. In Asia, Europe and North America, almost the total cultivable area is either under cultivation or

2. Thanks to Paolo Gruppo and colleagues at FAO for guidance on this section.

under forest in which cultivation would have "severe environmental consequences" (Fischer *et al.*, 2002:ii). In these regions, expansion of biofuel crops can only come about as a substitution for other crops or through ecologically risky expansion into forest areas.

In effect 80% of the world's reserve agricultural land is thus in Africa and South America (Fischer *et al.*, 2002). Estimates based on satellite imagery from 1995-1996 give a total cultivable land in Africa and South America of 807 and 552 million ha respectively (all three suitability categories minus land under forest), of which 197 and 159 million ha respectively are under cultivation. The underestimation of the actual use, according to the authors, ranges from 10 to 20%, which would increase the "cultivated land" up to about 227 million ha (Africa) and 183 million ha (South America). However, it is not clear how land under shifting cultivation and fallow systems is included in these measurements. In Africa, a ratio of five plots under fallow to every plot under cultivation would give a range of the total "cultivated" land from a minimum of 227 ha up to a maximum of 1135 ha – well above the available reserves. In addition, since 1994, there is likely to have been an increase in land under agriculture in Africa, plus a decline in available agricultural land due to competing land uses.

There is a widespread policy preference for biofuels crops to be planted on "marginal" lands rather than prime agricultural land. Taking marginal land to be equivalent to Fischer *et al.*'s "moderately suitable" land category, regional totals of unforested marginal land amount to 154 million ha (Africa), 96 million ha (South America), 79 million ha (North America), 147 million ha (Europe and Russia), 99 million ha (Asia) and 35 million ha (Oceania), giving a global total of 610 million ha (calculated from Fischer *et al.*, 2002:11). De la Torre Ugarte (2006) looked at under-utilised agricultural land in temperate regions and estimated that 53 million ha arable land could be brought back into production (14 million ha in the US, 6 million ha in Europe and 33 million ha in Russia and former USSR).

Another estimate is based on the data of Houghton (1990 and sequential; quoted in Field *et al.*, 2007), in which the total area of degraded land globally was estimated as 500 million ha, with 100 million ha in each of Asia and South America and 300 million ha in Africa. Degraded land in this study was defined as tropical lands formerly forested but not currently used

for agriculture or other purposes. Field *et al.* (2007) used more recent (2004) satellite imagery to calculate the current abandoned agricultural land to be 386 million ha globally, noting a very wide (> 50%) margin of error.

Both the Fischer *et al.* (2002) and Field *et al.* (2007) studies show that large-scale assessments of land availability are subject to high levels of uncertainty, even when good data and sophisticated analyses are used. What is clear, however, is that reserves of land with high agricultural potential are extremely limited except in certain parts of South America and Africa. Indeed, about half of the cultivable land reserves are in just seven countries: Angola, Democratic Republic of Congo, Sudan, Argentina, Bolivia and Colombia (Fischer *et al.*, 2002). "Marginal" and "abandoned" lands may be more widespread, but there are likely to be major obstacles to commercial production of biofuels on these lands: most importantly lack of adequate water for viable harvests, but also fragmented rather than continuous land holdings and inaccessibility from markets. Another important consideration is that over-use of land that is already "marginal" can easily result in long-term or permanent ecological damage such as salination or severe erosion (Eves, 1997). Finally, there are a number of social implications of use of marginal lands for biofuels production, which are discussed in Section 2.2 below.

In which countries is increased production of feedstocks likely to happen?

The countries that are the current leading processors of biofuels (e.g. the United States for bioethanol and Germany for biodiesel) do not have the land available to grow the feedstocks required for future outputs. As a result, a significant share of the growing biofuel demand, both in Europe and North America and globally, will continue to be met through importing biofuels, or raw materials to produce biofuels, from countries with land available for feedstock cultivation. A supply-and-demand analysis carried out by the Stockholm Environment Institute showed that, by 2020, developed "energy consuming nations will need to import a substantial amount of their biofuel requirements from the developing world" (cited in Rothkopf, 2007:574).

A huge growth in agricultural trade is predicted, particularly of vegetable oils (70% internationally traded by 2016; OECD-FAO, 2007). Ethanol imports

to the EU rose by 43% in the first three quarters of 2007 up to 650 million litres, primarily from Brazil, the US and Pakistan (F.O. Licht, 2008:163). Future regions for expansion of export of biofuels are predicted to Brazil and low-cost producer countries in Asia, Africa and the Caribbean (Dufey *et al.*, 2007). In the longer-term, tropical countries will likely play an increasingly important role in feedstock production, due to favourable biophysical conditions and generally lower costs of land and labour, so long as suitable trade arrangements and stable conditions for investment prevail.

2.2 LIMITATIONS TO USE OF "AVAILABLE" AND "IDLE" LAND

A major hope for biofuels is that feedstock crops can be grown on idle and marginal lands. Governments have claimed that significant land areas are under-utilized and available for biofuel production. For instance, the government of Mozambique has stated that only 9% of the county's 36 million ha of arable land are currently in use and that there is the possibility of bringing into production an additional 41.2 million ha of marginal land currently not being used (Namburete, 2006). Similarly, in Indonesia, the Department of Agriculture recently held that there are approximately 27 million ha of "unproductive forestlands" that can be offered to investors and converted into plantations (Colchester *et al.*, 2006, quoting national press).

Based on these and similar estimates, several governments have taken steps to identify "idle" land and to allocate it for commercial biofuel production. The Indian government has initiated large-scale jatropha cultivation over more than a million ha in Andhra Pradesh and Jaipur (Chan *et al.*, 2006). In southwest China, the main target area for jatropha development, provincial governments plan to expand jatropha acreage to one million ha of "barren land" over the next decade and a half, i.e. a 15-fold increase over the current area (Weyerhaeuser *et al.*, 2007).

Yet growing evidence raises doubts about the concept of "idle" land. In many cases, lands perceived to be "idle", "under-utilised", "marginal" or "abandoned" by government and large private operators provide a vital

basis for the livelihoods of poorer and vulnerable groups, including through crop farming, herding and gathering of wild products (Dufey *et al.*, 2007). In India, for instance, the widespread planting of jatropha on "wasteland" has been brought into question because of the heavy reliance of rural people on these lands for collecting fuelwood, food, fodder, timber and thatch (Rajagopal, 2007). The tenure status of such lands may also be complex, with governments asserting land ownership but exercising little control at local level, and local groups claiming resource rights based on local ("customary") tenure systems that may lack legally enforceable status.

For instance, in Tanzania, an area provisionally identified for sugar cane plantations in the Wami Basin is reported to be used already for rice production by thousands of smallholders; there have also been reports that a thousand rice farmers may be evicted as a result of the project. Other ongoing or planned large land allocations in Tanzania have been reported to involve the displacement of local farmers (ABN, 2007).

In southwest China, much of the "barren" land identified for jatropha production is owned not by the state but by village collectives, with use rights granted to individual households. In Yunnan, for instance, a recent provincial survey found that 76% of forestland is owned by collectives, and the remaining 24% by the state. Most private investment in biofuels has so far been limited to state-owned land – with a few exceptions, including a four-year project begun in 2006 and involving cooperation with individual growers. But the ambitious targets for scaling up jatropha production are likely to encounter problems of land availability, and will have to extend cultivation to collective lands (Weyerhaeuser *et al.*, 2007).

2.3 EFFECTS OF INCREASING LAND DEMAND ON LAND ACCESS: DIRECT AND INDIRECT LINKAGES

Increasing demand for land for biofuels will result in changes to land access for poor people through two routes: direct linkages that involve direct land use change to biofuels crop production from other uses, and indirect linkages that involve changes in land use triggered by biofuels expansion elsewhere. These two pathways are discussed in more detail below.

Direct linkages

Direct linkages relate to effects on land access that can be directly ascribed to the spread of cultivation of biofuel crops. Possibly the most straightforward example is where the government takes ("expropriates", "dis-allocates", "withdraws" – depending on the country context) land from local users and allocates it to biofuel producers, based on the assumption that biofuel crop production is more economically viable than existing forms of land use.

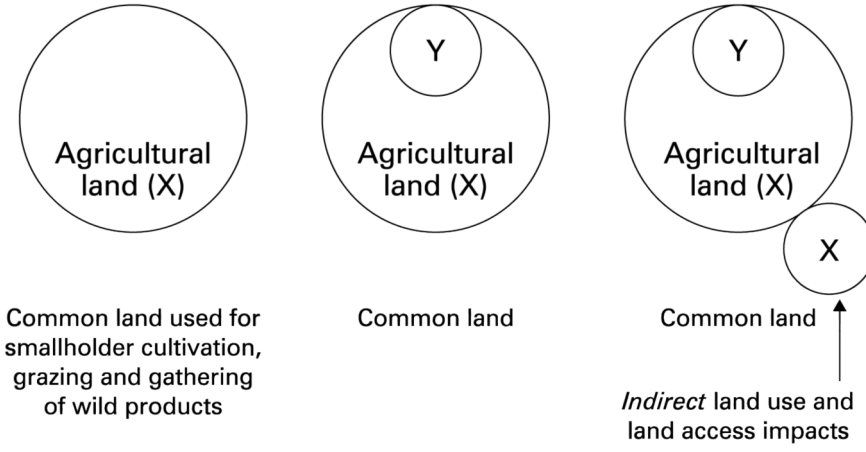
A more complex type of direct linkage relates to the operation of market forces. The spread of biofuels to meet growing internal and international demand tends to increase the value of land – whether this is expressed in terms of market prices or, where land markets are limited or informal, in terms of opportunity costs and preferential allocation to particular uses. This may result in poorer land users being priced out of land markets (either sale or rental markets). It may also foster changes in land access along gender lines as control over increasingly high-value land may shift from women to men.

Indirect linkages

Indirect linkages between biofuels and land access refer to effects on land access which are produced not directly by the spread of biofuel crop production, but rather by other factors which are in turn caused by the spread of production of biofuels crops. Increases in food prices linked to the spread of biofuels may change the economic terms of trade between agriculture and other sectors of the economy, and between rural and urban areas. Higher rates of return in agriculture will reinforce trends towards higher land values, particularly in more fertile lands.

Indirect linkages are often known as "displacement" or "leakage" and have been particularly explored with regard to deforestation rather than land access (Dehue *et al.*, 2007; Searchinger *et al.*, 2008). In this context, they refer to deforestation caused (not directly by biofuel cultivation but) by food crops in turn displaced from higher-value lands by the spread of biofuels. Similar processes can occur with regard to land access issues. As food crops are displaced from higher value lands, they may retreat to areas that are less fertile but still fit for farming, pushing current users onto other lands. Figure 3 below illustrates these dynamics.

FIGURE 3. VISUAL REPRESENTATION OF "DISPLACEMENT" (AFTER DEHUE *et al.*, 2007)



In Figure 3, Y represents new land demand from the biofuel sector. X is the expansion of existing cultivation into common land as a result of the displacement effect. While in this case the displaced area X = area Y, in many real cases the displaced area is larger than the area it replaces, because of differences in land prices, soil fertility or farming practices. For example, displacement of farmers from the cerrado to the Amazon in Brazil may be associated with multiplier effects in land clearance (Grieg-Gran *et al.*, 2007). Displacement effects will also occur between different crops. For example, diversion of European rapeseed oil into biodiesel manufacture will create a demand for substitute oils in the food and cosmetics industries, with palm oil expected to increase in supply to fill much of the gap. This will have significant implications for deforestation and displacement.[3]

Indirect linkages present greater challenges than direct linkages in terms of availability of evidence and clearly established causal relations. Owing to these challenges, this study acknowledges the importance of understanding both direct and indirect linkages in order to fully capture the land access implications of the spread of biofuels but the empirical evidence (chapter 4) mainly focuses on direct linkages.

3. Thanks to Rob Bailey for emphasising substitution effects among different oilseed crops.

2.4 EFFECTS OF INCREASING LAND DEMAND ON LAND ACCESS: ANTICIPATED IMPACTS ON SMALL-SCALE LAND USERS

A first issue to be clarified concerns the relationships among land use, land tenure and land access (see Box 1 for definitions). Land use relates to the ways in which land is used, while land access emphasises *who* has access to it and uses it.

Land use changes associated with cultivation of biofuels can occur through both direct and indirect pathways as described above. Land use change may involve conversion from one crop to another, from pasture to cropland, from unutilised to utilised farmland, or from low intensity management (e.g. shirting cultivation) to high intensity. As the economic opportunities linked to biofuel production improve, agricultural producers may shift from food or cash crops to feedstocks. For example, small-scale jatropha projects implemented in Mali have involved a shift from cotton to jatropha, linked to falling cotton prices and rising perceived (monetary and non-monetary) values of jatropha (personal communication from project staff described further in Chapter 3).

