GLOBAL POLICY AND LOCAL OUTCOMES: A POLITICAL ECOLOGY OF BIOFUELS IN GUATEMALA

Julia Tomei

University College London (UCL)

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Declaration

I, Julia Tomei, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed,

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Abstract

The thesis is an investigation of how global processes intersect with local contexts to shape the outcomes of biofuels for different social groups within Guatemala. Its theoretical stance is drawn from political ecology, which argues that phenomena such as the development of biofuels cannot be understood in isolation from the political economic contexts within which they are embedded. The analysis begins with a description of the European Union's evolving biofuels policy framework. It then turns to an examination of the outcomes in Guatemala, a country that has taken advantage of the opening up of global and specifically European markets for biofuels. The EU is by design one of the few markets to address the sustainability impacts of biofuels and the thesis examines the question of whether its objectives are being met.

Since 2006, the production of biofuels, specifically sugarcane ethanol, in Guatemala has increased from almost nil to more than 94 million litres per year in 2011-12. Virtually all of this production was destined for the EU market, which has been an important driver of this growth. This makes Guatemala an excellent case study for examining not only the impacts of increased global demand for biofuels, but also whether sustainability governance, as developed by the EU, adequately captures those issues that are salient to producer country contexts. The main empirical basis of the research is a series of more than seventy interviews, field visits and personal observations drawn from eight months field work in Guatemala. Interviewees ranged from the ex-Minister for Energy to peasant farmers. There are also interviews with EU officials.

The thesis argues that given Guatemala's history of civil conflict, weak governance and unequal land tenure the likelihood of developing an equitable and sustainable biofuels sector as envisioned and understood by European policy actors – one which would deliver rural development and environmental benefits – appears limited.

Table of Contents

Declaration 2

Acknowledgements 3

Abstract 4

Table of Contents 5

List of Figures 7

List of Tables 10

List of Acronyms 11

1. Introduction 13

1.1. A global to local analysis: the European Union and Guatemala 15

1.2. Research aim and objectives 16

1.3. Thesis Structure 18

2. The promise and the practice of biofuels 21

2.1. Conceptualising biofuels 22

2.2. Political ecology 27

2.3. Introducing biofuels 31

2.4. Biofuels: politically driven demand 35

2.5. Ecological Modernisation 39

2.6. Biofuel controversies: land, livelihoods and carbon 44

2.7. Producing biofuels: multiple crops, multiple markets 48

2.8. Lessons from political ecology: context matters 55

2.9. Conclusions 56

3. Researching biofuels 57

3.1. The Research Focus: aim and objectives 58

3.2. Epistemology and Methodology 59

3.3. Research Strategy 63

3.4. Field Research and Data Collection: in theory and in practice 68

3.5. Data Analysis, Representation and Writing 91

3.6. Conclusions 93

4. Governance for Sustainability: biofuels in the European Union 94

4.1. Governance for sustainability 95

4.2. The global governance of biofuels 103

4.3. Hybrid governance: the European approach to biofuels 107
4.4. Conclusions 124

5. Guatemala: a land of beauty and violence 126

5.1. Introducing Guatemala: state, society and economy 127
5.2. A land of poverty amidst plenty 130
5.3. Agriculture and land use 139
5.4. Energising Guatemala 144
5.5. Conclusions 151

6. Three models of biofuel production: sugarcane, jatropha and African palm 152

6.1. Biofuels: an abundance of ethanol and a drop of biodiesel 153
6.2. Sugarcane ethanol 154
6.3. Biodiesel: a nascent industry 170
6.4. Are biofuels a concern for Guatemala? 193
6.5. The role of domestic capital 195
6.6. Conclusions 197

7. Developing biofuels in the absence of the state 198

7.1. Historical perspectives 199
7.2. Actors: motivators and barriers 201
7.4. The absence of the state: a domestic market for biofuels? 218
7.5. Governing biofuels in the absence of the state 222
7.6. Conclusions 223

8. Governing for Sustainability: labour, land and environment 225

8.1. Sites of sugarcane cultivation 226
8.2. A modernising sector: land, labour and environment 244
8.3. Governance for sustainability: Guatemalan sugarcane ethanol 262
8.4. Conclusions 264

9. Conclusions 266

9.1. A multi-scalar approach to biofuels 266
9.2. Politicised biofuels 269
9.3. Biofuels in Guatemala 272
9.4. Governance for sustainability 275
9.4. Future research directions 279

References 282

Appendix I. Sample interview guides 326

Appendix II. Information Sheets..334
Appendix III. ISCC Principles and Criteria 336

List of Figures

Figure 1. Classifying Environmental Discourses 24

Figure 2. The Environmental Discourse Spectrum 25

Figure 3. Global biofuel production, 2000 – 2010 33

Figure 4. Projected ethanol production, exports and world prices, 2013 to 2022 34

Figure 5. Projected biodiesel production, exports and world prices, 2013 to 2022 34

Figure 6. The nested case study design 64

Figure 7. Map of Guatemala indicating the two areas of sugarcane production, the Pacific Coast and the Polochic Valley 67

Figure 8. Map of agricultural land capacity, Guatemala 72

Figure 9. Default GHG emission savings for selected biofuels compared with threshold values 120

Figure 10. Political and administrative map of Guatemala 127

Figure 11. "Widespread unrest on the South Coast" 134

Figure 12. Land use change in Guatemala, 1960 to 2012 140

Figure 13. Final energy consumption, 2012 145

Figure 14. Percentage share of net electrical generation by source, 1990- 2010 146

Figure 15. Women and children return home after collecting fuelwood, Escuintla, Pacific Coast 148

Figure 16. Rural energy realities: a traditional stove run on fuelwood, Community Nueva Alianza, Retalhuleu 149

Figure 17. The geographical location of the sugarcane cluster on Guatemala's Pacific coast 155

Figure 18. Evolution of Sugarcane Production in Guatemala, 1980-81 to 2012-13 156

Figure 19. Dehydration plant at DARSA, March 2012 164

Figure 20. The location of BioEtanol (circled) within the Pantaleon industrial complex, Santa Lucia Cotzumalguapa 167

Figure 21. Advertising sustainability: ISCC seal of approval at the Tululá sugar mill 170

Figure 22. The hut housing the now defunct Nueva Alianza biodiesel plant 172

Figure 23. The use of jatropha (foreground) as a hedge to protect sugarcane plantations 174

Figure 24. Intercropping of jatropha with pineapple and papaya in the corridor seco (dry corridor), Camotan 175

Figure 25. Jatropha field trials 177
Figure 26. African palm plantation, Valle del Polochic, Alta Verapaz................................. 179
Figure 27. Expansion of African palm in Guatemala, 2003, 2006 and 2010....................... 181
Figure 28. Transportation of palm fruits and temporary workers, Petén 189
Figure 29. Sugarcane cultivation on the Pacific Coast.. 227
Figure 30. Map of Guatemala's Pacific Coast 228
Figure 31. "Developing an educational programme for academic remediation, another project from the Pantaleon Foundation" 231
Figure 32. "Today we'll learn... what's behind a teaspoonful of sugar?"............................ 232
Figure 33. Map of the Polochic Valley 234
Figure 34. Promotional material for Chabil Utzaj 239
Figure 35. The Chabil Utzaj sugar mill, January 2012 241
Figure 36. Households located within metres of sugarcane crops, Escuintla 257
Figure 37. The felling of 'invisible' trees on the Pacific Coast 260
Figure 38. A man fishes in mangrove swamps, Escuintla 261

List of Tables

Table 1. Actual and projected production and consumption of biofuels (billion litres), 2000 to 2020 33
Table 2. Summary of interviews 75
Table 3. List of expert interviewees 75
Table 4. Summary of field visits, November 2010 to April 2012 88
Table 5. Selected national and supranational biofuel targets and potential feedstocks 104
Table 6. Description of EU-accepted sustainability schemes 121
Table 7. Origin of biofuels on the EU market, 2008 and 2010 123
Table 8. Distribution of farmland in Guatemala, 1979 to 2003 129
Table 9. Land area under agricultural production (thousand hectares), 2001 – 2010 141
Table 10. Number and percentage distribution of people by occupation in the agricultural sector, 2006 142
Table 11. Characteristics of small, medium and large-scale biofuel production 153
Table 12. Principal characteristics of the Guatemalan sugar mills 159
Table 13. Ethanol production in Guatemala, 2011-12 162
Table 14. Estimated installed biodiesel production capacity, 2011 171
Table 15. Evolution of palm oil cultivation, 2003 – 2010 180
Table 16. Guatemalan palm oil companies, 2012 182
Table 17. Fuel consumption and projected biofuel demand 201
Table 18. Actors with an interest in the biofuels sector 202
Table 19. Summary of perceived influences on biofuels in Guatemala 216

List of Acronyms

ACR	Asociación de Combustibles Renovables de Guatemala
ASAZGUA	Asociación de Azucareros de Guatemala
BCIE	Banco Interamericano de Integración Económico
CACM	Central American Common Market
CAP	Common Agricultural Policy
CENGICAÑA	Centro Guatemalteco de Investigación y Capacitación de la Caña de Azúcar
CEPAL	Comisión Económica para América Latina y el Caribe
CH_4	Methane
CGN	Compañía Guatemalteca de Niquel
CO_2	Carbon dioxide
CONAP	Consejo Nacional de Áreas Protegidas
CONCYT	Consejo Nacional de Ciencia y Tecnología
CUC	Comite de Unidad Campesina
DG	Directorate General
EESC	European Economic and Social Committee
EM	Ecological Modernisation
ENGO	European NGO interview
EP	European Private sector interview
EU	European Union
FAO	Food and Agricultural Organisation
FFV	Flex Fuel Vehicle
FONTIERRAS	Fondo de Tierras
FUNDAZUCAR	Fundación de Azúcar
FQD	Fuel Quality Directive
GA	Guatemala Academic interview
GDP	Gross Domestic Product
GG	Guatemala Government interview
GP	Guatemala Private sector interview
GHG	Greenhouse Gas(es)
GNGO	Guatemala NGO interview
GREPALMA	Gremial de Palmicultores de Guatemala
Ha	Hectares
HACCP	Hazard Analysis and Critical Control Point
ICC	Instituto Privado de Investigación sobre Cambio Climático
IDB	Inter-American Development Bank
IICA	Instituto Interamericano de Cooperación para la Agricultura
INAB	Instituto Nacional de Bosques
ISCC	International Sustainability and Carbon Certification
IO	International Organisation interview

ILO	International Labour Organisation
ISO	International Organisation for Standardisation
LCA	Life Cycle Analysis
MAGA	Ministerio de Agricultura, Ganadería y Alimentación
MARN	Ministerio de Ambiente y Recursos Naturales
MEM	Ministerio de Energía y Minas
Mha	Million hectares
MINECO	Ministerio de Economía
MINFIN	Ministerio de Finanzas Públicas
MOU	Memorandum of Understanding
MS	Member State
NGO	Non Governmental Organisation
OAS	Organisation of American States
OECD	Organisation of Economic Cooperation and Development
RD&D	Research, Development and Deployment
RED	Renewable Energy Directive
RFS2	Renewable Fuel Standard 2
RSB	Roundtable on Sustainable Biomaterials
RSPO	Roundtable on Sustainable Palm Oil
RTRS	Roundtable on Responsible Soy
SAA	Secretaría de Asuntos Agrarias de la Presidencia de la República
SEGEPLAN	Secretaría de Planificación y Programación de la Presidencia
TNC	Transnational corporation
TOE	Tonnes of oil equivalent
UCO	Used cooking oil
URL	Universidad Rafael Landivar
USAC	Universidad de San Carlos
USAID	U.S. Agency for International Development
UVG	Universidad del Valle de Guatemala

1. Introduction

Since the turn of the century, biofuels have been promoted as a sustainable alternative to hydrocarbon transport fuels. The most commonly cited drivers are climate change mitigation and energy security, although the potential benefits of biofuels for rural development have also provided important motivations (Rosillo-Calle and Johnson 2010). It is argued that biofuels offer a technological solution which leads to 'win-win' outcomes for environment and economy (Mol 2007). As a result, biofuels have rapidly become a favoured policy option and many governments, both in the global North and global South, have established policy frameworks to promote the production and consumption of biofuels (Dauvergne and Neville 2010; Sorda et al. 2010).

Biofuels therefore provide an example of a politically-instituted market (Pilgrim and Harvey 2010), in which both the demand and the institutional frameworks that govern their use have to be created. Biofuels do not offer a radically new service, but rather provide a renewable alternative to conventional petroleum-derived fuels. This is both a strength and a weakness. While biofuels are a technology that can be used with few modifications to existing infrastructure, it means that they also compete with incumbent fossil fuel transport technologies. Hampered by high production costs and yet to benefit from economies of scale and learning effects, biofuels have required policy support to establish demand. This support has taken the form of research, development and deployment (RD&D), market development policies and financial incentives (Sorda et al. 2010). In particular, many governments have legislated demand for biofuels through mandated markets, which require transport fuel suppliers to blend a minimum amount of biofuels in their products. In effect, this guarantees the biofuel industry and fuel suppliers a market of minimum size (Pilgrim and Harvey 2010).

Many countries and regions that have established domestic mandates for biofuels are unable to meet their biofuel commitments through domestic production alone. This production deficit offers the potential for increased trade with producer countries, offering potential benefits to both parties: new markets for producer countries and diversified energy supply for importers (Mathews 2007). Moreover, while most of the demand for biofuels is concentrated in the industrialised world, much of the production potential is located in the global South, where there are higher rates of productivity, greater land availability and lower labour costs. For some, this situation raises hopes that increased biofuel production and trade will provide opportunities for product diversification and macroeconomic growth, as well as offering a route out of poverty for rural communities in the developing world (Mol 2007).

However, despite original optimism that biofuels represented a win-win, low-carbon alternative for liquid fuels in the transport sector, concerns about their unintended consequences have grown. In particular, the rationale that biofuels delivered carbon benefits has been undermined by growing evidence that suggests biofuels can be more carbon intensive than the fossil fuels they replace (e.g. Pimentel and Patzek 2005; Fargione et al. 2008). One of the key reasons that biofuels found social and political acceptance was the assumption that they were carbon neutral. This means that even though carbon dioxide (CO_2) is emitted when the biofuel is burned, the carbon will have been taken from the air and stored in the plant during its growth. In practice, however, the cultivation, harvesting, processing and distribution of biofuels all release greenhouse gases (GHG) (Davis et al. 2009). Moreover, biofuel feedstocks grown on land that was previously forest, wetland, peatland or grassland incur a carbon cost from the loss to atmosphere of above and below-ground carbon; this also has implications for biodiversity (Pin-Koh and Ghazoul 2008). However, it is not only the carbon benefits that have been questioned as controversies over competition with food crops (e.g. Rosillo-Calle and Johnson 2010; Thompson 2012), large-scale land acquisitions (e.g. Anseeuw et al. 2012; Fairhead et al. 2012), and indirect land use change (e.g. Searchinger 2008; RFA 2008) have undermined the purported benefits of biofuels. Indeed, claims about the environmental and social costs and benefits of biofuels have led to an increasingly polarised debate amid concerns that policy has moved ahead of the evidence (Sharman and Holmes 2010; Upham et al. 2013).

Finally, some criticisms of biofuels have focused on the potential for an unequal exchange of materials, goods and services between the global South and the global North (Kuchler 2010). Although others have argued that this overlooks increasingly complex 'webs' of international trade in biofuels, with some countries, such as Brazil, better placed to capitalise on the opportunities offered by the increased trade (Dauvergne and Neville 2009). However, the costs and benefits within producer countries are likely to be distributed unevenly amongst different social groups. Well-capitalised domestic producers, often in alliance with transnational corporations and governments, look set to benefit, while already vulnerable people in the global South are likely to bear a disproportionate share of the costs

(Dauvergne and Neville 2010). However, academic research on the local level impacts of global demand for biofuels in the global South remains scarce (Hodbod and Tomei 2013).

1.1. A global to local analysis: the European Union and Guatemala

This doctoral thesis addresses one aspect of this complex picture, namely how global demand for biofuels is transformed into local outcomes. It does this by focusing firstly on the European Union (EU) as a proxy for global demand and, secondly, on the local level implications in one producer country, Guatemala.

The EU has been a key player in the promotion of biofuels. The bloc has created one of the biggest global markets for biofuels and is one of the few markets to address the sustainability impacts of biofuels. Originally promoted as an option for decarbonising the transport sector, and having apparent benefits for agriculture and energy security policy, the policy framework supporting biofuels has strengthened over time. In 2009, the Renewable Energy Directive (RED) established a mandatory 10% renewable fuels target by 2020 for the transport sector. However, even as the EU legislated mandatory demand for biofuels, doubts about the purported benefits of biofuels were growing, even within European institutions. In order to address these growing concerns about the negative environmental and social impacts of biofuels, the RED also established mandatory sustainability criteria (EC 2009a). Only biofuels that meet the sustainability criteria count towards the 10% target and are eligible for financial support. While these criteria represent an important innovation in the governance of biofuels, they have not, as some might have wished, provided the assurances necessary to stem further controversy. The debate is no longer about creating the 'right' framework for biofuels, but rather about whether these fuels should be promoted in the first place.

Between 2008 and 2010, around 80% of the biofuels consumed within the EU were produced by EU Member States (Ecofys 2011, 2013), yet it is biofuel imports that have caused the most controversy. While the role of imports to the EU has shifted as the policy framework has evolved, an autarkic approach to meeting demand was never regarded as either possible or feasible (EC 2005). Guatemala is one country that has taken advantage of the opening up of global, specifically EU, markets for biofuels.

Guatemala is the most populous nation in Central America, with a population of almost 15 million of whom almost half are indigenous. Despite its small size (it has a land area of 108,889 km^2) the country has an incredible diversity of climates, landscapes and cultures. During the twentieth century Guatemala experienced almost four decades of civil war, which culminated in a brutal counterinsurgency campaign and a militarily-controlled transition to democracy (Grandin et al. 2011). The signing of the Peace Accords in 1996 ushered in a new era, one which has led to increased participation in the global economy, but also to growing levels of violent crime, corruption and impunity. The failure of successive governments to address the root causes of the civil conflict, namely social disparities, racism and extreme inequality, has also had consequences for the country in peacetime.

Interested in doing the research in Latin America, I sought an under-researched country that was developing a biofuels sector where issues of land use, marginalisation and power were likely to be important. Many of the countries of Central America are in the process of developing biofuel policies and programmes, including Costa Rica, Nicaragua and Guatemala (Tomei and Diaz-Chavez 2014). Only Guatemala, however, is currently producing biofuels on a large scale. Identified as the strongest potential leader in Central America for the production, trade and use of biofuels (USDA 2010, 2012a), since 2006 the production of biofuels, specifically sugarcane ethanol, has increased from almost nil to more than 103 million litres in 2011/12. Production has since fallen, for reasons that will be explored in this thesis. Virtually all of this production was destined for the EU market, which means that the biofuel produced in Guatemala has also been certified sustainable. However, whether biofuels produced in Guatemala are 'sustainable' is deeply contested, illustrated by NGO reports which highlighted the negative impacts of 'agrofuels', particularly for marginalised communities (e.g. ActionAid 2008, 2012; Mingorría and Gamboa 2010; Alonso Fradejas et al. 2011; Alonso Fradejas 2012a). This made Guatemala an excellent case study for examining not only the impacts of increased EU demand for biofuels, but also whether sustainability, as conceptualised by the EU RED, can capture those issues that are salient to the Guatemala context.

1.2. Research aim and objectives

The aim of this thesis is to investigate the sustainability outcomes of biofuels in Guatemala, and how this intersects with the European framework to govern the sustainability of biofuels. It does this through a global to local analysis, which examines the interdependent ways in which biofuels are produced, marketed, sold and consumed. Understanding biofuels as embedded within, and therefore shaped by, Guatemala's highly fragmented society, this thesis emphasises the key issues of scale, power and marginalisation and the outcomes for different social groups. The frame of analysis that underlies this doctoral thesis is political ecology, a research field that links natural resource management to contemporary and historical political economy. This framework suggests that that phenomena such as biofuels cannot be understood in isolation from the political economic contexts within which they are embedded (Blaikie and Brookfield 1987; Bryant and Bailey 1997). The adoption of a political ecological framework brings global factors (such as institutions, markets and regulations), which may privilege certain actors and outcomes, to the forefront of the analysis. The thesis is driven by the following objectives:

1. To examine the European Union's governance framework for biofuels;
2. To discuss the mechanics of biofuels production in Guatemala, as embedded within historical and contemporary agrarian political economies;
3. To investigate the role and motivations of different actors in the development of Guatemala's nascent biofuels sector and the consequences for the governance of the sector;
4. To examine the outcomes of sugarcane ethanol production for different social groups; and,
5. To assess whether the European Union's approach to governance for sustainability captures those issues that are salient to the Guatemalan context.

Political ecology lends itself to both qualitative and quantitative investigation and this research adopted a largely qualitative methodology. While the research aim and objectives have evolved as the research progressed, the need to analyse both the multiple scales (i.e. from the community level to the international arena) and to incorporate the voices of the multiple actors involved in producing, promoting and contesting biofuels has remained constant. This study used qualitative research methods to reveal these multiple voices and to generate the rich empirical detail that would enable an understanding of the political-economic processes that influence the local level outcomes of biofuels.

The data upon which this research is based have been generated using a non-linear and iterative research approach, concentrated in three phases of fieldwork that were carried out in Europe and in Guatemala. Over eighty interviews, multiple field visits and personal observations were conducted during the field research, the core of which was a seven month period in Guatemala. Interviewees ranged from an ex-Minister for Energy to peasant farmers; there were also interviews with EU actors, including civil servants, NGOs and industry.

1.3. Thesis Structure

The thesis is structured as follows: **Chapter Two** begins with an overview of the promise and the practice of biofuels. This chapter draws out three interconnected themes drawn from political ecology that form analytical threads that run throughout this thesis: scale, marginalisation and power. It then sets out the discursive journey that has seen biofuels shift from being a socially and politically acceptable alternative to conventional transport fuels to a controversial technology choice. It reviews the existing literature on the practice of biofuels, focusing on the production of biofuels in the global South. It suggests that the early promise that biofuels could bring local livelihood benefits has largely been superseded by a large-scale agroindustrial reality, wherein the benefits accrue to well-capitalised actors. However, it also cautions that the negative impacts of large-scale biofuels should not be assumed *a priori*; rather, the outcomes of biofuels will depend on the political economic contexts within which they are embedded.

Chapter Three describes the methodology used in this research. This chapter begins by re-introducing the research focus, aims and objectives. The implications of a political ecological approach for the research philosophy, approach and strategy are then discussed. It then describes the nested case study approach adopted by this research and examines the methodological questions raised through conducting research on the political ecology of biofuels, specifically in the global South. A discussion of the research methods follows, before the process of analysing and writing the research is described.

Chapter Four focuses on the governance of biofuels and, in particular, on the EU as the largest import market for biofuels. The chapter begins with an introduction to the literature on governance for sustainability, highlighting the shift towards polycentric governance regimes that involve multiple actors across multiple scales. It then turns to an analysis of the way in which biofuels have been governed to date by the EU, drawing out changes in conceptualisations of sustainability in biofuel policy debates. This chapter draws on documentary evidence and interviews with EU officials, NGOs, industry and academics to track the EU's evolving policy and legal framework. It focuses on the sustainability requirements of the EU RED and the potential implications of this negotiated framework for exporting countries.

Building on the argument that context matters for understanding the local level outcomes of biofuels, **Chapter Five** describes Guatemala's natural environment, socio-economic context, politics and economy. It then moves on to discuss its history, focusing on its agrarian history, which established a pattern of dominance and subordination that persists today. The role of traditional export-agriculture, which led to the concentrated accumulation of wealth by a few families, is highlighted. Bringing the analysis up to date, the next sections describe Guatemala's agricultural and energy sectors. These sections again highlight the disconnect between the lived realities of rich and poor in Guatemala. The chapter concludes with a short introduction to the Guatemalan biofuel sector.

The first of three empirical chapters, **Chapter Six** examines the agricultural systems that provide the foundation for understanding the production of biofuels in Guatemala. It identifies three possible biofuel models: large-scale ethanol from sugarcane; large-scale biodiesel from African palm; and small and medium-scale biodiesel from various feedstocks. Noting that there is no domestic market for biofuels, the chapter describes each of these models in turn, focusing on three key potential feedstocks (sugarcane, *Jatropha curcas* L. and African palm. Drawing on interview and secondary data the chapter discusses the land use implications of the different feedstocks and introduces the sustainability issues associated with their production.

