Scoping report on biofuels projects in five developing countries

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1 Introduction

This report summarises a set of scoping exercises carried out in early 2013 into the status of biofuel projects in five countries: Ethiopia, Indonesia, Mozambique, Tanzania and Zambia. The scoping exercise was undertaken to determine:

- Whether countries which are commonly referred to as important destinations and hosts for biofuel projects have seen commensurate levels of activity by planned projects; and
- If so, whether projects have reached a stage at which it is possible to assess the impacts of the biofuel projects on local food security.

This report constitutes the first part of a larger exercise undertaken to explore the impacts of biofuel production on local food security in developing countries. The second part of the exercise will review the literature available on the impacts of biofuel production in developing countries on local food security, drawing on longstanding analysis of key feedstocks used both for biofuels and other end products, namely sugarcane and oil palm.

The report begins by analysing the data publicly available on land allocated to biofuels projects both globally and in the five countries targeted by the scoping exercise. It then summarises the findings from the scoping exercises, relating this back to comparable data in existing databases. These findings are presented in more detail for each country. The report provides a conclusion about whether the basis exists to investigate the possible effects of increased biofuel production on food security and indicates areas for further research.

2 Background

The wave of interest sparked in biofuels due to the rise in oil prices in 2007–2008 and the potential for large mandated volumes of biofuels in the EU and US led to investors requesting and acquiring large tracts of land for producing biofuel feedstocks, mainly in developing countries. This has led to a series of concerns about potential negative economic, social and environmental impacts at local and global levels. One fear raised is that local food security may be threatened due to loss of access to land (or water, labour and other factors of production) for food production by local producers or that land may have been switched out of food production into production of biofuel feedstocks, reducing aggregate availability. Conversely, others argue that increased demand for sustainable biofuels will encourage investment in agricultural production[1] and that there could be synergies between biofuel and food production by bringing investment into relatively undeveloped areas with poor access to input and output markets.

2.1 What does the data tell us?

Data on land deals

Analysis of this question is hampered by a lack of accurate data on the amount of land requested and allocated for biofuel production and other ends. Several publically available databases have been established in recent years to monitor projects and areas of land which have been subjected to deals. These include the NGO GRAIN's farmlandgrab.org portal, the International Land Coalition's (ILC) two portals (the Commercial Pressures on Land website and the Land Matrix website) and the Center for International Forestry Research's (CIFOR) Global Bioenergy Information Tool. Of these, only the latter was set up to look specifically at biofuel projects, while others look at large-scale land acquisitions both in the wider agricultural sector as well as for other land uses. There are also other ongoing initiatives, by the ILC (through country-based Land Observatories), CIFOR and the International Institute for Environment and Development (IIED) to track and further investigate land deals in more detail (including the contracts underpinning the deals). Further investigations into particular projects have been commissioned and published by academic institutions and civil society organisations including the Oakland Institute, Oxfam, Friends of the Earth and Actionaid.

Of the tools in the public domain, the Land Matrix is perhaps the most widely used source of information on large-scale land acquisitions (including biofuels). The database provides information on the location, size, year and intended land use of investments, and notes the name and nationality of the investor. Reliability of the data available on the Land Matrix is an important challenge, as the website recognises in several disclaimers. Specific issues concerning reliability are: the accuracy of the information submitted to the website through crowdsourcing;[2] and how quickly information becomes outdated, given that new projects are announced and existing ones fold within short periods of time. In addition, as the Land Matrix website explains, data refers to announced deals, and these may or may not have been concluded nor have activities started on the ground. The most recent reports on land deals uploaded to the database were for 2011, so subsequent activity is not captured in the current version.[3]

Data on land for biofuels

Determining the intended purpose of land deals (such as the proportion for biofuel production) is complicated by the fact that decisions about which crops to plant may change quickly. In

[1] http://online.wsj.com/article/SB10001424052748704071704576277122793802138.html

[2] Different groups of stakeholders including governments, companies, researchers and citizens are encouraged to submit data on land deals to the Land Matrix. This is subsequently checked with ILC partners and given a reliability score (ILC website).

[3] Updated data will be made available in May 2013. This was not available at the time of writing this report.

order to overcome this, a Land Matrix analytical report (Anseeuw et al. 2012a) classifies land deals according to whether the intended crops are for food, non-food, flex (flexible between food and non-food) or multiple uses. They also acknowledge that there may well be a research bias towards reporting of flex crops (particularly biofuels) given the high level of attention paid to the sector.

Nonetheless, reports produced using Land Matrix data (including by the ILC, groups campaigning on biofuels[4] and media reports) do provide some statistics on land acquisitions associated with biofuels. According to Anseeuw et al. (2012b), large-scale land deals reportedly sought for biofuel crops represented about 40% of the total deals verified and 75% of all agricultural deals between 2000 and 2009. Figures in the report show that deals for biofuels in Africa, Asia and Latin America cover up to 36.6 million hectares, of which over half are in Africa (18.8 million hectares). This constitutes 66% of all the land involved in reported deals in Africa. Schoneveld (2011) found that 11,220,334 hectares were acquired for biofuel production in Africa between 2008 and 2011 using a dataset which only includes plantations deals; this represents 63% of the area acquired in Sub-Saharan Africa. A recent report by GRAIN (GRAIN 2013) using several sources of data[5] estimates that there have been 293 reported land deals, covering 17 million hectares for producing biofuels, 7.5 million hectares of which were in Africa. There has been a specific focus on jatropha deals in East Africa, given that this has been the crop reported in numerous deals. The Land Matrix analytical report (Anseeuw et al. 2012a) reported that between 5.5 million and 10.4 million hectares[6] of land were dedicated to jatropha production, which represents 73% of projects in the non-food category. According to the report, most of the deals associated with jatropha globally are in three of the countries examined in this report (Ethiopia, Mozambique and Tanzania).

Given differing criteria for including data on land deals, aggregating individual deals can lead to widely different figures for the areas involved in biofuel-related deals at national level and above. Table 1 illustrates this, using the figures available from the publically available databases and reports. For Ethiopia, where the range between the lowest and highest figures is largest, the area associated with deals for biofuels is estimated at between nearly 174,000 hectares and 1.16 million hectares. Other countries have narrower, but still high absolute, ranges. The last row in Table 1 shows the difference when the reports are aggregated to the level of the African continent: the ILC report indicates an area of 18.8 million hectares while the figure in the recent GRAIN report is substantially lower, at 7.2 million hectares. This indicates that the data is highly sensitive to the time period covered, on-going activity and differences in methodologies used. It also supports disclaimers (including those made by the ILC) which state that reported data may not accurately indicate what is happening at project development level.