Another important form of biofuel-induced land use change involves conversion of forest. Large-scale land use changes from forest and conservation areas to biofuels crops are predicted (Fargione *et al.*, 2008). Vast land use changes from forest to cash crops have already occurred. The spread of oil palm in Indonesia, for example, has resulted in the clearance of 18 million ha of forest over the past 25 years, although only 6 million ha have actually been planted (Colchester *et al.*, 2006).

The spread of biofuels may cause changes in land use that do not impact in any way on land access (a simple change from one crop to another crop under the same communal or individual system of management). Alternatively – the subject of interest in this study – production of biofuels crops may cause impacts on land access. Some cases will involve changes in land tenure (formal or socially legitimised access to land) while other changes will be more subtle, without any highly visible changes to tenurial arrangements, but a range of less visible implications for access to land-based resources. We do not explore these more subtle changes in any detail

in this report, but, as examples, a biofuels crop rather than a food crop might mean: landless people are excluded from post-harvest gleaning; husbands take over land from their wives now that the crop is cash rather than subsistence; fallow periods are shorter meaning less land in total for communal livestock grazing.

As emphasised in Figure 2, this report is mainly concerned with the cases where cultivation of biofuels crops has major impacts on both land use and land tenure – particularly the cases in which control over land shifts away from pre-existing small-scale land users. We anticipate that the highest levels of impact will be associated with development of large-scale biofuels plantations. But small-scale biofuels developments can also potentially have major effects on land access by pre-existing resource users. Sometimes it is small-scale farming rather than large-scale plantation that leads the advance of the agricultural frontier into forested territories of hunter-gatherer indigenous peoples, with irreversible impacts on their use of and control over their traditional lands.

We also anticipate that most impacts of expanding cultivation of biofuels on access to land by pre-existing, small-scale farmers and other resource users will be exclusionary: both in terms of exclusion from land use and from the benefits of land use and in terms of exclusion from decision-making over land use and sharing of its benefits.

However, this does not mean that all impacts of biofuels cultivation on land access will be negative. Biofuels may be able to strengthen land access for some poorer land users. Experience shows that higher crop and land values can renew people's interest and investment in land and encourage small-scale farmers to seek more secure individual or communal tenure over their land resources (e.g. Williams and Vermeulen, 2005). In South Africa, women have planted tree crops (future second generation biofuels) specifically to secure their claims over land contested by their late husbands' families (Mayers and Vermeulen, 2002).

A central hypothesis is that much of the impact of biofuels on land access will be an outcome of increased land values (Figure 2). Rising values of biofuels crops with knock-on prices for other crops, exacerbated by changing diets in major markets (India and China) and climate change, will in turn lead to rising land values. Trends towards higher land values

may be further compounded where biofuel production is promoted through public subsidisation, as the economic gains made possible by subsidies are capitalised into land values. In addition, changes in land values may also influence land access by other means. For instance, there have been reports that, in Brazil, large landowners who had previously acquiesced to the principle of land redistribution are now holding more tightly to the land. This is reportedly due to the higher economic returns that may be generated by biofuel cultivation.[4] In this case, impacts on land access relate not to a compression of existing access but to lost opportunities for greater access through redistributive reform.

In the longer term, growing biofuel production is likely to entrench changes in land tenure. Research has shown that, in the past, the spread of cash crops and the associated increases in land values led to greater individualisation of land rights previously held in common and to the greater commercialisation of land rights where these previously operated outside a market logic (Mortimore, 1997; Amanor, 1999; Cotula with Neves, 2007). Those with better access to financial resources are likely to be better able to gain or secure access to land, while poorer and more marginalised groups may see their access to land eroded (Odgaard, 2002; Cotula and Toulmin, 2007). Specific social groups, such as pastoralists, shifting cultivators and women, are especially liable to suffer exclusion from land caused by rising land values (Box 2), while people who are already landless are likely to see the barriers to land access increase further.

BOX 2. POSSIBLE IMPACTS OF BIOFUELS ON LAND ACCESS FOR SPECIFIC SOCIAL GROUPS

Pastoralists and shifting cultivators

Several feedstocks (e.g. jatropha) can be successfully grown on lands that may have previously been of limited significance for farming but of strategic importance for pastoralists, providing vital dry season grazing or livestock corridors. Longstanding misconceptions about pastoralism in East and West Africa, for example, have resulted in widespread perceptions about the extent

4. Discussions at the forum "Policies Against Hunger VI: Bioenergy and Food Security", Berlin, 16-19 December 2007.

to which this form of resource use can be deemed to satisfy productive use requirements. As a result, in many places, pastoralism has lost significant land areas to other forms of resource use, which are perceived by governments to be more productive (Hesse and Thébaud, 2006). Some of the countries that have more enthusiastically embraced the biofuels agenda host significant numbers of pastoralists. In Tanzania, for example, the IEA has noted that "More intensive cattle-raising could also be necessary to free up grassland [for biofuels] currently used for grazing" (IEA, 2006). In moist forest areas, shifting cultivators face similar problems to pastoralists in semi-arid areas: lack of policy recognition for their production systems, which are considered inefficient and non-viable, coupled typically with insecure and contested land rights. For reasons such as these, shifting cultivators in south-east Asian countries such as Cambodia have had limited success in defending their land access against competing interests such as large-scale commercial crop production (MacInnes, personal communication).

Women

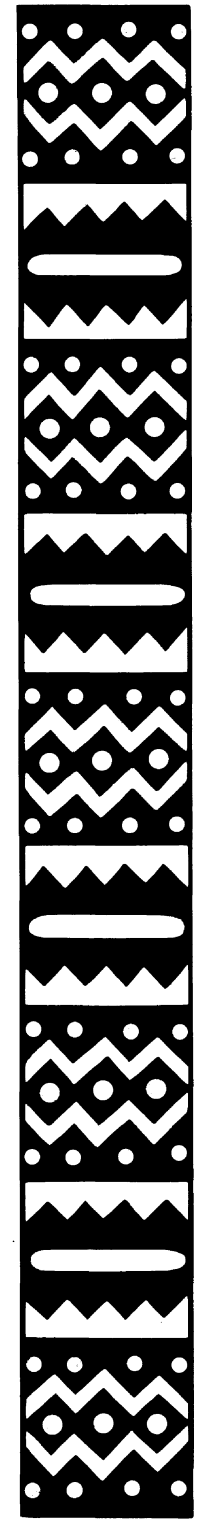
A recent IUCN report noted that women are "more vulnerable to displacement from the uncontrolled expansion of large-scale mono-crop agriculture" (IUCN, 2007). While local energy self-sufficiency projects have the potential to improve women's livelihoods and reduce time-consuming dependence on traditional bioenergy (fuelwood), women's land rights risk being eroded by large-scale biofuels expansion, due to existing gender inequalities. In Kenya, for example, despite providing 70% of agricultural labour women only own 1% of the land they farm (DFID, 2007). This is replicated across the developing world with only 5% of women farmers owning their land (IUCN, 2007). In addition, women's land is often registered to male members of the family, and widowed women and single mothers risk being thrown off the land or denied land titles (DFID, 2007). Female-headed households and women within male-headed households are less likely to have access to the best farming land and are more likely to be displaced from the marginal lands on which they depend as areas under biofuels crops expand (Rossi and Lambrou, 2008). More progressive gender-neutral land legislation has recently been enacted in many developing countries (Cotula, 2006), but these new laws are often implemented in gendered contexts that continue to deny women equal access to land. This is compounded by women's lack of awareness of the statuary laws (Kameri-Mbote, 2006). This baseline situation shows the existing fragility of women's land tenure security.

2.5 MEDIATING FACTORS THAT AFFECT OUTCOMES FOR LAND USE AND LAND ACCESS

Both direct and indirect linkages between biofuels and land access are mediated through a range of policies and processes. These include processes at the international level, such as fluctuations in international commodity prices and the level of barriers to trade in biofuels; at the national level, such as policy and legal frameworks on biofuels and on land tenure; and at the local level, such as the balance between traditional and formal land rights. Some of the mediating factors may exacerbate the tendency towards loss of land access by poorer people and smaller-scale land users – such exacerbating factors might include national government policies to promote expansion of export-oriented feedstock plantations, or deep-seated power asymmetries between current small-scale land users and prospective large-scale land users. In counterpoint to these exacerbating factors is a set of mitigating factors: a new and growing assemblage of good practice and innovative business approaches towards more equitable and sustainable land management.

The interplay of these mediating factors shape the way the spread of biofuels affects land access. The next chapter discusses available evidence on the biofuels-land access nexus in light of some of these mediating factors.

3. EVIDENCE ON LIKELY IMPACTS OF BIOFUELS ON ACCESS TO LAND



Debates on biofuels tend to be polarised. In reality, the land access implications of biofuels cultivation vary enormously. Different feedstocks and different land tenure systems lend themselves to very different models of biofuels production, ranging from local energy self-sufficiency schemes through to large-scale export-oriented plantations. Differences in the relative importance of agriculture in the national economy tend to differentiate land access impacts: countries with smaller rural populations and less dependence on agriculture will experience less impact from land use change towards biofuels crops. Land access issues are likely to be far more acute in countries where much of the population depends on land and natural resources and where poverty has a significant rural dimension.

As outlined in Chapter 2, while biofuels may give some small-scale land users opportunities to strengthen access to land, in general we might expect rising land values to provide grounds for increased land access to more powerful interests at the expense of poorer rural people. Major concerns associated with such changes include increasing land concentration, lack of respect for existing land tenure, especially where it is sanctioned through traditional rather than legal authority, lack of prior informed consent in land acquisition, and in some cases aggressive land seizure.

In light of these considerations, this chapter organises available evidence as follows. First, examples are given of small-scale and large-scale biofuels feedstock production projects to illustrate the diversity of models for energy crop production, control and use. Second, the major concerns outlined above are provided. Third, we give examples to illustrate some – but by no means all – of the mediating factors shaping land access impacts.

Some of these mediating factors are exacerbating factors that could magnify the likelihood of small-scale land users losing access to land. These include power asymmetries, unclear and poorly enforced legal frameworks, investment promotion policies and agencies, and environmental policies that may create perverse incentives with respect to land access, such as the Clean Development Mechanism. Other factors could mitigate negative impacts of rising crop and land values on poorer people's access to land. These are largely intentional "good practice" approaches and include novel

business models that specifically provide for involvement of local land owners and land users, policy safeguards to protect local land rights, sustainability initiatives and civil society "watchdog" actions.

The outcomes of either "exacerbating" or "mitigating" factors are not hard and fast; results on the ground are likely to be mixed. Investment promotion agencies, for example, may well bring increased opportunities for rural development and employment at the same time as encouraging large-scale land use change that might erode local land access. Similarly, novel business models may look promising on paper but in practice reinforce inequitable arrangements. Our aim here is not to pass judgement on the basis of little evidence, but rather to present a set of experiences to date that show possible outcomes for future biofuels developments. Actual future outcomes will depend on specific case-by-case circumstances, depending, as we have emphasised, on a wide range of factors from the nature of the feedstock and local tenurial systems through to prevailing global economic conditions.

It is also important to note that much of the evidence comes from production of crops that can be used as biofuel feedstocks but are currently used predominantly for food, animal fodder and non-edible uses – crops such as soy, palm oil, sugarcane and cereals. We assume that changing the end use of these crops to biofuels will not change their impacts on land access.

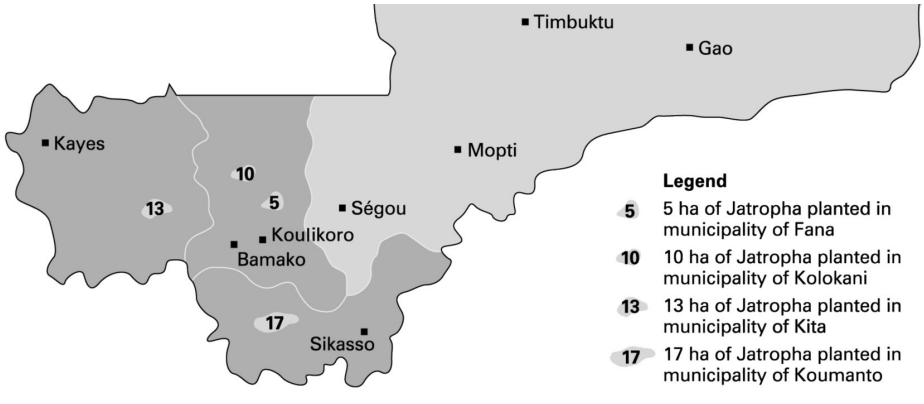
3.1 SMALL-SCALE BIOFUELS PROJECTS

Local energy security strategies and rural development efforts have underpinned recent interest in the cultivation of biofuels feedstocks as part of rural development projects. High oil prices and scarce access to electricity in many rural areas have sparked interest in jatropha as a basis for local energy supply.