Building on the previous discussion, **Chapter Seven** explores the question of why there is no domestic market for biofuels. It finds that biofuels in Guatemala are driven by domestic private sector actors rather than the Guatemalan state. These domestic actors are not motivated by the purported environmental and rural development benefits of biofuels, but rather by economic gains. This chapter analyses the motivations, perceptions and characteristics of different actors involved in promoting and contesting biofuels and explores the distinct institutional traits that have prevented the development of a national biofuels policy. Interview data are used to show how the weakness of the Guatemalan state has allowed some actors, but not others, to influence the way in which the sector has developed.

The final empirical chapter, **Chapter Eight**, focuses on the sustainability of sugarcane ethanol, the only biofuel currently being produced on a large-scale in Guatemala. It draws on interviews and field visits in the two regions where sugarcane is being produced in Guatemala: the Polochic Valley, which in March 2011 was the site of forced evictions; and the Pacific Coast, which has a long history of export-oriented agriculture. Contrasting local narratives with those of ‘experts’ charged with ensuring Guatemalan production complies with the EU’s sustainability criteria, this chapter finds that although the sector encountered few difficulties demonstrating compliance, the sustainability outcomes were by no means uniformly positive. It argues that many of the criticisms of biofuels are situated within complex debates about the nature of modernity and the country’s historical and contemporary legacy of inequality and poverty. The chapter concludes with a discussion of whether the EU’s governance structure captures the sustainability concerns that matter to Guatemalans.

Finally, **Chapter Nine** synthesises the research findings. It highlights the main empirical, conceptual and methodological contributions of the research, and suggests some avenues for future research.

2. The promise and the practice of biofuels

In less than a decade biofuels transitioned from being a socially and politically acceptable alternative to conventional transport fuels to a deeply contested technology solution. Claims of land grabs, food riots and forest loss have emerged to undermine the sustainability rationale that originally motivated the adoption of biofuels. In this chapter I map this discursive journey and argue that ecological modernisation provides a persuasive rationale for biofuels. Both a theory and a discourse, ecological modernisation emphasises the potential gains for both environment and economy from addressing environmental problems. As advocated by ecological modernisation, biofuels are a solution that comes from within the existing political economic system, one that requires no major changes in infrastructure or consumption patterns. The lack of natural markets for biofuels has, however, meant that politics have been important in creating the demand for this technology; yet, the unintended consequences of biofuels have raised the question of whether political imperatives have been privileged over the growing evidence base that documents the negative impacts of first generation biofuels.

In this chapter, I draw on insights from political ecology and use the analytical themes of scale, marginalisation and power to examine the global and local outcomes of biofuels. I argue that biofuels represent a highly complicated technology-policy complex; one that links multiple agendas, sectors and markets. This means that general statements about whether biofuels are 'good' or 'bad' are unhelpful since they mask the importance of context in determining the actual outcomes of biofuels and the differentiated impacts on social groups within producer countries. I then review the literature on the practice of biofuels, focusing on the production of biofuels in the global South, both small and large-scale. I suggest that the early promise that biofuels could bring local livelihood benefits has largely been superseded by a large-scale agroindustrial reality, wherein the benefits accrue to well-capitalised, globalised actors. Moreover, the highly technological, capital-intensive nature of this model of biofuel production makes it difficult to include local communities and marginalised actors. However, the negative impacts of large-scale biofuels should not be assumed *a priori*; rather, the outcomes of biofuels will depend on the political economic contexts within which they are embedded.

The rest of this chapter is structured as follows: the first section draws on Dyzek's work on environmental discourses to provide an overarching framework for conceptualising the emergence and subsequent development of biofuels. It then turns to the literature on political ecology, a field which has demonstrated the importance of both discursive and material factors in understanding and addressing environmental problems. The third section reintroduces biofuels, focusing on current and future consumption, production and trade in biofuels, before the third section describes the history of biofuels and the current drivers of increased global demand for this commodity. In the fourth section, I draw on Ecological Modernisation to explain why biofuels found political traction, while the following section explores the controversies that have since emerged to undermine the original promise of biofuels. The next section then focuses on the production of biofuels, highlighting the increasing connectivity of biofuels trade. Two scales of biofuel production – small-scale, community level and agroindustrial production – are then explored in more detail and the outcomes for different actors highlighted. The penultimate section returns to political ecology arguing that context matters for determining how the costs and benefits of biofuels are distributed. The final section concludes the chapter.

2.1. Conceptualising biofuels

This thesis draws upon a range of literatures in order to understand, conceptualise and explain the emergence of biofuels in the global arena and the specific sustainability outcomes in Guatemala. This approach is necessitated because biofuels are complex; they present an interconnected and multidimensional phenomenon that interacts with diverse policy domains (including agriculture, environment, energy, economics, technology and innovation, international development and so on), across different geographies, scales and timeframes. Biofuels are supported and opposed by a range of different discourses, creating tension and triggering extensive debate about the nature and desirability of their development. These arguments are underpinned by radically different paradigms and approaches to economic development, environmental sustainability and social justice. In this thesis, I draw on John S. Dryzek's seminal work on environmental discourse in order to make sense of these multiple, often competing discourses of biofuels.

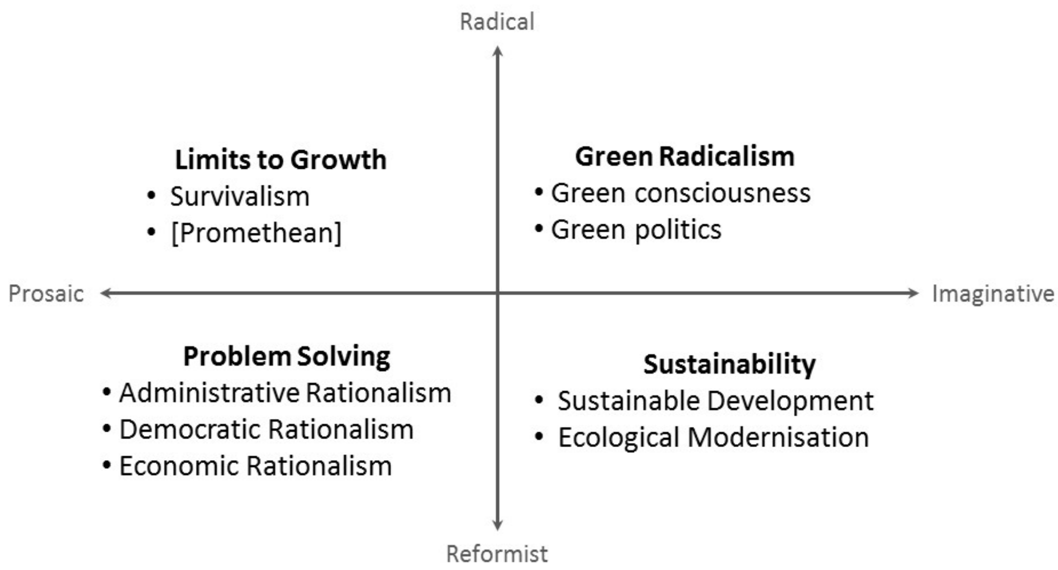
Dryzek provides a framework for conceptualising and organising environmental discourses, which he describes as 'a shared way of apprehending the world' (2005: 9). He goes further, explaining:

> '[A discourse is] embedded in language, it enables those who subscribe to it to interpret bits of information and put them together in coherent stories or accounts. Discourses construct meanings and relationships, helping to define common sense and legitimate knowledge. Each discourse rests on assumptions, judgements and contentions that provide the basic terms for analysis, debates, agreements and disagreements. If such shared terms did not exist, it would be hard to imagine problem-solving in this area at all, as we would have continually to return to first principles' (p.9).

Discourses, therefore, not only provide a 'shared way' of understanding a phenomenon – in this case, biofuels – but can also have a 'real world' impact in terms of policies and practices (Fairhead and Leach 1996; Adger et al. 2001; Dryzek 2005). Discourses may 'reinforce or challenge' existing social and economic arrangements (Bryant and Bailey 1997: 21), and may constrain or enable what constitutes 'knowledge', excluding some voices whilst privileging others. Discourse therefore becomes a key means through which power operates (Foucault 1980). The power of ideas and hence struggles over meaning feature prominently in political ecology and scholars have explored divergent constructions of nature, ecology and environmental concerns, such as soil erosion (Blaikie and Brookfield 1987), climate change (Adger et al. 2001), biodiversity (McKenzie 2005), development (Escobar 1995, 1996), and the privileging of some narratives over others (Hajer 2005; Paulson and Gezon 2005; Robbins 2012).

Dryzek (2005) identifies four basic environmental discourses, which he argues have emerged in response to the dominant discourse – 'industrialism'. For Dryzek, industrialism encompasses competing ideologies such as conservatism, (neo)liberalism, socialism, Marxism and fascism, which – in spite of their differences – have all overlooked and suppressed environmental concern in favour of a commitment to economic growth (2005: 13). While assumptions about the relationship between 'nature' and humans vary, all of these discourses are characterised by concern for the environment and by modification or rejection of industrialism. These four broad categories are then broken down into eight environmental discourses and one counter discourse, Promethianism, which is characterised by a denial of environmental limits. As shown in Figure 1, Dryzek defines these discourses along two dimensions.

Figure 1. Classifying Environmental Discourses



Source: Author's own

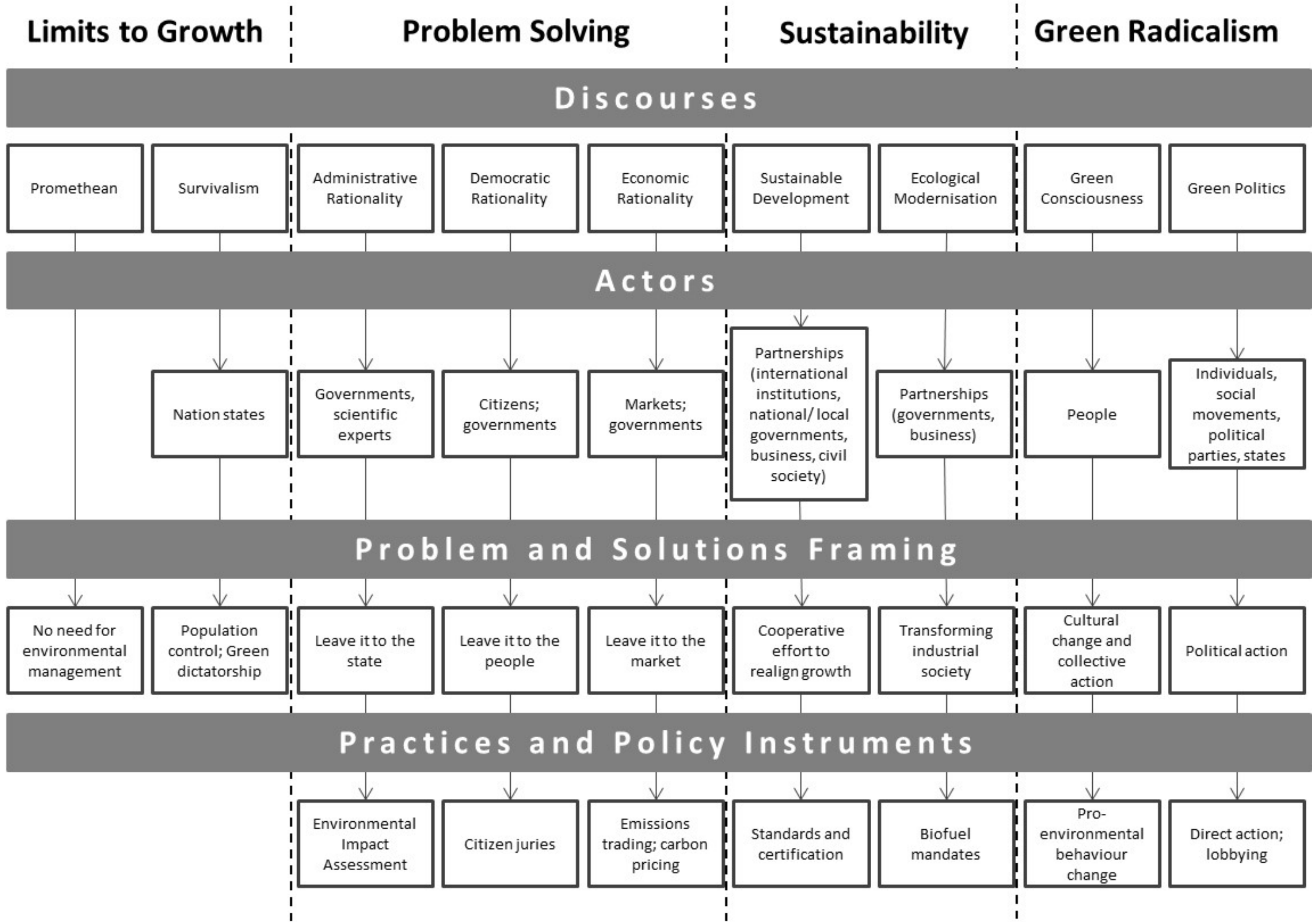
The first dimension, reformist or radical discourses, considers the extent to which the alternative discourses seek to move away from industrialism; while the second, prosaic or imaginative, defines the character of the proposed alternatives to industrialism. For Dryzek, whilst prosaic discourses:

> 'take the political economic chessboard set by industrial society as pretty much given... They require action, but do not point to a new kind of society... In contrast, imaginative departures seek to redefine the chessboard. Notably, environmental problems are seen as opportunities rather than troubles' (p. 14).

Each of these discourses embodies different ontologies, ideas, storylines, actors and practices; each therefore also promotes different responses and solutions to perceived environmental problems. For example, top-down environmental regulation is a characteristic of Administrative Rationalism (a sub-category of the Problem Solving discourse), while a Sustainable Development discourse promotes less hierarchical solutions that rely on networked polycentric governance arrangements (Dryzek 2005; see also, Glasbergen 2007; Paterson 2009). Figure 2 illustrates some key characteristics of the environmental discourses identified by Dryzek (2005).

Discourses are often portrayed in hegemonic terms. According to this line of reasoning, at any one time particular understandings of an environmental problem will gain traction leading

Figure 2. The Environmental Discourse Spectrum



Source: adapted from Allen (2012) and Dryzek (2005) to alternative understandings being discredited (Hajer 1995). However, biofuels are supported and opposed by different discourses, none of which are hegemonic overall. An Ecological Modernisation discourse, which assumes ecological protection and economic development can be reconciled, underpinned the emergence of biofuels. This discourse is still prevalent amongst those who support the large-scale production and trade in biofuels (e.g. Mathews 2007; IEA 2011; REA 2013a, 2013b; FAO 2013a). Ecological Modernisation will be assessed in relation to the emergence of biofuels in Section 2.5. Many of those who oppose biofuels adhere to a Green Radicalism discourse with these actors, including many academics and NGOs, calling for more radical changes to the status quo (e.g. Holt-Gimenez and Shuttack 2009; McMichael 2009, 2010; FOE 2010; White and Dasgupta 2010; ActionAid 2011). While not hegemonic, it is Sustainable Development that has arguably become the dominant discourse of biofuels. Not only is it the primary way in which people talk and think about biofuels, but many of the proposed solutions to address the negative impacts of biofuels are characterised by the decentred policy approach typical of sustainable development (see Figure 2). Unlike many other expressly environmental discourses, sustainable development also incorporates social wellbeing and inter and intra-generational equity (Dryzek 2005; Adger and Jordan 2009). For example, one narrative that maps (albeit approximately) onto this discourse focuses on the small-scale production of biofuels to provide local energy access specifically in the global South (e.g. Ejigu 2008; Practical Action 2009). The discourse of Sustainable Development is, however, contested and ambiguous, which is considered to be both its strength and its weakness (Dryzek 2005; Faber et al. 2005; Hysing 2010). It is not the aim of this research to analyse the Sustainable Development discourse, yet because it has become 'the dominant global discourse of ecological concern' (Dryzek 2005: 145), it is an issue that recurs throughout this thesis. I will discuss the concept (rather than the discourse) of sustainable development in more depth in Chapter Four, specifically in relation to the governance of biofuels.

Not all of the discourses identified by Dryzek are relevant to this thesis; for example, the Survivalism discourse, with its focus on global environmental limits, is largely absent from the biofuels debate. Other narratives sit less easily within Dryzek's typology, an example being the small-scale, localised vision of biofuels referred to above. Although this fits within the Sustainable Development discourse, this is largely a virtue of it being one of the few discourses to incorporate the social dimensions of environmental change and to consider the global South. However, one of the criticisms of the discourse of Sustainable Development is that it is fundamentally a 'Northern' concept, one which requires few changes to the dominant model of industrial capitalism and therefore continues to perpetuate poverty (e.g. Escobar 1995, 1996; Bryant and Bailey 1997; Neumann 2005). Political ecology has functioned as a key critique of the discourse of Sustainable Development (Neumann 2005). Whilst Dryzek's typology is therefore useful for conceptualising the emergence, contestation and governance of biofuels, another perspective is required to interrogate these discourses and to analyse how these global environmental discourses intersect with local contexts (e.g. Fairhead and Leach 1996); for this, I turn to political ecology.

2.2. Political ecology

Political ecology emerged in the 1970s in response to apolitical explanations of ecological change, such as neo-Malthusian[1] theories (i.e. Dryzek's Survivalism discourse), technocentric approaches and neo-classical economic models (both Problem Solving discourses), which failed to recognise the dependence of the economy on the natural environment (Neumann 2005). By giving politics 'analytical pride of place', political ecologists sought not only to overcome the perceived shortcomings of other approaches, but also to understand the ways in which 'the status quo is an outcome of political interests and struggles' (Bryant and Bailey 1997: 5). While the field has since evolved and diversified, the central focus remains the exploration of the relationships between nature and society, and the material and discursive dimensions of these interactions (Neumann 2005).

The most oft cited definition of political ecology is that of Blaikie and Brookfield (1987), who state that:

> 'the phrase 'political ecology' combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself' (p. 17).

In other words, by situating environmental change within a 'broadly defined political economy', political ecological studies bring to the fore the political economic factors that shape and constrain the use of natural resources at the local level (Blaikie and Brookfield 1987; Rocheleau et al. 1996; Bryant and Bailey 1997; Robbins 2003; Peet and Watts 2004; Peet et al. 2011). A focus on scale, both vertical and horizontal, as well as temporal, is a mainstay of political ecology.

[1] The idea that population growth is the primary cause of environmental degradation.

Political ecological scholars have analysed various forms of environmental change including soil erosion (Blaikie 1985), land degradation (Blaikie and Brookfield 1987), climate change (Adger et al. 2001; O'Brien and Leichenko 2003), deforestation (Hecht and Cockburn 1989), and environmental governance (Eden 2011). Political ecology is not a theory nor does it imply a specific methodology, but rather it represents a 'community of practice' (Robbins 2012: 20). Political ecology links the environment to political economy, the global North to the global South, production to consumption, and material to discursive practices. As such, it offers not only an understanding of environmental change, but also a conceptual toolkit for an analysis of the impacts of global biofuel policy, particularly on local communities and environments. Typically, political ecologists draw on social and ecological evidence to critically assess human-nature interactions and to challenge prevailing approaches to and understandings of environmental change. For example, scholars have questioned the equation of upland deforestation with lowland soil erosion (Forsyth 1996), the misreading of 'deforested' savannah landscapes (Fairhead and Leach 1996), and the perceived superiority and equity of community-based conservation schemes (Bryant 2002). A more structural approach to political ecology was a characteristic of early political ecology, and emphasised the biophysical dimensions of environmental change (e.g. Blaikie and Brookfield 1985; Walker 2005). Since the 1990s, pststructural approaches to political ecology (e.g. Escobar 1996) have emphasised the social construction of knowledge and the privileging of particular knowledge(s) – especially scientific analyses of environmental problems – which may lead to inappropriate, simplistic and unjust interventions. However, political ecology seeks not only to explain ecological change, but also to address it – to contribute to the wellbeing of people and the environments in which they live (Peet and Watts 2004; Blaikie 2012). Robbins (2012: 13) suggests that political ecology seeks not to simply be retrospective or reactive, but also to be progressive, 'plant[ing] the seeds' for alternative forms of environmental management. This explicitly normative agenda chimes with Peet and Watt's (2004) focus on 'liberation' political ecologies, and the calls of scholars-cum-practitioners Piers Blaikie (2012) and Dianne Rocheleau (2008) for a more 'engaged' and 'applied' political ecology.

The multiple scales, locations and discourses of biofuels lend themselves to a political ecological approach, yet there have been very few such accounts of biofuels; Ariza-Montobbio and Lele (2010), Ariza-Montobbio et al. (2010) and Hollander (2008, 2010) provide exceptions. Pere Ariza-Montobbio's research has focused on the political, technical and social construction of *Jatropha curcas* L. (hereinafter referred to as jatropha) in India and its consequences for small farmers and rural communities, while Gail Hollander's research has focused on 'ethanol assemblages', specifically regional alliances emanating from the U.S. to Latin America and the Caribbean. There have been rather more papers that have interrogated the political economy of biofuels, some focused on the global effects of this commodity (e.g. Dauvergne and Neville 2009, 2010; Borras Jr et al. 2010), while others have centred on national political economies (e.g. Hunsberger 2010). This deficit is surprising, especially given the focus within political ecology on linking proximate factors of environmental change to the distal factors that shape the settings within which decisions are made. Increased global demand for a new agricultural commodity, i.e. biofuels, provides an example of a distal factor that influences the decisions made by land managers, which in turn has consequences for local environments and communities. In focusing on the how global biofuel discourses intersect with local, specifically Guatemalan, contexts this research therefore represents a contribution to this literature.

Furthermore, and heeding the call for a more applied political ecology, this research also pays attention to both the discursive and material factors that influence the outcomes of biofuels in the Guatemalan context. In so doing, it bridges structural and poststructural approaches to political ecology. It also draws on Bryant and Bailey's actor-oriented approach to political ecology, which emphasises the need to focus on the interests, characteristics and actions of different actors (1997). This approach views conflicts (and cooperation) over resources as an outcome of the interactions between the diverse, typically competing interests of different actors. In adopting this hybrid approach, this research seeks to capture the complexities of political, economic and ecological dynamics, across the multiple scales of biofuels. The operationalisation of this approach will be discussed in Chapter Three.

Having discussed the history and praxis of political ecology, and set out the approach taken by this research, I now turn to examination of three interconnected themes from political ecology are especially relevant to this study of global policy and biofuels in Guatemala: scale, marginalisation and power.

2.2.1. Scale, marginalisation and power

Scale – both temporal and spatial – is an important analytical concept in political ecology. Adopting an approach grounded in political ecology involves situating local environmental problems within their broader historical and political economic context and, conversely, tracing the consequences of global policy shifts for local outcomes. By adopting an approach that investigates the multi-level connections between global and local phenomena, political ecological studies are able to trace the causes of environmental problems to broader systems, demonstrating that outcomes at the local level are often tied to distant and often indirect factors (Turner and Robbins 2008). External structures, such as global markets and international institutions, provide the framework which shapes the decision-making processes of national and local actors and which serves to explain the (local) outcomes of policies, practices and programmes (Ariza-Montobbio et al. 2010). These scales are linked through 'chains of explanation' (Blaikie and Brookfield 1987) and 'complex assemblages' (Rocheleau 2008; Hollander 2010), which demonstrate the horizontal and vertical relationships between actors and the contextual factors that constrain and direct environmental and social outcomes. A political ecology of biofuels therefore necessitates a multi-scalar analysis – one which may incorporate international, national, regional, local and household scales (Rocheleau 2008). Not all of these spatial scales are relevant for this thesis; the focus is on the interconnections between the international (Chapters Two and Four) and national (Chapter Five, Six and Seven) scales, and the implications of these interactions for local level sustainability (Chapter Eight).

The second theme relates to marginalisation, equity and the distribution of environmental impacts. The unequal distribution of the costs and benefits associated with environmental change reinforce existing social and economic inequalities both between and within nations (O'Brien and Leichenko 2001); inequalities which are unevenly distributed along lines of class, race and gender (Bryant and Bailey 1997). The differentiated impacts of environmental change can affect power, altering the ability of actors to control or to resist others, and often leading to conflict over environmental resources (Bebbington 2012). The equity outcomes, however, are not inevitable but rather are contingent on access, structure and agency (Robbins 2012). Who 'wins' and who 'loses' from biofuel production and consumption in a given context will not only depend on the production system, but also on the political-economic conditions and governance arrangements. In particular, competing discourses and drivers mean that whose voices are heard and whose are excluded will influence the ways in which biofuels develop at the local, national and global levels.