[4] See for instance the IF campaign policy report: http://enoughfoodif.org/sites/default/files/IF_policy_report.PDF

[5] GRAIN (2013) includes the Land Matrix data, information from Biofuels Digest and their own database.

[6] This range results from applying a distinction of source reliability to the data. The lower estimate is based upon including only data with a reliable source. The higher estimate is based upon including all submissions to the Land Matrix database.

Table 1: Comparison of data on areas involved in biofuel-related land deals, according to reports compiled in different databases (hectares)

	Databases			Reports	
	CIFOR Global Bioenergy Information Tool (up to 2011)*	Land Matrix database data (up to 2011)*	GRAIN (2013)*	CIFOR WP 85 (Schoneveld 2011)	ILC report (Anseeuw et al. 2012b)
Ethiopia	173,990	1,160,350	710,715	807,390	--
Mozambique	590,162	507,106	469,332	506,255	--
Tanzania	225,122	100,200	652,835	--	--
Zambia	676,483	243,413	273,715	--	--
Africa	N/A	N/A	7,177,541	11,220,334	18,800,000
	Note: Database figures (marked with asterisks) have been aggregated by the author and are not presented as aggregates in the databases or reports. Notes on the methodology for aggregation and presentation in this table are provided in Annex 2.				

3 Methodology and general findings

Given the high level of uncertainty over the publically available data in these databases, this report carried out a separate scoping exercise to provide more accurate figures on the area of land that has been allocated to, and is being cultivated for, biofuel production in the five countries selected. The objective of this report is to summarise findings of the five national-level scoping studies undertaken to determine whether biofuels projects in these countries have progressed to a state whereby meaningful analysis of the effects of national biofuel production on local food security could be carried out.

3.1 Methodology

To determine which effects could plausibly be analysed, the scoping exercise focused on planned and current biofuels projects, highlighting their location, and levels of production and employment. Information on the status of biofuel projects was collected through contracted consultants familiar with the status of biofuel developments in each of the countries. Each consultant was asked to complete a report that included sections on the status of biofuels projects, and comment on the policy and market environment in each of their countries. The consultants were also asked to complete a matrix with details on all the current biofuels projects in their country, detailing information, wherever available, on the types of projects, models used, current and planned land use and production, and employment. The reporting methodology did not set a timeframe for inclusion of investment authorisations, or a minimum size of concessions. Rather, consultants were asked to gather the most up-to-date information possible on authorised investments, within the appropriate timeframe (identified in each case study) for each country, to gauge the current status of biofuels investments.

To gather this information, consultants relied predominantly on official information, including documented material and interviews with employees at relevant government offices. In the four African countries,[7] this process included physical visits to the relevant offices (investment promotion centres and sectoral ministries[8]). Where possible, publicly available information from government offices was cross-checked with company representatives or government officials to verify its accuracy, although this was not possible in all cases (see limitations below). The separate country reports have been synthesised for this summary report; the full country reports are available on request.

3.2 Limitations to this report

Reliability of information: We are confident that the data presented in the country reports provide a reliable sense of the overall picture and trends in land acquisition and development for biofuels. We are also reasonably confident that the trends in the four African countries analysed are representative of trends in other countries, given that they rank within the top seven countries globally in terms of reported area of all land deals (Anseeuw et al. 2012a). However, this is subject to several qualifications:

- Due to the short timeframe in which this exercise was carried out, and some difficulty in acquiring up-to-date information, not all company-specific information could be verified. In some cases (e.g. Mozambique, Tanzania and Indonesia), consultants reported that information on biofuels projects is not brought together in one centralised database and some databases are not up to date.

- The opaque nature of negotiations also means that reliable information on specific deals is difficult to come by and the accuracy of reports is difficult to verify.

[7] Visits to government offices were not possible in the Indonesian case; however, contact was made via email.
[8] Usually ministries of energy and agriculture.

- As mentioned in the Background section, there is uncertainty over the accuracy of aggregated figures, and figures should be viewed as tentative with the possibility of becoming outdated relatively quickly.

- Moreover, there may be exceptions to the general trends identified here in particular countries not covered by this scoping exercise. For example, Addax, a company which has established a sugarcane project in Sierra Leone, has developed around 4,000 hectares of a 14,000 hectare concession; its core output remains ethanol while other companies have tended to switch from ethanol to sugar as their core end product.

Gaps in information: The availability of information varied across the different countries, with gaps in particular types of information. Information on the status of developments of projects in Indonesia, in particular, was not easily accessible. Other gaps in information available for the countries include:

- ***Status of land development:*** While it was clear that the operations for a number of projects had stalled, in some cases the scoping exercises were unable to determine what changes to land use had been undertaken: whether land clearing had occurred in all cases, whether biofuel feedstocks had been planted or were in a gestation phase. In projects currently reported as non-operational, it is unclear whether the land is being used for food production in the meantime and whether unused land is reverting to previous owners or land rights users.

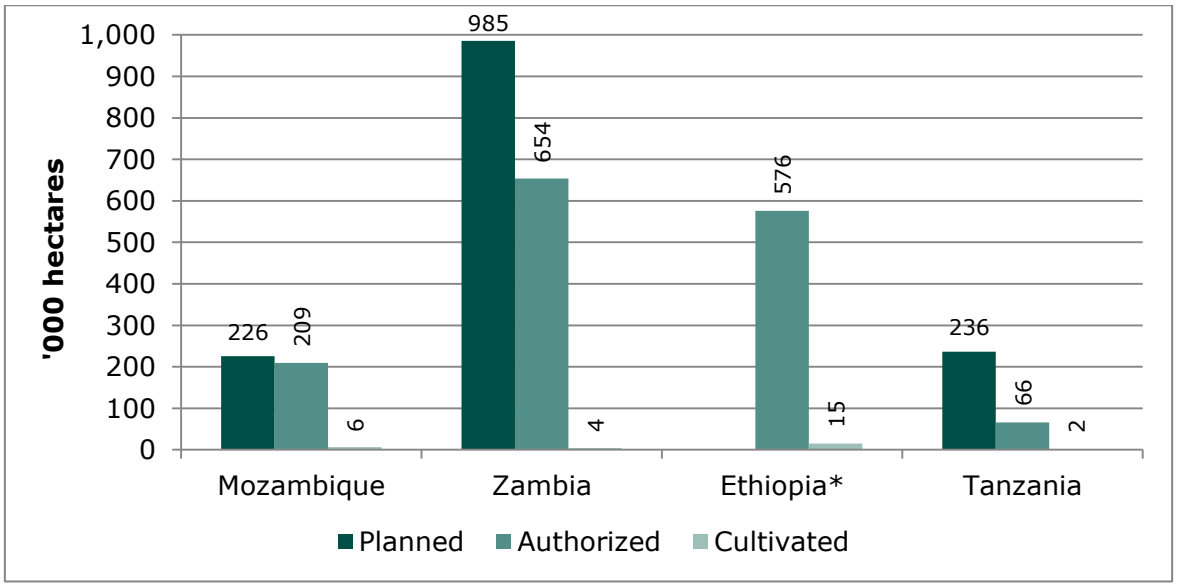
- ***Employment data:*** In general, there was little specific information on the number and category of employees. For instance, for Indonesia, information on employment was only readily available at the parent company level. For Mozambique, where the most information was available, this was complete for 60% of companies. In Zambia and Tanzania, only 30% and 20% of companies had information on employment available respectively. In several cases, information on employment does not have to be registered with the investment centres (e.g. in Tanzania). In addition, while companies often publish expected numbers of employed staff, in many cases these appeared to be considerably higher than the numbers of staff they currently employ. Because of this, and due to the low level of activity in many of the projects, this synthesis report does not consider employment.