In Mali, for instance, small-scale jatropha cultivation to meet local energy needs has been promoted by both government authorities and development agencies. The Ministry of Mines, Energy and Water is implementing a US$ 1.6 million *Programme National de Valorisation Energétique de la Plante Pourghère* (PNVEP) to promote the use of jatropha

for rural electrification, conversion of vehicles to biofuels, and poverty reduction amongst rural women.[5] At the same time, development agencies have implemented jatropha projects since the 1990s. GTZ began a jatropha scheme in five sites in 1993 (Henning, 1996) and the Mali Folkecenter Nyetaa (MFC Nyetaa) more recently helped communities to set up local biofuels systems in four localities (see Map 1 below). In the village of Tiécourabougou, for instance, MFC Nyetaa coordinates a project cultivating 20 ha of jatropha that supply the energy needs of villages within a 20 km radius. The second stage of the project (begun in 2006) involves planting 1,000 ha of jatropha and aims to provide electricity to 10,000 rural dwellers (UN-Energy, 2007:8).

MAP 1. JATROPHA PROJECTS IN SOUTHERN MALI ASSOCIATED WITH MFC NYETAA



Source: Mali Folke Center website (http://www.malifolkecenter.org/lowersection/Dep3_NRM/jatropha/jatropha_plantation_map.html#)

Access to land for biofuels production is based on agreements with local villagers. Villagers collectively agreed to allocate communal lands to jatropha cultivation because of the opportunities for improved access to energy. Before the project intervention, villagers had to go 50 to 60 kilometres to buy diesel, and the cost of diesel accounted for about 50% of household expenditure. These energy needs are currently being met by the

5. http://www.anpe-mali.org/news/vulgarisation-de-la-plante-pourghere

use of jatropha generators. In addition, rental agreements have been established with local farmers, who rent out part of their land to the project (personal communication from staff involved in the project).

Similarly, in Mozambique, farmers and local non-governmental organisations have collaborated on small-scale biofuels projects, though they have only planted about 150 ha of jatropha for rural energy generation since mid 2005 (De Jongh, 2006). In West Africa, five countries (Burkina Faso, Ghana, Guinea, Mali and Senegal) are part of a UNDP *Plates-formes Multifonctionnelles* (Multipurpose platforms) project that tackles lack of access to electricity and rural women's poverty through the provision of simple multipurpose diesel engines able to run on jatropha oil.[6]

3.2 LARGE-SCALE BIOFUELS PROJECTS

Land access implications are quite different in the case of large-scale commercial projects. Recent government allocations of large areas of land for biofuel production in countries as diverse as Mozambique, Tanzania, India and Colombia have raised significant concerns and criticism concerning the impacts on land access for more vulnerable groups.

The Mozambican government has pursued policies to attract large-scale investment in biofuels. Recent signing of a contract between the government and the London-based Central African Mining and Exploration Company (CAMEC) for a large bioethanol project, called Procana, illustrates this. Procana involves the allocation of 30,000 ha of land in Massingir district, in the Southern province of Gaza, for a sugar cane plantation and a factory to produce 120 million litres of ethanol a year. The land was allocated on a provisional basis for two years, within which the investor must initiate project implementation (Agencia de Informacao de Mocambique, 2007).

Concerns have already been raised with regards to the effects of Procana on access to both land and water for local groups. The plantation will abstract water from a dam, fed by a tributary of the Limpopo River, which also supports irrigated smallholder agriculture. Farmers downstream have

6. http://www.ptfm.net/spip.php?rubrique1, 15 February 2008

expressed concerns that the Procana project will absorb the bulk of available water, leaving little for local farmers.[7] Government officials have disputed these calculations, arguing that the dam has enough capacity to meet the water demand of both Procana and local irrigation schemes (Agencia de Informacao de Mocambique, 2007).

As for land, the Procana project attracted criticism from representatives of international donors and local communities on the grounds that the land allocated to the project had already been promised to four local communities displaced from their land by the creation of the Limpopo Transfrontier Park, a joint conservation initiative among Mozambique, South Africa and Zimbabwe (IRIN, 2007).

The displaced communities, numbering over 1,000 families, were promised housing, electricity, running water and grazing at the new site after a protracted three year battle with the government, in which they were supported by a local human rights organisation ORAM (Organizacao Rural de Ajuda Mutua, Rural Organisation for Mutual Help). However, according to press reports, the date of the planned relocation has been postponed several times and has not yet occurred as the same tract of land has been granted to the Procana bioethanol project. Community leaders have been told that there is sufficient land in the site for both the new villages and the biofuel plantations, but they have yet to see any construction work begin (Howden, 2008).

In Benin, industrial groups from Malaysia and South Africa have proposed the conversion of 300,000-400,000 ha in the wetlands of Southern Benin for the production of palm oil, while the agricultural modernisation strategy implemented by the government of Benin is reported to involve large increases in land under cultivation, for both food crops and biofuels (ABN, 2007).

In Tanzania, the prime minister is fast-tracking agrofuels to accommodate a Swedish investor looking for 400,000 ha in the Wami Basin, one of the country's major wetlands, to plant sugar cane for ethanol (GRAIN, 2007;

7. Local farmer groups published calculations in the national weekly "Savana", highlighting that while the reservoir can hold up to 2500 million cubic metres of water, it presently holds only 1625 million cubic metres, 950 of which would go to Procana; http://allafrica.com/stories/printable/200710100997.html. See also http://www.irinnews.org/PrintReport.aspx?ReportId=75382.

ABN, 2007). Various other proposed or ongoing land allocations for jatropha and oil palm cultivation, including various combinations of plantations and outgrowers, have been reported from different parts of the country, involving investors from Sweden, the United Kingdom, Germany, Malaysia and other countries (ABN, 2007). Large-scale jatropha cultivation may be associated with significant negative impacts on land access for local groups. For example, a multimillion dollar jatropha spared by a British firm in the Kisarawe district of Tanzania has been reported to involve acquiring 9,000 ha of land and the clearing of 11 villages which, according to the 2002 population census, are home to 11,277 people. Some US$ 632,400 have been set aside to compensate a total of 2840 households (African Press Agency, 2007).

In South Africa, farmers' organisations and rural communities are opposing plans by the Eastern Cape government to plant 500,000 ha of communal land in the Transkei region with rapeseed for biofuel production. The land is currently used for communal grazing and vegetable gardens, but would be fenced off under the plans. A biofuel plant would also be constructed in the near by East London industrial development zone. It is reported that the first stage of the project, a 70,000 ha rapeseed plantation in the Umzimvubu valley, will be planted in 2008 (African Centre for Biosafety, 2007).

3.3 LAND CONCENTRATION

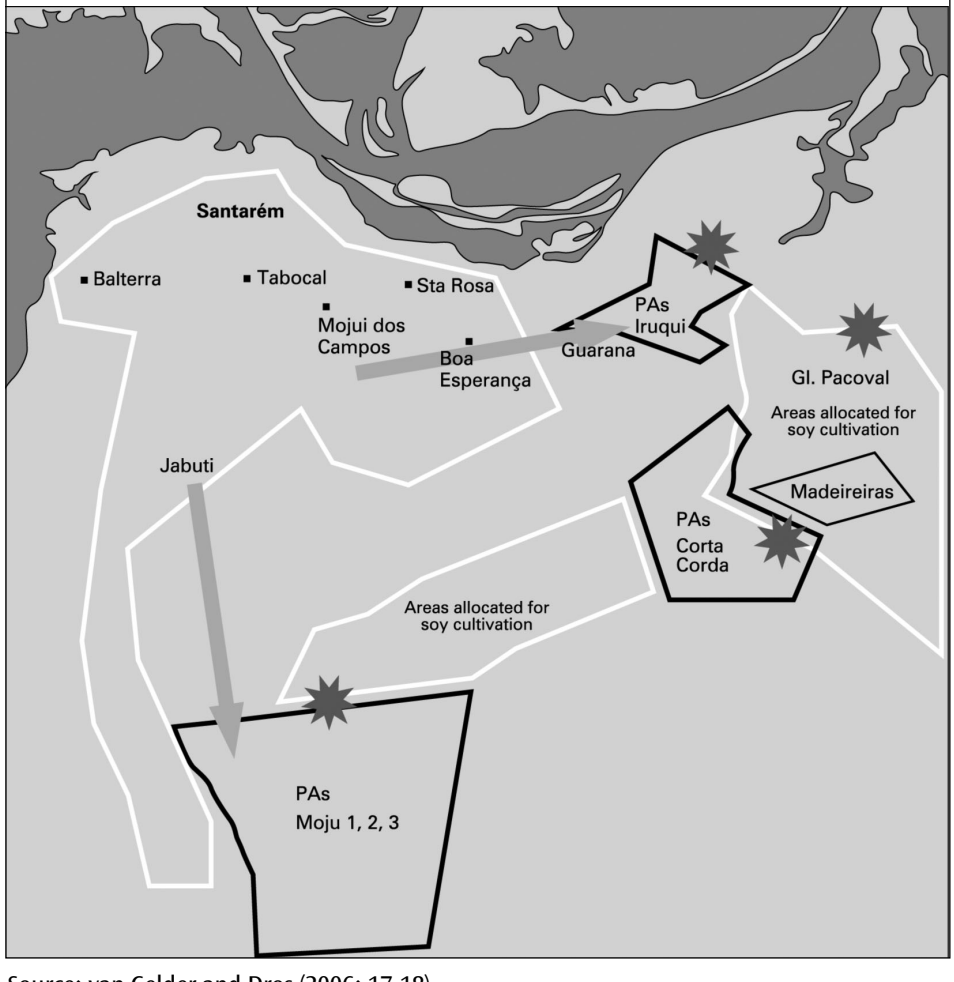
In Brazil, the rapid expansion of sugar cane has been accompanied by increased land concentration (Peskett *et al.*, 2007). Here, 70 % of land under sugarcane cultivation is owned by 340 industrial-scale mills, with average holdings of 30,000 ha; the remaining 30% is owned by 60,000 smaller scale landowners, with average holdings of 27.5 ha (Rothkopf, 2007:521), though many of these do not farm the land themselves but simply rent it to the large-scale sugar estates (Abramovay and Bailey, personal communication). Friends of the Earth and other groups have documented the expulsion of small farmers and land concentration as part of these processes (Noronha *et al.*, 2006). Sugarcane has been Brazil's primary bioethanol feedstock since the 1975 PROALCOOL Programme, and around 50 % of the country's annual crop goes towards the production of bioethanol.

The growth of soybean cultivation in Brazil has been dramatic, expanding from 3 million ha in 1970 to 18.5 million ha in 2003, with demand expected to increase further due to its use as a biofuel feedstock (Bickel and Dros, 2003: 4). The wave of large-scale soy farms has had an enormous impact on land access. Large-scale farms displace inhabitants and land users who tend to rely on extensive cattle rearing and small-scale agriculture for their livelihoods. In general they do not have official proof of ownership of the land. Customary rights to land holdings, known as posse, are partially recognised by law, but often only entitle the owner to a meagre level of compensation in the event that the land is taken over for soy cultivation. There have been reports of intimidation and the use of violence to force the original inhabitants to vacate land (van Gelder and Dros, 2006).

Once land is cleared for soy cultivation, opportunities for employment are very low, with on average only one worker in permanent employment per 167-200 ha of soy (Bickel and Dros, 2003:20). This often leads to depopulation, with displaced farmers moving to peri-urban slums or to forest areas to clear new farmland. This can be expected in turn to impact forest communities' access to land. In Santarém in the state of Pará (Brazil), 600 families sold their land to plantation owners between 2000 and 2003, and 70% of the population in some communities were displaced (van Gelder and Dros, 2006:17-18).