The third theme concerns power, knowledge and values. Power – broadly defined as the ability of one actor to control the environment of others (Bryant 1992: 86) – is a key focus of political ecologists. Power relations between actors will shape social and environmental conditions and their outcomes (Bryant and Bailey 1997). Power may be exerted materially through, for example, control of natural resources or political institutions, as well as through ideas, knowledge and discourse. Power may privilege specific forms of knowledge, representations of reality and value systems, determining how environmental problems are interpreted and what may be done to address them (Ariza-Montobbio et al. 2010; Peet et al. 2011). As discussed in Section 2.1., the discursive turn within political ecology has done much to reveal the implications of dominant discourses on environmental policy (Bryant and Bailey 1997). Ariza-Montobbio et al. (2010) argue that techno-economic discourses, privileged by elites in power, often suppress alternative knowledge and value systems, such as those expressed by local communities and indigenous groups. With specific regard to biofuels, there are two important factors related to the materiality of power: firstly, biofuels link multiple actors (from different sectors and policy domains) with very different objectives. A biofuels value chain may involve a subsistence farmer in Sub-Saharan Africa as well as a global corporation such as Shell or Cargill and, as a result, the power differentials are often substantial. Secondly, biofuels can be produced and consumed on very different scales and in different geographies. Production may be small or large-scale, and biofuels may be used locally or traded as global commodities. Biofuels are further complicated by where the loci of demand and production are based; much of the production potential is concentrated in the global South, while the largest markets are based in the North, specifically the U.S. and EU. Many of the critiques of biofuels focus on the large-scale production model and on the implications of increased global trade in biofuels; for critics, trade in biofuels raises concerns about the potential for an unequal exchange and extraction of materials, goods and services (e.g. McMichael 2009, 2010; Kuchler 2010; White and Dasgupta 2010; Borras Jr. et al. 2010).

These three political ecological themes – scale, marginalisation and power – form analytical threads that run throughout this chapter and indeed throughout this thesis. The rest of this chapter is dedicated to an analysis of biofuels and to mapping the discursive journey of this phenomenon. Firstly, I introduce biofuels and place the growth of this sector in a global context.

2.3. Introducing biofuels

Biofuels are liquid fuels derived from non-fossil biological materials. Biofuels may be produced from a wide range of biological sources, or feedstocks, including agricultural crops, energy crops, wastes, agricultural and forestry residues, and algae. Biofuels are divided into categories based on the feedstocks from which they are derived. First generation, or conventional, biofuels are produced from food crops, such as sugarcane, palm oil, soya and maize. Second and third generation biofuels, also referred to as advanced biofuels, are produced from non-food feedstocks, such as jatropha (*Jatropha curcas* L.), lignocellulosic sources and algae, and use fuel conversion technologies that make use of the whole crop. Further investment in research, development and deployment (RD&D) is required in advanced biofuel technologies to enable them to reach commercial production (IEA 2011). At present, only first generation biofuels are commercially viable and produced on a large-scale. According to the FAO (2009), biofuels represent the largest source of new demand for agricultural commodities in recent years. As we shall see, this has raised concerns about the unintended consequences for related markets.

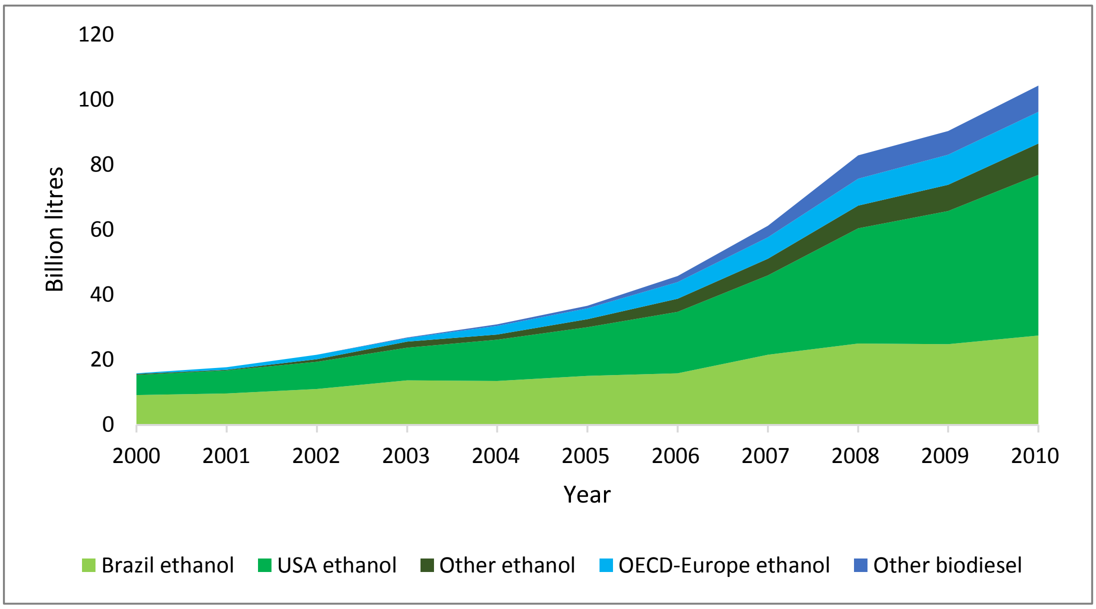
There are two main types of biofuels: ethanol, which is blended with gasoline, and biodiesel, which is blended with diesel. Ethanol is made from three types of feedstocks: sucrose-containing feedstocks (e.g. sugarcane and sugar beet), starchy materials (e.g. maize) and woody (i.e. lignocellulosic) biomass. Since it is corrosive, ethanol cannot be used in a strong blend (i.e. above 10%) in a conventional petrol car without modifications. However, flex-fuel vehicles (FFV), which are widely used in Brazil, are designed to run on higher ethanol blends or pure ethanol. Conversely, biodiesel is made from vegetable oils, such as soya, palm oil or rapeseed, as well as used cooking oil (UCO) and tallow. Biodiesel is designed for use in a diesel engine and nearly all diesel engine cars can run on pure biodiesel without modification. Which feedstock is used to produce biofuel varies according to the region and the pre-existing agricultural production in each country: maize-based ethanol dominates U.S. production, ethanol from sugarcane is key for Brazil, and biodiesel from rapeseed is dominant in the European Union (EU).

2.3.1. Production, consumption and trade in biofuels

Since 2000, there has been rapid growth in the production and consumption of biofuels. Biofuel production increased from around 16 billion litres in 2000 to more than 100 billion litres in 2010 (see Figure 3). The latter was equivalent to 2% of road transport fuel, although some countries had higher shares; in Brazil, for example, biofuels accounted for 21% of transport fuel (IEA 2011; WEC 2011).

As shown in Figure 3, in 2010 Brazil and the U.S. were the biggest global producers of ethanol, while the EU was the biggest global producer of biodiesel (IEA 2011). The Organisation of Economic Cooperation and Development (OECD) countries and Brazil were the key consumers of biofuels.

Figure 3. Global biofuel production, 2000 – 2010



Source: IEA (2011)

Estimates of future demand for biofuels vary from 210 billion litres (OECD-FAO 2013) to 300 billion litres by 2022 (Lane 2013). The U.S. Energy Independence and Security Act (EPA 2007) alone mandates demand for 136 billion litres by 2022; while the EU's 10% renewable fuels target is projected to create demand for an estimated 40 billion litres by 2020 (see Table 1).

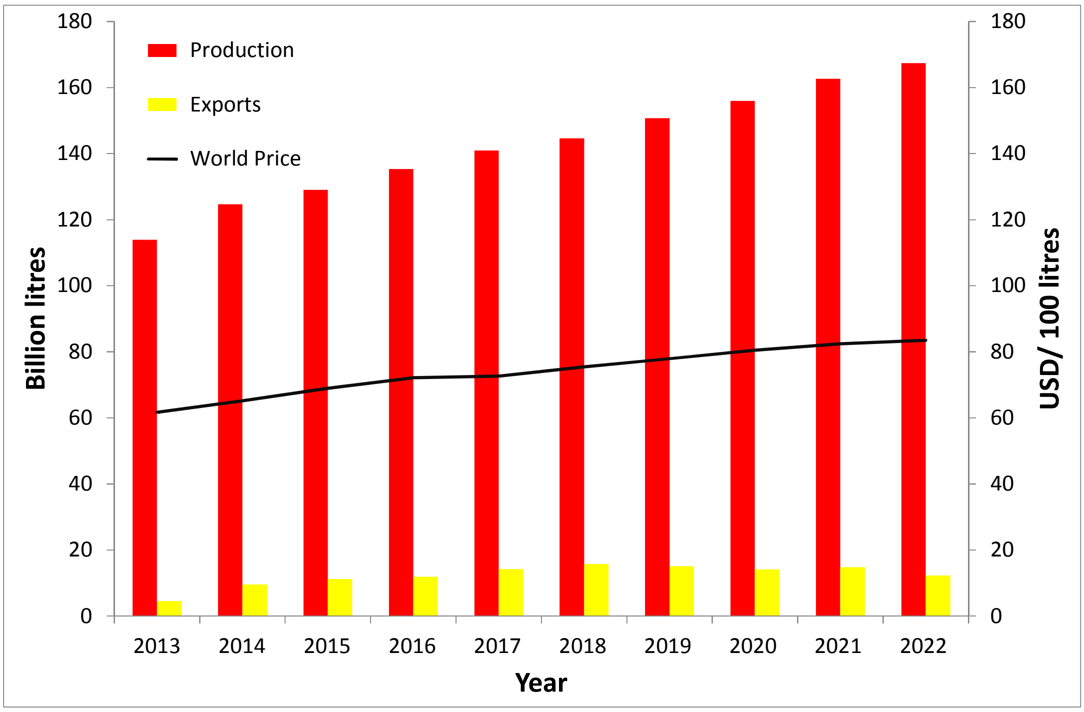
Table 1. Actual and projected production and consumption of biofuels (billion litres), 2000 to 2020

	2000[1]	**2010**		**2020 (2022)**	
Region	Production	Production	Consumption	Projected consumption	% fuel consumption
EU	0.2	14.8	18.4	40	10%
U.S.	6.1	51.3	51.2	(136)	(16%)
Latin America	10.5	37.4	25.6	62	-
World	**17**	**>100**		**210 -300**	**5%**

Sources: [1] Brown (2010); IEA (2011); Hart Energy (2011); USDA (2011, 2012b, 2012c, 2012d, 2012e)

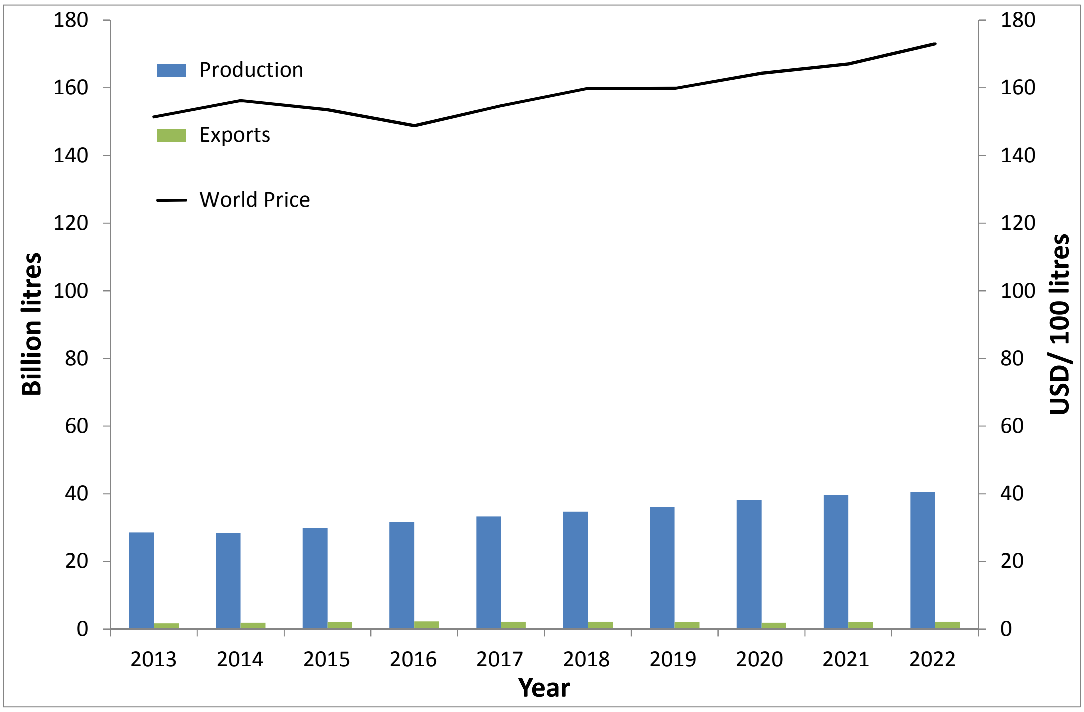
According to the OECD-FAO Agricultural Outlook (2013) trade in biofuels was low. In 2013, only 4% of total ethanol production and 6% of total biodiesel production was exported. These figures were expected to remain roughly constant up to 2022 (see Figures 4 and 5). Even though the majority of the biofuels consumed within the EU were produced by Member

Figure 4. Projected ethanol production, exports and world prices, 2013 to 2022



Source: OECD-FAO (2013)

Figure 5. Projected biodiesel production, exports and world prices, 2013 to 2022



Source: OECD-FAO (2013)

States (Ecofys 2011, 2013), it was the largest market for imports of both ethanol and biodiesel (OECD-FAO 2013).

By 2020, ethanol is expected to supply 13% of the total demand for gasoline, while biodiesel could supply 6% of diesel demand in the same year (Hart Energy 2011). By 2020, most countries are expected to be in a supply deficit for ethanol and Brazil is expected to be the only country with surplus ethanol production (ibid). The OECD-FAO (2013) estimate that by 2022, biofuel production is project to consume a 'significant' amount of the total world production of sugarcane (28%), vegetable oils (15%) and coarse grains[2] (12%). Beyond 2020, BP (2011) estimate that all biofuels could account for 9% of transport fuel by 2030, while the IEA Biofuels Roadmap (2011) suggests that biofuels could provide as much as 27% of transport fuel by 2050. Having discussed the actual and projected growth of biofuels, this chapter now turns to a discussion of the different arguments that have been used to support, and later to oppose, biofuels.

2.4. Biofuels: politically driven demand

Biofuels are not a new fuel, having been used since the early twentieth century. Built in 1908, Henry Ford's Model T car was originally conceived to run on ethanol. Ford's vision was to 'build a vehicle affordable to the working family and powered by a fuel that would boost the rural farm economy' (cited in Rosillo-Calle and Johnson 2010: 1). However, as we know, petroleum eventually became the fuel of choice and dominated the motorised transport market in the twentieth century. At the beginning of the twenty-first century, as concerns grow about climate change, oil dependency and energy security, support for alternatives, such as biofuels, electricity and hydrogen, has increased. As Mol (2007: 310) observes, biofuels represent the 'first serious challenge to petroleum-based fuel for a century'.

Biofuels provide a renewable alternative to conventional petroleum-derived fuels, specifically for the transport sector (although biofuels can also be used in the heat and power sectors). Biofuels do not offer a radically new service, but rather an alternative supply technology for an existing service, for instance travel by private car. Since biofuels substitute ethanol for petrol and biodiesel for diesel, they are in direct competition with conventional fuels.

[2] According to the OECD 'coarse grains' refers to cereal grains other than wheat and rice; in the OECD countries, those used primarily for animal feed or brewing.

However, few biofuels are cost competitive with fossil fuel alternatives without subsidies[3] (e.g. Hill et al. 2006; IEA 2007). Further, the lack of natural markets for biofuels has meant that the demand has had to be created and here political support has played a critical role (Pilgrim and Harvey 2010). In terms of demand-side measures, since 2000, more than sixty governments have established blending mandates[4] and targets for biofuels (Sorda et al. 2010; Kraxner et al. 2013). Supply-side support measures include subsidies, tax exemptions and other fiscal incentives. In 2012, government subsidies for biofuels amounted to USD 20 billion in the OECD countries alone (IISD 2012); however, by comparison, global fossil fuel subsidies amounted to USD 1.9 trillion in the same year (IMF 2013). Political support for the biofuel industry, as well as support from agricultural and initially environmental lobby groups, was also essential to overcoming opposition by the oil industry (Pilgrim and Harvey 2010; Dauvergne and Neville 2009). Indeed, many oil companies are now investing in biofuels, particularly in advanced biofuel technologies, which has strengthened the chances for market survival.

The transition to the increased use of biofuels in transport is part of a broader transition from fossil energy to renewable energy systems. Toke (2011: 41) argues that this transition could not have occurred without 'major state-sponsored restructuring of the incentives and regulations governing energy in favour of renewable energy industries'. Without policy support to level the playing field, it is highly unlikely that the biofuels sector would have been able to emerge from being a niche technology, which raises the critical question of what has driven political support for biofuels. While the relative importance of each driver shifts in time and in response to global and national concerns and pressures, biofuels are driven by three key policy objectives: energy security, rural development and climate change, arguably all issues of 'security'.

The concept of 'energy security' was a product of the 1970s oil crises and has been high on the political agendas of energy-importing countries ever since. In response to these crises governments sought to find alternatives to oil, this included unconventional energy sources such as tar sands and oil shale, as well as biofuels (Foley 1992). Brazil provides the most obvious example of a country that initiated a biofuels programme, although other countries including

[3] The cost of biofuel production is dependent on a number of factors including, feedstock, process, land type and crop yields; typically, feedstock accounts for 40-65% of total production costs (IEA 2011). Furthermore, since biofuels are blended with conventional fossil fuels, the economic competitiveness is directly tied to oil markets.

[4] A law that requires transport fuel suppliers and retailers to sell hydrocarbon fuels blended with biofuel; ethanol is blended with gasoline, biodiesel with conventional diesel.

the U.S., Argentina and Guatemala also invested in biofuels around this time. However, falling energy prices and oil gluts weakened political resolve to pursue alternatives to oil (Kozoloff 1995). Only Brazil continued to support the fledgling industry and the Brazilian ethanol industry now provides the model that other countries seek to emulate. High and volatile oil prices during the third oil price surge, which began in 2003 and had by 2008 led to a quadrupling of oil prices (Kesicki 2010), contributed to a renewed push for biofuels. Oil price rises also meant that biofuels were increasingly cost-competitive, although without a sustained period of high oil prices it is harder to maintain investment in alternative fuels such as biofuels (IDB 2006). A related concern is dependence on unstable fossil fuel supplies, particularly oil. Oil production is dominated by a few countries and regions characterised by geopolitical instability, most notably Russia, the Middle East and Venezuela. This has led importing countries to establish programmes to reduce oil dependence and thus to increase national energy security. Since biofuels can be produced virtually anywhere there is land, such fuels have the potential to increase energy security by diversifying energy supply. Finally, it is not only national energy securities that may be addressed by biofuels. In many developing countries, biofuels have been promoted as an option for addressing local energy securities, whilst delivering multiple livelihood benefits (Ejigu 2008). Thus, the notion of 'energy security' has evolved over the decades – from being prominently about the security of oil supply in the face of high prices and geopolitical tensions, to also encompass macroeconomic, environmental and human dimensions. As we shall see, all of these dimensions of energy security have been reflected in debates on biofuels.

The second driver, beginning in the 1980s with overproduction of agricultural products in OECD countries, is agricultural development, which relates to the macroeconomic and human security aspects of the debate. Agricultural surpluses, combined with low prices and low income levels for farmers, led to calls to redirect subsidies for dumping agricultural products on world markets to the production of biofuels (Londo and Deurwaarder 2007; Mol 2007). Biofuels therefore provided a new demand for agricultural commodities (especially for large-scale, industrialised agricultural areas), helping to reduce price volatility (Clancy 2007). Indeed, the U.S. and EU have subsidised farmer and agribusiness involvement in biofuel production (Mol 2007). Agricultural development is also a key driver of biofuels in developing countries. Over the past decade, there has been an ongoing crisis in smallholder agriculture in the developing world characterised by falling public expenditure, fluctuating agricultural commodity prices and policy neglect (Koning and Mol 2009; Rao 2009; White and Desgupta 2010). Several factors are driving a renewed interest in agriculture, including rising populations, food price increases, climate change and shifting consumption patterns. Biofuels have been promoted as a vehicle for rural development in developing countries, for example through technology transfer, which would enable poor farmers to raise productivity on existing lands (Mathews 2007), and by improving farm gate prices (Koning and Mol 2009). Thus the agricultural development objective, like energy security, has different meanings that are supported by different discourses; one which views biofuels as an opportunity to shore up large-scale agricultural systems, the other which envisages benefits accruing on a smaller scale, particularly in developing countries. These arguments will be returned to in Section 2.7.

Finally, since the 1990s, biofuels have also been promoted as a strategy to address environmental security concerns, specifically anthropogenic climate change. Ostensibly carbon neutral, biofuels provide one of the few near-term options for decarbonising the transport sector. In 2010, the transport sector accounted for 22% of global carbon emissions, with road transport accounting for three quarters of emissions (IEA 2012a, 2012b). The road transport sector is notoriously hard to decarbonise because of lock-in and the dominance of the internal combustion engine. Biofuels, which are renewable fuels, in principle represent a potential option for mitigating climate change by substituting the use of petroleum-based fuels in road transport and aviation. In addition, biofuels can be accommodated within existing institutions since their adoption requires fewer infrastructural and behavioural changes than other alternatives, such as hydrogen and electricity.

Within a decade from the late 1990s, there was a shift from biofuels having many challenges to overcome to one in which biofuels were ‘booming’ (Mol 2007: 297). So, why did biofuels prove so popular? The political appeal of biofuels was, and still is, multifaceted. In addition to the seeming ability to address all three policy objectives (i.e. energy security, agricultural development and climate change), biofuels were also palatable to businesses, politicians and consumers alike. Several NGOs were also early supporters; for example, in 2000, Greenpeace petitioned the UK government to establish a fund to support non-petroleum fuels, including biodiesel (The Guardian 2000; Dauvergne and Neville 2009; Pilgrim and Harvey 2010). Moreover, as the next section explores, biofuels became a favoured policy option because they offered a technological solution that would lead to ‘win-win’ outcomes for environment and economy.

2.5. Ecological Modernisation

Ecological Modernisation, one of the eight environmental discourses discussed in Section 2.1, provides a powerful way of conceptualising and understanding the emergence of biofuels. The notion of Ecological Modernisation first emerged in Europe in the early 1980s, and was presented as a 'technology-based and innovation-oriented strategy focusing on the efficient use of resources and providing co-benefits both for ecology and economy' (Mol and Jänicke 2009: 17). According to Ecological Modernisation, the solutions to environmental problems are to be found from within the capitalist system. Furthermore, if executed well, these solutions will lead to new markets, new businesses and new demand, whilst driving innovation and efficiency (Hajer 1995). In contrast to other environmental discourses, Ecological Modernisation posits that economic growth and environmental protection could be reconciled: remedying ecological damage is therefore regarded as a positive-sum game (Hajer 1995, 1996; Dryzek 2005).

Ecological Modernisation recognises that the current capitalist system is a major source of environmental degradation but, unlike other discourses such as Green Radicalism, does not call for a fundamental restructuring of the current capitalist system (Dryzek 2005). Rather it assumes that existing political, economic and social institutions can 'internalise' care for the environment (Hajer 1995: 25). For adherents of Ecological Modernisation, capitalism is neither a precondition for nor a barrier to environmental reform. However, given that all alternatives to the present economic order have so far proved unfeasible, the focus of Ecological Modernisation is to 'redirect and transform' free-market capitalism so that it contributes to rather than obstructs 'the preservation of society's sustenance base' (Mol and Jänicke 2009: 24).

In addition to the transformation of industrial systems, Ecological Modernisation also theorises a reorientation of the relationship between the state and non-state actors. Under Ecological Modernisation, there is a restructuring away from a hierarchical, command-and-control state towards a more decentralised and flexible state. There is also a trend towards a consensual style of national governance, wherein the state creates networks with other actors to ensure the integration of the environment into social practices and institutions (Mol 2001; Mol and Jänicke 2009). This has created opportunities for multi-level governance and the emergence of international institutions to tackle global environmental change, arguably undermining the traditional role of the nation state in environmental reforms (Mol 2001). These trends are evident in the literature and practice of biofuels, which has seen non-state actors, particularly the private sector and NGOs, take on a greater role in their governance. The governance of biofuels, with a focus on the EU, will be the subject of Chapter Four.