3.3 General findings

The main finding from this research was that biofuel projects in the four African countries investigated have only managed to cultivate a very small proportion of the land authorised by the government (ranging between 2.9% for Mozambique, 2.6% for Ethiopia and less than 1% for Zambia and Tanzania).

Figure 1 shows the amount of land planned for acquisition in each country (column 1), compared to the amount of land authorised (column 2) and the area on which biofuel feedstock is reported to be currently planted (column 3). In Ethiopia, of approximately 576,000 hectares authorised for production, only 15,000 hectares are being cultivated. The areas under biofuels in other countries are smaller: only 6,000 hectares in Mozambique, 4,000 hectares in Zambia and 2,000 hectares in Tanzania.

Figure 1: Planned, authorised and cultivated areas of land for biofuels in four African countries, 2012



Notes: 1. Planned areas refer to land originally requested of the government, or which companies announced they were seeking. These figures should not be compared across the countries due to different inclusion criteria. 2. Numbers in data labels (indicating area) have been rounded up to the nearest thousand hectares. 3. Indonesia is not included due to difficulties in attributing areas of oil palm to biodiesel, rather than edible palm oil production. 4. *= Area planned for production by companies is not reported for Ethiopia. Data presented for Ethiopia does not include land partially used for ethanol production.[9]

Results from the scoping exercises also indicate that, in the four African countries, projects have taken a much longer time getting off the ground than anticipated and many have been suspended. The country reports cite a number of factors that have contributed to delays or cancellation of projects, summarised in Table 2. These include lack of realism in the project development timetables envisaged by most companies, financial constraints, lack of viability of certain feedstocks, and policy or administrative obstacles.

With respect to different feedstocks planned, there were several clear trends:

- The lack of viability of jatropha as a feedstock is cited as a frequent reason for problems with implementing biodiesel projects. In the African countries reviewed, several projects appear to be attempting to change production away from jatropha in favour of other crops on their concessions.
- While sugarcane projects are advancing on their land concessions, some projects have placed sugar production centre-stage, rather than ethanol production, often changing plans to produce ethanol only from the molasses produced from the sugar processing. This switch in production is due mainly to changes in the domestic policy environment or reduced possibilities for exporting ethanol.

[9] In Ethiopia's case, ethanol is produced from molasses rather than directly from sugarcane juice, which is used, instead, for sugar production.

Table 2: Reasons cited for the slow rate of implementation of biofuels projects

Reason	Examples in countries
Constraints to acquiring sufficient capital	• Mozambique: investors pulled out as project implementation took longer than envisaged. • Zambia: insufficient capital to finance processing facilities; uncertainty over gestation period for projects, especially those using outgrower models; financing concerns over jatropha.
Lack of economic viability of feedstock production for biofuels	• Ethiopia: lack of economic viability in jatropha production leading to widespread interest in switching to other crops. • Indonesia: ethanol production has stalled since 2010 due to unattractive pricing. Jatropha production has similarly not got underway. • Mozambique: evident in the jatropha sector, where increasingly clear that returns are not as high as originally predicted. • Tanzania: sugarcane-based ethanol projects switched to sugar production; jatropha switched to other crops, e.g., rice.
Bureaucratic obstacles	• Mozambique: delay in acquiring land use licence (DUAT) leading to higher financial risk categorisation.
Unclear policy, changes in policy or policy incoherence	• Zambia: lack of prioritisation by the Zambian Development Authority, continued subsidisation of fossil fuels. • Tanzania: lack of a clear policy, legal and institutional framework: especially on blending ratios, land, and preference for feedstock. • Indonesia: continued subsidisation of fossil fuels and unattractive price set for ethanol blending.
Poor initial research and project siting	• Tanzania: inappropriate knowledge of local soil and geography.
Other	• Tanzania: limited human capital. • Zambia: high machinery costs and low availability of expertise.

Overall, the low rate of implementation of projects and minimal areas planted to biofuel feedstock indicate that it would be difficult to conduct further research aimed at making generalised and comprehensive statements about the effects that biofuel projects are having on local food security in these countries, at this point in time (the forthcoming part 2 of the study will discuss in more detail the different ways that biofuels could theoretically influence food security). It may be possible, and useful, to find effects due to displacement of food production from land granted to biofuels investors in specific cases.[10] However, it appears unlikely that wider effects owing to substitution and reduction of food crop production (resulting in lower aggregate availability or higher prices of food) would be observable. This is also the case for assessing the potential positive impacts of biofuel production on food security, through improving access to markets and generating employment opportunities. A possible exception to this may be Indonesia, where palm oil plantation expansion has occurred at a rapid pace over recent years. However, this may not be due to biofuels production alone, as the rising use of palm oil as a vegetable oil and growth in demand for this product have also driven oil palm expansion.

These observations only draw on some of the countries where large-scale biofuels project development may be happening and does not cover others countries that have received more

[10] Case study work in some countries documenting this has been undertaken by organisations such as the Oakland Institute, Actionaid, Friends of the Earth and others.

attention recently for their biofuel-related land deals (e.g., Liberia, Ghana and Guatemala). However, we are reasonably confident that there is the same pattern in other countries and nothing suggests that the countries included in this study are anomalous to the situation in other countries (the case of Addax in Sierra Leone seems to be an exception that proves the rule).

The findings here suggest that, in the countries studied at least, and for the time being, there is little basis for making strong statements that biofuel production in developing countries causes widespread undermining of food security through displacing food or competing for resources.