Similar patterns occur throughout Brazil. A recent survey by INTERPI (Land Institute of Piauí) and INCRA (National Institute of Colonisation and Agrarian Reform) revealed that ownership of more than 80% of land in the state of Piauí is irregular, meaning that land titles have often been obtained illegally or fraudulently (van Gelder and Dros, 2006:11). Partly as a result of this, there are 240,000 rural landless people in Piauí (Bickel and Dros, 2003:12). In Mato Grosso, the number of farms smaller than 10 ha decreased from 23,900 in 1980 to 9,800 in 1996. In the same period the land area under cultivation by farms larger than 10,000 rose from 17.8 million to 20.6 million ha. The public prosecutor investigated farms occupying public land on behalf of the MST (Movimento dos Trabalhadore Rurais Sem Terra, Landless Rural Workers' Movement). He found that large farms illegally occupied 3.2 million ha of public land in 2003 (Bickel and Dros, 2003:20). According to the 1988 constitution, the government is obliged to reclaim this land and undertake agrarian reform, but no action

MAP 2: EXPANSION OF SOY CULTIVATION, DISPLACEMENT OF SMALL-SCALE FARMERS AND LAND CONFLICTS IN THE REGION OF SANTARÉM, BRAZIL



Source: van Gelder and Dros (2006: 17-18).
Arrows represent expansion of soy cultivation and displacement of small-scale farmers; stars represent land rights conflicts and deforestation.

has been taken (Bickel and Dros, 2003:20). Similar experiences with soy cultivation have been documented in Paraguay (Semino *et al.*, 2006).

Soybeans are currently the most widely used feedstock for biodiesel in Brazil (Abramovay and Magalhães, 2007), although the government PNPB programme supports a variety of other oil crops including castor and palm

oil. The share of the soybean harvest going toward the production of biofuels can be expected to increase with the phasing in of government legislation on mandatory biofuel blending requirements for diesel (starting at 2% in 2008 and rising to 5% in 2013), though the PNPB Social Fuel Seal programme will continue to provide support for smallholder inclusion (Abramovay and Magalhães, 2007).

3.4 LACK OF RESPECT FOR EXISTING LAND RIGHTS AND LACK OF PRIOR INFORMED CONSENT

In Indonesia, several reports have documented widespread negative impacts of palm oil cultivation on land access for local groups (Colchester *et al.*, 2006; WRM, 2006; Zakaria *et al.*, 2007). Palm oil production has been accompanied by a history of repression and coercion, lack of information and loss of land rights.

A well documented land conflict has involved the operations of the firm PT Mitra Austral Sejahtera (PT MAS) in Sanggau district, West Kalimantan (Colchester *et al.*, 2006). Palm oil was first introduced to the district in 1979 and now 120,000 ha are given over to its cultivation. In order to expand production, PT MAS started the process of land acquisition in Sanggau district in 1995 according to the *plasma/nucleus* model that is common in Indonesia. According to the arrangement local community members who wanted to be involved had to give 7.5 ha of land to PT MAS. The company would keep 5.5 ha, and 2 ha would be allocated back to community members for their share of the *plasma*. However, on average, they only received 1.2 ha per family (Colchester *et al.*, 2006). Similar experiences with misinformation about, and non-emergence of, smallholder allocations have been recorded in multiple sites in Indonesia (Marti, 2008).

In addition, PT MAS did not follow "prior and informed consent" procedures. The company, it is alleged, both made out "land acquisition" documents for local people to sign without prior consent, and carried out a customary ritual of transfer of land rights without consent. Later a neighbouring village demanded compensation when the company's bulldozers illegally encroached on the village land while clearing the area of the plantation (Colchester *et al.*, 2006).

Zakaria *et al.* (2007) carried out an investigation into the activities of the Wilmar Group, one of the largest palm oil and biodiesel producers in Asia, in Sambas District, West Kalimantan. The authors identified approximately 6,000 ha of land disputed between the company and local groups (Zakaria *et al.*, 2007:45). In one instance, in Senujuh village, company workers cleared approximately 450 ha of community rubber plantations in 2005-06. In protest, villagers confiscated equipment used to clear the community forest. Along with the Forestry Department and the local parliament, local leaders wrote to the company to stop the clearance. The company responded that workers did not know the boundary of Senujuh village and apologised, agreeing to paid a fine of US$ 550 to the village for the damage caused (Zakaria *et al.*, 2007:45-46).

Villagers were successful in defending their rights in this instance because it was not solely a conflict of customary (*adat*) rights versus the claimed land rights of the company, but that in clearing land in Senujuh village the company had crossed a sub-district border into Sejangkung, which was not included in any of the three land grants to the company in that region. Wilmar later blamed the mistake on a map, prepared for them by the Investment Coordination Board, which was not sufficiently accurate. No effort has so far been made to restore the land (Zakaria *et al.*, 2007:45-47).

These negative impacts are linked, among other things, to the weak protection of local land rights under Indonesian law (Marti, 2008). Under the Basic Agrarian Law of 1960, the state plays a central role in land relations (cf. article 2 of the Basic Agrarian Law, quoted in Colchester *et al.*, 2006). All land not encumbered by a registered land title (thus including customary landholdings) is treated as state land (Law No. 24 of 1997, article 1.3). On state lands, plantation operators obtain access to land through long-term leases (under the Basic Agrarian Law and the Plantation Act of 2004). While many local resource users gain access to resources through "customary" ("*adat*") rules (for instance as documented by Colchester *et al.*, 2006 for the Sanggau, West Pamasan and West Lampung districts), customary land rights are legally protected only so long as customary systems still exist and their exercise is consistent with the national interest and with legislation. Local land rights may be taken for a public purpose, which includes business activities run by private corporations (article 18 of the Basic Agrarian Law and subsequent instruments; see Colchester *et al.*, 2006).

These conditions for the legal protection of customary rights give government agencies wide discretion in determining whether customary systems are still functioning effectively and whether their operation is consistent with the national interest, which opens the door to abuse and limits the ability of local groups to exercise their land rights (Colchester *et al.*, 2006). Internationally, there are also broader questions of the extent to which "prior informed consent" can be freely granted by a community or user group when basic development and services, such as roads and education, may be contingent on accepting the incoming commercial land use project (e.g. Freeman *et al.*, 2008).

Where local land rights are taken, local groups have no right to stop land acquisitions, and can only obtain compensation based on negotiations. Case studies in the Sanggau, West Pamasan and West Lampung districts show that local groups were not involved in decisions concerning allocations of land for oil palm development; they were merely informed after key decisions had been taken. While in some cases negotiations between companies and local groups resulted in enforceable written agreements, in others they led to oral agreements that have very weak status under Indonesian law. As for compensation, the case studies documented several examples of non-compliance with the (albeit weak) protection accorded by Indonesian law to local land rights. For instance, in some cases compensation was offered only for titled lands, to the exclusion of customary land rights. In the eyes of local groups, this compensation tends to be seen not as the price obtained for a permanent transfer of land, but as compensation for the temporary transfer of a right to use the land, while palm oil companies understand compensation to extinguish the land claims of local groups (Colchester *et al.*, 2006).

Issues of tenure security for local land rights are even more important where legal protection of these rights is subordinated to the fulfilment of productive use requirements (such as the "*mise en valeur*" requirements under much land legislation in Francophone Africa, or under Tanzania's Land Act 1999) and where legislation or administrative practice provide no clear definition of what "productive use" might be. This is even more so as biofuels may be seen as more productive than existing forms of local land use. Certain forms of resources are particularly vulnerable to this possession, such as pastoralism (Box 2).

3.5 AGGRESSIVE LAND SEIZURES

In countries where legal and political frameworks are contested and difficult to implement, securing access to land for biofuel feedstocks can involve more direct, aggressive land seizures. This has been alleged specifically in the case of palm oil cultivation in Colombia. Palm oil in Colombia is in a period of strong expansion with 300,000 ha currently under cultivation, up from 188,000 in 2003, making it the fourth largest producer of palm oil worldwide (WRM, 2006). However, according to recent reports, this expansion has been accompanied by armed groups in Colombia driving black and indigenous communities off their land to make way for palm oil plantations (Balch and Carroll, 2007). According to these reports, paramilitary groups have carried out a "campaign of killing and intimidation", which has driven thousands of people off their land, primarily in the palm oil growing areas on the Caribbean coast (Balch and Carroll, 2007). There have been unconfirmed allegations of links between the paramilitary groups and palm oil companies. The situation prompted a government investigation, which found that "at least 25,000 hectares suitable for the cultivation of oil palms, which had been awarded by the state to black communities, were acquired by private interests through illegitimate land titles" (Martinez, 2006).

This is against the background of a strengthened legislative framework for indigenous land holdings in the country in recent decades. The 1991 constitution recognises the right of Afro-descendent and indigenous communities to their ancestral lands, and in 2000, two government resolutions assigned uncultivated land to displaced indigenous communities in Curvaradó and Jiguamiandó. However, when these communities returned to their land they found it was occupied by a palm oil company, and they are currently involved in a lengthy legal process to reclaim the land (WRM, 2006).

These alleged "land grabs" are likely to become increasingly associated with the booming biofuels market. According to the National Federation of Oil Palm Growers (Fedepalma), palm oil is the primary feedstock for biodiesel production in Colombia, and demand can be expected to increase in the future following Law 939 of 2004 which introduced a mandatory 5% biofuel blend for diesel across the country as well as a growing export demand (WRM, 2006).

3.6 POWER ASYMMETRIES

The security of local land rights depends not only on how these rights are legally protected (in terms of substantive protection or of procedures and remedies), but also on the extent to which local land users have access to information and capacity to make use of the law. Large-scale commercial biofuel projects typically involve different actors with very different negotiating powers, from the biofuel investor to different government agencies to different groups of local land users. Many of the investors in biofuels are already among the largest operators in the agribusiness and energy sectors, which dominate bioethanol production: agricultural commodity companies such as Archer Daniels Midland (ADM), Noble and Cargill; energy companies such as British Petroleum (BP); as well as major financiers, such as George Soros and the Carlyle Group, a private equity fund (GRAIN, 2006:10-15). In government, the locus of control over biofuels developments may be unclear, with ministries of land, agriculture, industry and energy equally eligible to be the lead agency (Dufey *et al.*, 2007). Local land users are likely to be a less powerful, but by no means homogenous, group.

Power asymmetries may involve a range of different factors: differences in the capacity to influence decision-makers and opinion formers, to mobilise political support and to draw power from parallel processes of negotiation; differences in access to finance, technology, information and skills; differences in social status and networks; and differences in the degree of internal cohesion, for instance where local groups are divided in their position on proposed investment projects (Cotula, 2007).

Importantly, local resource users tend to constitute a heterogeneous group reflecting varied and even conflicting interests – along status, wealth, gender, age and social professional lines. For instance, local farmers and transhumant herders may have different interests with regard to the spread of biofuels. Similarly, the land access implications of biofuels are liable to be differentiated along gender lines (Box 2). These differences may be exacerbated by the higher stakes brought about by the biofuel project, when some groups may oppose the project while others (often local elites such as customary chiefs) may strike deals with government and the private sector to the detriment of other local groups (Cotula, 2007).

An example of this comes from palm oil expansion in the ancestral land of the Dayak peoples in Sanggau district, West Kalimantan. Some Dayak (adat) community leaders have, it is reported, aligned themselves with a palm oil company that operates in the district in order to gain personal benefits for themselves and their family such as priority access to smallholdings. Some Dayak peoples have received smaller parcels of land than agreed with the company, and 37 families who transferred their land to the firm in 1982/83 have still not received any land for palm oil cultivation, agriculture or housing (Colchester *et al.*, 2006).

Insights are also provided by experience with oil palm cultivation in Papua New Guinea, where land is predominantly under customary ownership. Private plantation companies are able to lease land for palm oil production through a "lease, lease-back scheme" by which a customary land-owning group registers itself and its land with government, which then provides a basis for sub-letting to a plantation company. However, there have been some concerns that the schemes are negotiated by, and in favour of, local leaders and that poorer families and women are disenfranchised and do not receive a fair share of royalties, nor participate fully in decision-making (Koczberski *et al.*, 2001).

3.7 INVESTMENT PROMOTION POLICIES AND AGENCIES

Many governments have established investment promotion agencies (or equivalents), responsible for attracting investment, particularly foreign investment, including to the biofuels sector. The extent to which, and the ways in which, these agencies work to facilitate land access for prospective investors varies widely, ranging from facilitating investors' dealings with government land agencies to a more direct role in allocating land to investors.