Technology has also been an important element of EM since its inception. Technological development is regarded as a key element of industrial transformation and the decoupling of material flows from economic flows (Mol 2001). Indeed, Joseph Huber, one of the founders of Ecological Modernisation, argues that technology, which for him includes new fuels such as biofuels, has 'turned out to be the key component of any viable response to ecological challenges' (2004: 337). For Huber, environmental strategies that aim to reduce energy demand would have detrimental effects on the ongoing evolution of modern society. Instead, he calls for 'a strategy of clean energy which fits in with nature's metabolism' (p. 336). Biofuels provide an example of the type of solution advocated by Huber. Firstly, the solution (i.e. biofuels) to the problem (i.e. carbon emissions) comes from within the capitalist system; both the technology and the knowledge to produce and use biofuels already exist. Furthermore, because biofuels are produced from agricultural feedstocks, the actor networks and institutions to support their production and consumption are already present. Secondly, no 'revolutionary' changes are required; the adoption of biofuels involves no major structural changes or shifts in consumption patterns. Thirdly, the environmental outcomes of their use can readily be monitored and valued by ecological management tools, such as life cycle analysis (LCA), standards and certification. And finally, biofuels offer the opportunity for innovation and technological development with first generation biofuels posited as a transitional technology to advanced biofuels (see also Chapter Four).

Ecological Modernisation has, however, been criticised for its technocratic approach and technological optimism (i.e. the belief that technological advances will allow humans to expand the resource base ahead of ever increasing demand (Basiago 1994)). Hajer (1996: 87), for example, asked 'how can it be that we try to resolve the ecological crisis drawing on precisely those institutional principles that brought the mess about in the first place'? Mol and Jänicke (2009) concede that early Ecological Modernisation was characterised by technological optimism, but argue the discourse has evolved since then. They contend that while technology is still an important component of Ecological Modernisation, it is no longer as central as critics argue nor is it regarded as the sole determinant of environmental reforms. Some technological optimism is nonetheless apparent in the promotion of biofuels; for instance, in the hopes pinned to advanced biofuel technologies, as well as the political focus on technological solutions rather than demand reduction in the transport sector. The concern with biofuels is that they provide a technological fix for what are complex social, economic and environmental problems. This situation has led White and Dasgupta (2010) to question the political promotion of biofuel technologies and, unlike Huber, these authors call for policies that 'deal with the real imperative of learning to use less energy from whatever source' (p. 595).

2.5.1. Approaches to Ecological Modernisation

Toke (2011), drawing on Buttell (2000), identifies two approaches to Ecological Modernisation that are relevant to the case of renewable energy: the 'objectivist' approach of scholars such as Mol and Spaargaren (e.g. Mol 1995, 2001; Mol and Spaargaren 2000; Mol and Jänicke 2009) and the 'social constructionist' or 'reflexive' approach associated with Hajer (1995, 1996). To these Toke adds a third approach, which he calls 'identity' Ecological Modernisation.

The first, 'objectivist' approach interprets Ecological Modernisation as a social theory. This approach has been used to analyse how industrial systems may be moved into more environmentally sound directions. The basic premise, as outlined above, is that eco-efficiencies can be achieved as industry adapts its technologies and practices in response to social pressures; the solution to environmental problems therefore lies in more, and not less, modernisation (Buttell 2000; Huber 2004; Mol and Jänicke 2009). Of particular interest to an analysis of biofuels are discussions of the 'growing autonomy of an ecological perspective... vis-a-vis other perspectives and rationalities' (Van Koppen and Mol 2009: 301). For Mol (1995: 33) this does not mean that the ecological rationality is given precedence over economic rationality, but rather that 'practices of production and consumption should be designed and evaluated according to both rationalities'. The importance of the climate change driver has meant that political support for biofuels has been justified on environmental and, to a lesser extent, on social grounds. This introduces a moral and ethical, normative dimension to an analysis of biofuels. Toke (2011) argues that decisions about what incentives are given to renewable energy technologies are inevitably bound up with value judgements, and should not be dominated by considerations of market cost. According to Toke, renewable energy technologies should not be assessed against the economics of conventional fuels, but because they are the 'right' technology from an ecological rationality perspective. In the case of biofuels, as we have seen, political support has been given in order to realise the additional values of biofuels i.e. the purported environmental and socio-economic benefits. However, this raises an interesting question - what happens when key actors raise doubts about the ecological promise of a technology? As we shall see, this is precisely what has happened with biofuels and many NGOs are now calling for a moratorium on the use of biofuels. As a consequence, an array of state and non-state actors have been involved in developing governance frameworks to guide more sustainable production and to ensure that only those biofuels that meet certain environmental and social standards are promoted. However, these efforts have not alleviated the concerns of many actors about the sustainability of biofuels, which raises a further question – what prevents a policy reversal if the ecological rationale for a technology turns out to be false? These issues will be explored in greater detail in Chapter Four.

The second 'social-constructivist' or 'reflexive' approach to Ecological Modernisation is most commonly associated with Maarten Hajer (1995, 1996). In his 1995 study on the politics of acid rain, Hajer uses discourse analysis to appraise how environmental problems are constructed and the political and institutional responses to these problems. Hajer argues that Ecological Modernisation is the dominant discourse in the environmental domain, one that is based on the belief that society can 'modernise itself out of the [ecological] crisis' (1996: 83). Hajer is critical of the implied techno-corporatist nature of mainstream (objectivist) EM and, drawing on Beck's theory of 'reflexive modernisation', proposes a 'reflexive' Ecological Modernisation. For Hajer, reflexive Ecological Modernisation not only envisages a greater role for social movements in environmental decision-making, but also aims to stimulate debate on the norms and values that are driving modernisation (Hajer 1995; see also Dryzek 2005). In a later paper, Hajer argues that the debate on the ecological crisis is:

> '... one of the few remaining places where modernity can still be reflected upon. It is in the context of environmental problems that we can discuss the new problems concerning social justice, democracy, responsibility, the preferred relation of man and nature, the role of technology in society, or indeed, what it means to be human' (1996: 97).

For many scholars, Hajer's social-constructivist work is incompatible with an objectivist EM perspective (Buttell 2000). In particular, Hajer's criticism that while ecological issues call into question larger institutional practices, objectivist Ecological Modernisation draws on those very same practices to find solutions, brings to mind biofuels. Many of the critiques of biofuels follow this line of argument; for example, McMichael (2009) argues that:

> 'the rush to agrofuels can be seen to be the ultimate demystification of capitalism's subjection of food to the commodity form: deepening the abstraction of food through its conversion to fuel, at the continuing expense of the environment' (p. 609).

These critics call for more fundamental shifts in the capitalist system in order to address environmental degradation and social injustice; arguments that speak to a Green Radicalism discourse. Certainly, the choice by social movements to use the word 'agrofuel' over 'biofuel' highlights the importance of language in the construction of interest groups and shared framings of biofuels. Hajer argues that discourses 'need to be the central point of analysis of how interests are constructed, how environmental policy changes are negotiated and how policy outcomes transpire' (cited in Toke, 2011: 32).

The third approach of relevance to renewable energy is 'identity' Ecological Modernisation (Toke 2011). Toke argues that it is public support for renewable energy technologies that has been the key political driver for the development of renewable energy. He criticises both the objectivist and social-constructivist approaches to Ecological Modernisation for their failure to place sufficient emphasis on social movements in the emergence of renewable energy technologies. In response, Toke develops 'identity' Ecological Modernisation, which:

> 'includes the notion that it is positive public identification with specific (renewable energy) technologies that has allowed the emergence and growth of the renewable energy industries as an alternative sector to that of conventional energy industries, such as fossil fuels and nuclear power' (2011: 2).

However, the role for civil society in debates on biofuels is less convincing. Toke (2011) argues that public support for renewable energy technologies is essential for its development, yet it is difficult to see how this applies to biofuels. Unlike some other renewable energy technologies, such as solar photovoltaic panels, consumers have little choice about what they consume at the fuel pump. Biofuels are blended with petrol and diesel before reaching the forecourts and most consumers are unaware that in filling up their tanks, they are consuming biofuels (Bailis and Baka 2011; Upham et al. 2013). Even though scepticism about the benefits of biofuels may be growing, consumers cannot choose whether or not to consume them. Conversely, without emblazoning one's vehicle with stickers advertising the use of biofuels it is also difficult to establish the 'ecological identity' so important for other renewable energy technologies (Toke 2011: 21) and for establishing more sustainable consumption patterns e.g. through eco-labelling (Hatanaka et al. 2005; Eden 2011). This is not, however, to say that social movements have not been important for biofuels indeed, as we shall see, NGOs have been crucial in raising awareness of the environmental and social harms caused by biofuels. However, the lack of ecological identity associated with biofuels also makes it difficult for those who are opposed to their use.

As a result, most NGOs focus on lobbying governments or on campaigns to raise awareness of the impacts of biofuel production, rather than on influencing consumption patterns (Pilgrim and Harvey 2010).

All three of these approaches to Ecological Modernisation provide useful insights into conceptualising the emergence of biofuels. However, it is the reflexive approach that is most relevant to this research. The use of discourse analysis, in particular, enables an understanding of why certain understandings of an environmental problem gain traction, thus paving the way for particular (policy and technical) solutions (Adger et al. 2001; Hajer 1995; Dryzek 2005). In the case of biofuels we see that this technology offered the type of 'clean' energy solution that was advocated and endorsed by Ecological Modernisation; in other words, a technological solution that 'fitted in with' existing transport modalities and institutions, whilst stimulating innovation, creating new markets and businesses, and ostensibly delivering environmental benefits.

However, almost as soon as governments began to promote biofuels, evidence began to emerge that called into question their environmental and socio-economic credentials. In 2007, Doornbosch and Steenblik asked whether the cure (i.e. biofuels) was worse than the disease (i.e. petroleum-based fuels). Today, many agree with this prognosis. As subsequent sections will discuss, support for biofuels has since become more equivocal, with distinctions increasingly being made between 'good' and 'bad' biofuels as the reality of biofuels has failed to live up to the promise. The next section discusses four key issues that have emerged to undermine the ecological and socio-economic rationales for biofuels: carbon, competition with food crops, indirect land use change (ILUC) and large-scale land acquisitions.

2.6. Biofuel controversies: land, livelihoods and carbon

The first controversy to hit biofuels called into question their carbon benefits. In theory, biofuels are carbon neutral. This means that even though burning the biofuel releases carbon dioxide (CO_2), the carbon will have been removed from the atmosphere and stored in the plant during its growth. However, in practice, potential carbon savings are reduced as the growth, harvesting, transport and conversion of biofuels generates greenhouse gases (GHG). A growing body of evidence has demonstrated that, in some instances, biofuels can be more carbon-intensive than their fossil fuel counterparts (see for example, Pimentel and Patzek 2005; Hill et al. 2006; Zah et al. 2007; Panichelli et al. 2008; Fargione et al. 2008; Scharlemann and Laurance 2008). In particular, the carbon balance of biofuels will be affected by land use changes. The production of biofuel feedstocks on land that was previously forest, wetland, peatland or grassland has enormous consequences for the carbon balance of the biofuel. Although research has focused on the carbon implications of direct land use change, other environmental impacts of habitat loss – for example biodiversity loss, water pollution and soil degradation – can be as significant.

The second major criticism of biofuels concerned the impacts on food prices – the 'food vs. fuel' debate, which has called into question the ethics of diverting land from food to energy production. According to the FAO (2009), biofuels represent the largest source of new demand for agricultural commodities in recent years. First generation biofuels are produced from conventional food crops, including corn, palm oil, sugarcane and soya, which led to direct competition with food production – increasing agricultural commodity prices and affecting food security. Increased demand for biofuels was blamed for the food commodity price increases of 2007-08, which sparked riots in several countries, including Haiti, Zimbabwe and Indonesia (Dauvergne and Neville 2010; FAO 2013a). The actual contribution that biofuels made to the food price hikes has been debated (e.g. FAO 2008; Zilberman et al. 2012), but most assessments concluded biofuels played an important role. Regardless of the actual proportion, the diversion of crops from food to fuels has affected food security, in particular for poor rural smallholders and urban dwellers, since both groups are net purchasers of food (FAO 2008; Ewing and Msangi 2009).

In the same year, awareness of the indirect impacts of biofuels was raised by the publication of Tim Searchinger's paper in Science (Searchinger et al. 2008; see also Fargione et al. 2008). ILUC occurs when biofuel production displaces existing agricultural activity onto to another area of land resulting in the conversion of an area that was not previously under agricultural production. This conversion may take place in the same country where the feedstock is produced or may be displaced to a different country. Just as with direct land use change, the carbon debt may take decades or centuries to recoup. Bertzky et al. (2011) caution that ILUC is effectively invisible, rendering it extremely difficult to identify, document and monitor. Various models have been developed to quantify the ILUC impacts of biofuel production (e.g. Searchinger et al. 2008; Al Riffai et al. 2010; Laborde 2011), yet significant uncertainties and varying assumptions make the outcomes ambiguous (Palmer 2011; Di Lucia et al. 2012). This renders determining the actual (indirect) impacts of specific biofuel targets difficult and presents a challenge for policymakers who must regulate drawing on inconclusive evidence on the scale and severity of ILUC (Di Lucia et al. 2012). Governance responses to ILUC will be discussed in Chapter Four, but it is important to mention here that attempts to establish a consensus on addressing the issue have so far proved unsuccessful.

The most recent biofuels controversy has focused on large-scale land acquisitions or 'land grabs', which have increased rapidly since the 2007-08 food price hikes. Although land acquisitions have occurred throughout history, the speed and scale at which the current land rush is taking place has caused concern, particularly amongst NGOs and development academics. There is no single definition of a 'land grab'; land may be sold outright, acquired through long-term leases or obtained through outgrowing schemes (FOE 2010). Land deals are difficult to document and as a result estimates of the scale of the phenomenon vary. Between 2000 and 2010, the Land Matrix (2012) documented land deals that amounted to 83 million hectares (Mha), equivalent to 1.7% of the world's agricultural area. Alternative figures are provided by Oxfam (2011) who claim 227 Mha has changed hands over the same period, while the World Bank (2010) identified 464 projects between 2008 and 2009 covering 57 Mha. What is certain is that this new wave of land acquisitions involves deals that are large-scale; in 2010, the median size of land acquisitions was 40,000 ha, while a quarter of all deals involved areas greater than 200,000 ha (Schiedel and Sorman 2012). Despite a focus on international actors, national actors (including both governments and companies) are also playing a major role in land acquisitions. The (macro) economic opportunities for countries involved in land acquisitions rarely extend to local communities where poor governance and weak enforcement of customary land rights has caused rapid and widespread changes in land use patterns and ownership. Although critics have been quick to blame biofuels (e.g. FOE 2010; ActionAid 2011; Oxfam 2012) and transnational actors (e.g. Carrington 2011; Der Spiegel 2013; Global Witness 2013), research reveals a more complex picture that involves multiple drivers, actors and pressures on land (Anseeuw et al. 2012; Fairhead et al. 2013). As the global population increases and consumption patterns change these pressures on land are unlikely to diminish.

These debates have not only undermined the ecological rationale for biofuels, but have also drawn attention to their social consequences, particularly for producer countries in the global South. They have raised the possibility that political imperatives have dominated over the scientific and social scientific evidence and have highlighted the importance of understanding the social, political, economic and ecological contexts within which biofuels are produced and promoted. These debates also raise the question of whether these issues were foreseeable and therefore preventable. Taking the food versus fuel debate as an example, in 2007 – even before the food price hikes – Swenson observed that large changes in one segment of a commodity production system would have consequences for other aspects of agriculture, as well as for other industries and consumers (Swenson 2007). Given that explicit aims of the agricultural development objective were to prop up food prices and create new markets for agricultural products, conflict with food prices was arguably inevitable. However, in Europe and the U.S., it was envisioned that biofuels would be produced by domestic farmers for domestic markets. The involvement of exporter countries, in the EU at least, was not mentioned until relatively late in the policy development process and even then only in terms of the trade benefits (EC 2001a; see also Chapter Four). Early biofuels policy was centred on creating demand in the industrialised countries and little consideration was given to the potential consequences beyond national borders. Stirling (2006, 2007, 2009) has repeatedly argued for the 'opening up' of the social appraisal of technologies in order to develop more robust understandings of technical and environmental complexities. Opening up technology appraisals would include:

> 'aspects of the social and organisational – as well as physical and biological - context and, in particular, the effects of the exercise [i.e. appraisal] of political, economic and institutional power' (Stirling 2009: 206).

Early appraisals of biofuels were narrowly framed to focus on the technical, economic and climate outcomes, particularly for OECD countries. A more precautionary approach – one that provided for independence from sectional interests, an examination of uncertainties, and the integration of different knowledges and divergent social values – could arguably have revealed future tensions and implications of biofuels policy (Stirling 2007, 2009; Palmer 2012). In addition, greater participation, particularly from stakeholders in the global South, might have opened up the debate to different framing conditions and assumptions (Brown 2009; Stirling 2009). Biofuels pose difficult, if not insuperable, challenges including the need to quantify, ex-ante, indirect effects that spread across regions and countries in ways that are difficult to isolate with much accuracy (Upham et al. 2013). However, the narrow framing of biofuels as a win-win, ecologically modern solution to decarbonising the transport sector failed to recognise and develop ways of dealing with the risks. Even though evidence of the negative impacts of biofuels continues to emerge, governments have remained steadfast in their provision of political and financial support for biofuels.

This section has discussed the growing controversies over biofuels; however, these arguments are typically high-level, obscuring the differentiated impacts between and within countries. These impacts will be shaped by power and scale, issues which political ecological studies seek to make explicit. Before I return to the evidence of the local level outcomes of biofuels, the next section discusses the complexities associated with investigating and assigning causality to biofuels.

2.7. Producing biofuels: multiple crops, multiple markets

Biofuels represent a remarkably complicated technology-policy complex. They may be produced virtually anywhere there is land (although advanced biofuels may also be produced from algae), from an array of feedstocks, produced through different cultivation systems and processing patterns, and consumed in different end-markets (i.e. transport, heat and electricity). Further, the feedstocks themselves have multiple end uses. Indeed, biofuels typically account for a smaller percentage of the market than food products; for example, Obidzinski et al. (2012) report that only 1.3% of palm oil produced in Indonesia is used for biodiesel, while Lima et al. (2011) estimate that only 6% of Brazilian soya production may be attributed to biodiesel demand. This flexibility is the reason many are increasingly referring to crops such as sugarcane, palm oil, soya and maize as 'flex crops' (e.g. Alonso-Fradejas 2012a, 2012b; Franco and Borras 2013). For farmers and local communities affected by the cultivation of a crop, the specific destination of the produce will be of little interest. What will matter is how the crop is produced; in other words whether they are incorporated as outgrowers, independent producers, cooperatives or salaried workers, the resulting relations of production, and the creation of a stable and competitive end-market for their product(s) (Borras Jr et al. 2010; White and Desgupta 2010; REA 2013a).

The biofuels debate does not therefore relate to a spatially or temporally constrained sector, activity or form of impact. The global nature and multiple end uses of biofuel feedstocks make establishing the relationships between cause and effect highly complex. Furthermore, controversial interdependencies between land uses exist, as the debates about ILUC, food versus fuel, and land acquisitions have demonstrated. Biofuels have also revealed the complex linkages between land resource management and energy policies in the global economy. Indeed, proponents argue that debate on biofuels has drawn attention to the multiple uses of agricultural land (i.e. for fuel, food, fibre, feed, fertiliser and flowers) and highlight that no other form of fuel or energy, or indeed cosmetic or food product, has been subject to the same scrutiny as biofuels (Pilgrim and Harvey 2010; REA 2013a). This has led some biofuel proponents to argue that the land use debate needs to be broadened to also incorporate food and other agricultural commodities. While this would be a laudable outcome, this argument overlooks the fact that in contrast to markets that emerge through innovation or consumer demand, biofuels are a politically-driven commodity; a factor which has contributed to their politicisation (Pilgrim and Harvey 2010).

2.7.1. Globalised biofuels: webs of trade

Biofuels have been viewed as an opportunity for both the global North and South. Tropical crops typically have higher yields than temperate crops and, with greater land availability[5] and lower labour costs, the South could have a competitive advantage. This situation has raised hopes that increased biofuel production and trade will provide opportunities for developing countries, including product diversification, foreign exchange benefits, and rural development. For example, Mathews (2007) proposes a 'biopact' that would not only provide guaranteed markets for fuels grown in the global South, but would also guarantee the 'integrity' of fuels sourced from the South, since any trade in biofuels would have to meet certain environmental guidelines – established by the North. While standardisation is a necessary requirement for global trade, since varying fuel specifications can jeopardise trade, it can also restrict the ability of small farmers and companies to participate in the sector (Partzsch 2011).

According to Mathews (2007), much of the investment for the proposed biopact would come from the global North, since many countries in the South 'do not have the entrepreneurial and investment capacity needed to erect huge new biofuel industries' (p.3558). This argument, however, ignores the complexity of global biofuels trade, which has moved away from a simple flow of biofuels from the global South to the North, to more complicated 'webs' of North-South and South-South trade (Dauvergne and Neville 2009: 1087). A notable example is Brazil, which not only has biofuel investments in Sub-Saharan Africa, but is also promoting biofuels in Central America and the Caribbean through a Memorandum of Understanding (MOU) on Biofuels with the U.S. (see also Chapters Four and Seven). However, other countries may not be as well placed as Brazil to capitalise on the opportunities presented by biofuels. Mol (2007) highlights the requirement for 'socio-technical infrastructures', the absence of which could result in producer countries becoming exporters of biomass (rather than higher value added biofuels) or in large (foreign) companies investing in biofuel production facilities. A related concern is the

[5] The use of marginal or idle land has been proposed as a solution to concerns about the negative land use impacts of biofuels (Fargione et al. 2008; RFA 2008; Nuffield Council on Bioethics 2011). However, this has been met with criticism by those who question the 'myth' that there are vast tracts of marginal or waste land available; rather, it is argued that these so-called marginal lands are often a vital resource for rural livelihoods (Ariza-Montobbio et al. 2010; Bailis and Baka 2011).

requirement for strong state institutions that are able to regulate and control the sector, providing environmental and social safeguards.

Many countries, including Guatemala, have responded to external biofuel policies – policies which are now shaping biofuel programmes and investments in producer countries. Governments have sought to attract (foreign) investment in export-oriented biofuel production, as well as to promote the domestic consumption of biofuels. However, strengthening alliances between governments, domestic actors and transnational corporations (TNCs) has raised concerns that benefits will accrue to powerful actors while marginalised groups in the global South pay the costs (Dauvergne and Neville 2010). Moreover, while always interconnected, the production of 'energy crops' implies an integration of energy and agricultural markets and actors hitherto unseen (Kuchler and Linnér 2012).

2.7.2. The scales of biofuel production

There are several possible models of biofuel production, but I want to focus on two which encompass very different visions, scales, actors and outcomes: the first is a small-scale community-based system, while the second is a large-scale export-oriented model. Typically, academic studies have shown a bias towards investigating certain feedstocks (with jatropha being the most common) in particular geographies (specifically Africa and Asia) (Hodbod and Tomei 2013). This may relate to the ease of investigating certain scales of production (i.e. small vs. large-scale), the actor-networks involved in production (e.g. local communities vs. multinational corporations), or the political and institutional contexts within which biofuel production is being promoted. In other words, it is perhaps easier to investigate (and to assign causality for) the local level impacts of jatropha cultivation run by an NGO for community benefit than it is to investigate those impacts resulting from the large-scale production of soya by a transnational corporation with multiple end markets. Global trade in biofuels is currently dominated by sugarcane, maize and soya, yet these crops are underrepresented in research on the local level outcomes of biofuels (Hodbod and Tomei 2013). Examples of both biofuel models can be found around the world and the purported benefits of both have been questioned; however, it is the large-scale production model that has been subject to most criticism. The subsequent sections discuss each of these models in more detail, focusing on the outcomes at the local level and the actors involved in each.