However, this is not to say that badly executed acquisitions for biofuels have not negatively affected local groups' access to land and resources in specific cases; there is both anecdotal and case study evidence from campaigner and research groups to support that this has happened in specific cases. In addition, while the scoping study found that smaller areas of land appear to have been allocated and planted to biofuels relative to reported land deals, the total area is still close to 1.5 million hectares and individual projects can have significant impacts on local communities through the loss of land.

The lack of readily available information on the status of the development of biofuels projects, and current occupation and status of land allocated to undeveloped biofuels projects is a cause for concern and would benefit from closer examination.

4 Country-specific overviews and findings

The following section presents further details of the findings by country. Each section provides a brief overview of the state of the biofuels sector in the country, recent project development trends and details, and national factors that have affected the development of biofuel projects. Tables for each country highlight the differences between areas that companies reportedly planned to plant to biofuel feedstocks, the areas actually authorised by the appropriate government department, and the actual area of land on which cultivation is occurring or has occurred.

4.1 Ethiopia

Biofuels-related investments in Ethiopia have attracted significant attention globally due to the large number of projects that were expected to start in the country, as well as the number of controversial land deals that have occurred. The government has actively promoted the development of the bioenergy sector, ostensibly to reduce imported fuel bills as well as to promote rural development (MoME 2008).

Investments originate from both the public and private sector; production of sugarcane-based ethanol is largely associated with publicly-held sugar estates while biodiesel feedstocks (jatropha and castor beans) are associated with private sector initiatives. The data for Ethiopia included investments authorised between 2007 and 2012. The smallest area for an authorised investment reported was 200 hectares.

Status of biofuel projects

Table 3 confirms the general findings of this report as the area planted to biodiesel feedstocks is a low percentage of the area authorised for planting these feedstocks (below 3%). The 15,000 hectares of biofuel feedstock are from one project producing castor beans. There is no project underway that produces feedstock for ethanol as its main output; although there are sugarcane projects, their main output is sugar, with ethanol produced as a by-product from the molasses. To reflect this situation, we have put the area planted to ethanol feedstock as zero in Table 3, and have not included areas from Ethiopian sugarcane projects in Figure 1.

Table 3: Overall land use for biofuel feedstock production in Ethiopia

	Ethanol feedstock	Biodiesel feedstock	Total
Planned area for cultivation (ha)*	--	--	--
Total area authorised (ha)	0**	575,902	**575,902**
Current area under cultivation (ha)	0**	15,000***	**15,000**

*Information on planned output is not reported for Ethiopia as data is based only on projects which have been granted land.
** Projects have been allocated land for sugarcane production (around 430,280 ha) and have cultivated a portion of this to date (around 47,280 hectares). The main output of these projects is sugar. Molasses, which is a by-product of the sugar production process, is used to produce ethanol.
***This figure only includes the area of castor beans known to be under cultivation. There is currently no reported commercial planting of jatropha.

Sources: Data gathered during this scoping exercise in January 2013 from the Agricultural Investment Support Directorate of Ministry of Agriculture, Ethiopian Sugar Corporation (ESC), and Ethiopian Investment Agency (EIA). The information collected from the EIA and Sugar Corporation was checked with experts from the Agricultural Investment Support Directorate of the Ministry of Agriculture.

Biodiesel

There are currently 25 biodiesel projects which have received authorisation to plant biodiesel feedstock crops; however, only one project is currently harvesting planted crops. This is a significantly smaller number than the 52 projects registered in 2009, indicating that many projects have since ceased.

Twenty of the 25 biodiesel projects originally planned to use jatropha as a feedstock. In line with experiences in other countries, jatropha-based projects in Ethiopia have not progressed successfully. Currently, none of the projects provided with land by the Ministry of Agriculture are operational, partly due to issues surrounding economic viability. There are reports that a large number of the investors (with current, i.e. not expired/revoked licences) are attempting to change the crops registered in their production plans.

There are also three projects which use castor beans for biodiesel production, including the one operational project, Acazis Ethiopia PLC, which has 15,000 hectares planted under castor beans.

Ethanol

The government-operated sugar sector is currently expanding, with three estates and factories completed, and five additional estates underway. These are primarily designed to produce sugar as a main product, with the molasses by-product used for ethanol production. As such, these are not strictly land-based ethanol projects. Ethanol produced is destined for local consumption, in order to meet domestic fuel blending targets.

Table 4: Status of Ethiopia biofuel projects

Feedstock	Operational	Active but not producing/ experimental	Planning Phase
Jatropha	--	--	20
Castor	1	2	--
Sugarcane	3	5	1

Note: Given the high number of projects in Ethiopia, this table enumerates rather than lists the projects. Details of the project in each category are available in the consultancy reports, which can be provided upon request.

Sources: Ministry of Agriculture, Ethiopian Sugar Corporation (ESC), and Ethiopian Investment Agency (EIA)

National policy context

The policy environment surrounding biofuels is generally supportive. Since 2010, the allocation of land has been made by the federal government from a national land fund (a collection of land allocated by regional governments and managed by the Ministry of Agriculture) rather than regional governments. In theory, this should simplify the land acquisition process.

In general, the government has given priority in land allocation to investments for edible oil, cotton and other similar sectors that have potential in substituting imports. Investments for biofuel production are usually allocated land that is considered marginal.

4.2 Mozambique

There has been sustained interest in biofuel development in Mozambique since 2004, when the government actively encouraged jatropha cultivation on marginal lands. Given the large surface area that Mozambique covers, interest in biofuels projects has been encouraged by what investors and the government have perceived to be abundant land available for biofuels projects. The majority of projects have had stated intentions to produce feedstocks for both local and foreign (EU) biofuel markets.

Initial interest in development opportunities was high from both domestic and international investors: by December 2010, there were 48 registered biofuels projects, 23 of which had land under cultivation (Atanassov et al. 2011). However, the interest in biofuels projects has slowed over the last few years and production has declined owing to the difficult global financial situation as well as difficulties in acquiring land use licences due in part to political or bureaucratic delays. The data for Mozambique included investments authorised between 2008 and 2012. The smallest area for an authorised investment reported was 1,220 hectares.

Status of biofuel projects

Implementation of biofuels projects has not kept up with the pace envisaged in plans submitted to government agencies at the outset of projects, as Table 5 demonstrates. Although a total of 209,327 hectares of land is currently authorised (97,530 hectares and 111,797 hectares for ethanol and biodiesel feedstock respectively) only 6,110 hectares have been planted with feedstock, 3% of the total area authorised.