In Senegal, for instance, the *Agence Nationale Chargée de la Promotion de l'Investissement et des Grands Travaux* (APIX) acts as a one-stop-shop, accompanying investors in the rather complex and cumbersome process to obtain land from relevant government agencies.[8] Similarly, in Ghana and

8. APIX website (www.investinsenegal.com)

Mozambique, investment promotion agencies act as one-stop-shops, facilitating the acquisition of all necessary licences, permits and authorisations. Their direct role in facilitating land access seems focused on helping investors in their dealings with other agencies. In Mozambique, while investment legislation makes no explicit mention of the role of the *Centro de Promoção de Investimentos* (CPI) in facilitating land access, the application form for prospective investors to seek government approval of the investment projects does mention, among possible areas where CPI assistance is sought by the investor, the "identification and licensing of land".[9]

A somewhat more "hands-on" role is played by Tanzania's investment promotion agency, the Tanzania Investment Centre (TIC). Under the Tanzanian Investment Act 1997, the TIC is mandated, among other things, with identifying and providing land to investors, as well as with helping investors obtain all necessary permits (article 6). This entails identifying land not currently under productive use and directly allocating it to investors. Under this arrangement, the land is vested with the TIC and transferred to the investor on the basis of a derivative title (under article 19(2) of the Land Act 1999). After the end of the investment project, the land reverts back to the TIC (article 20(5) of the Land Act).[10] In order to perform this function, the TIC has set up a "land bank" of 2.5 million ha identified as suitable for investment projects, as shown in Table 1.[11]

The TIC has been active in identifying and negotiating access to land for foreign biofuel investors. One example is a 9,000 ha area for jatropha cultivation for a British firm in Kisarawe District. The TIC has been working with the Kisarawe District Council and the 11 villages that currently occupy the land, but the process has stalled due to allegations that the compensation offered to villages was too small (Kisembo, 2007).

While the role of investment promotion agencies in identifying "idle" lands may help bring underutilised land into production, it may also create risks

9. CPI website (www.cpi.co.mz)
10. Tanzania's Land (Amendment) Act 2004 introduced another land access arrangement - the establishment of joint ventures between foreign investors and local groups (under article 19(2)(c) of the Land Act, as amended). Under this arrangement, local groups retain land rights while the investor obtains lesser land rights from the local group.
11. TIC website (www.tic.co.tz) particularly at http://www.tic.co.tz/TICWebSite.nsf/2e9cafac3e472ee5882572850027f544/729d4c075f2b03fc432572d10024bea6?OpenDocument

TABLE 1: TANZANIA'S "LAND BANK"		
Currently available land for investors	**Parcels**	**Area (ha)**
Agriculture	386	1,100398.00
Housing estate	21	1,469.47
Industry	156	537,880.60
Mining	11	445.80
Ranching	49	238,939.20
Tourism	127	711,027.80
Grand total	**743**	**2,590,161.00**

Source: TIC website

of dispossession. Where forms of local resource use are perceived as low-productivity, land may risk being classified as idle or under-utilised, and therefore available to prospective investors, despite the economic, social or cultural functions it performs for local people (see Section 2.2).

3.8 THE CLEAN DEVELOPMENT MECHANISM

International measures to contain land use changes may have unintended consequences on land access. The 2001 Marrakesh Accords provide detailed rules for the implementation of the Clean Development Mechanism (CDM). They limit CDM "Afforestation and Reforestation" projects (the only admitted land-use change projects) to land that had been cleared as of 31 December 1989.[12] Afforestation and reforestation projects formally include the establishment of biomass plantations for energy production and the substitution of fossil fuels (UNEP, 2004:44).

Governments and biofuels producers have expressed interest in CDM qualification as a means to improve commercial viability through trading in carbon credits. For instance, some recent legislation specifically states that biofuel projects are eligible for CDM credits.[13]

12. UNFCCC, COP7 (2001), Decision CMP.1, articles 1(c) and 13 of the Annex to the Decision, http://unfccc.int/resource/docs/cop7/13a01.pdf#page=54
13. e.g. *Mexico's Ley de Promoción y Desarrollo de los Bioenergéticos* of 2007, and *Paraguay's Ley de Fomento de los Biocombustibles* of 2006, both quoted in Jull *et al*. (2007)

At the project level, the recent Kavango Biofuel Project in Namibia, which involves the cultivation of jatropha on communal land, has paid specific attention to compliance with Kyoto Protocol requirements: project staff collected evidence to show that the project area had already been cleared in the past, and that "much of that land" was no longer cultivated (Jull *et al.*, 2007). Similarly, in India, Southern Online Biotechnologies are applying for CDM approval for a cultivation of 1,000 ha of jatropha on wasteland and a biodiesel plant in the state of Andhra Pradesh.[14]

The purpose of the Marrakesh Accords was to prevent CDM projects from fostering deforestation, but may create incentives to establish biofuel projects on land that has been cleared but is in use. However, possible unintended consequences stemming from the CDM provisions of the Kyoto Protocol are likely to be mitigated by the short timeframe of the Protocol (which runs to 2012).

3.9 SAFEGUARDS FOR LOCAL RIGHTS

Procedures for accessing land may perform a useful role in establishing safeguards for local land rights. These safeguards aim to ensure that, at a minimum, local groups are not arbitrarily dispossessed of their land as this is made available to investors. In this regard, a particularly interesting example is provided by Mozambique, where investors are legally required to consult "local communities" holding rights in the land area sought for the investment project (article 12 of the Land Act 1997 and article 27 of the Land Act Regulation 1998).

Under Mozambique's Land Act, community consultation must be undertaken regardless of whether the land has been registered. The consultation process is required before land use rights are allocated to investors; the specific purpose of this consultation is to ascertain that the land area is "free" and "has no occupants" (article 13(3) of the Land Act; see also article 24 (1)(c) of the same Act). The mandatory community consultation process is meant to pave the way for the negotiation of

14. Biodiesel production and switching fossil fuels from petrol-diesel to biodiesel in transport sector - 30 TPD Biodiesel CDM Project in Andhra Pradesh, India. The CDM project document is available at http://cdm.unfccc.int/UserManagement/FileStorage/FS_686206579. On this project, see also Gonsalves (2006: 30-31).

benefit-sharing agreements between local groups and the investor applying for land.

This model constitutes an interesting approach to facilitating investors' access to land while protecting local land rights – both of which were explicit objectives pursued by the National Land Policy, which preceded the adoption of the Land Act. However, shortcomings in the design and implementation of the community consultation process have been reported in the literature (Johnstone *et al.*, 2004; Norfolk, 2004; Chilundo *et al.*, 2005; Durang and Tanner, 2004). The system is centred on a one-off consultation between the investor and the community. This is at odds with the long-term duration of land allocations and forest concessions (Johnstone *et al.*, 2004; Durang and Tanner, 2004).

In practice, several agreements between communities and investors emphasise one-off compensation for loss of land rights rather than long-term benefit sharing. They usually involve very small payments compared to the value of the forest concessions acquired by the investor (Norfolk, 2004; Durang and Tanner, 2004). In addition, there are no established mechanisms to monitor compliance with the agreement on the part of the investor. No effective sanctions exist in case of non-compliance – there are no effects on the concession (Johnstone *et al.*, 2004; Durang and Tanner, 2004).

The implementation of these provisions has been beset with difficulties. In many cases, consultation processes only involve a few community members, usually customary chiefs and local elites who also monopolise the benefits (Norfolk, 2004; Durang and Tanner, 2004). In some cases, the consultation did not take place at all – or at least there is no record of it (Norfolk, 2004; Johnstone *et al.*, 2004). Even where consultation takes place as required, communities lack the bargaining power and technical skills to negotiate with foreign investors on an equal footing (Johnstone *et al.*, 2004; Durang and Tanner, 2004).

Recently, government authorities have taken steps to reduce what are perceived to be constraints on investors' access to land. In October 2002 a government decree set a 90-day time limit for the processing of investor land applications (including community consultations) (Kanji *et al.*, 2005). The tightening of the legal regime around local consultation processes is putting pressure on the quality of these processes. The period of 90 days

may seem long, but meaningful consultation among large communities in contexts characterised by significant power asymmetries between private companies and local groups would require sustained investment in time and effort in order to build local capacity to engage in consultation and negotiation exercises (Kanji *et al.*, 2005).

Government interventions to ease the requirements and reduce the time set aside for community consultation came partly from the assertion that such requirements impose an excessive burden on investors and may therefore discourage firms from investing in Mozambique. However, much of the burden perceived by investors is linked to bureaucratic requirements imposed by government agencies (e.g. concerning investment approval requirements) rather than by local consultations per se. The effectiveness of Mozambique's legislation in securing land access for poorer rural groups when areas are allocated for biofuels plantations, such as in the Procana project, remains to be seen.

Another country where, on paper, local groups have a say in decisions to allocate land to outside investors is Senegal. Here, the exact nature of this say varies depending on the legal status of the land in question: whether it belongs to the state, to private interests or to the *domaine national*, a land area held by the state of which the bulk (*zones de terroir*) is managed by local governments (*communautés rurales*). Where land belongs to the state or to parastatal agencies, central government agencies can directly allocate land to investors without much local consultation. On the other hand, local governments have a say in the allocation of land within the *zones de terroir*, over which they hold considerable powers. The extent to which local governments have the skills and confidence to resist an investment project that enjoys central government backing, and the extent to which they have been able to use their legal powers to influence the distribution of the costs and benefits generated by the project, will be of great importance as interest in biofuels production expands.

3.10 ALTERNATIVE BUSINESS MODELS

A compelling strategy for securing land access for small-scale farmers is to facilitate their direct engagement in and benefit from the biofuels industry.

Economies of scale in production, transport and processing will favour extensive cultivation (Kojima and Johnson, 2005; ICRISAT, 2007), even for those feedstocks that have high labour demands (Box 3). Even so, appropriate policy incentives can promote inclusion of small-scale operations on an economically viable basis (UN-Energy, 2007; Dufey *et al.*, 2007). Possible business models are extremely varied: rather than a

BOX 3. FEEDSTOCKS AND THE SCALE OF PRODUCTION

Specific biofuels feedstocks may be more or less suited to extensive or intensive production. Biodiesel feedstocks that require harvesting by hand, specifically jatropha and palm oil, are the most suited to small-scale cultivation. Smallholders in West Africa and South-east Asia have a long history of cultivating palm oil while jatropha has traditionally been grown for its oil or as a hedge in India and throughout dryland Africa; both crops continue to be harvested by hand even in large-scale commercial plantations. Bioethanol feedstocks such as sugarcane and maize, on the other hand, can accrue sizeable cost savings through large-scale mechanised harvesting. Even though both of these crops are grown commercially by small-scale farmers (e.g. outgrower schemes for sugarcane exist in Kenya and South Africa), economic incentives to concentrate production will be much stronger than for oilseed crops (jatropha and oil palm) where labour remains an important input.

In addition to the economies of scale linked to large-scale cultivation, pressures towards large-scale business models may originate from economies of scale in processing and distribution. A recent commentary noted that "The competitiveness of a biofuels industry is highly dependent on gaining economies of scale. Costly, sophisticated processing plants require massive, steady inflows of feedstock in order to produce sufficient volumes of fuel at competitive prices. […] Small-scale operations will not be economically competitive except perhaps for running village pumps and engines in remote, impoverished areas that are largely disconnected from the cash economy" (ICRISAT, 2007:15). Thus land concentration might be driven by the economics of processing, including for crops like jatropha that are particularly touted for their suitability for small-scale cultivation.

On the other hand, experience to date shows that economic drivers may sometimes push towards the small-scale. For example, one of the drawbacks of palm oil is that fruits must be processed within 24 hours of harvest, which has tended to tie small-scale producers into selling to the closest large-scale mill within reach. The lack of price competition has more recently given rise to an upsurge in establishment of independent small-scale mills (Vermeulen and Goad, 2006).

dichotomy between small-scale and large-scale there is a continuum of options. For example, economies of scale at the processing stage may co-exist with production by smallholders, provided that institutional arrangements are in place to link up smallholder production to large-scale distribution. Joint ownership of both production and processing, giving farmers shared equity in value-addition as well as primary production, is another option (Dufey *et al.*, 2007). Some examples of operational business models that link small-scale and large-scale business are discussed below.

Contract farming

In Ethiopia, a German firm has invested US$ 77 million in a biofuel project in Oromia Regional State. The company will plant castor beans on 10,500 ha of farming land and construct a biodiesel processing plant. An area of 8,000 ha has been granted by Oromia Investment Commission, which operates a "one-stop shop" for processing land applications, signing agreements and granting title deeds (Oduu, undated; for more on the role of investment promotion agencies see below). The additional 2,500 ha will be planted in "community farming" areas in the Fadis and Miks districts (*woredas*) of the East Hararge zone, where the firm has signed a Memorandum of Understanding with the regional farmers' association. Under the agreement, farmers will cede two ha of land for a period of five years, and the company will provide seeds and buy their produce. It is reported that farmers welcome the investment in their region and are looking to diversify away from coffee production due to volatile prices (Zenebe, 2007). In general, contract farming schemes offer price stability and technical support to farmers, but have the disadvantage of locking both sides into arrangements that may be perceived as less fair and advantageous as market conditions progress over time (Mayers and Vermeulen, 2002).