Community-based biofuels: local production, local needs

The small-scale production of biofuels has been promoted by diverse actors, but particularly by NGOs and governments, as a means to support rural development. This model of biofuel production typically involves the cultivation of crops such as jatropha, castor, cassava and sorghum. These crops, which may be intercropped and are less likely to compete with food crops, offer multiple benefits including job creation, livelihood diversification, local energy access, and increased access to technologies and knowledge. The involvement of smallholders in biofuel cultivation may also deliver benefits, particularly when local farmers play an active role and remain in control of their land, for example through contract farming or outgrower schemes (Ejigu 2008; FAO 2013b). However, the terms and conditions of the contract matter, since they determine the relationship between the partners (FAO 2013b). For instance, in a study on smallholder production in Mexico, Skutsch et al. (2011) found that contracts were vague and contained no agreed farm gate price. This coupled with a failure to purchase the jatropha seeds led to an erosion of trust in the partnership, creating conflict and resentment. Similarly, Ariza-Montobbio and Lele (2010) highlighted partner companies abandoning buyback contracts, which led to smallholders shouldering the losses.

While few would question the promise of small-scale biofuel production, in practice the socio-economic and environmental outcomes are dependent on multiple factors, including the wider political economic conditions within which such systems are embedded. In particular, the failure to deliver on the early promise of jatropha, which was once hailed as a 'wonder weed' for its ability to grow on marginal soils (e.g. Sanderson 2009), led many to question whether this model can deliver the purported benefits. However, there are few academic studies that provide empirical evidence of the sustainability impacts at the local (household and community) level (Esteves Riberio 2013; Hodbod and Tomei 2013). Of those studies that have investigated the impacts of biofuel production on local communities, several have found evidence of negative impacts of small-scale production on food security. For example, substituting biofuel for food crops can lead to a loss of food security that is not compensated through increased monetary income (Ariza-Montobbio and Lele 2010; Ariza-Montobbio et al. 2010; Hunsberger 2010; Schut et al. 2011); although German et al. (2011), in their study of jatropha cultivation in Zambia, found that the loss of self-sufficiency was countered by the opening up of new land (which will have negative environmental impacts). Smallholder production can also have impacts on land access, either via the willing sale of private lands (Lima et al. 2011) or via dispossession (McCarthy 2010; Schoneveld et al. 2011). The clearance of forests and the related loss of access to non-timber forest products have implications for the provision of ecosystem services and household economies (German et al. 2011; Hought et al. 2012). There are also health and gender implications; for example, the switch from 'traditional' to 'modern' fuels can lead to reductions in the negative health impacts associated with traditional biomass, as well as time spent collecting firewood, both of which particularly affect women and children (Ewing and Msangi 2009; Practical Action 2009; Tandon 2009; Nelson and Lambrou 2011). Other studies have shown that women experience a loss of land access as a result of community-level biofuel production (German et al. 2011; Schonveld et al. 2011; Skutsch et al. 2011). Schonveld et al. (2011), for example, found that this was due to the way in which men and women perceived land, with land classed as agricultural by women and viewed as fallow by men. With specific regard to local energy provision, while locally produced biofuels have the potential to be used as a replacement fuel, e.g. for electricity generators and kerosene lamps, this potential has yet to be borne out in practice (Hunsberger 2010; Schut et al. 2011; Dyer et al. 2012; Grimsby et al. 2012). Indeed, feedstock cultivation can have a negative impact due to reduced access to firewood and the loss of charcoal production (Findlater and Kandlikar 2011). However, Mol (2007) cautions that economies of scale and energy balances favour large-scale production systems, which limits the community-model of biofuel for energy to peripheral areas not served by existing energy infrastructures.

The limited academic research on the local level impacts of small-scale biofuel production reveals a complex picture; one that highlights the need to consider each project on its own merit whilst paying due consideration to the differentiated outcomes for farmers, households and communities. Furthermore, there is little evidence on the long-term sustainability of this biofuel production model, which may be due to the relative newness of the field. However, this is again likely to be contingent on each project, its 'fit' with local needs and sensitivity to the political economic contexts at multiple scales.

Agroindustrial biofuels

At the other end of the spectrum is a large-scale, externally oriented biofuels sector. It is this model that today dominates the biofuel sector due to the economies of scale achieved through large-scale production. The agroindustrial model for biofuels is likely to favour those actors who are best able to capitalise upon the opportunities provided by increased global trade in biofuels, in particular large companies and TNCs. Mol (2007) identifies agribusiness companies (e.g. Cargill and Archer Daniels Midland), oil companies (e.g. BP and Shell), and car companies (e.g.

Toyota and Ford), as powerful players in biofuel networks. Other companies such as Monsanto and Syngenta are also involved, for example through the development of biotechnologies, including genetically modified maize specifically for processing into ethanol. Annie Shuttack (2008) expresses her unease that biofuels provide an opportunity for the introduction of contested biotechnologies, she argues:

> 'Agrofuels are the perfect Trojan Horse, promising not only whole new markets for biotech products, but the irreversible entrenchment of genetically modified crops throughout the world' (p. 89).

For Holt-Gimenez and Shattuck (2009: 181) biofuels represent the 'final stage in the centuries-old transformation of agriculture by industry' and, as we have seen, these authors are by no means alone in their criticism of the agroindustrial model of biofuels. Indeed, many critics prefer to use the term 'agrofuel' to highlight the intensive, industrial nature of liquid fuel derived from agriculture.

The production of biofuels on an agroindustrial scale also carries the risk of tying energy supply into unsustainable agricultural practices. For example, the expansion of soya in Argentina has led to the consolidation of an intensive large-scale, mechanised agricultural system and the concurrent loss of traditional agricultural systems and crops (Tomei and Upham 2009; Tomei et al. 2010). Similarly, palm oil production, primarily for use in food products but increasingly as a biodiesel feedstock, in Indonesia and Malaysia is a leading driver of rainforest and peatland destruction (Nellemann et al. 2007). While agriculture has always been linked to energy markets through direct (i.e. production, processing and transport) and indirect (e.g. fertiliser and insecticides) costs, biofuels have provided additional direct linkages between these sectors (Ewing and Msangi 2009; Kuchler and Linnér 2012). Critiquing the 'agrofuels project', McMichael (2009) argues that 'the conversion of agriculture to a branch of the energy-industrial complex deepens the fetishisation of agriculture as a source of profit, rather than recognising it as a life source' (p.826). Mol (2007) concurs, arguing that if biofuels take on too many characteristics of fossil fuels the fuel switch is unlikely to benefit vulnerable actors, although other vulnerabilities such as oil dependency will be mitigated.

In terms of the impacts on local communities, large-scale biofuel production can provide jobs, skills development and secondary industries, whilst providing access to other welfare benefits such as access to schools and health care (Nhantumbo and Salomão 2010; Lima et al. 2011). However, as we have seen, large-scale, mechanised agricultural systems favour large producers who are better able to take advantage of economies of scale and secure access to capital. Furthermore, the high concentration of ownership and control implied by the agroindustrial production of biofuels limits the opportunities for local involvement (Rao 2009). Local communities will be directly affected by requirements for labour, resource and land inputs but, other than employment (typically as temporary labourers), local people are not easily included in such systems (Clancy 2007; Nelson and Lambrou 2011; Hunsberger et al. forthcoming). Indeed, the mechanisation and intensification of agriculture has led to a reduction in labour demands, with consequences for rural economies (Rao 2009; Tomei and Upham 2009). Furthermore, many of the controversies that were discussed in Section 2.6 relate to the large-scale production of biofuels, rather than small-scale production; although the loss or deterioration of ecosystem services would also applies to the latter.

It has also been posited that local benefits will be provided if the biofuel plant is situated close to the site of production, since much of the value added in biofuel production is generated during processing and refining (Mol 2007; Ejigu 2008). However, as stated previously, processing plants require considerable financial investment as well as 'socio-technical infrastructures' (Mol 2007: 305), which may not be available in all producer countries or regions. This may intensify inequalities both between and within countries (Dauvergne and Neville 2010). Local ownership of biofuel processing plants has also been posited to have a positive impact on the long-term wellbeing and sustainability of the communities in which they are situated (Ejigu 2008; Bain 2011). However, Bain's (2011) research on the local (i.e. in-state investors) ownership of ethanol plants in Iowa found that the benefits for local communities were overstated; the research presented in this thesis also finds little evidence to support the assumption that benefits accrue to local communities (Chapters Six to Eight).

While sceptical of the potential of large-scale biofuel production to deliver pro-poor outcomes, Clancy (2007) recognises that displacement of poor farmers is not an inherent characteristic of biofuels, but rather 'is a consequence of political processes vested in power relations in a particular context' (p. 421). This statement is echoed by Ariza-Montobbio et al. (2010) who urge for caution in assuming *a priori* that export-oriented or commercial crops have negative socio-economic impacts. Further, they argue for careful, locally based analyses of how new economic activities correspond and are adapted to the livelihood systems of local populations, as well as the distribution of the impacts.

2.8. Lessons from political ecology: context matters

The different models of biofuels not only encompass vastly different scales of production, but also different actor networks and policy objectives. Furthermore, the social and environmental outcomes of a biofuel in a given context have been shown to be contingent on the production system (i.e. potential feedstocks, agronomies, conversion processes, end markets etc.) as well as on the political-economic conditions. Generalisations about 'good' and 'bad' biofuels are therefore unhelpful and should be treated with caution; biofuels are rarely the only driver of environmental degradation and social marginalisation at the local level.

The evidence discussed above reveals that the early promise that biofuels could deliver livelihood opportunities to rural economies appears to have been superseded by a large-scale, industrialised reality. Under this agroindustrial model, the (economic) benefits accrue to a small number of well-capitalised and well-connected actors, including national elites, governments and TNCs. The incorporation of local, rural communities into biofuel value chains along equitable lines appears increasingly unlikely without directed policy support. Meanwhile these already vulnerable actors are likely to shoulder a disproportionate share of the (social and environmental) costs (Dauvergne and Neville 2010). The institutional structure of the biofuels sector plays a key role in ensuring that benefits are evenly distributed rather than accruing to the most powerful actors (Clancy 2007; Hunsberger et al. forthcoming), but not all states will have the capacity to derive and distribute the (economic) benefits. While the governance of the biofuels will be the focus of Chapter Four, it is important to mention here that policies and practices with pro-smallholder objectives are rarely evident in the emerging agro-industrial biofuels model. The challenge therefore is to design and promote biofuel policies and programmes that generate opportunities for rural communities and smallholders. The Brazilian Programme for Production and Use of Biodiesel (PNPB) is one such policy and aims to promote the participation of smallholders in the production of biodiesel through its Social Fuel Certification. The creation of effective and equitable biofuel policies will, however, require both broad and specific understanding across the multiple scales of biofuel production and governance. Such policies will need to be attentive to local contexts, whilst taking into account the multi-level connections between global demand and local outcomes (Rocheleau et al. 1996; Hunsberger et al. forthcoming). This is clearly no easy undertaking. By paying attention to the webs of interrelation between the multiple levels at which biofuels have been promoted and developed, this research provides an expansive yet situated account of the political ecology of biofuels in Guatemala.

2.9. Conclusions

The power, politics and scale of biofuels are clearly critical in determining the winners and losers of this commodity. In particular, competing arguments and drivers mean that whose voices are heard and whose are excluded will influence the ways in which the biofuels sector develops at the local, national and global levels, raising questions about whose sustainability is being pursued. If biofuels are to deliver social and environmental benefits, it will be necessary to ensure that the production and use of biofuels does not strengthen existing exploitative social relationships and destructive environmental practices. Yet the multiple locations, objectives, actors and scales involved in the production and trade in biofuels raises interesting dilemmas about how biofuels should be governed. As biofuels continue to globalise, the relevance of national efforts to govern the sustainability of biofuels has increasingly been called into question. While it is possible to regulate for sustainability within national borders, there are clear restrictions on nation-states which may wish to limit the negative impacts of biofuels in exporter countries. Governing for sustainability therefore requires global collaboration and new governance arrangements have been sought which involve a range of actors from across governments, the private sector and civil society. Private standards and certification schemes have emerged as the frontrunner and there has been a proliferation of initiatives that attempt to minimise the sustainability impacts across space and time. Yet, these initiatives are also subject to debate and have been criticised for 'greenwashing' (i.e. attempts by corporations to mislead consumers about environmental practices) and 'green imperialism' (i.e. limiting participation of developing countries in global markets) (Mol 2007). Dauvergne and Neville (2009: 1100) caution that with increased South-South linkages, new consumer countries may be willing to accept biofuels without sustainability guarantees, thus negating the impact of such efforts to ameliorate the sustainability impacts. Biofuel opponents claim that biofuels, as well as the governance arrangements to mitigate the impacts, are tinkering around the edges of the capitalist system that produced the problems in the first place (McMichael 2009, 2010; White and Dasgupta 2010). These issues will be taken up in more detail in Chapter Four, but first I describe the methodology used to research the biofuels in Guatemala.

3. Researching biofuels

Biofuels have been portrayed as both ‘good’ and ‘bad’ yet, as argued in the previous chapter, this is overly-simplistic. The social, economic and environmental outcomes of biofuels depend on many factors including the specific drivers, the institutional and governance structures that promote their use, and the cultural, political and social contexts in which their production and use is embedded. This research therefore aims to go beyond discussions of ‘good’ versus ‘bad’ to provide a more nuanced analysis of biofuels and their outcomes in a specific context. The adoption of a political ecological framework enables the analysis to be situated within global debates on the sustainability of biofuels, as well as the regional to local contexts that condition the outcomes of biofuels. This chapter describes the research methodology that was employed to operationalise the research aim and objectives that were set out in the introductory chapter.

This research was conducted between 2010 and 2013, with field research taking place in three separate phases between November 2010 and April 2012. The core of the field research was a seven month period in Guatemala. The personal and situational challenges encountered during the field research had an important influence not only over the research strategy, but also on the research aim and objectives. Heeding Punch’s (2012) call for greater awareness of the personal challenges that impact the research process, this chapter reflects upon the research strategy and the methods adopted to shed light on these processes. As Sayer (1992) notes, reflection of this kind is a critical exercise for social scientists since all methods adopted – and thus the research findings derived from them – are value laden. Thus, the arguments presented in this thesis should be seen as embedded within and constituted by a range of social values and contexts, including my own positionality.

The rest of this chapter is divided into six sections that interweave points of debate from the methods literature with personal observations derived from experiences of conducting field research. The first section sets out the research focus and reiterates the aim and objectives that were introduced in Chapter One. The second section then reflects on epistemological and methodological considerations, before the third section introduces the research design, a nested case study, and elaborates on the selection of the European Union (EU) and Guatemala as cases. The following section then discusses the methods used to produce the data for this thesis, illustrating their strengths and weaknesses with reference to the different contexts in which this research was conducted. The next section then describes the process of writing the research, before the final section concludes the chapter.

3.1. The Research Focus: aim and objectives

The past twenty years have witnessed a proliferation of research on biofuels. Much of this research has focused on the technical challenges, for example the development of so-called second or third generation biofuels (e.g. IEA 2008), or on the life cycle impacts of biofuels (e.g. Davis et al. 2009; de Boer et al. 2012). Research on the local-level or community impacts of biofuels is, however, more limited and much of the evidence has been generated by NGOs rather than academics (Hodbod and Tomei 2013). Research by NGOs has done much to highlight the potential negative outcomes of biofuels, particularly for vulnerable populations in the global South, yet their issue-driven agendas and need to convey 'simple' messages to target audiences can mask more complex realities. As Chapter Two has discussed in detail, biofuels not only cross multiple policy domains, but also geographies and scales. This means that the sustainability outcomes will be contingent upon broader systems as well as place-specific arrangements (Robbins 2012; Hunsberger et al. forthcoming). Many of the advances in measuring and analysing the sustainability of biofuels have come from the field of sustainability assessment (Diaz-Chavez 2011). Tools such as Environmental Impact Assessment, Life Cycle Assessment and Strategic Environmental Assessment have been used to assess the sustainability impacts of plans, policies and programmes. Yet these apolitical tools rarely take into account the broader systems within which biofuels are embedded, nor do they acknowledge the historical, socio-cultural and political economic factors that shape the outcomes for sustainability. Despite these limitations, efforts to govern the sustainability of biofuels typically rely upon such assessments and are therefore likely to privilege some sustainability interests whilst excluding others (Glasbergen 2007; Visseren-Hamakers and Glasbergen 2007). Using the EU and Guatemala as cases, this research seeks to show that the environmental and social changes brought about by biofuels are conditioned by political and economic processes at multiple scales.

This research aims to investigate the sustainability outcomes of biofuels in Guatemala, and how this intersects with the European framework to govern the sustainability of biofuels. In order to meet this overall aim, this research has five interrelated objectives:

1. To examine the European Union's governance framework for biofuels;
2. To discuss the mechanics of biofuels production in Guatemala, as embedded within historical and contemporary agrarian political economies;

3. To understand the role and motivations of different actors in the development of Guatemala's nascent biofuels sector and consequences for the governance of the sector;
4. To examine the outcomes of sugarcane ethanol production for different social groups; and,
5. To assess whether the European Union's approach to governance for sustainability captures those issues that are salient to the Guatemalan context.

This thesis therefore contributes to the literature on the sustainability of biofuels in three key ways: firstly, by situating the research within the field of political ecology, this research takes into account the multiple political, economic, social and ecological factors that affect the development of biofuels. Drawing upon both structural and poststructural approaches to political ecology, this research also pays attention to both the discursive and the material elements of biofuels in the European Union and Guatemala. This requires an evaluation of biofuels at multiple, inter-connected and nested scales including local, national, regional and global levels. Secondly, it provides empirical evidence on the local, community level outcomes of biofuels. The word 'outcome' rather than 'impact' is used deliberately here, since the aim of this research was not to assess, to measure or to quantify the impacts on local communities. Rather, the research aimed to capture local people's perceptions of the changes in their livelihoods that were underway and to situate those qualitative findings within a broader political economic context. Finally, these issues are explored in one biofuel exporting country, Guatemala, a country that has so far been overlooked in research on biofuels.

The adoption of a political ecological framework has had a number of important implications for this research, including for the research philosophy, approach and strategy. These are discussed in the next section.

3.2. Epistemology and Methodology

In light of diverse and often incompatible views on biofuels, the aim of this research was not to discover absolute truths, but rather to investigate the plurality of perspectives and experiences of those involved in this sector, specifically in the EU and Guatemala. This implies an interpretivist epistemology, one which emphasises the diversity of interpretations rather than aiming to uncover an objective truth (Denzin and Lincoln 1998). However, interpretivism has been criticised for placing metaphysical concerns (i.e. those regarding epistemology, ontology and methodology) over practical and empirical concerns (Tashakkori and Teddlie 1998; Morgan 2007). In particular, Morgan (2007: 64) argues that:

> 'outside of 'how-to' advice about constructivism... the metaphysical paradigm was mostly concerned with abstract discussions about the philosophical assumptions behind the paradigms it defined, with correspondingly little attention to how those choices influenced the practical decisions being made by actual researchers'.

The poststructural, constructivist approach within political ecology has similarly been criticised for being elitist, for having little practical relevance outside the academy, and for failing to engage with environmental science on its own epistemological grounds i.e. rigour, representativeness and relevance (Blaikie 2012).

Whilst acknowledging the existence of multiple and conflicting realities (Grbich 2007), this research does not adopt a pure constructivist-interpretivist position; rather, it heeds Tashakkori and Teddlie's (1998: 21) call for a 'pragmatic approach' to methodology, one which considers the research questions to be more important than either the methods used or the paradigm underlying the method. This argument resonates with my own worldview: I do not believe in the incommensurability of qualitative and quantitative research, but rather that different methodologies will be appropriate for different research questions. Further, addressing real-world challenges, such as sustainable development, will require interdisciplinary research capable of crossing epistemological divides.

Epistemologies guide methodological choices, which in turn shape and are shaped by the research objectives and study design (Carter and Little 2007). A commitment to 'epistemological plurality' (Miller et al. 2008) accepts that there are many ways of knowing the world in which we live, enabling the researcher to draw on the theoretical and methodological frameworks that are most appropriate to the research in question. With this in mind, an investigation of the sustainability of biofuels could have adopted a quantitative and/ or qualitative research strategy. However, this research was concerned with understanding the complex world of lived experiences from the perspective of those who live it (Schwandt 1994: 118) and with questions of how and why things happen – typically interpretivist concerns. For these reasons, this research aimed to be exploratory and descriptive, rather than explanatory (Bryman 2008); inquiries more suited to a qualitative, rather than quantitative research strategy.

Qualitative research allows the researcher to focus on an exploratory, in-depth investigation of a phenomenon. Denzin and Lincoln (1998: 3) define qualitative research as:

> 'Multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings that people bring to them'.

Thus, situated within the world(s) they are studying, qualitative researchers focus on specificity, context and the meaning of human action. A qualitative approach asks open questions about phenomena rather than testing predetermined hypotheses (Carter and Little 2007). Further, a focus on depth rather than on breadth facilitates the production of rich empirical detail on 'problems that matter to the local, national and global communities in which we live' (Flyvbjerg 2001: 166). It was this depth of detail that this research sought to obtain and in so doing to contribute to our understanding of the multi-scalar political-economic processes that influence the (local) outcomes of biofuels.

Adopting a qualitative, interpretivist position has two interrelated implications for the research methodology adopted for this research. First of all, since most qualitative research methods involve social interactions, it is recognised that the researcher is an active participant in the construction of knowledge. While this may equally be true of other research approaches, qualitative researchers have responded to these criticisms through 'reflexivity' – the examination of the researcher's own impact upon the research process and its outcomes. The positionality of the researcher, i.e. his or her identity, personal history, values and perspectives, will affect the ways in which knowledge is generated, interpreted and transmitted to an audience (England 1994; Mullings 1996; Herod 1999; Dowling 2010; Punch 2012). Therefore, rather than seeking to downplay subjectivity, qualitative researchers seek to emphasise how the research process is influenced by the researcher. Acknowledging the contingent nature of social research, this chapter adopts a reflexive approach to 'open up' and make transparent my own influence over the research process. Since, as England (1994: 85) notes, 'the researcher cannot conveniently tuck away the personal behind the professional, because research is personal'.

Secondly, the 'element of unpredictability' (Holliday 2007: 71) characteristic of qualitative research means it can be difficult for the researcher to decide exactly what sort of data (s)he wants to collect before going into the field. This implies that qualitative research strategies have to be responsive to the opportunities that emerge between the researcher and participants and to develop in conjunction with the research settings (Murray and Overton

2003). In this research, both biofuels and the research setting proved 'unpredictable', with policy changes and security challenges demanding a flexible research strategy. With regard to policy, within the EU, opposition to biofuels grew and specifically, debates about the impacts of indirect land use change (ILUC) threatened to derail the biofuel policy framework (as we shall see in Chapter Four). This constantly evolving framework therefore required a watching brief on policy developments. In Guatemala, presidential elections during 2011 had implications for the field research, since typically violence grows during political campaigns and key government actors are likely to change post-election. Further, as I discovered during the research, Guatemala is not an easy country in which to do field research. While Chapter Five will describe the challenges and violence that characterise contemporary Guatemala in more detail, it is important to mention here that security is both an everyday concern for the public, as well as a key issue in politics. A key policy issue during the 2011 elections was that of security and support for '*la mano dura*' (a strong hand) led to the election of former general, Otto Perez Molina. In 2010, the International Crisis Group described Guatemala as 'one of the world's most dangerous countries', a situation which threatened 'citizens from all walks of life' (pp. 1-3). This clearly presented a challenge for the field research and, after conducting a scoping study and consulting other researchers with field experience in Guatemala, led to a shift in the research focus. It moved from what would have been an emphasis on the local, community level using mainly ethnographic methods, to one that also incorporated field research in Brussels and had a greater focus on national level stakeholders in Guatemala. This shift in focus was beneficial in four key ways. Firstly, and perhaps most importantly, the research focus was strengthened as a consequence, becoming more relevant to both policy and the academy. By situating biofuels within 'real world' policy developments, the research provided an opportunity to reflect on the discursive elements that shape emerging modes of governance and on their applicability to external contexts. Secondly, it became less controversial and emotive; as Chapter Five will explore in greater depth, issues such as land access are highly divisive in the Guatemalan context; thus, a lesser emphasis on the local, community level avoided immediate associations with such polarising themes. Thirdly, the research became less dependent on the Guatemalan field research should I have needed to leave the country earlier than expected (e.g. Lee 1995; Lee-Treweek and Linkogle 2000; Belousov et al. 2007). A final, related, benefit was the shift in emphasis from the local to the national and global levels, which implied less time spent in rural communities many of which have become the foci of conflict over land use (see Chapter Five). This reduced the risk to my personal safety, as well as to potential research participants in rural communities.