Table 5: Overall land use for biofuel feedstock production in Mozambique of companies authorised to operate

	Ethanol feedstock	Biodiesel feedstock	Total
Planned area for cultivation (ha)	98,000	127,732	**225,732**
Total area authorised (ha)	97,530	111,797	**209,327**
Current area under cultivation (ha)	2,080	4,030	**6,110**

Sources: Data gathered during this scoping exercise in January 2013 principally from the Centre for Agricultural Promotion (CEPAGRI), The National Directorate for New and Renewable Energies (DNER), and the Ministry for coordination of Environmental Affairs (MICOA). Other sources consulted are listed in Annex 1. **Note:** This table includes projects that currently have authorisation to operate (i.e. with a land use license). Projects that have had their land use licenses revoked are not included.

Of the 48 projects registered to operate in 2010, 18 are currently operating. The others have since ceased or have had their land use rights revoked. Of the projects operating, implementation has generally proceeded at a slow pace. Three of the six registered ethanol projects and ten of the twelve biodiesel projects have got underway; however, as Table 6 shows, only two out of all the projects are currently producing any feedstock for biofuels (NIQEL and Cleanstar). Most other projects can be classified as either being active, but not yet producing any feedstocks for biofuels, or in an experimental phase. Four projects (Enerterra, Zamcorp-Indico, Sun Biofuels and Mozambique Principle Energy) have ceased activities but have not had their licenses revoked.

Plantings being carried out by companies are still largely in testing phases. Within the projects operating, there is currently more ethanol than biodiesel output, owing to the production of one cassava-based ethanol project (Cleanstar). Currently, the estimated output of ethanol (all from Cleanstar) is 3,500 tonnes/year. The one active jatropha project (NIQEL) has only produced 152 tonnes of biodiesel to date.

Table 6: Status of biofuel projects operating in Mozambique

Feedstock	Producing for biofuels	Active but not producing/ experimental	Producing for other purposes/ other crops	Ceased/ Suspended	Still in planning phase
Jatropha (12)		Bioenergia Mozambique; AVIAM; Mozambique Biofuel Industries; Sociedad Inveragro; SAB Mozambique; Deluco Emvest, NIQEL	Luambala Jatropha*	Enerterra; Zamcorp-Indico; Sun Biofuels	Mocamgalp
Sugarcane (5)		Massingir AgroIndustrial SA; Grown Energy Zambeze		Mozambique Principle Energy	Envalor; Galp Buzi
Cassava (1)	Cleanstar Mozambique				
*Luambala Jatropha also has sunflower and soy production.					

Sources: CEPAGRI, DNER, MICOA and others listed in Annex 1.

National policy context

Despite the slow rate of implementation, Mozambique is seen as having the most developed biofuels legislation among the four African countries reviewed. In 2009, the government launched its biofuels policy and strategy to guide sector development. In 2012, the country drafted its own biofuels sustainability criteria, which are currently awaiting final approval at ministerial level.

4.3 Tanzania

Interest in the Tanzanian biofuels sector has been high in recent years, especially in 2007–2008. The total land requested for biofuels investment in the country had reached over four million hectares by 2009, and 37 companies were granted land for biofuel production (Kamanga 2008, Sulle & Nelson 2009). Although deals were finalised for less than 100,000 hectares, an area of up to 640,000 hectares was potentially under negotiation (Sulle & Nelson 2009). Since then, however, the high level of interest has not led to the establishment of viable projects. In 2009, amidst reports of land conflicts arising due to biofuel deals, the government suspended land allocations to biofuel production and since then, no new biofuel projects have been established (Mande 2009). The data for Tanzania included investments authorised between 2006 and 2012. The smallest area for an authorised investment reported was 163 hectares.

Status of biofuel projects

The figures in Table 7 provide an indication of the area on which biofuel feedstocks are being produced, according to the figures collected during this scoping exercise. Areas under cultivation are well below the areas for which authorisation has been granted. The largest area is planted to jatropha (1,020 hectares), although it is unclear how much of this remains actively managed.[11] An area of 350 hectares is planted to oil palm and 200 hectares to sugarcane for ethanol production.[12] These areas represent less than 4% of the total authorised areas for production.

Table 7: Overall land use for biofuel feedstock production in Tanzania

	Ethanol*	Biodiesel	Total
Planned area for cultivation (ha)	34,132	202,364	**236,496**
Total area authorised (ha)	22,000	42,211	**66,211**
Estimated current area under cultivation (ha)	200	1,370	**1,570**
*figures for ethanol production exclude areas for projects that plan to produce ethanol from sugarcane as a by-product of sugar production.			

Sources: Data gathered during this scoping exercise in January 2013 principally from Tanzania Investment Centre (TIC), Ministry of Agricultural, Food Security and Co-operatives, and Ministry of Land and Housing Development

There is, however, some uncertainty over the total area of land for which biofuel investments are planned. A forthcoming report by HAKI ARDHI (a local NGO working on land issues) indicates that current requests for land add up to 313,221 hectares, of which 80,373 hectares have been leased out. Both these figures are higher than their counterparts reported in Table 7. This may result from differences in timescale or inclusion criteria, or errors in areas reported. A study by Locher and Sulle (forthcoming) illustrates how many projects have ceased, and how the inclusion of projects that did not complete the acquisition process inflated the figures. Also, there are several large projects that reached an advanced stage of land acquisition but have since ceased operations or changed plans and have not been replaced with projects that have a license to operate.[13] The area of these projects is not included in the 'total area authorised' figure, which may explain why this figure is lower than earlier estimates.

[11] This area is from a number of projects, each of which planted a small area. Many of the projects currently have uncertain production plans, so it is difficult to state how much of this area is under active management.
[12] These figures do not include areas of the feedstock which are planted for other primary uses (e.g. edible palm oil or sugar production).
[13] Africa Biofuel & Emission Reduction Company, Bioshape Tanzania and CAMS Agri-Energy all fall into this category.

Table 8 presents information collected from the present scoping study on the status of individual biofuels projects in Tanzania. There is uncertainty over the total number of biofuel projects operating in Tanzania. Although the latest figures from the Tanzanian Investment Centre indicate that 11 companies are registered to produce biofuel feedstocks, a recent survey suggests that another 14 companies were active in the land acquisition process (although not necessarily producing), which were not currently registered with the Tanzanian Investment Centre (Locher & Sulle, forthcoming). This is a significantly lower number than the 37 companies active in the land acquisition process in 2008.