Joint ventures

In Namibia's Kavango Biofuel Project, jatropha production is to be led by local farmers in collaboration with a Namibian company, Prime Investment. The project involves the establishment of a joint venture (the "Farming Company") to run farming activities, with Prime Investment initially holding 60% of its shares and the Kavango Jatropha Farmers' Association holding the remaining 40%. The Association is a legally constituted body run by the growers and representing their interests (Jull *et al.*, 2007). Under this

project, families who wish to become jatropha farmers are contracted to grow jatropha on communal land. Farmers contribute communal land and labour, while Prime Investment covers capital costs and compensates participating farmers with food and cash for loss of maize and millet. As not all residents have access to qualified land, the project plans to grant priority to those without access to project land for other project-related employment opportunities (e.g. tractor drivers, factory employees) (Jull *et al.*, 2007).

In Sarawak, Malaysia, three-way joint ventures involving companies, government and customary landowners have been in place for palm oil since the mid-1990s under a government-led scheme known as *Konsep Baru* (New Concept). A private plantation company, selected by the government, holds 60%. Rather than purchase land, the company provides financial capital for landowners to develop the land for palm oil production. The local community that holds native customary rights to the land is awarded a 30% share for this investment. A Land Bank mechanism allows farmers to register their land in a bank as an asset, which enables the private company to use the land as a guarantee for bank loans. Finally, the government, acting through a parastatal agency, acts as trustee and power of attorney, and holds the remaining 10% (Majid-Cooke, 2002). While there may be good financial returns from *Konsep Baru* arrangements, customary landowners have also raised many concerns, such as lack of real choice in whether to accept or reject the schemes, little say in negotiating the terms or length of the agreement and uncertainty over land access once the standard 60-year contract comes to an end (Vermeulen and Goad, 2006).

Purchase agreements

Since 2003 Brazil has pioneered an innovative institutional arrangement to integrate smallholders into the production of biodiesel through the National Programme for the Production and Use of Biodiesel (PNPB). The Federal Government has facilitated an arrangement where by two previously antagonistic groups, rural trade unions and agricultural companies, cooperate to avoid a repeat of the social and ecological damage associated with the spread of sugarcane monoculture and the PROALCOOL programme (Abramovay and Magalhães, 2007).

The PNPB is especially active in northeast Brazil. Companies and trade unions work together through the award of a "social label". In order to qualify for the label companies must buy from 10% to 50% of biofuel feedstock from family farms, depending on the region (Abramovay and Magalhães, 2007:11). The social label, in return, guarantees companies that the product will be bought by PETROBRAS and entitles them to tax breaks. The trade unions play a vital role in mediating between producers and industry through the negotiation of contracts. There is also a price guarantee and companies supply technical assistance to smallholders (Abramovay and Magalhães, 2007).

As the PNPB was set up only recently, it is too early to judge its impact on land rights, however, some of the early signs are promising for the inclusion of low income farmers into the biodiesel market. Over 68,000 contracts have been signed with family farms, mainly on the basis of castor oil but also soybeans. Average holdings are between 2 and 5 ha (Abramovay and Magalhães, 2007). The programme is not without its critics, however, including the MST (Landless Movement). They point to the fact that the largest biodiesel feedstock is soy, which is associated with monoculture, deforestation and land conflicts, and that smallholders are not the "dominant producers" of biodiesel (GRAIN, 2007).

3.11 SUSTAINABILITY INITIATIVES

Multiple sustainability initiatives applicable to biofuels production are emerging or in operation. These can be broadly divided into multi-stakeholder initiatives, such as the roundtables on sustainable palm oil and soy, and government-led schemes such as the EU's proposed biofuels sustainability criteria. The multi-stakeholder initiatives mainly combine a roundtable deliberation process with development of a set of voluntary sustainability criteria coupled with a system of internal governance that provides decision-making power and support for members as well as sanctions for members that do not adhere to the agreed principles of the roundtable. The government-led initiatives are more of a policy tool to discriminate between sustainable and non-sustainable production systems for purposes of differentially applying subsidies, tax breaks, soft loans or other policy instruments.

The Roundtables on Sustainable Palm Oil (RSPO), set up in 2002, is one of the most developed multi-stakeholder roundtables and private certification schemes. Members have agreed a set of principles and criteria, which include several clauses related to respect of land rights. Criteria 2.3, 7.5 and 7.6 establish the principle of "prior and informed consent" of existing land users to new palm oil cultivation, respect for legal and customary land rights, and compensation for land acquisitions.[15] The RSPO has actively sought to incorporate smaller-scale producers of palm oil, who account for about 30% of global production, through Smallholder Task Force, which is seeking means to adapt the process of certification to smaller producers. The RSPO is aiming to be a mainstream rather than niche certification scheme, accounting for the majority of the world's palm oil.

In the case of soy, two of the nine principles of the Roundtable on Responsible Soy (RTRS) deal with land issues. Principle 3 states that "The soy value chain shall ensure that soy producers and other suppliers comply with all applicable national and local regulations related to land rights, including but not limited to, ensuring legal title to land, compliance with contractual obligations and respect for the formal and/or customary land rights of local communities including indigenous peoples" and Principle 4 that "The soy value chain recognizes the importance of small scale and traditional land use systems and shall adopt measures to integrate and support small scale producers into the chain of value in accordance with local conditions and practices". However, the timeframe for implementation of a global certification scheme for soy is uncertain and long-term. In the case of sugarcane, the Better Sugarcane Initiative has no plans to incorporate land access or land rights issues (Willers, personal communication).[16]

A new initiative, the Roundtable on Sustainable Biofuels, coordinated by the Swiss EPFL (*École Polytechnique Fédérale de Lausanne*), is currently facilitating agreement on a comprehensive set of principles for sustainable biofuels. A draft version includes respect of land and water rights and the socio-

15. Criterion 2.3 Use of the land for oil palm does not diminish the legal rights, or customary rights, of other users, without their free, prior and informed consent; Criterion 7.5 No new plantings are established on local peoples' land without their free, prior and informed consent, dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions; Criterion 7.6 Local people are compensated for any agreed land acquisitions and relinquishment of rights, subject to their free, prior and informed consent and negotiated agreements. See http://www.rspo.org/

16. Personal Communication with David Willers, 19/10/2007. For more information about RTRS see http://www.responsiblesoy.org/; for the Better Sugarcane Initiative see http://www.bettersugarcane.org/

economic development of communities (Principle 5) and food security (Principle 6).[17]

The EU and some national governments are also examining biofuel certification schemes. The European Commission has recently published its legislative proposal for the Renewable Energy Directive, which includes its proposed sustainability scheme for biofuels. In the proposal, only biofuels that meet the minimum certification requirements would count towards the 10% biofuel target. However, the proposed criteria are purely environmental, and seek to assure that biofuel "lifecycle greenhouse emissions" are 35% lower than fossil fuels while also stipulating criteria for biodiversity and high carbon stock areas. Therefore, direct land use changes are only taken into account in so far as they impact the carbon balance of biofuels and biodiversity, but not for social impacts including land access (GRAIN, 2007:8-9). Indirect land use changes are not considered at all.

Some European governments are implementing sustainability criteria for biofuels. The UK government has pledged that, from 2008 to 2011, companies will be required to report on comprehensive social and environmental criteria including some on land rights, such as "free, prior and informed consent". The reporting requirement is however very weak and without obligation to comply. Furthermore, it will be required to come within the terms of the EU scheme, which does not include social criteria, in 2010 (Bailey, personal communication). Outside Europe, governmental certification of biofuels is also under consideration. The government of Colombia, for example, is developing a certification system based on the Netherlands' Testing Framework for Sustainable Biomass (Energy Transition IPM, 2007), which includes a criterion on protection of legal and customary land rights. The Brazilina government is also developing a national certification scheme that will include social elements, though it is unclear whether land rights will be included. However, compulsory standards could, at least in theory, be challenged as illegal barriers to trade under WTO rules (E4Tech *et al*., 2005).

In conclusion, the proliferation of certification schemes is a positive development, demonstrating awareness among governments, citizens,

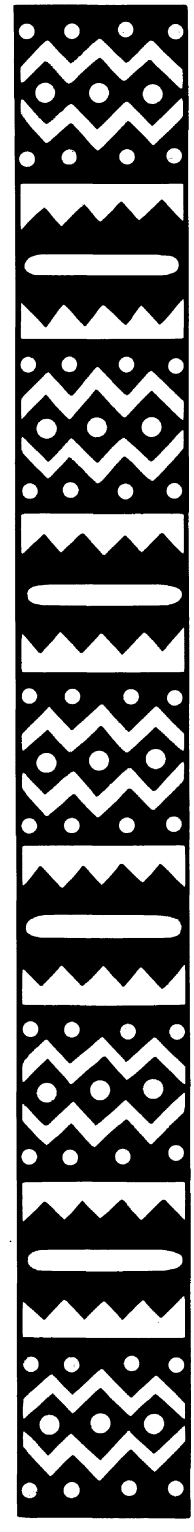
17. For more information see the wiki internet resource: http://www.bioenergywiki.net/index.php/Roundtable_on_Sustainable_Biofuels

consumers and producers of the risks and challenges involved in expanding biofuel production. The inclusion of land rights criteria in some private certification schemes is also welcome. It is too early, however, to see whether they will have a real impact. The EU and government schemes, which are potentially far more influential, have not addressed land issues – in effect giving licence to European companies to ignore principles of prior informed consent in land allocation for large-scale biofuel crop cultivation.

3.12 CIVIL SOCIETY ACTIONS

Popular protest against large-scale land transfers for purposes of biofuels production is an indication of public concern over the implications of biofuels for land use and land rights. For example, in Uganda there has been a strong public outcry against allocation of national forest reserves in Bugala and Mabira to foreign plantation companies for establishment of palm oil and sugarcane plantations. Civil society concern has been expressed through demonstrations in Kampala and a series of NGO-led court cases. Other mass tactics have included a boycott of Lugazi sugar, petitions and a mobile phone messaging campaign (Mayers, 2007). The Ugandan government has subsequently withdrawn Bugala forest reserve from conversion to sugarcane (Tenywa, 2007). Civil society actions have also become a feature in countries that import biofuels and biofuel feedstocks. An early focus on environmental impacts has broadened into a wider concern for abuse of human rights in areas in which biofuels are grown (e.g. Marti, 2008) – with a strong emphasis on issues of access to land.

4. CONCLUSIONS



Biofuels are not necessarily bad news for small-scale farmers and land users. Indeed, biofuels could be instrumental in bringing an agricultural renaissance that revitalises land use and livelihoods in rural areas. Price signals to small-scale farmers could significantly increase both yields and incomes, securing real, long-term poverty reduction in countries that have a high dependence on agricultural commodities. Large-scale biofuels cultivation could also provide benefits in the form of employment, skills development and secondary industry. In the long run, production of biofuels feedstocks can be expected to become a stable rather than a rogue element in land use (Box 4).

However, these possibilities depend on security of land tenure. Where competing resource claims exist among local resource users, governments and incoming biofuel producers, and where appropriate conditions are not in place, the rapid spread of commercial biofuel production may result – and is resulting – in poorer groups losing access to the land on which they depend. In these contexts, the spread of commercial biofuel crop cultivation can have major negative effects on local food security and on the economic, social and cultural dimensions of land use.

Some of the governments promoting commercial biofuel production have sought to address these concerns. For instance, Mozambique's Minister for Agriculture recently pledged that the Mozambican government will not allow biofuel production to compromise food security; and affirmed that while the government will continue to identify available land for commercial production of biofuel feedstocks, it will exclude land that is fit for food production from these activities (Agencia de Informaçao de Moçambique, 2008). However, what is less certain is the extent to which such promises can be implemented, given the range of competing interests and the challenges to putting policies into effective action.

BOX 4. WILL THE BUBBLE BURST? LONGER-TERM TRENDS AND THE LIMITS TO THE BIOFUELS BOOM

Is the current boom in biofuels any different (or separate) from any what is happening to other commodities, or from previous commodity booms? Are the effects on land access going to be unprecedented, or much the same as the effects due to demands for land for food, fodder, fibre and other agricultural products?