The research methodology was therefore both guided by the literature and constructed through the process of inquiry. This iterative approach to inquiry (Grbich 2007) involved a back and forth process between data collection and analysis, a process which would then inform subsequent stages of data collection. In order to facilitate this process, the field research was carried out in three discrete phases: a five week scoping study, carried out between November and December 2010. The second phase of the field research was carried out in Brussels during September 2011. The core of the field research was a seven month period spent in Guatemala (October 2011 to April 2012) when the majority of the data collection took place. The process of analysis and writing was also ongoing, which enabled me to learn as I wrote, to relive the field research, and to revisit and further investigate themes and issues as they emerged and re-emerged.

This section has discussed the research philosophy (epistemological plurality) and methodology (qualitative) that have guided this investigation. To conclude this section, I draw on Denzin and Lincoln's (1998: 3) description of the qualitative researcher as a bricoleur or quilt maker who 'deploy[s] whatever strategies, methods and empirical materials are at hand'; according to this perspective, the finished 'piece' is also a construction that reflects different voices, perspectives and points of view. The following sections describe the process of operationalising the methodology, drawing on this conceptualisation of qualitative research as a bricolage and as a pragmatic, strategic and self-reflexive process.

3.3. Research Strategy

Rocheleau (2008) outlines four methodological hallmarks of political ecology: multiple scales of analysis; multiple methods, objectives and audiences; the integration of social and biophysical evidence; and, empirical observation and data gathering at the local level. All of these components are clearly relevant to this analysis of biofuels, although the Guatemalan field setting placed constraints on what could be achieved at the local level. Further, owing to limited time, financial resources, data availability and my own research interests, a biophysical analysis was not within the scope of this study. In this section, I focus on the first of Rocheleau's hallmarks, namely the multiple-scales of analysis (2008), for which I employed a 'nested' case-study design.

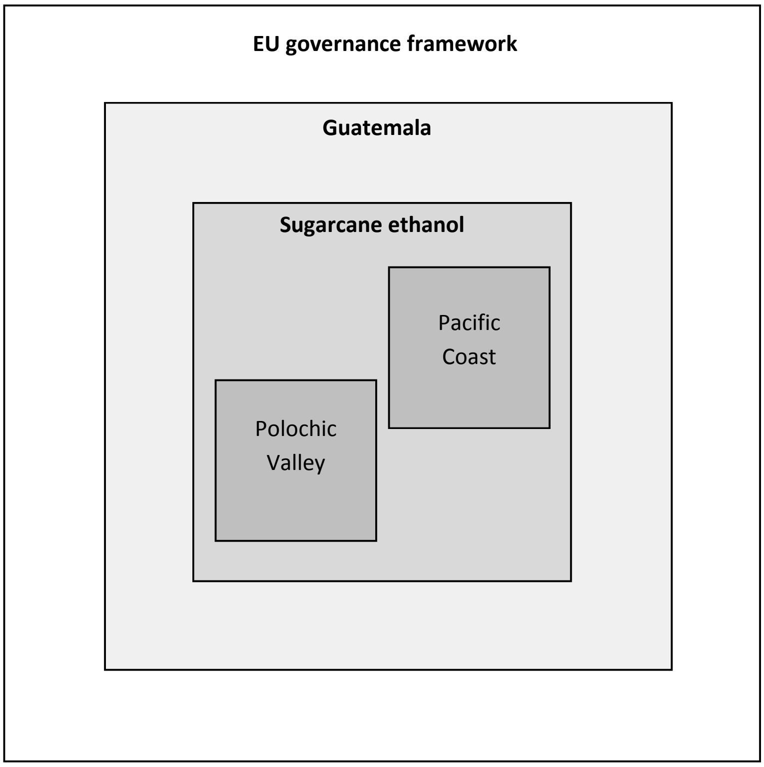
Since its inception, 'chains' or 'webs of explanation' have been a defining characteristic of political ecological research (e.g. Blaikie and Brookfield 1987; Rocheleau 2008). Conceptualisations of scale have moved away from the purely hierarchical (i.e. household, local, regional, national and global) to also incorporate the vertical and temporal dimensions; policy, practice and effects also represents an important scale of analysis (Rocheleau 2008). All of these notions of scale were important to this study.

In order to anchor this multi-scalar analysis in specific empirical sites, a 'nested' case study design was adopted (see Figure 6). The specific case studies were elaborated during the research on the basis of their importance to biofuels in Guatemala. Yin (2009: 18) defines a case study as 'an empirical enquiry that investigates a contemporary phenomenon in-depth and within its real-life context'. This design is particularly useful where the researcher wishes to gain a rich understanding of the research context and the processes and power relations that affect the phenomenon being investigated (Flyvberg 2006). These characteristics mean that case studies have been used extensively in political ecology to demonstrate how social and ecological change is connected to wider political economic processes (e.g. Blaikie and Brookfield 1987; Fairhead and Leach 1996; McKenzie 2005).

This thesis' commitment to examine the multiple scales of biofuels began with the identification of the principal case – Guatemala. As discussed in Chapter One, this nation was selected for a number of reasons. It is the Central American state with the greatest potential in the production, trade and consumption of biofuels due to high yields of sugarcane and palm oil (USDA 2010, 2012a). As well as immense personal interest in the politics, history and culture of Guatemala, the offer of support from contacts there – particularly academics and NGOs engaged in the biofuels issue – constituted a further motivating factor; these connections not only assisted in setting up the research, but they also provided essential support throughout the study.

Shifting outwards from the level of the nation state, it was also essential to examine Guatemala – a developing world producer country – as nested within the global political economy. Chapter Two described the increasingly complex webs that characterise global trade in biofuels and the growing concern about the potential negative sustainability outcomes. It is therefore critical to examine emerging governance mechanisms in order to anticipate, avoid and mitigate future problems. Guatemala is one country that has responded to the increasing global demand for biofuels. As the key export market for biofuels produced in Guatemala, the EU – selected here as a proxy for the 'global' level - was identified as a further case for analysis. The EU is one of the few markets to address the sustainability impacts of biofuels, and a condition of market access is that biofuels must be certified sustainable. This makes it an excellent case study for examining whether this mode of governance is able to capture the sustainability concerns that matter to the Guatemalan context.

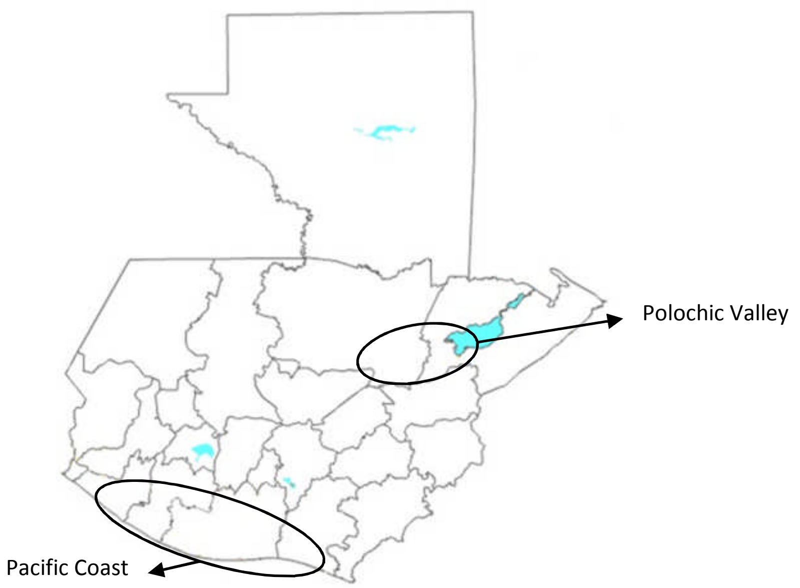
Figure 6. The nested case study design



The next scale of analysis was within Guatemala – representing a 'case within a case' – that of the sugarcane sector. This case emerged once I had commenced the field investigation phase in Guatemala; only with immersion in the field did the salient features and complex dynamics of the sector (and how I should ultimately investigate it) become clear. Sugarcane was selected for the principal reason that, at the time of research, it was the only sector producing biofuels on an industrial scale. Since 2006, the production of fuel grade ethanol from sugarcane has increased from virtually nil to 94 million litres per year. All of the ethanol produced in Guatemala was certified 'sustainable' by the EU-approved International Sustainability and Carbon Certification (ISCC) scheme. Yet within Guatemala there was little consensus on whether sugarcane production, and therefore ethanol, was sustainable. Again, this makes sugarcane an obvious choice to examine the issues of interest to this thesis. Practical considerations also shaped this selection; for instance, an alternative case could have been African palm, however, I soon realised that accessing this closed and opaque sector would present significant challenges. Furthermore, from a personal safety perspective, the insecure nature of many of the regions cultivated with oil palm directed me towards the sugarcane sector. The case of African palm is nonetheless included in this analysis because it was not possible to discuss the topic of biofuels with respondents without also touching upon this feedstock. As I discovered during the field research, there is currently no biodiesel production from African palm, yet the expansion of this feedstock has been subject to national and international controversy. This expansion has been blamed by NGOs on increased global demand for biofuels (e.g. ActionAid 2008; Alonso Fradejas et al. 2011), yet whether this is the case is uncertain. However, determining the (indirect) effects of global biofuel demand on vegetable oil markets and how that demand manifests in different world regions would have involved the use of complex economic and land use models, which was beyond the scope of this thesis.

Two further embedded cases, the Polochic Valley and the Pacific Coast, were chosen to investigate the production of the sugarcane feedstock *in situ*. At this local level, I was interested in the lived experiences of those who were affected – positively or negatively – by the cultivation of sugarcane. At this local scale, the choice of cases was somewhat easier, since sugarcane in Guatemala is predominantly produced in these two geographic regions. Figure 7 indicates the location of these two cases.

Figure 7. Map of Guatemala indicating the two areas of sugarcane production, the Pacific Coast and the Polochic Valley



Source: adapted from SAVIA (2009)

As with any research design, a case study design has certain limitations. In particular, case studies have been criticised by scholars from a positivist perspective for the perceived lack of generalisability (Stake 2005; Flyvberg 2006; Yin 2009). However, this research is rooted in the belief that the strength of qualitative case studies lies in the provision of rich, contextual data (Flyvberg 2001, 2006), which have the potential for transferability. Transferability is where aspects of such in-depth data may be transferred and applied to other contexts and situations (Flyvberg 2006; Baxter 2008; Bryman 2008; Yin 2009). In this instance, these data relate to the multiplicity of factors that influence the sustainability outcomes of biofuels. Having described the nested case study research design, the following sections elaborate on the methods used to generate the data whilst in Brussels and in Guatemala.

Cross-cultural research

The principal case was Guatemala which, in addition to the academic and security challenges raised in the previous section, gave rise to a number of ethical issues related to what is termed 'cross-cultural research'. Methodological debates tend to focus on cross-cultural research carried out with marginalised groups rather than with 'elites', although there are exceptions (e.g. Herod 1999; Mullings 1999; Krznaric 2006; Gould 2010; Oglesby 2010). Research with the former in particular raises concerns about colonialism, the extraction of knowledge and asymmetrical power relationships between 'researcher' and the 'researched' (Sidaway 1992; Twyman et al. 1999; Howitt and Stevens 2010). However, investigating biofuels in Guatemala required fieldwork with multiple actors at multiple-scales; it involved negotiating relationships with different epistemic communities living in vastly different contexts. Moving between the socially disparate, but geographically close 'worlds' of my research (Gent 2014) – from the air conditioned offices in Guatemala City to my similarly affluent home in the capital, to the families in Alta Verapaz who struggled to survive on a dollar a day – required critical reflections of my own positionality. Furthermore, being exposed to and identifying with multiple worldviews required an awareness of how these different 'worlds' influenced my own perceptions and interpretations. Seeking to work in collaboration with local people, a willingness to put aside preconceptions, and to engage reflexively are all offered as ways in which the researcher can seek to redress power asymmetries in cross-cultural research (Howitt and Stevens 2010). While this research was not collaborative, the research topic (biofuels) addressed issues of concern to many participants, particularly those involved in social justice and environmental sustainability. During field visits with communities, I sought to counter asymmetrical power relations by positioning myself as the supplicant, willing to listen and to learn from participants. Debate amongst feminist scholars about power, positionality and reflexivity has also been invaluable in thinking through some of these ethical issues, and are themes that recur throughout this chapter (e.g. Schoenberger 1992; McDowell 1992, 1998; England 1994; Katz 1994; Nast 1994; Mullings 1996; Rose 2006).

3.4. Field Research and Data Collection: in theory and in practice

The case study approach described in the previous section aimed to understand the global to local dynamics that were shaping the outcomes of biofuels in Guatemala. This cross-scale strategy demanded engagement with different actors involved in the biofuel sector, particularly in policy, academia, the private sector and NGOs. Here again, political ecology provided guidance on how the research should be conducted. In particular, a mainstay of political ecological research is the use of multiple methods to address the multiple objectives, actors and audiences that are typical of political ecology (Rocheleau 2008). This perspective also chimes with the notion of the qualitative researcher as bricoleur that was described in Section 3.2. Drawing on structural and poststructural approaches to political ecology, required paying attention to both the material and discursive elements that influence the outcomes of biofuels. This required analysis of written documents, including policy documents, NGO publications and academic papers, as well as paying attention to the political economic factors that influence social and environmental change. It also used an actor-oriented approach, which emphasises the roles motivations and perspectives of different actors involved in biofuels (Bryant and Bailey 1997). This latter approach also emphasises distinct 'voices' to be heard, in particular those of local communities whose perspectives are all too often excluded from dominant narratives.

This research used multiple methods, the choice of which was influenced not only by the methodology, but also by the type of data I was looking to obtain, time and financial resources, and the fieldwork context(s). Three principal data collection methods were employed during this research: document analysis (including secondary data collection), interviews and field visits. The use of multiple methods facilitated the process of triangulation, wherein multiple sources, methods and theories are used to clarify meanings, check the research process and interpretations and thus ensure credibility (Stake 1998; Bryman 2008). Addressing each of the research objectives outlined in Section 3.1 required a different emphasis to be placed on each of these methods. For instance, exploration of the EU's governance framework for biofuels relied largely on analysis of policy documents with supplementary interview data (see Chapter Four). Understanding the mechanics and governance of the Guatemalan biofuels sector required in-depth interviews, and was supported by data produced through observation and document analysis (Chapters Six and Seven). Addressing the final research objectives, which focus on the sustainability outcomes of the sugarcane sector, necessitated the use of interviews and field visits, again supplemented by document analysis where relevant (Chapter Eight). The following sub-sections elaborate on the methods used to gather and produce the research data.

3.4.1. Document Analysis

Following the discursive 'turn' within political ecology, the critical examination of language and text has become increasingly important (Neumann 2005). Discursive analysis has revealed the power and politics in socially constructed narratives of environment and environmental change (Bryant and Bailey 1997; Dryzek 2005). For this research, however, the lack of written documentation pertaining to biofuels in Guatemala prevented a comprehensive examination of discourse. Rather, where documents were available, it entailed a close reading of the numerical, textual and visual content of documents, including books, peer-reviewed literature, newspaper articles, government documents, websites and social media. Rapley (2007) refers to these materials as an 'archive' which, together with researcher-generated data, enables the production of specific research findings. Indeed, over the course of this research, I amassed a vast archive related to biofuels, sustainability governance, political ecology, and Guatemala amongst other topics. Many of these documents were publicly available, others were given to me during interviews, while still others required visits to libraries, newspaper archives and government offices.

Document analysis was an important method throughout this thesis, but was especially important for addressing the first research objective (see Section 3.1). Understanding the evolution of EU biofuels policy required a close reading of the documents that had played a role in establishing the form and content of the policy. Publications and policy documents by the European Commission formed the backbone of this analysis, supplemented by newspaper articles, publications by NGOs and industry, and peer-reviewed papers. The document search began with the three key EU Directives – the 2003 Biofuels Directive, the 2009 Renewable Energy Directive and 2009 Fuel Quality Directive. Policy developments were then traced backwards and forwards by following up references in the Directives, such as Communications from the Commission, Impact Assessments and White Papers. Moving forward, a 'watching brief' on policy developments led to the identification of more recent documents pertaining to biofuels in the EU. All of these documents were available online. Finally, some documents were sent to me by interviewees. These publications covered the period from 1997 to late 2013. Owing to my familiarity with the European biofuels field, these documents were analysed using a largely deductive approach, wherein key themes were identified in advance and the documents coded manually. Themes included sustainability, motivations and drivers, governance and actors. Key themes for discussion at interview were also identified on the basis of the document analysis.

The collection and analysis of documents pertaining to biofuels in Guatemala was also an important component of the research. The identification of documents began with an initial search of the internet using both English and Spanish keywords; institutions such as the US Department for Agriculture (USDA) and the UN Economic Commission for Latin America and the Caribbean (CEPAL) proved invaluable sources of general information on the development of biofuels in Latin America. At this early stage of the research, I also spent time in UCL's library reading about historical and contemporary Guatemala. Once in Guatemala, and as part of an ongoing stakeholder mapping exercise (see Section 3.5.2), key institutions and stakeholders relevant to this research were identified. Prior to interviews, I would conduct an initial search of the internet, wherever possible identifying and reading relevant documents; however, numerous organisations did not have a web presence and many documents were not available online. As a result, many of the documents referenced in this thesis were given to me prior to or after interviews. The vast majority of these documents were available only in Spanish. Finding relevant literature was, however, complicated by the absence of a biofuels policy for Guatemala, the research and consequences of which will be discussed in Chapter Seven. This meant there were very few government and policy documents to draw upon. Interviews therefore provided most of the data for the role of the state in the biofuels sector. Documents published by the private sector were similarly difficult to obtain due to the commercially sensitive, and controversial, nature of biofuel production. Much of the existing literature on biofuels in Guatemala is therefore written by NGOs (e.g. ActionAid 2008, 2012; Mingorría and Gamboa 2011) and international organisations, including the USDA (2010, 2012a), the Organisation of American States (Hart Energy 2010a, 2010b) and CEPAL (2004, 2007), amongst others. Since NGOs, in particular, tend to be opponents of biofuels the dearth of literature published by private and state actors gives a polarised, one-sided perspective of biofuels and must therefore be treated with caution. Similarly, documents published by large organisations such as the USDA rarely take into account the place-specific arrangements that will condition the local outcomes of biofuels. Nonetheless, these documents provided an important starting point that informed later stages of data collection and analysis. As with the European biofuel policy component of the research, on my return from Guatemala, I continued to maintain a ‘watching brief’ on developments whether related to biofuels, megaprojects or politics. This approach to selecting documents was not therefore systematic, but rather exhaustive. While a more systematic approach may have had the advantage of limiting the number of documents to be analysed, given the constraints outlined above, an exhaustive approach, one that would enable the identification of a wide range of documents was considered important to not only understand biofuels, but also the Guatemalan context.

My lack of familiarity with the Guatemalan context meant that, in contrast to the EU analysis, I adopted an inductive approach to document analysis. An inductive approach is one which allows key research themes to emerge from the data, rather than being imposed prior to data collection (Denzin and Lincoln 1998). In addition to indicating what would become key research themes, these documents also aided the identification of potential research participants.

Before moving on to discuss the principal method (interviews) that was used in this thesis, I want to briefly discuss the collection of secondary data in Guatemala. Here, secondary data refers not to the documents discussed in this section, but rather to quantitative data such as census and land use data, agricultural, employment and trade statistics, as well as data on biofuel production.

Secondary data collection

Secondary data is likely to form an important component of any research project, particularly for the provision of contextual information. This was certainly true for this research, particularly for aiding my understanding of the agricultural systems that produce biofuel feedstocks in Guatemala. As discussed in Chapter Two, the environmental and social impacts of increased land use for biofuel production are amongst the most contested outcomes of biofuels. Similarly, early document analysis had revealed that a key criticism of biofuels in Guatemala was the concentration of land driven by the expansion of African palm and sugarcane. However, it soon emerged that scarce state resources meant that much secondary data were scarce, out of date and/ or dispersed. For example, there have been only three agricultural censuses – in 1964, 1979 and 2003. Only the most recent of these is available online, while the others have to be viewed in the offices of the National Institute of Statistics (INE) in Guatemala City. Comparisons between the three censuses are also complicated by different methodologies, changing definitions and the context under which the earlier censuses were carried out (i.e. the first two were carried out during the civil conflict).

An interview with the GIS unit of the Ministry of Agriculture (MAGA) revealed another challenge for the use of secondary data. Given the importance of land use changes to analyses of biofuels, it is important to have an idea of existing land uses and of the agricultural capacity of the land. However, the map shown in Figure 8, which is used as a baseline to assess agricultural capacity in Guatemala, was based on a study done in the 1940s. Although there is a project underway to update the map, published data were still only available for four of Guatemala's twenty two departments. These new data revealed greater agricultural capacity than is shown in Figure 8 (GG7, March 2012)[6]. This is likely to have implications for the production of biofuel feedstocks and other crops and, in particular, this interviewee argued it would undermine many of the conservation movement's arguments for protected areas.

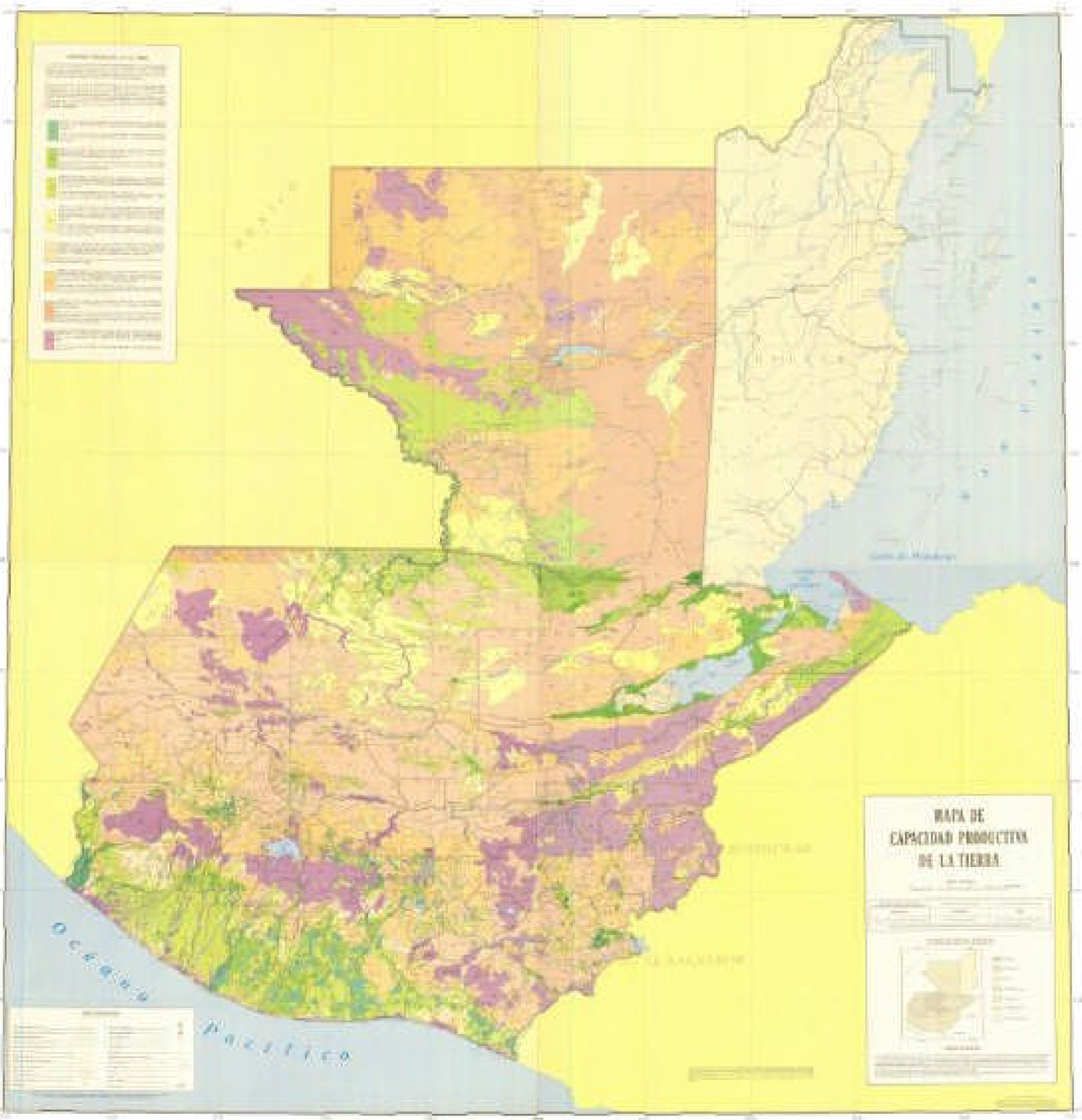
The sugarcane sector proved to be a good source of such secondary data since it routinely publishes data on land use, yields and production and trade statistics, which are also available online (e.g. CENGICANA 2011a, 2011b, 2011c, 2013; ASAZGUA 2011). Often, on arrival at participants' offices, I was presented with a folder containing these data without having to ask for it and Chapter Six, in particular, draws on these resources. However, other data – particularly those on wages and longitudinal data on jobs – were not publicly available and I did not feel comfortable asking for them during interviews, for reasons that will be discussed in the next section. The lack of transparency by private companies in Guatemala was acknowledged by one respondent who worked for a sugar mill:

> 'I know that in other countries things are more transparent, that companies share a lot of information, that they publish a lot, but here in Guatemala the culture is different. More than anything what they dislike is when the company name is published, because sometimes information is used for other means' (GP11, February 2011).