Biodiesel

The majority of biodiesel projects originally established in Tanzania aimed to use jatropha as a feedstock and this appears to continue to be the case. At least 12 of the biodiesel projects in Table 8 aimed to use jatropha. While some of these had started production (e.g. Sun Biofuels) most of these appear to have stopped operations and only two domestic projects (Savannah Biofuels and JKT) appear to be operational and may be producing, although this could not be verified. Four oil palm-based projects have been established in recent years, of which only FELISA was known to have started production through a smallholder scheme, and appears to still be running. One other project that planned to use croton to produce biodiesel (African Biofuel and Emission Reduction Company) was halted by the Vice-President's Office and has yet to start operations (Locher & Sulle, forthcoming).

Ethanol

A small number of ethanol projects have been established in the last few years, all planning to use sugarcane as a feedstock. Of these only EcoEnergy Tanzania Ltd., is currently producing sugarcane, mainly in its cane nurseries. However, the company's plans have changed and its main product will be sugar, rather than ethanol, with plans to produce ethanol from the sugar by-product, molasses. There is at least one other sugar project (Kagera Sugar, not shown in Table 8) which aims to produce ethanol using molasses.

Table 8: Status of Tanzanian biofuel projects

Feedstock	Producing for biofuels	Producing for other purposes	Delayed	Ceased/ Suspended	Planned	Unknown
Jatropha	Savannah Biofuels, JKT Tanzania			BioShape Tanzania Ltd, Sun Biofuels, Trinity Consulting Bioenergy Ltd. Diligent Tanzania Ltd*	30 Degree East, Sekisui	Enviro-fuels Technology, Shanta Estates, Kitomondo, Prokon Ltd.
Oil Palm	FELISA			Clean Power Ltd., Africa Green Oils	Tanzania Biodiesel Plant Ltd	
Sugarcane	EcoEnergy Tanzania Ltd.					Rufiji Sugar Plant
Other			African Biofuel and Emission Reduction Company, (croton), Arkadia Ltd (unknown)			Agrisol Energy Tanzania (corn, soya), CAMS Agri-energy Ltd. (sweet sorghum)
***Diligent Tanzania has recently ceased; however, it has sold a part of its contractual relationship with smallholders on to another company (Eco Carbon) which may continue to produce. However, the level of activity remains unclear at the moment.						

Sources: TIC, Ministry of Agricultural, Food Security and Co-operatives and Ministry of Land and Housing Development and interviews with project staff.

Cited reasons for the cessation or slow implementation of projects include lengthy discussions with local communities over relocation and compensation for land, heightened sensitivity over the social consequences of land deals, as well as difficulties in financing and proving the economic viability of projects (Mkind 2008, Bergins 2012, Markensten and Mouk 2012).

National policy context

Currently, Tanzania has no policy, legal or institutional framework to manage and govern biofuels investments in the country. The National Biofuels Task Force (NBTF) was established in 2006 to formulate the national policy framework but it has only managed to produce initial Biofuel Guidelines, which were published in 2010. The NBTF recently came up with a liquid biofuels draft policy in 2012 but this has yet to be finalised and there remain uncertainties over key areas, including planned domestic blending ratios and land acquisitions, and associated processes and responsibilities.

4.4 Zambia

Zambia experienced a surge of interest in investment in biofuels in the mid-2000s, especially in the production of jatropha. The publication of the National Energy Policy in 2008 demonstrated government support for the development of biofuels. This was followed by attempts to develop projects using both vertically-integrated and outgrower models for biofuels production (BAZ 2008).

Status of biofuel projects

According to the scoping study findings, since 2008 the scale and ambition of most projects in Zambia have been significantly revised downwards or terminated. As of early 2013, there were no significant large-scale projects aimed at commercial production of biofuels in Zambia, as previous ventures have all been scaled back or abandoned. A small number of outgrower jatropha schemes still operate, with feedstocks destined for small-scale national processors. In addition, the sugar and palm oil industries are currently in an expansion phase; whether these will lead to the further development of biofuels remains uncertain for now. The data for Zambia included investments authorised between 2006 and 2012.[14] The smallest area for an authorised investment reported was 250 hectares.

This situation is illustrated in the figures presented in Table 9, which show that no land is currently under cultivation for ethanol feedstocks, while less than 4,000 hectares are estimated to be planted to biodiesel feedstocks.

Table 9: Overall land use for biofuel feedstock production in Zambia

	Ethanol	Biodiesel	Total
Planned area for cultivation (ha)	58,383	927,049	**985,432**
Total area authorised (ha)	53,383	600,173	**653,556**
Reported Peak* area under cultivation (ha)	0	30,325	**30,325**
Estimated current area under cultivation (ha)	0	3,925	**3,925**
*= This corresponds to the area reported at the peak of production, prior to some projects terminating.			

Sources: Data gathered during the scoping exercise in January 2013 from the Zambian Development Agency (ZDA), the Ministry of Agriculture (MOA), the Ministry of Mines, Energy and Water Development (MEWD), and companies' representatives.

Biodiesel

At the height of interest in biofuels, there were 15 companies who were interested in producing feedstock for biodiesel in Zambia but only six of these reached production stage. All of these were involved in the production of jatropha, namely D1 Oils, ETC Bioenergy, Marli Investments, Oval Biofuels, Kansanshi Mining and Southern Biopower. Of these, only two — Kansanshi Mining and Southern Biopower — remain in operation (see Table 10). Neither of these companies produces for commercial markets: Kansanshi Mining produces for its own mining operations, and Southern Biopower uses biofuels and biogas from jatropha to fuel its own on-farm agribusiness operations only.

[14] Data from Zambia Sugar PLC, which was authorised in 2001, was listed in the scoping exercise but its main output is sugar.

This decline in interest is reflected in Table 9. While over 30,000 hectares of land were being cultivated under jatropha at the peak of production (between 2009 and 2010) the area reported to be currently cultivated has since declined considerably to around 4,000 hectares.

Ethanol

No ethanol projects currently operate or have got to an implementation stage in Zambia, although there is some information that three projects may be in the making (AgZam, Puzzolana and Zambia Sugar) as demonstrated in Table 10. These would all be sugarcane-based, but there is currently no further information available on these.

Table 10: Status of Zambian biofuels projects

Feedstock	Producing for biofuels	Producing for other purposes	Downsized	Ceased/ Suspended	Planned*
Jatropha	Kansanshi Mines, Southern Biopower		D1 Oils	Oval Biofuels; Marli Investments; Bedford Biofuels; ETC Energy; Ferrostaal	Kaidi Biomass
Oil Palm		Gourock; Zampalm			Biomax
Sugarcane		Zambia Sugar			AgZam Puzzolana

*projects in the planned category are either new projects or older projects which never progressed passed the planning phase. The benchmark for inclusion is low: projects all had an understanding with the government to start the registration process, but have not necessarily secured financing or undertaken further administrative procedures.