Commentators have given wildly different predictions of how far the expansion of biofuels might go: from today's 14 million ha up to 35 million ha by 2030 under prevailing policy regimes (IEA, 2006), or up to as much as 1,500 million ha by 2050 (Field *et al*., 2007). The latter figure, which is equivalent to the entirety of the world's arable land today, assumes a scenario of strong demand but no brakes on biofuels expansion.

Commentators commonly forecast unchecked upward trends, particularly sustained increases in prices, during commodity booms – but these predictions have not been borne out for any of the major commodities (Deaton, 1999). Analysis of the three major commodity booms in recent history (1950-51, 1973-74 and 2004-present) shows that all three were triggered by demand shocks, but otherwise have had different and complex sets of causes (Radetzki, 2006). The current boom, clearly longer-lived than those of the 1970s and 1950s, is driven primarily by growth in the Chinese and Indian markets, though it appears that irregularity of demand rather than growth in demand is the main factor behind rising commodity prices (Radetzki, 2006).

For biofuels, we can expect a range of factors to counter the current explosive growth in demand and production. On the supply side, competition with other crops (especially food and fodder – often exactly the same crop, as for maize and soy) will be a major brake on expansion, tending towards a dynamic equilibrium set by prices offered in the food, fodder and fuel sectors (see Schmidhuber, 2007). Food security issues will be problems of access (e.g. unaffordability of a nutritious diet for poor people) rather than of global food supply. Rising prices for biofuels will be a market signal to improve technologies and yields, leading to deceleration in land expansion. As costs of biofuels feedstocks rise, so will investment in oil exploration and other fuels, thereby damping incentives for untrammelled expansion of biofuels.

At a more speculative level, second generation biofuels will deliver a new set of technologies and land use implications, in theory at least reducing competition with food crops (though, presumably, increasing competition with fibre crops for the supply of paper versus fuel). If trends follow those of agribusiness and forestry, the business models of the emerging biofuels industry, with strong ownership-based vertical integration from plantation through to overseas processing (particularly for jatropha), is likely to be replaced by contract-based vertical integration.

In environmental terms, water is likely to be a key limiting factor to biofuels crop expansion at the regional level (de Fraiture *et al*., 2007). Over-use of marginal lands for biofuels could lead rapidly to salination, erosion and exhaustion of those lands. Climate change will increasingly drive irregularities in supply of biofuels and other agricultural commodities, ensuring that commodity prices are, if anything, even more erratic than they have been to date.

A growing body of evidence documents the negative impacts of large-scale commercial biofuel production for access to land, drawing on contexts as diverse as Africa (e.g. Tanzania, Mozambique), Latin America (e.g. Colombia, Brazil), and Asia (e.g. India, Indonesia, Papua New Guinea).

Promising approaches also exist, but they have so far received less attention. In some contexts, smallholders have been able to use and even consolidate their land access through seizing the opportunities offered by biofuel feedstock cultivation, whether for income generation or for local energy self-sufficiency. Large-scale and small-scale biofuels production can co-exist and even work together in synergy to maximise positive outcomes for rural development – and secure land rights for smallholders can provide an asset in their negotiations with larger players.

Documenting this "successful" experience, and analysing the conditions that made it possible, the spread of costs and benefits among local land users, investors and government, and the extent to which such experience can be replicated elsewhere, can help build and disseminate better practice.

Preliminary experience, collated in Chapter 3 of this report, already provides several pointers for policy and practice by governments and the private sector at local, national and international levels. Some of the key issues are summarised below.

- Governments need to develop robust safeguards in procedures to allocate land to large-scale biofuel feedstock production where they are lacking and – even more importantly – to implement these effectively. Safeguards include clear procedures and standards for local consultation and attainment of prior informed consent, mechanisms for appeal and arbitration, and periodic review. Safeguards should be applicable across agricultural and land use sectors rather than specific to biofuels, to enable due process for both the direct impacts of biofuels crops and the indirect effects (displacement of non-biofuels crops from other farming areas by biofuels).

- Large-scale privately owned plantations are not the only economically viable model for biofuels feedstock production. Producers' associations, governments and investors may want to explore alternative business models such as joint equity in production and processing. Policy instruments based

on financial incentives can help provide for inclusion of small-scale producers in the biofuels industry.

- Clearer definitions of concepts of idle, under-utilised, barren, unproductive, degraded, abandoned and marginal lands (depending on the country context) are required to avoid allocation (dis-allocation) of lands on which local user groups depend for livelihoods. Similarly, productive use requirements in countries in which security of land tenure depends on active use (mise en valeur) need to be clarified so as to minimise abuse.

- Land access for rural people requires policy attention not only to land tenure but also to the broader circumstances that determine land use and agricultural economics. Relevant policy areas include taxation and subsidies, regional and international trade, and standards for environment and labour.

- International policy arenas are also influential on the impacts of biofuels expansion on land access. Certification criteria, such as those under development by the EU, should incorporate free prior and informed consent, based on secure land tenure of local residents, as a fundamental requirement, disallowing production on contested land. Attention may need to be given to eligibility rules regarding land use change under the Clean Development Mechanism of the Kyoto Protocol and its successor. International governance of trade and investment will continue to be a major determinant of the economic potential of different forms of land use in producer countries.

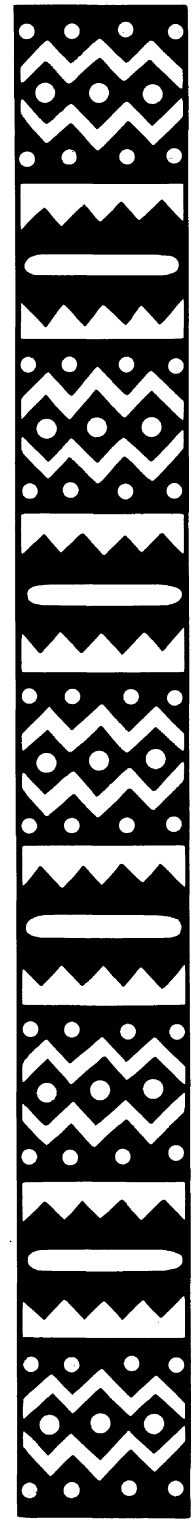
- Policies, laws and institutions matter – but in contexts characterised by strong power asymmetries they are likely to achieve little if they are not accompanied by sustained investment in building people's capacities to claim and secure their rights.

- Local, national and international NGOs and civil society organisations have a continued role to play in holding governments and industry to account regarding their promises on protection of land access and food security to specific communities and more generally.

- Finally, "biofuels" is a catch-all term for a set of very different crops and cropping systems, end-products, policy goals (e.g. commercial production vs energy self-sufficiency), business models (different combinations of

ownership and benefit-sharing among large-scale and small-scale operations) and local contexts – all of which significantly affect land access outcomes. A better understanding of this diversity will promote a more balanced and evidence-based debate.

REFERENCES



ABN (African Biodiversity Network), 2007, *Agrofuels in Africa; The Impacts on Land, Food and Forests*, available at http://www.biofuelwatch.org.uk/docs/ABN_Agro.pdf.

Abramovay, R., and Magalhães, R.S., 2007, *The access of family farmers to biodiesel markets: partnerships between big companies and social movements*, Regoverning Markets Programme Component 2 Case Study, available at www.regoverningmarkets.org.

African Centre for Biosafety, 2007, "Rural communities express dismay: land grabs fuelled by biofuels strategy", Report of Civil Society Workshop on SA Biofuels Strategy, Durban, 5 March 2007, available at http://stopbp-berkeley.org/docs/Biofuel-Workshop-Durban-Proceedings.pdf.

African Press Agency, 2007, "Thousands of Tanzanian peasants to be displaced for biofuels farm", African Press Agency, 12 August 2007, available at http://pacbiofuel.blogspot.com/2007/08/pbn-thousands-of-tanzanian-peasants-to.html.

Agencia de Informacao de Mocambique, 2007, "Contract Signed for Ethanol Production", AllAfrica.com, 10 October 2007, available at http://allafrica.com/stories/printable/200710100997.html.

Amanor, K.S., 1999, *Global Restructuring and Land Rights in Ghana*, Nordiska Afrikaininstitutet, Uppsala.

Balch, O., and Carroll, R., 2007, "Massacres and paramilitary land seizures behind the biofuel revolution", *The Guardian* (UK), 5 June 2007, available at http://www.guardian.co.uk/international/story/0,,2095338,00.html.

Bickel, U., and Dros, J. M., 2003, *The Impacts of Soybean Cultivation on Brazilian Ecosystems: Three Case Studies*, Report Commissioned by the WWF Forest Conversion Initiative, available at http://assets.panda.org/downloads/impactsofsoybean.pdf.

Chan, A., Chen, E., Min, T.T., and Ali, H., 2006, *Biofuel Sector: Global comparisons of a fast-growing sector*, Sector Review, Credit Suisse, London.

Chilundo, A., Cau, B., Mubai, M., Malauene, D., and Muchanga, V., 2005, *Land Registration in Nampula and Zambezia Provinces, Mozambique*, International Institute for Environment and Development, London.

Colchester, M., Jiwan, N., Andiko, Sirait, M., Firdaus, A.Y., Surambo, A., and Pane, H., 2006, *Promised Land: Palm Oil and Land Acquisition in Indonesia – Implications for Local Communities and Indigenous Peoples*, Moreton-in-Marsh, Forest Peoples Programme, Perkumpulan Sawit Watch, HuMA and the World Agroforestry Centre.

Cotula, L., (ed), forthcoming, *The Right to Food and Access to Natural Resources – Using Human Rights Arguments and Mechanisms to Improve Resource Access for the Rural Poor*, Food and Agriculture Organisation of the United Nations, Rome.

Cotula, L., 2007, *Legal Empowerment for Local Resource Control: Securing Local Resource Rights within Foreign Investment Projects in Africa*, IIED, London.

Cotula, L., 2006, *Gender and Law: Women's Rights in Agriculture*, Legislative Study No. 76, Second Edition, FAO, Rome.

Cotula, L., with Neves, B., 2007, "The Drivers of Change", in Cotula, L. (ed), *Changes in "customary" land tenure systems in Africa,* IIED, London.

Cotula, L., and Toulmin, C., 2007, "Conclusion", in Cotula, L. (ed), *Changes in "customary" land tenure systems in Africa*, IIED, London.

D1 Oils plc., 2008, *Breeding Better Plants*, available at http://www.d1plc.com/agronomyPlantScienceProgramBetterPlants.php.

Deaton, A., 1999, "Commodity prices and growth in Africa", *Journal of Economic Perspectives*, 13, pp. 23-40.

De Fraiture, C., Giordano, M., and Yongsong, L., 2007, *Biofuels: implications for agricultural water use*, International Water Management Institute, Colombo.

Dehue, B., Meyer, S., and Hamelinck, C., 2007, *Towards a Harmonised Sustainable Biomass Certification Scheme*, Utrecht, Ecofys Netherlands BV for WWF International.

De Jongh, J., 2006, *State of art Jatropha Development Mozambique,* Arrakis, Veldhoven, Netherlands, available at http://www.arrakis.nl/reports/State%20of%20Art%20Jatropha%20Development%20Mozambique.pdf.

De la Torre Ugarte, D., 2006, *Opportunities and challenges of biofuels for the agricultural sector and food security of developing countries*, Paper presented at the Expert Meeting on Participation of Developing countries in New Dynamic Sectors for World Trade, Geneva, 30 November 2006.

Dentzer, S., and Rose, B., 1996, *Key trends in feeding the world 1970-95*, 2020 Vision Synthesis Paper, International Food Research Institute, Washington DC.

DFID, 2007, *Land: Better access and secure rights for poor people,* Department for International Development, London.

Dufey, A., Vermeulen, S., and Vorley, W., 2007, *Biofuels: strategic choices for commodity dependent developing countries,* Common Fund for Commodities, Amsterdam.

Durang, T., and Tanner, C., 2004, "Access to Land and Other Natural Resources for Local Communities in Mozambique: Current Examples from Manica Province", presented to the Green Agri Net Conference on 'Land Administration in Practice', Denmark, 1-2 April 2004.

E4tech, ECCM and Imperial College London, 2005, *Feasibility study on certification for a Renewable Transport Fuel Obligation*, Final Report, E4tech, Edinburgh Centre for Carbon Management Ltd., Imperial College London, London.

XEnergy Transition IPM, 2007, *Testing framework for sustainable biomass,* Final report of the project group 'Sustainable production of biomass', Energy Transition Interdepartmental Programme Management, Netherlands.

Eves, C., 1997, *Effect of land use change on marginal agricultural land*, The Royal Institute of Chartered Surveyors, Coventry.

FAO, 1999, *Terminology for integrated resources planning and management*, FAO, Rome.