This quotation also points to the consideration that must be given to the dissemination of the research findings (e.g. Oglesby 2010). Published data also apply only to the thirteen mills that are members of the Guatemalan Sugar Producers Association (GP7, December 2011); independent producers and the country's only other sugar mill, Chabil Utzaj (see Chapters Six and Eight), are typically not included in these data.

[6] For example, the original map shows a high percentage (41%) of Type VII land. This refers to 'uncultivatable land, land suitable only for forestry and broken topography with very steep gradients'. The more recent map showed that only 16% of the land was unsuitable for agricultural production due to high gradients.

Figure 8. Map of agricultural land capacity, Guatemala



Source: MAGA (no date)

By comparison, the relative newness and controversial expansion of the Guatemalan palm oil sector meant that data on land use, yields and production were more difficult to access. An interview with the Guatemalan Palm Oil Producers Association revealed that while each company kept their own data, it was not (yet) the job of the Association to collate these statistics (GP10, January 2012). Data on land use by the palm oil sector were therefore obtained from other sources (see Chapter Six); publications by the Institute of Agriculture, Natural Resources and Environment (IARNA 2012a, 2012b) proved particularly useful sources of data on the sector, as did a report by ActionAid (2012). As with any document, issues of credibility meant that these documents also had to be interrogated in the context of other sources of data (Bryman 2008). As discussed in Section 3.3, the closed nature of the African palm sector was one of the reasons that this thesis focuses on sugarcane.

The difficulties associated with secondary data collection in Guatemala meant that interviews, supported by field visits, provide the majority of the empirical data used in this research. This method too was beset by challenges, which are discussed in the next section.

3.4.2. Interviews

As with much qualitative research, the principal method of data collection used in this thesis was that of interviews. Understandably given the widespread use of this method there is a vast literature on their use (see for example Goode and Hatt 1952; Eyles 1988; Valentine 1997; Patton 2002; Marshall and Rossman 2003; Desai and Potter 2006; Kvale 2007; Bryman 2008). To avoid simply reiterating what has already been said – and far more eloquently than I could do here – I provide only a limited discussion of the method itself, focusing instead on how the method was deployed in practice, drawing where relevant on my contrasting experiences in Brussels and Guatemala.

Interviews have been described as a 'conversation with a purpose' (Eyles 1988: 111), as 'an interchange of perspectives between two [or more] people' (Marshall and Rossman 2003: 145) and as 'pseudo-conversation' (Goode and Hatt 1952). They are social encounters in which the researcher will explore a few general topics, but the focus is on understanding how the participant frames and understands the issues under discussion. The majority of the interviews I conducted were semi-structured i.e. they were guided by 'an inventory of issues' to be discussed in each interview (Bryman 2008: 439), although others were unstructured. The key benefit of a semi-structured approach to interviews is that they adopt a flexible and discursive approach, one that allows divergence from the set agenda to explore new lines of thought (ibid). By comparison, in-depth or unstructured interviews began with just a single question, allowing the interviewee to respond freely; I would then follow up on those issues I considered important to the research.

A total of 76 expert interviews were held: 64 in Guatemala and twelve in Europe. These are summarised in Table 2, while Table 3 contains a full list and short description of the organisations that are represented in this research. To protect anonymity, expert participants are referred to in the text by a code: the first letter refers to the location of the research (i.e. E represents EU interviews, while G refers to those conducted in Guatemala); the following letters represent the sector to which the participant belongs; finally, the number refers to the interview number.

Table 2. Summary of interviews

Location of field work	Expert actor group	Code in text	Number of interviews
Brussels (August to September 2011)	NGO	ENGO	3
	Academic	EA	1
	European Commission	EC	7
	Private sector	EP	1
Guatemala (November to December 2010; October 2011 to May 2012)	Private sector	GP	17
	Government	GG	11
	NGO	GNGO	19
	Academic	GA	9
	International Organisation	GIO	5
	Other	GO	3
Total			**76**

In addition to the expert interviews, in-depth interviews were also conducted with individuals in communities affected by the cultivation of sugarcane. These interviews are discussed in Section 3.4.3 where I elaborate on the field visit method.

Table 3. List of expert interviewees

Interview Reference	Organisation	Description	Location and date
		European Interviews	
EA1	UCL Energy	Academic lawyer specialising in European environmental law	London, July 2011
ENGO1	Institute for European Environmental Policy	Independent research organisation focused on European environmental policy	London, August 2011
ENGO2	Transport and Environment	Promotes sustainable transport policy	Brussels, September 2011
ENGO3	European Environmental Bureau	Europe's largest federation of environmental organisations	Brussels, September 2011
EP1	European Biomass Association	A not for profit organisation that aims to represent bioenergy at the EU level	Brussels, September 2011
EC1	DG CLIMA	Leads international negotiations on climate change and helps to deal with the consequences of climate change	Telephone interview, August 2011
EC2	DG ENV	Responsible for maintaining and improving natural resources	Brussels, September 2011
EC3	DG DEVCO	Responsible for designing EU development policies and delivering aid programmes	Brussels, September 2011

EC4	DG ENER	Focuses on the creation of a competitive internal energy market and the development of renewable energy sources	Brussels, September 2011
EC5	DG ENV	Responsible for maintaining and improving natural resources	Brussels, September 2011
EC6	European Forum for Renewable Energy Sources	A European cross-party network of European Members of Parliaments that aims to promote renewable energy	Brussels, September 2011
EC7	European External Action Service	Guatemala delegation	Telephone interview, September 2011
		Guatemala: Academics	
GA1	Faculty of Agronomy, Universidad San Carlos de Guatemala (USAC)	Interview with a researcher who was leading a project investigating the small-scale production of jatropha	Guatemala City, November 2010
GA2	Centre for Environmental Studies and Biodiversity, Universidad del Valle	Interview with a researcher whose research focuses on environmental issues in Guatemala	Guatemala City, November 2010
GA3	Latin American Faculty of Social Sciences (FLACSO)	Interview with a researcher leading an investigation into the expansion of African palm in the Franja Transversal del Norte	Guatemala City, November 2010
GA4	Institute of Agriculture, Natural Resources and Environment (IARNA), University Rafael Landívar	Research institute that publishes a biannual report on the state of the environment; in 2012, published a study on the expansion of palm oil in Guatemala	Guatemala City, November 2010
GA5	Chemical Engineering Department, University del Valle.	University faculty that has designed a small-scale biodiesel plant that uses used cooking oil	Guatemala City, December 2010
GA6	Faculty of Agronomy, USAC	Interview with a researcher working on rural development	Guatemala City, December 2010
GA7	Faculty of Agronomy, USAC	Investigation of the small to medium-scale cultivation of jatropha	Guatemala City, March 2012
GA8	IARNA	Rafael Landívar University	Guatemala City, April 2012
GA9	Faculty of Agronomy, USAC	Interview with a researcher working on rural development	Guatemala City, April 2012
		Guatemala: Non-Governmental Organisations	
GNGO1 (2)	Inter-American Foundation for Tropical Investigation (FIIT)	Not for profit organisation working to promote and certify sustainable agriculture.	Guatemala City, November 2010; November 2011
GNGO2	CEIBA	Not for profit that works with local communities and is particularly focused on agroecology and food sovereignty	Chimaltenango, November 2010
GNGO3 (2)	ActionAid	Published several reports critiquing the expansion of agrofuels in Guatemala, especially focused on African palm	Guatemala City, December 2010; March 2012

GNGO4	Co-ordination of NGOs and Cooperatives (CONGCOOP-IDEAR)	Co-ordinating body that has also investigated the expansion of sugarcane and African palm, especially in the Polochic Valley	Guatemala City, December 2010
GNGO5	Institute for Rural Development (IDR)	NGO that focuses on workable finding policy solutions to rural development	Guatemala City, December 2010
GNGO6	Fundación Solar	Private organisation that promotes small-scale, distributed renewable energy solutions	Guatemala City, December 2010
GNGO7 (2)	El Observador	Through investigation seeks to provide and publish an alternative analysis of Guatemala's political and economic situation	Guatemala City, December 2011; January 2012
GNGO8	Technoserve	An international not for profit that promotes business solutions to poverty in the global South	Guatemala City, February 2012
GNGO9	CALMACEC	Environmental NGO, focused on energy forests	Guatemala City, February 2012
GNGO10,	National Coordination of Campesino Organisations (CNOC)	Umbrella group that represents the interests of indigenous people and farmers.	Guatemala City, February 2012
GNGO11	Action Aid/ FLACSO	Researcher who had worked on several reports focused on the palm oil sector	Guatemala City, February 2012
GNGO12	Fundación Menchu	Set up by Nobel prize winner Rigoberta Menchú to create justice and democracy, particularly for indigenous peoples	Guatemala City, February 2012
GNGO13 (2)	Fundación Guillermo Torrillero	Promotes social justice and rural development	Guatemala City, March 2012
GNGO14	CODECA	Established after the civil war by indigenous people and campesinos to promote rural development	Guatemala City, March 2012
GNGO15	Red Manglar	Guatemalan arm of an international network dedicated to protecting and reversing the degradation of mangroves.	Guatemala City, March 2012
GNGO16	National Council for Displaced People (CONDEG)	Set up after the civil conflict to assist people displaced during the war	Guatemala City, March 2012
GNGO17	Guatemala Solidarity Project	International solidarity project, working with campesinos affected by megaprojects	Guatemala City, March 2012
GNGO18	Committee for Campesino Unity (CUC)	One of the largest peasant organisations in Guatemala	Guatemala City, April 2012
GNGO19	CUC	Delegates from the CUC	London, July 2012
Guatemala: Private Sector			
GP1 (4)	Association of Renewable Fuels (ACR)	Private organisation focused on the promotion of renewable fuels, specifically biofuels	Guatemala City, November 2010; December 2011; April 2012; Interview via Skype, March 2013

GP2 (2)	Biopersa	Small-scale production of biodiesel from used cooking oil	Antigua, December 2010; February 2012
GP3	Madre Tierra	One of Guatemala's sugar mills	Guatemala City, November 2011
GP4	Private Institute for Climate Change Research (ICC)	Private research institute, funded by the sugarcane sector that focuses on climate change research and watershed management	Guatemala City, November 2011
GP5	Guatemalan Sugarcane Research and Training Centre (CENGICAÑA)	Private sector research institute focused on crop agronomy	Santa Lucia Cotzumalguapa December 2011
GP6	CENGICAÑA	Private sector research institute focused on industrial uses of sugarcane, including ethanol	Guatemala City, December 2011
GP7	Guatemalan Sugar Association (ASAZGUA)	Industry trade association focused on collaboration between companies, standardisation, and public relations	Guatemala City, December 2011
GP8	Ethanol Consultants	Consultancy set up to promote the use of ethanol	Guatemala City, December 2011
GP9	High Enthalpy Biofuels	Private company set up to promote a high enthalpy technology to produce biodiesel	Guatemala City, January 2012
GP10	Guatemalan Palm Producers Trade Association (GREPALMA)	Industry trade association focused on collaboration between companies, standardisation, and public relations	Guatemala City, January 2012
GP11	Pantaleon	Guatemala's largest sugar mill and ethanol producer	Santa Lucia Cotzumalguapa January 2012
GP12	Biocombustibles de Guatemala	Private company focused on the cultivation of jatropha	Guatemala City, February 2012
GP13	ECOSISA	Consultancy focused on energy, including renewable energy and biofuels	Guatemala City, February 2012
GP14	Tulula	One of Guatemala's sugar mills that also produces ethanol, including fuel grade ethanol	Quetzaltenango March 2012
GP15	DARSA	The distillery that owns the Tulula sugar mill	Quetzaltenango March 2012
GP16	SG Biofuels	Private company focused on the cultivation of jatropha	Guatemala City, March 2012
GP17	FUNDAZUCAR	Foundation established by the sugarcane industry to promote Corporate Social Responsibility	Guatemala City, March 2012
Guatemala: Government			
GG1	Ministry of Energy and Mines (MEM)	Representatives of the National Biofuels Commission	Guatemala City, December 2010
GG2	Presidential Secretariat for Agrarian Affairs (SAA)	Representatives of the SAA delegation to the Polochic Valley	Guatemala City, February 2012

GG3	Ministry of Environment and Natural Resources (MARN)	Representative of the Environmental Impact Assessment unit	Guatemala City, March 2012
GG4	MEM	Representatives of the National Biofuels Commission	Guatemala City, March 2012
GG5	Presidential Secretariat for Territorial Planning and Programming (SEGEPLAN)	Department of Planning and Territorial Legislation	Guatemala City, March 2012
GG6	Congress	Congressman, Commission of Energy and Mines	Guatemala City, March 2012
GG7	Ministry of Agriculture, Livestock and Food (MAGA)	Unit for Geographical Information Systems	Guatemala City, March 2012
GG8	MAGA	Representatives of the National Biofuels Commission	Guatemala City, March 2012
GG9	MAGA	Representative of the Climate Change Unit	Guatemala City, March 2012
GG10	Ministry of Finance (MINFIN)	Representatives of the National Biofuels Commission	Guatemala City, April 2012
GG11	Ministry of the Economy (MINECO)	Representatives of the National Biofuels Commission	Interview via Skype, May 2012
Guatemala: Other			
GO1	ECOAIA	Ex-minister of Energy and Mines, now director of a company that carries out environmental impact assessments	Guatemala City, November 2011
GO2	BIOTEC	A Colombian company working with sugarcane ethanol	Santa Lucia Cotzumalguapa December 2011
GO3	SITRABI	Representative of the banana plantation workers union	London, October 2012
Guatemala: International Organisations			
GIO1	Inter-American Institute for Cooperation on Agriculture	An agency of the Organisation of American States that focuses on agricultural development and promotes rural wellbeing.	Guatemala City, November 2010
GIO2	EU Delegation	European External Action Service	Guatemala City, March 2012
GIO3	Mercy Corps	International development organisation	Guatemala City, March 2012
GIO4	Roundtable on Sustainable Biomaterials (RSB)	International stakeholder initiative that promotes the sustainable production of biofuels	Interview via Skype, March 2012
GIO5	Organisation of American States (OAS)	Supporting the development of biofuels in Guatemala	Interview via Skype, April 2013

Sampling

Sampling involves setting the parameters of the study. It concerns making decisions not only about who should be involved, but also about the settings, events and processes that are studied. However, for some the term 'sampling' is problematic for qualitative research since it 'implies the purpose of "representing" the population sampled' (Maxwell 2004: 88), whereas qualitative research typically aims to be illustrative rather than representative (see also Valentine 2005). Recognising this concern, expert participants were selected both purposively, i.e. on the basis of their relevance to the research topic in question, and through snowball sampling (Patton 2002; Rice 2010).

In Europe, a supervisor provided initial contacts and additional respondents were identified through familiarity with the field. Participants were approached from different sectors – policy, civil society and industry – on the basis of their organisation's knowledge of and involvement in EU biofuels policy. All interviews were held in English, and the majority took place in Brussels, although two were held over the phone and one took place in London. In contrast to the European organisations, which had a significant online presence, many of the institutions and actors engaged in biofuels in Guatemala were not so visible. An ongoing mapping exercise facilitated the sampling process, but was complicated by a highly disparate biofuels landscape. As will be discussed in detail in Chapter Seven, a wide range of actors are engaged with different angles of the biofuels debate, some more directly than others. Being in Guatemala for an extended period therefore facilitated the development of networks and the follow-up of new opportunities as they arose, also known as opportunistic or emergent sampling (Patton 2002). During this time I sought to engage with as wide a range of actors as possible in order to enhance my understanding of this diverse and complex field, but also to gain access to the world views of actors not directly involved in biofuels. Interviewees included a Congressman, representatives of rural communities living in the Polochic Valley, government officials who are involved in the National Commission on Biofuels, and the managing director of one of Guatemala's sugar mills. A total of 64 face-to-face expert interviews were held in Guatemala (see Tables 2 and 3). All interviews were held in Spanish and some participants were interviewed more than once, for example the representative of the Guatemalan Biofuels Association[7] (ACR) was interviewed on four separate occasions.

[7] *Asociación de Biocombustibles de Guatemala*

A word on interviewing 'elites' and 'experts'

The methods literature makes a distinction between 'elite' and 'non-elite' interviews (Schoenberger 1991, 1992; McDowell 1992; Herod 1999; Kezar 2003; Conti and O'Neil 2007; Rice 2010), both of which were employed during this study. Definitions of elites, as a social group and as individuals, vary (Rice 2010); for Mills (1963, cited in Conti and O'Neill 2007: 65) elites are those individuals 'at the very top of society', while for Herod (1999) elites also encompass those 'holding positions of power within organisations, such as corporations and/ or governments'. However, in Guatemala the term 'elite' has a different connotation, referring specifically to a handful of families (many with roots that trace back to the colonial period) that 'control the larger part of industry, agricultural exports, finance and trade', as well as land (Briscoe and Rodriguez-Pellecer 2010: 17; see also Oglesby 2004, 2010; Krznaric 2006; Gould 2010). Therefore, throughout this research I have restricted the use of the term 'elite' to refer only to these actors; I use the term 'expert' to refer to interviews with those falling under Herod's definition of elites. It should, however, be noted that while 'elites' are typically presented as homogenous groups, such labels often mask differences within them. Not all individuals within a group will hold the same idea or indeed will experience the world in the same way (Lewis 2003; Hunsberger 2010; Rafey and Sovacool 2011). Within Guatemala's sugarcane elites, for example, some families are wealthier and more powerful than others. Those such as the Herrera Ibargüen, who own the Pantaleon sugar mill and who have numerous other investments in key economic sectors, are amongst the most powerful in Guatemala (El Observador 2007); others, while still 'elite' families, are much less powerful. Similarly, care should also be taken to avoid the assumption that Guatemala's *campesinos* are homogenous; there will be disparities between and within communities, not only with regard to factors such as age, gender and wealth, but also with regard to values, knowledge and experiences of environmental change.

Gaining access

Gaining access to participants is a critical phase of any research project, yet it can also be one of the most difficult (McDowell 1998; Herod 1999; Conti and O'Neil 2007; Rice 2010). In expert interviews, where participants are chosen on the basis of their specialised knowledge, it is argued that gaining access may depend as much on strategic planning, connections and networks, as on serendipity (McDowell 1998; Conti and O'Neil 2007; Rice 2010). With regard to this research, which aimed to incorporate multiple voices, an important risk was therefore ensuring the participation of a range of different stakeholders. For example, in Guatemala, engagement with government actors was challenging due to the 2011 electoral campaign and subsequent change of administration. Arriving six weeks before the elections, I made a decision to wait until near the end of the field research before approaching government actors. This strategy entailed risks, but also revealed important challenges to the development of a biofuels policy in Guatemala that may not have been identified otherwise. These issues will be discussed in Chapter Seven.

The scoping study had highlighted the challenges associated with accessing and engaging with Guatemala's 'elites', which influenced how and when I approached different actors. As a result, three strategies were employed to minimise the risk of non-participation during the core of the field research. Firstly, and particularly relevant to Guatemala, was that of institutional alignment. Although Scheveyens and Storey (2003) recommend strong institutional support whilst in the field, given the deeply contested nature of biofuels, I chose not to align myself with any particular organisation other than my own institution, UCL. While this support would have provided the advantage of facilitating a deeper engagement with some actors, it could have closed the doors to others (McDowell 1992). Secondly, given that biofuels are an issue that polarises, the research was positioned in a way that was as neutral and value-free as possible. For example, the terminology used when presenting the research was important; some participants referred to *biocombustibles* (biofuels), while others used the term *agrocombustibles* (agrofuels). As I discovered through the research process, in Guatemala certain issues are highly sensitive, the mention of which could have led to guarded responses or even refusal to participate. I firmly believe that a focus on the influence of global policy, rather than on the social implications of biofuel production, was a more appealing framing for certain actors, particularly for those involved in promoting their use – many of whom were keenly aware of the potential for negative publicity as discussed above. The issue of self-positioning also relates to the final strategy, which concerned the timing of the interviews. Once the central role of sugarcane ethanol to biofuels in Guatemala became apparent, ensuring the participation of respondents from this sector was critical. However, during the scoping study (and later) interviews NGO participants commented upon the difficulties of engaging with this and other perceived 'closed' sectors, such as the palm oil sector (GNGO3, GNGO4, December 2010; GNGO8, February 2012). Issues of access were acknowledged by an employee of a sugar mill who explained that she had needed to obtain permission from her employers to meet with me. Wary of negative publicity, securing permission for the interview had been facilitated by my connection to another private sector actor (GP11, January 2012). I was also concerned that visits to rural areas that had been the focus of recent conflict over the expansion of sugarcane (particularly the Polochic Valley) would preclude further engagement with the sector. Thus, in order to minimise the risk of non-participation I decided to initially focus on establishing links with the sugar and other private sector actors before I investigated the local level outcomes of biofuels (see also Oglesby 2010).

Fortunately, and contrary to what is emphasised in much of the literature, access proved to be easier than anticipated. Whether in Brussels and in Guatemala, the majority of the people approached were accessible and open to sharing their time, knowledge and opinions. In Brussels I was greatly facilitated by a participant in the European Commission who took an interest in the research. While in Guatemala, my concern that I would not be able to engage with the sugarcane sector proved unfounded. An introduction by a friend to his colleague (affiliated to the sugarcane sector) led to an informal interview with the director of a private research institute, whose name and networks subsequently opened doors for me. In this instance, it was my friend's own network that created this initial contact, but it was also suggested to me that my identity as an 'outsider' had also facilitated access. This relates to Herod's (1999) discussion of interviewing foreign elites, who found that his 'outsider' position afforded him a warmer reception than if he had been a local researcher. My positionality[8] inevitably shaped my relationships with participants, and played different roles across the different 'worlds' of my research – the air conditioned offices of Brussels and Guatemala City, and the adobe homes of participants in rural Guatemala. In particular, I suspect that my nationality and positioning as a 'doctoral researcher' facilitated access to participants in both research sites, as well as amongst experts and non-experts. On only one occasion was I aware that my gender also affected access[9]. However, as Herod (1999) and Mullings (1999) caution, determining how one's identity affects the production of knowledge is not possible; my positionality shifted according to who I was talking to as I consciously and unconsciously emphasised different aspects of my identity.

The Interview Process

As discussed earlier, this research employed both semi-structured and unstructured approaches to the interviews. Which approach was used depended on who I was interviewing, as well as the objective of each interview. Semi-structured interviews were used for all the European

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[8] i.e. my identity as a white, British, (relatively) young, female, Anglophone

[9] A research participant was encouraged by another to meet with me not only because my research was of interest to his business, but also because I was *guapa* (good looking/ pretty).

interviews, the aim of which was to follow up on specific issues that had arisen during the document analysis. The same interview guide was used in all eleven interviews (see Appendix II for sample interview guides); the questions focused on the drivers of EU biofuels policy, the role of different actors in the development of the governance framework and the development of the sustainability criteria.

The diversity of actors in Guatemala, the depth of each organisation's involvement in biofuels, and the need to understand and engage with the wider political economic context meant that each interview was approached individually. The fifteen interviews carried out during the scoping study had helped to identify core research themes, including power and marginalisation, and highlighted the role of the state (and other actors) as being critical to the outcomes of the developing biofuels sector in Guatemala. These themes informed the topics explored and questions asked during interviews although as the research progressed new themes emerged. This would then require additional interviews or follow-ups to previous interviews.