Sources: Zambian Development Agency (ZDA), the Ministry of Agriculture (MOA), the Ministry of Mines, Energy and Water Development (MEWD), and sources listed in Annex 1.

National policy context

There is still some policy-level support for biofuel projects in Zambia. In 2011, the Zambian government established official blending ratios of 5% for biodiesel and 10% for ethanol. On the other hand, the government continues to provide subsidies for fossil fuel, thereby hampering the price competitiveness of biofuels. The Zambian Development Authority continues to promote investments in the biofuel sector, although it is not one of their priority sectors.

4.5 Indonesia

Indonesia presents a different case to the other countries included in this scoping exercise, due both to its location outside of Africa and to its longer experience of producing palm oil in large quantities, primarily for the edible oil market. In recent years, Indonesia has also embarked on efforts to increase its use of biofuels in its transport fuel sector and has introduced policy initiatives in order to attempt to spur production, including blending targets.

Status of biofuel projects

Indonesia has been relatively successful in expanding its biofuels sector, in contrast with the African countries analysed in this study. Although it has not met its domestic blending targets, international demand has provided incentives to expand production. Currently, 73% of biofuel production in Indonesia is exported, mainly to Europe (CIFOR 2011). However, areas of land which are used for biofuel production are difficult to assess, due to the fungible nature of palm oil and the fact that companies generally produce for dual (edible oil and biofuel) purposes. Therefore, tables on land areas dedicated to biofuel crops are not included in the analysis for Indonesia.

Biodiesel

Indonesian biodiesel output has been expanding rapidly over the last few years, doubling from 740 million litres in 2010 to 1.52 billion litres in 2011, and further increasing to 1.8 billion litres in 2012 with an expected rise to 2.2 billion litres in 2013 (USDA 2012). Currently, Indonesian companies have installed capacity to produce and refine 4.2 billion litres of biodiesel per year. Domestic biodiesel consumption increased from 220 million litres in 2010 to 304 million litres in 2011, with demand mainly coming from the transport sector.

Palm oil

Biodiesel is largely produced using palm oil as a biodiesel feedstock, with industry sources estimating it to constitute over 95% of the biodiesel produced locally. Every company reported to be involved in the production of biodiesel had palm oil operations, although three were also involved in jatropha and production of some other feedstocks (coconut, soya). While commercial private enterprises are the most important source of production, smallholders account for around 38% of production, with state-owned companies producing less than 10% of the total (PWC 2012). Over the last decade, expansion is thought to have been fastest in the smallholder sector, although there are also large areas of concessions held by businesses, which have not been fully cultivated.

There are currently 22 companies involved in the production of feedstock for biodiesel. The three palm oil-based biodiesel producers with the largest production capacity in Indonesia are PT Wilmar Bioenergi (production capacity>1 billion tonnes/year), PT Cemerlang Energi Perkasa (400,000 tonnes/year) and PT Ciliandra (250,000 tonnes/year). There are four other companies with capacity above 100,000 tonnes/year, with the remaining 14 companies producing less than 100,000 tonnes/year.

Since palm oil has multiple uses and many of the companies involved in production have downstream associated industries, it is difficult to attribute biofuel feedstock to specific oil palm plantations. Currently, it is estimated that there are eight million hectares under oil palm, concentrated mainly in Sumatra and Kalimantan (PWC 2012). More plantations are expected, with 2011 seeing additional permits for around 1.5 million hectares of palm oil plantation issued for these islands.

Given the rate of expansion of the palm oil sector, further research into the role of palm oil-based biodiesel in food security outcomes is likely to be more feasible than in other countries. Indeed, a small number of studies have been carried out to date on some aspects of this, with mixed findings, which will be discussed in the literature review.

Jatropha

Jatropha planting has been expanding over recent years, although at a slower rate than initial (optimistic) targets projected (Ditjenbun 2010).[15] By 2009, Indonesia had 9,310 hectares under jatropha, which was projected to grow to 21,000 hectares by 2014. However, most projects are still at the planning phase, with little production of jatropha to date, and there is little information on the planning and output as of yet. This slow rate of development is attributed to the low economic viability of jatropha production.

Ethanol

There are eight companies producing ethanol for biofuels in Indonesia. The largest producers are PT Indolampung and PT Molindo Raya, both of which have a capacity to produce 40,000 tonnes/year. The other companies have the capacity to produce less than half this amount. Indonesian ethanol is largely produced using the molasses by-product from sugar production (USDA 2012). Sugarcane plantations (for both sugar and ethanol production) are estimated to increase to 766,613 hectares in 2014. There are also plans to develop cassava plantations as a feedstock; however, these are still at a planning phase.

However, Indonesia has not produced any ethanol for domestic fuel consumption since 2010, due to rising costs and the lack of a price formula for ethanol blending needed to stimulate production for domestic markets. Instead, ethanol is largely produced for export for non-fuel, industrial uses.

National policy context

In 2008, the government legislated that from May 2012 onwards, petrol stations must sell non-subsidised biofuels,[16] and that fuel blending with subsidised biofuels is introduced at progressively higher rates. Blending mandates of between 5% and 10% (depending upon the consumption sector) are targeted by 2015 (MEMR 2012, USDA 2012). In addition, a new price formula for ethanol production is awaiting final approval, which should lead to the ethanol producing companies restarting production for domestic consumption after a two-year hiatus (USDA 2012).

[15] Timnas BBN aimed to achieve 1.5 million hectares of jatropha plantation by 2010 and 3 million by 2015.

[16] A media report from May 2012 (Indonesia Financial Today, 2012) indicated that companies were ready to start this, but no recent information was found on how much non-subsidised biofuel is currently sold.

5 Conclusions

What we know from the scoping study

The results of this scoping exercise indicate that much less land is allocated to biofuels projects in the four African countries reviewed than figures used in some key reports suggest. The total of the upper limits of estimates for the four countries from the four global databases and reports reviewed (see Table 1) came to over 3.1 million hectares, while the sum from the four country scoping studies was half that area, at little more than 1.5 million hectares. While it is important to remember that the databases and studies in Table 1 report land deals, rather than allocated land area, the fact that this difference is so large indicates that many reported deals have not translated into allocated land areas, and that allocations may have since changed.

The variation in figures across different databases also demonstrates that lack of reliable data is a big issue. Even in the country studies, while we had local consultants gathering and crosschecking information, and feel that the exercise reflects the general picture and trends in land-based biofuels projects, it was still hard to collect comprehensive and irrefutably current information, partly because data is often not centralised in one database, it can be out of date or reflects intentions rather than implemented activities. This is even more marked with the global land databases. There are some ongoing projects trying to improve the quality and availability of data (e.g., updating of the Land Matrix and the ILC's Land Observatories) but doing this properly requires significant resources and time.