FAO, 2007, Proceedings of the First FAO technical consultation on bioenergy and food security, 16-18 April 2007, Food and Agriculture Organisation of the United Nations, Rome.

Fargione, J., Hill, J., Tilman, D., Polasky, S., and Hawthorne, P., 2008, "Land clearing and the biofuel carbon debt", *Science*, 319, pp. 1235-1238.

Field, C.B., Campbell, J.E., and Lobell, D.B., 2007, "Biomass energy: the scale of the potential resource", *Trends in Ecology and Evolution*, 23, pp. 65-72.

Fischer, G., van Velthuizen, H., Shah, M., and Nachtergaele, F., 2002. *Global agro-ecological assessment for agriculture in the 21st century,* International Institute for Applied Systems Analysis, Laxenburg, Austria and Food and Agriculture Organisation of the United Nations, Rome.

F.O. Licht, 2008, F.O. Licht's *World Ethanol and Biofuels Report*, Vol. 6, No. 9, 10 January 2008, www.agra-net.com.

Freeman, L., Lewis, J. and Borreill-Freeman, S., 2008, *Free, prior and informed consent: implications for sustainable forest management in the Congo Basin,* Paper presented at the Workshop on Forest Governance and Decentralisation in Africa, Durban, South Africa, 8-11 April 2008.

Gonsalves, J.B., 2006, *An Assessment of the Biofuels Industry in India*, prepared for UNCTAD (United Nations Conference on Trade and Development), UNCTAD/DITC/TED/2006/6.

GRAIN, 2007, *Seedling: agrofuels special issue,* GRAIN, Barcelona, Spain.

Grieg-Gran, M., Haase, M., Kessler, J-J., Vermeulen, S., and Wakker, E., 2007, *The Dutch economic contribution to worldwide deforestation and forest*

degradation, Report prepared for Greenpeace Netherlands, IIED, London, and AIDEnvironment, Amsterdam.
Henning, R., 1996, "Combating Desertification: The Jatropha Project of Mali, West Africa", Aridlands Newsletter, Vol. 40, Fall/Winter, available at http://ag.arizona.edu/OALS/ALN/aln40/jatropha.html.
Hesse, C., and Thébaud, B., 2006, "Will Pastoral Legislation Disempower Pastoralists in the Sahel?", *Indigenous Affairs* 1/06, IWGIA, pp. 14-23.
Houghton, R.A., 1990, "The future role of tropical forests in affecting the carbon dioxide concentration of the atmosphere", *Ambio*, 19, pp. 204-210.
Howden, D., 2008, "Hidden victims of the 'green revolution'", Independent (UK), 16 February 2008, available at http://www.independent.co.uk/news/world/africa/hidden-victims-of-the-green-revolution-783012.html.
ICRISAT, 2007, *Pro-Poor Biofuels Outlook for Asia and Africa: ICRISAT's Perspective,* March, available at http://www.icrisat.org/Investors/Biofuel.pdf.
IEA, 2006, *World Energy Outlook 2006*, International Energy Agency, Paris.
IFPRI, 2006, *Global scenarios for biofuels: impacts and implications,* International Food Policy Research Institute, Washington DC.
IRIN, 2007, "Mozambique: no lift off for biofuels yet", *IRIN Humanitarian news and analysis*, UN Office for the Coordination of Humanitarian Affairs, available at http://www.irinnews.org/PrintReport.aspx?ReportId=75382.
IUCN, 2007, *Gender and Bioenergy,* International Union for the Conservation of Nature, available at http://www.genderandenvironment.org/admin/admin_biblioteca/documentos/Factsheet%20BioEnergy.pdf.
Johnstone, R., Baoventura, C., and Norfolk, S., 2004, *Forestry Legislation in Mozambique: Compliance and the Impact on Forest Communities,* Terra Firma Lda, Maputo.
Jull, C., Redondo, P.C., Mosoti, V., and Vapnek, J., 2007, *Recent Trends in the Law and Policy of Bioenergy Production, Promotion and Use*, Legal Paper Online 68, FAO, Rome.
Kameri-Mbote, P., 2006, "Women, land rights and the environment: the Kenyan experience", *Development*, 49, pp. 43–48.
Kanji, N., Cotula, L., Hilhorst, T., Toulmin, C., and Witten, W., 2005, *Can Land Registration Serve Poor and Marginalised Groups? Summary Report*, IIED, London.
Kisembo, P., 2007, "Kisarawe land compensation 'stalls' Jatropha project", 8 August 2007, available at http://www.ippmedia.com/ipp/guardian/2007/08/08/95976.html.

Koczberski, G., Curry, G., and Gibson, K., 2001, *Improving productivity of the smallholder oil palm sector in Papua New Guinea: a socio-economic study of the Hoskins and Popondetta schemes*, Research Unit for the Study of Societies in Change, Curtin University of Technology, Perth.

Kojima, M., and Johnson, T., 2005, *Potential for biofuels for transport in developing countries*, Energy Sector Management Assistance Programme, World Bank, Washington DC, USA, available at http://esmap.org/filez/pubs/31205BiofuelsforWeb.pdf.

Majid-Cooke, F., 2002, "Vulnerability, control and oil palm in Sarawak: globalization and a new era?", *Development and Change*, 33, pp. 189-211.

Marti, S., 2008, *Losing ground: the human rights impacts of oil palm plantation expansion in Indonesia*, Friends of the Earth, LifeMosaic and Sawit Watch, available at http://www.foe.co.uk/resource/reports/losingground-summary.pdf.

Martinez, H., 2006, "Colombia: Biodiesel Push Blamed for Violations of Rights", Inter Press Service, 5 December 2006, available at http://ipsnews.net/news.asp?idnews=35722.

Mayers, J., 2007, "Forest protests and killings in Uganda", IIED press release, 14 April 2007, IIED, London.

Mayers, J., and Vermeulen, S., 2002, *Company-community Forestry Partnerships: From Raw Deals to Mutual Gains?*, IIED, London.

Mortimore, M., 1997, *History and Evolution of Land Tenure and Administration in West Africa,* Issue Paper No. 71, IIED, London.

Namburete, H.E.S., 2006, "Mozambique biofuels", Presentation at the African Green Revolution Conference, Oslo, Norway, 31 August – 2 September 2006, available at http://mediabase.edbasa.com/kunder/yaraimages/agripres/agripres/agripres/j2006/m09/t04/0000443_2.pdf.

Norfolk, S., 2004, "Examining Access to Natural Resources and Linkages to Sustainable Livelihoods: A Case Study of Mozambique", FAO LSP Working Paper No. 17, FAO, Rome.

Noronha, S., Ortiz, L., and Schlesinger, S., (eds.), 2006, *Agribusiness and biofuels: an explosive mixture. Impacts of monoculture expansion on the production of bioenergy*, Rio de Janeiro, Núcleo Amigos da Terra Brasil (Friends of the Earth Brazil).

Odgaard, R., 2002, "Scrambling for Land in Tanzania: Processes of Formalisation and Legitimisation of Land Rights", *The European Journal of Development Research,* 14, pp. 71-88.

Oduu, undated, *Oromia Studies New Scheme for Land Allocation*, available at http://www.oduu.com/news/index.php?news_id=297.

OECD-FAO, 2007, OECD-FAO *Agricultural Outlook 2007-2016*, Organisation for Economic Cooperation and Development and the Food and Agriculture Organization of the United Nations, Paris and Rome.

Peskett, L., Slater, R., Stevens, C., and Dufey, A., 2007. "Biofuels, agriculture and poverty reduction", *Natural Resource Perspectives*, 107, Overseas Development Institute, London.

Pinstrup-Andersen, P., Pandya-Lorch, R., and Rosegrant, M.W., 1999, *World food prospects: critical issues for the early twenty-first century,* International Food Policy Research Institute, Washington DC.

Radetzki, M., 2006, "The anatomy of three commodity booms", *Resources Policy*, 31, pp. 56-64.

Rajagopal, D., 2007, *Rethinking current strategies for biofuel production in India*, Ribot, J.C., and Peluso, L., 2003, "A Theory of Access", 68(2) *Rural Sociology*, pp. 153-181.

Rossi, A., and Lambrou, Y., 2008, *Gender and equity issues in liquid biofuels production: minimizing the risks to maximize the opportunitie*s, FAO, Rome.

Rothkopf, G., 2007, "A Blueprint for Green Energy in the Americas: Strategic Analysis of Opportunities for Brazil and the Hemisphere", *The Global Biofuels Outlook 2007,* Inter-American Development Bank, Washington DC.

Schmidhuber, J.F., 2007, "Biofuels: an emerging threat to Europe's food security?", Notre Europe Policy Paper 27, Notre Europe, Paris.

Searchinger, T., Heimlich, R., Houghton, R. A., Fengxia Dong, Elobeid, A., Fabiosa, J., Tokgoz, S., Hayes, D., and Tun-Hsiang Yu, 2008, "Use of U.S. croplands for biofuels increases greenhouse gases through emissions from land-use change", *Science*, 319, pp. 1238-1240.

Semino, S., Joensen, L., and Rulli, J., 2006, *Paraguay Sojero: soy expansion and its violent attack on local and indigenous communities in Paraguay,* Grupo de Reflexion Rural, Argentina.

Tenywa, G., 2007, "Uganda: Bidco Drops Bid for Bugala Forests", *New Vision,* Uganda, 24 May 2007, available at http://allafrica.com/stories/200705250010.html.

UN-Energy, 2007, *Sustainable bioenergy: a framework for decision makers,* United Nations, available at http://esa.un.org/un-energy/pdf/susdev.Biofuels.FAO.pdf.

UNEP, 2004, *Legal Issues Guidebook to the Clean Development Mechanism,* UNEP Risø Centre on Energy, Climate and Sustainable Development, Roskilde.

Van Gelder, J.W., and Dros, J.M., 2006, *From rainforest to chicken breast: Effects of soybean cultivation for animal feed on people and nature in the amazon region – A chain of custody study,* study commissioned by Milieudefensie/ Friends of the Earth Netherlands and Cordaid.

Vermeulen, S. and Goad, N. 2006, *Towards better practice in smallholder palm oil production,* Natural Resources Issues Series 5, IIED, London.

Weyerhaeuser, H., Tennigkeit, T., Yufang, S. and Kahrl, F., 2007, *Biofuels in China: An Analysis of the Opportunities and Challenges of Jatropha Curcas in Southwest China*, World Agroforestry Centre, ICRAF Working Paper 53, available at http://www.worldagroforestrycentre.org/SEA/Publications/Files/workingpaper/WP0088-07.PDF.

Williams, J., and Vermeulen, S., 2005, *Media and lobby tactics: linking farmers' actions with national policy processes,* Power Tools series, IIED, London.

Worldwatch Institute, 2006, *Biofuels for transportation: global potential and implications for sustainable agriculture and energy in the 21st century,* Prepared for the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), Worldwatch Institute, Washington DC.

WRM, 2006, "Biofuels", *Bulletin*, Issue 112, November 2006, World Rainforest Movement, available at http://www.wrm.org.uy/bulletin/112/viewpoint.html.

Zakaria, A., Theile, C., Khaimur, L., and Maher I., 2007, *Policy, practice, pride and prejudice: Review of legal, environmental and social practices of oil palm plantation companies of the Wilmar Group in Sambas District, West Kalimantan (Indonesia)*, Amersterdam, Milieudefensie (Friends of the Earth Netherlands), Lembaga Gemawan and KONTAK Rakyat Borneo.

Zenebe, W., 2007, "Ethiopia: German Co Invests Half Bln Birr Plus on Bio-Fuel", *Addis Fortune,* Addis Ababa, 6 April 2007, available at http://allafrica.com/stories/200704090810.html.

Fuelling exclusion? The biofuels boom and poor people's access to land

Lorenzo Cotula, Nat Dyer and Sonja Vermeulen

What are the impacts of the increasing spread of biofuels on access to land in producer countries, particularly for poorer rural people? Biofuels could revitalise rural agriculture and livelihoods – or, where there are competing claims on land – exclude poorer land and resource users. This study documents current knowledge on current and potential impacts of commercial biofuel production for access to land in Africa, Latin America and Asia, charting both negative experiences and promising approaches.

ISBN: 978-1-84369-702-2

International Institute for Environment and Development
3 Endsleigh Street
London WC1H 0DD, UK
Tel: +44 20 7388 2117
Fax: +44 20 7388 2826
Email: info@iied.org
Website: www.iied.org

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00100 Rome, Italy
Tel: +39 06 57051
Fax: +39 06 570 53152
Email: FAO-HQ@fao.org
Website: www.fao.org