Of the land reportedly allocated to biofuel production, a tiny proportion is actually being cultivated, due to a series of constraints, including: companies being hit by the global financial crisis; lack of viability of key feedstocks, particularly jatropha; and political and bureaucratic delays with formal land allocation. Some companies allocated land for biofuels have switched to producing other products from the same crop (e.g., sugar from sugarcane rather than ethanol) or have switched to other crops (e.g., from jatropha to rice) although switching land from its original intended use is more difficult in some countries than others.

In Indonesia, a different set of circumstances exists due to the potential to use the major feedstock — palm oil — for both biodiesel and edible oil production. This has meant that the development of the biofuel industry has faced fewer initial obstacles and proceeded at a faster rate, although this still lags behind the expected growth rate. By contrast, and in line with the four African countries, the jatropha sector has not got off the ground due largely to lack of economic viability. Due to lack of viable returns under current domestic market prices and policy conditions, there has been no production of ethanol for biofuel consumption in recent years.

What we don't know

It is too early to know whether the contraction in biofuels project development is indicative of a temporary setback or whether it is of a more permanent nature. However, the number of projects which have already ceased their operations and the time required for new projects to start up operations indicate that production will not reach significant levels in the four African countries anytime soon. Once again, Indonesia might prove to be the exception.

The biggest gap in information is that we do not know what is happening to the land that was allocated but has not been cultivated, nor do we have details on where that land came from. This would require a much more detailed study.

Next steps

Given the lack of progress in biofuels projects, it appears that in the African countries in the report, there is little basis to comprehensively investigate all the possible effects of increased biofuel production on food security. What could be analysed with further research is the impact of displacement of people and their localised agricultural activity, which occurs as part of land transfers. These effects are likely to be the same for biofuels projects as for land deals that

have other land use intentions. There are some documented case studies on this that will be reviewed as part of the literature review in the second part of this study.[17] However, further dimensions involving competition between factors of production and the role of local biofuel production in increasing local food prices are unlikely to be observable.

The most plausible area for further research would be to focus on the few projects identified to be producing biofuels through this exercise, such as the Acazis Ethiopia PLC in Ethiopia or the longer-standing oil palm projects in Indonesia, and carry out further research on how their activities are affecting local food production and access. Alternatively, further analysis of projects which have involved displacement of communities, despite not being implemented, could also be carried out. Both approaches are likely to be limited by the lack of ex-ante survey data on production and consumption, although it may be possible to get around this through the use of recall data. Although case studies would naturally have limited general validity, these could be selected by criteria to make them representative of projects.[18]

Finally, there is a strong need to address the information gap on the current status of land that has been allocated but not yet cultivated and the processes by which those areas were acquired. The focus on transparency in the forthcoming G8 summit, with an active interest in promoting transparency in land allocation and governance, will provide an important forum for discussing this need.

[17] See, for example, the Procana project in Mozambique.

[18] This could reflect methodologies suggested by FAO's Bioenergy and Food Security project and the Global Bioenergy Partnership. See: http://www.globalbioenergy.org/toolkit/analytical-tools/en/

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Indonesian Commercial Newsletter (May 2010), http://www.datacon.co.id/Agri-2010Sugar.html

Ministry of Energy & Mineral Resources (ESDM), Directorate General of New, Renewable Energy & Energy Conservation (Dec 2012), Bioenergy Indonesia: Policy, Industry & Initiatives

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PT Bakrie Sumatera (2011) Annual Report

PT Multikimia IntiPelangi (2012) Annual Report Indonesian Center for Estate Crops Research and Development, (2012), Biomass. Availability & Identification of Feedstock Potential in Indonesia.

USDA (2012) Global Agricultural Information Network Biofuels Annual Report Indonesia National Biofuels Taskforce (Timnas) (2006) Report on National Biofuel Development

Annex 1: List of sources contacted during scoping exercises

Mozambique

Government institutions

- The Centre for Agricultural Promotion (CEPAGRI)
- The National Directorate for New and Renewable Energies (DNER)
- The Ministry for coordination of Environmental Affairs (MICOA)

Civil Society Organizations

- WWF
- Justica Ambiental

Private Sector (Biofuel projects)

- Grown Energy Zambeze
- Massingir Agro Industrial
- Mocamgalp and Galp Buzi
- NIQUEL
- Cleanstar Mozambique

Tanzania

Government

- Tanzania Investment Centre
- Ministry of Agriculture, Food Security and Co-operatives
- Ministry of Land and Housing Development

Companies

- Contact with various companies

Visits to field sites in Bagamoyo, Kilwa, Rufiji, Dodoma, Morogoro and Kilombero, Mkinga, Pandgani, Bahi, Chamwino and Tanga.

Zambia

Government

- Zambian Development Authority
- Ministry of Agriculture
- Ministry of Energy, Water and Development

Civil Society Organisations

- Biofuels Association of Zambia and CSBF
- Civil Society Biofuels Forum

Indonesia

Government institutions

- Directorate General of New and Renewable Energy and Energy Conservation, Ministry of Energy and Natural Resources

Private Companies

- First Resources
- Wilmar International Eterindo Wahanatam Permata Hijau/ Pelita Agung
- Musim Mas
- Sime Darby
- Sampoerna Agro
- Bakrie Sumatera Plantations

Ethiopia

Government

- Ethiopian Investment Agency
- Agricultural Investment Support Directorate, Ministry of Agriculture

Other

- Previous work (in 2012) by in country consultant on biofuels

Annex 2: Note on use of data sources in Table 1

Table 1 provides an overview of areas of land which are dedicated to biofuel production according to information available in publicly available reports and databases. Country totals are not presented explicitly in the databases[19] but have been aggregated by the authors based on reported land deals that the databases say involve biofuels:

- The GRAIN database contains only biofuel deals and the country totals have been calculated by summing up the land area for each reported project in the database by country.
- The CIFOR database also only reports biofuel deals but includes some notes on project status for some projects. Where it is noted that particular projects have ceased, these have not been included in the total in Table 1.
- The Land Matrix database reports deals for all land-related transactions. Figures reported in the second column of Table 1 (Land Matrix) are therefore sums of that deals that plausibly involve biofuels listed in the Land Matrix database. Deals were included either if the primary crop was an important biofuel feedstock or if the company name indicated that the aim of the project was the production of biofuels.

[19] Apart from the figure for the total area of reported biofuel deals in Africa from Anseeuw et al. (2012) reported in the last column of Table 1.