Given the diversity of actors I interviewed in Guatemala, and the topics that were pursued in each, it is difficult to describe here a standard interview. Nonetheless, prior to each interview, an interview guide would be modified on the basis of 'homework' done on each organisation (Schoenberger 1991; Fortin 2008; see Appendix I for sample interview guides). This was easier for some organisations than for others since not all organisations had an online presence, while others I had been referred to by someone else and would therefore know little about the organisation prior to the interview. In many instances, the interview guides provided no more than a way of structuring and focusing on the issues of interest and almost invariably additional topics arose, which would then lead to new lines of questioning. Each interview would begin with an introduction to myself and a brief description of the research aims. All interviewees were provided with an information sheet (see Appendix II), either prior to or during the interview, which provided them with additional information about the research. No personal information beyond the participant's role in the organisation was sought during interviews, but the information sheet also assured participants of their right to anonymity and to withdraw at any time. This information was reiterated at the beginning of each interview. I would then briefly explain what topics I hoped to discuss during the interview, which as discussed varied according to who I was interviewing. An introductory question (Kvale 1996), which typically focused on the mission and vision of the organisation, was used to initiate each interview. Depending on the organisation, follow-up questions would focus on, for example, their perspectives on biofuels, the role of different actors in the sector and in society more generally, and on the perceived impacts of biofuels and different agricultural sectors. The adoption of a less structured approach to interviews allowed for me to be flexible, but also to capture those issues and events that were of most interest and/ or concern to those I was interviewing (Kezar 2003; Bryman 2008). The questions used to close each interview also varied; for example, in some interviews I asked respondents how they envisioned the future of the Guatemalan biofuels sector. Many interviewees were also asked about other people they thought I should speak to and whether they had any additional comments. This frequently extended the interview and revealed new topics of interest. In terms of where the interviews were held, with only a few exceptions, expert interviews were conducted at the interviewee's place of work or organisational headquarters.

A key debate in the literature on expert interviews relates to interview dynamics and the interviewee's (in)ability to control the interview process (e.g. Schoenberger 1991, 1992; McDowell 1992, 1998; Herod 1999; Mullings 1999; Kezar 2003; Conti and O'Neil 2007; Rice 2010). Much has been written on unequal power relations between researchers and researched, with much of the methods literature focused on the vulnerability of research subjects. In such interviews, the perceived risk is that the interviewer will exert 'excessive control' over the respondent, thus distorting the information elicited (Schoenberger 1991: 217). However, in expert interviews the 'locus of control' is often reversed (bid: p.217). In such interviews, it is the researcher who is the supplicant 'requesting time and expertise from the powerful, with little to offer in return' (McDowell 1992: 213). Furthermore, experts are likely to be accustomed to being interviewed and as a result can be more 'sophisticated' in managing the interview process (Marshall and Rossman 2003; Kvale 2007). I certainly found that some participants sought to assert dominance in interviews, often controlling the dynamics of the interview. In addition, with some participants there were questions I felt I could not ask, and/ or questions that were not answered despite persistent questioning; despite this, what was not said was often as revealing as what was said. Herod (1999: 322) argues that his outsider status granted him a neutrality and objectivity that enabled him to ask sensitive and/ or ignorant questions. I was clearly an outsider in the halls of the Commission yet, as a European citizen, not enough of an outsider to feel comfortable asking certain questions of some people. Conversely, in Guatemala, I believe that my nationality, being a non-native Spanish speaker, and the fact that I had travelled thousands of miles to be there, did allow me to ask questions that would have been unacceptable from a Guatemalan (see also Herod 1999).

Contrasting my experiences of conducting interviews in Brussels and in Guatemala, I found that in Brussels interviews tended to be fairly concise, rarely digressing from the interview guide I had prepared. The shortest interview lasted under an hour, and the longest lasted two hours. In comparison, in Guatemala I found that on many occasions no sooner had I introduced myself and my research, the participant would launch into a long oration about biofuels and anything else they thought I might need to know on the subject. As a result, interviews in Guatemala tended to last much longer; the shortest of my interviews lasted one hour, while the longest was over four hours. The skill of the interviewer – to engage the respondent, to guide the discussion and to challenge when necessary – has been discussed far less in the literature on expert interviews, but is clearly critical to the 'success' or otherwise of an interview. According to Kvale (2007: 81) being 'gentle' is one of the criteria for a good interviewer; by this he means someone who has strong listening skills, allows people to finish, and who tolerates pauses. While being gentle is clearly important, interviews in Guatemala often required a stronger steer and a more purposeful approach than is advocated by Kvale. Cultural differences and conducting the interviews in my second language (which probably meant I was unable to respond as quickly when issues emerged) may explain some of these difficulties I encountered with guiding interviews. Nonetheless, through these often 'one-way' conversations, unexpected and useful topics often arose.

Where appropriate, interviews were recorded using a digital recorder with the permission of the participants and notes were taken during the interview. In only one interview did the interviewee deny my request to record our discussion. Recording the interviews enabled me to fully concentrate on the interview, whilst providing the opportunity to check the meaning of words and phrases later on; an important benefit given that in Guatemala the interviews were held in Spanish. All recorded interviews were transcribed; for others, including informal interviews, detailed notes were taken and written up as soon as possible afterwards. Analysis of these data will be described in Section 3.5.

3.4.3. Field Visits

The final method, one only used in Guatemala, was that of field visits. This involved trips to biofuel plants (both large and small-scale), sites of feedstock production and communities affected by crop cultivation. I was able to visit a wide range of biofuel-related projects whilst in Guatemala, which included field visits to: oil palm (1), sugarcane (2) and jatropha (2) plantations; small-scale biodiesel projects (4); and, and sugar mills (2), the latter also involved visits to ethanol distilleries. I also visited a number of communities affected by the expansion and cultivation of sugarcane and palm oil, including six communities in the Polochic Valley and six on the Pacific Coast. Table 4 summarises the field visits and provides more detail about the purpose of each visit.

The field visit has clear parallels with ethnographic research, which is field-based and relies on observation as a key method. However, unlike ethnographic research – the touchstone of which is the researcher's (long-term) immersion in a setting to observe behaviour (Kearns 2010) – these field visits lasted anything from a morning (visiting a large ethanol plant) to ten days (in the Polochic Valley). The purpose of these visits was to understand biofuels in practice, be this from an engineering or agronomy perspective or through discussions of the lived experiences of rural communities. Another potential distinction from ethnographic research is that of the role of the participant observer, which Schensul et al (1999: 91) define as a 'process of learning through exposure to or involvement in the day-to-day or routine activities of participants in a research setting'. Field visits gave me vital opportunities to learn about biofuels and to 'see things with my own eyes', yet I cannot claim that I was engaged in the activities themselves or was exposed to them over the longer term, activities which are inherent to ethnography (Angrosino 2007; Hammersley and Atkinson 2007; Kearns 2010). Kearns (2010: 241), however, argues that 'all observation is a form of participant observation'. Despite these differences, which make me reluctant to call this aspect of the research 'ethnographic', there were similarities. For example, the field visits involved a suite of data collection methods, including observation, interviews, photography and document analysis (Hammersley and Atkinson 2007). Also it allowed for a less exploitative and extractive relationship between myself – the researcher – and the participants by providing a 'voice' to some communities affected by the expansion of sugarcane. The incorporation of local perspectives was a critical component of the research, since such voices are typically excluded by dominant environmental discourses. Understanding the lived realities of subaltern groups can also help to explain the emergence of social movements and local resistance to dominant narratives.

Table 4. Summary of field visits, November 2010 to April 2012

Purpose	Name	Department	Code in text	Description
Crop cultivation	Jatropha	Chiquimula	FV1	A university-run project investigating the small-scale production of jatropha in the *Corridor Seco*
	Oil palm	Escuintla	FV2	Visit to an oil palm plantation to learn about the cultivation and agronomy of oil palm.
	Sugarcane	Escuintla	FV3	Guided tour of a sugarcane *finca* on the Pacific Coast to learn about crop cultivation and agronomy.
	Sugarcane	Quetzaltenango	FV4	Visit to a sugarcane *finca* on the Pacific Coast to observe harvesting and transportation.
	Jatropha	Escuintla	FV5	Visit to a privately-owned plantation dedicated to research into jatropha for biodiesel.
Biodiesel plants	Proyecto Biopersa	Sacatepéquez	FV6	Medium-size biodiesel plant that uses used cooking oil and tallow as feedstocks.
	Universidad del Valle	Guatemala City	FV7	Small-scale biodiesel plant that uses used cooking oil and tallow as feedstocks.
	Biocombustibles de Guatemala	Santa Rosa	FV8	A small-scale biodiesel plant, donated by a private company that ran on soya and jatropha; now defunct.
	Nueva Alianza	Quetzaltenango	FV9	Visit to a community that is primarily dedicated to the cultivation of coffee and macadamia nuts, which had a small-scale biodiesel plant; now defunct.
Ethanol plants	Pantaleón	Escuintla	FV10	One of Guatemala's sugar mills, with an ethanol distillery.
	Tululá	Quetzaltenango	FV11	One of Guatemala's sugar mills, with an ethanol distillery.
Communities	Parana Semau El Rodeo Bella Flor Q'anlun Rio Frio	Izabal & Alta Verapaz	FV12	In March 2011, twelve communities were forcibly evicted by private and state security forces. The violence was blamed on the expansion of sugarcane, driven by European demand for biofuels.
	Santa Lucia Cotzumalguapa	Escuintla	FV13	Visits to communities affected by the expansion of monocultures on the Pacific Coast, in particular sugarcane and African palm.
	Isla Chicales Santa Odilia El Rosario	Escuintla	FV14	
	Santa Rosa Las Champas	Suchitepéquez	FV15	

As with the interviews, gaining access to the field sites was a critical and often challenging step. All but a few of the opportunities for field visits resulted from expert interviews. Issues of access were different for each of the different field sites: visits to the mills came about as a result of interviews with those in the sugarcane sector, while rural communities were contacted via grassroots and activist organisations. Physical access was a challenge as many of the field sites were in remote rural areas. For security and for ethical reasons, I was unwilling to simply get on a bus and show up at potential field sites. These concerns are interlinked and my particular worry was that my presence in communities could pose a risk to participants. Instead, like Afflito and Jesilow (2007), I usually met with and interviewed organisational representatives prior to discussing the possibility of research with member communities. During these meetings I would discuss my research objectives and explain what engagement with communities would entail. The sampling process therefore entailed a purposive strategy, combining snowballing, opportunistic and convenience sampling (Patton 2002).

While I was interested in particular crops, sustainability impacts and events, which sites I actually had access to was limited by the individuals and organisations I had networked with in Guatemala City. As a result, I was beholden to these gatekeeper organisations, who determined who I spoke with, as well as the circumstances in which we talked. This strategy posed a number of constraints on the research: firstly, I cannot claim the field sites or participants are representative of the wider population; however, in qualitative case study research cases are not meant to be representative, but rather transferable (see Section 3.3; Flyvberg 2006; Baxter 2008, Yin 2009). Secondly, and of greater concern to qualitative research is that, since both field sites and participants were dependent on the contacts I made, it is possible that some voices were excluded. In addition, those who participated may have felt obliged to participate and/ or constrained by the gatekeeper's presence about what they could tell me. To address the former would require a separate research project, while the latter is simply unknowable. However, particularly in the rural communities, I was welcomed by participants who expressed their appreciation to voice their experiences and concerns to an interested 'outsider'. I am indebted to those organisations that facilitated the field visits, without which I would not have gained access to these research settings.

The diversity of sites I visited on field visits, and of the participants with whom I engaged, required a flexible approach to these interviews. Not only were the physical settings vastly different – some were conducted wearing a hard hat amidst industrial plant, while others were conducted in groups in people's backyards – but the social contexts were also different. Needless to say, an interview with an agronomist managing an area of sugarcane cultivation requires a different approach from one with a *campesino* (peasant) who has lost his home and belongings due to crop expansion. In terms of the objectives of the interviews, in communities, I was interested in the lived experiences of *campesinos* who had grown up in the shadow of the mills or who had been affected by feedstock expansion; while in biofuel plants, I was interested in the engineering and technical processes of biofuel production as well as the crop agronomy. Visits to biofuel plantations and mills took place during the working week (although during the six month *zafra* (harvest) the mills operate 24 hours a day, seven days a week), while those conducted in rural communities took place throughout the week.

A key challenge for researchers is that 'some people's worlds are hard and unpleasant to experience' (Scheyvens and Storey 2003: 59). I certainly found this to be the case during many of my visits to communities. Although I had already spent some years researching the sustainability of biofuels, and was well versed in debates about land grabbing, listening to participants recount the violent evictions they had experienced was emotionally challenging. This led me to reconsider the possible ethical dangers faced by research participants (Affilito and Jesilow 2007; Ybarra 2010), as well as the potentially extractive nature of my research (Sidaway 1992; England 1994; Rocheleau 2008; Blaikie 2012; Punch 2012). Despite these concerns, many participants expressed their gratitude that I, a *gringa* (foreigner), was taking an interest in their struggles and hoped that I would take their stories home to share with others, where they might have an impact (e.g. Patai 1991). As a result, throughout the thesis, community representatives are treated differently to expert participants and are allocated pseudonyms rather than codes; the names of all communities have also been changed to protect anonymity. While providing pseudonyms risks privileging the rights and concerns of these local participants, I believe this differential treatment is merited for two related reasons. Firstly, these community level voices are typically under-represented in research on biofuels (Hodbod and Tomei 2013); similarly, in Guatemala local communities affected by the expansion of agriculture are rarely afforded a voice. Indeed, as we shall see in Chapter Eight, a frequent concern expressed by these participants was their abandonment by the Guatemalan state and hence exclusion from policy debates. Secondly, the experiences shared by these individuals were not professional or organisational perceptions of biofuels, but rather were deeply personal stories about their lived experiences. As a result, I feel that referring to these individuals by code would have depersonalised these stories.

Whilst on field visits, observation was an essential method which required the noting and recording of events, conversations and settings. Bryman (2008: 417) notes that 'because of the frailties of human memory' field notes are a key component of observation. Although field notes can be highly structured, my notes, which were often written up in the evening or day after a field visit, were more descriptive notations on the setting (Marshall and Rossman 2003). These notes also provided a record of how the research changed during the field work. Similar to Storey (1997, cited in Scheyvens and Story 2003) who describes his field notes an 'evolving think pad' for research design and methodology, I found the process invaluable for linking ideas and refining the research objectives. These notes also formed an important component of the process of analysing and writing the research, and the next section is dedicated to these processes.

3.5. Data Analysis, Representation and Writing

Previous discussions in this chapter have made clear that data analysis was an ongoing process, one which occurred throughout the research. As discussed in Section 3.4, this meant that whilst in Guatemala, the ongoing analysis of documents, interviews and observations was used to inform subsequent interviews, in terms of both who I spoke to and the topics explored during interviews. Despite the increasing popularity of computer-assisted qualitative data analysis software, such as NVivo, I found that, due to the quantity and variety of data generated during the research (e.g. transcripts, field notes, maps, photos, newspaper articles, (un)published documents and presentations), NVivo was not a useful tool for visualising and analysing the data. Rather, the coding process was performed manually. As with most qualitative research, the iterative process of analysis involved the rigorous and systematic reading of interview transcripts and other data generated during the field research. This involved the use of both deductive and inductive reasoning to enable an understanding of biofuels in Guatemala to emerge from the data. My familiarity with the biofuels field meant that some themes, namely that of the sustainability of the sector, were arrived at deductively, whilst others arose inductively from the data (e.g. the absence of the Guatemalan state in the biofuel sector). As the analysis progressed, the relationships between the different themes became more apparent, facilitating the subsequent process of data interpretation.

In qualitative research, the researcher relies on text rather than numerical data and analyses the data in their textual form rather than converting them to numbers for analysis (Carter and Little 2007). Thus, in this thesis I make use of quotations to illustrate the arguments made in the main body of the text. Since the majority of the interviews were conducted in Spanish this raises ethical issues about representation in cross-cultural research, which warrants brief discussion here. While the official language of Guatemala is Spanish, the 2002 census lists 24 'living' languages (INE 2003). Veeck (2001: 34) argues that the ability to speak the local language is 'the centrepiece of successful field research' and speaking good Spanish was an important factor in the choice of Guatemala as the case study country. Nonetheless, Spanish is not uniform and being in Guatemala required familiarisation with different accents, vernaculars and vocabularies, as well as with the more technical language of biofuels. Furthermore, in some cases I had to rely on an interpreter where research participants only spoke local indigenous languages; this raises additional issues about whose voice is represented in the research (Leck 2014). Whilst my Spanish improved further during the trajectory of my fieldwork, I am still a non-native speaker and some of the 'multiplicity of meanings' that are present in language are likely to have been lost in translation and with it the risk of misinterpreting the views of participants (Spivak 1993). Given the focus in qualitative research on representation, one dimension of which is the incorporation of participants' voices into the written text, translation from Spanish was an important issue when writing the research. Smith (2003) suggests that one way to address this is to analyse interview transcriptions in their source language (in this instance Spanish) with only quotes translated into English, a strategy which I have adopted in writing this research. Further, given the untranslatability of some concepts, I have chosen to leave these in Spanish in the text (see Meyer and Maldonado-Alvarado 2010).

Finally, Richardson (1998) describes writing as a method of inquiry, a way of knowing the research and for the researcher to understand their relationship to the research. In writing this thesis, I also found that writing provided another way of analysing and 'discovering' meaning in the data (ibid). The process of writing frequently required me to relive my time in Guatemala and Brussels and to revisit the data as the inter-linkages and relationships between the research themes became apparent. However, the writing process has also involved making decisions about what would be written and how complex themes and issues would be represented in the text, therefore, it is necessarily my own interpretation of the research. Thus, throughout this thesis I make use of the first person in order to make my own role in the research process and interpretation more transparent.

3.6. Conclusions

This chapter has set out the research methodology used during this study. It has shown that, even with careful planning, research is not a linear process; rather, it can be 'messy' and fraught with problems such as access, power and representation. Adopting a qualitative, interpretivist view of research acknowledges this messiness as part of the production of context-dependent knowledge (Denzin and Lincoln 1998). As asserted by England (1994), research is both a process and a product and it is therefore important to reflect upon and evaluate the praxis of research. Acknowledging the contingent nature of research is one way to do this, and involves the researcher acknowledging and examining their own impact on the research process and the final form of the thesis. As this chapter has shown, this might entail making choices about the positioning of the researcher and the research topic. Such decisions may also be reactive, enabling the researcher to maximise the research outcomes in light of unexpected events. As Flyvbjerg (2001) suggests, reflecting upon these choices can strengthen the ability of research to make sense of complex phenomena, such as biofuels.

Having described the research process, the following chapter picks up from Chapter Two to analyse the governance of biofuels. Drawing on the literature on governance for sustainability and expert interviews, the chapter focuses on the EU's approach to governing biofuels as one of the few markets to explicitly address the sustainability of biofuels.

4. Governance for Sustainability: biofuels in the European Union

Chapter Two posited that national and supranational legislation have created the demand for biofuels and that this demand has affected global commodity prices and driven land use changes. This chapter builds upon this argument to illustrate that growing concern about the unintended consequences of biofuels has led to the establishment of new governance regimes, reflecting a wider and accelerating shift towards polycentric governance. This means that while government(s) remains a key actor, particularly in legislating into existence the demand for biofuels, non-state actors, including international organisations, the private sector and civil society, have been influential in creating the policy instruments to counter the associated negative externalities. Standards and certification schemes have emerged as preferred mechanisms to monitor and manage the sustainability of biofuels at the global, supranational, national and sub-national levels, as well as for specific commodity chains and for individual companies. In the context of globalised trade in biofuels, such governance arrangements enable governments and other actors to provide assurances about the sustainability of production beyond national borders.

The majority of the biofuels produced in Guatemala are exported (see Chapters One, Six and Seven). It is therefore essential to understand the external factors that are shaping this nascent biofuels sector, including the frameworks that have been put in place to govern the production and use of biofuels. At present, the European Union (EU) represents the most important market for biofuels produced in Guatemala (USDA 2012), and is one of the few global biofuel markets to explicitly address the sustainability impacts of biofuels. This chapter therefore examines the specific approach taken by the EU to govern the sustainability of biofuels, addressing the first of the research objectives– *'to examine the EU's governance framework for biofuels'*. The EU has positioned itself as a global leader on the mitigation of anthropogenic climate change and the adoption of targets for the use of renewable fuels in the transport sector has been a key component of the bloc's renewable energy policy. The EU has been developing a legislative framework for biofuels since the late 1990s when several Member States began to take an interest in their production and use. Indicative targets, established by the 2003 Biofuels Directive, were strengthened in April 2009 with the adoption of the Renewable Energy Directive (RED), which mandated a 10% target for renewable energy in transport fuels by 2020. However, even before the adoption of the Directive evidence was beginning to emerge about the potential negative impacts of biofuels. In response, the EU established mandatory sustainability criteria to restrict policy support to the production of sustainable biofuels. The EU provides an example of a hybrid governance arrangement that has established a mandated market for biofuels, but where sustainability is monitored by non-state actors through voluntary standards and certification schemes. Compliance with the EU's sustainability criteria is thus a requirement of market access, which means that all of the biofuels that Guatemala exports to the EU have been certified 'sustainable' according to these governance mechanisms. Of interest to this thesis, however, is how effective this arrangement is at capturing the implications of biofuels within the specific context of Guatemala.

The rest of this chapter is structured as follows: the first section draws on the literature on governance for sustainability in order to situate this analysis within wider academic debates. The following section then examines the global governance of biofuels, before the next section focuses on the EU's negotiated governance framework. Drawing on documentary evidence and interviews with civil servants, NGOs, academics and industry, this section traces the evolving European biofuel policy framework. In order to interrogate the outcomes of this framework for sustainability, the analysis focuses on the EU's sustainability criteria, with particular reference to debates on indirect land use change (ILUC) and the potential implications of this evolving framework for exporting countries. The final section concludes the chapter, cautioning that the narrow framing of biofuels as a primarily greenhouse gas (GHG) issue has limited the debate on the sustainable development of biofuels.

4.1. Governance for sustainability

There is a burgeoning literature on governance for sustainability, which is no doubt motivated by increasing evidence that we are moving further away from the goals of sustainable development rather than towards them. For example, the 2005 Millennium Ecosystem Assessment, which assessed the consequences of ecosystem change for human wellbeing, painted a grim picture of widespread ecosystem degradation (MEA 2005). More recently, the news in May 2013 that the concentration of carbon dioxide (CO_2) in the atmosphere had passed 400 parts per million, highlighted the lack of progress made so far on decarbonising the global economy. This all suggests that sustainability will not happen by itself; the overall development trajectory will need to be reoriented along more sustainable lines, ones that integrate environmental, social and economic concerns (Meadowcroft 2007). The direction and form of the transition to sustainability is not inevitable, but rather will be shaped by the interventions of governments and other actors as well as cultural values, institutional interests, economic priorities and power (Stirling 2008). Interventions in pursuit of normative goals, such as sustainable development, require opening up governance processes to diverse actors and different forms of knowledge across multiple levels (Walker and Shove 2007); these concerns are also central to political ecological studies. Biofuels provide an example of an intervention that, in the EU at least, was pursued in the name of sustainable development. Yet, as discussed at length in Chapter Two, the extent to which this label is justified has been fiercely contested. In spite of incomplete knowledge and innate uncertainty, governments have committed to ambitious targets and allocated resources, including research funding and fiscal support, to promote the use of biofuels. Increasing evidence about the potential negative impacts of biofuels has presented a challenge for governments and other actors who have invested in their use. The governance of biofuels must increasingly account for sustainable development, and is complicated by the multiple actors, sectors, scales and jurisdictions that are involved. The governance for sustainability literature provides important conceptual insights into thinking about the type(s) of governance system(s) adopted to govern biofuels, as well as the knowledges, understandings and evaluations that are informing the developing governance arrangements.

The discourse of sustainable development – or sustainability (the two are used synonymously in this thesis) – has found widespread support since it was popularised by the Brundtland Report in 1987. By integrating discourses on environment and development, the concept highlighted the 'triple bottom line' of human development, namely the reconciliation of economic growth, environmental protection and social wellbeing. Brundtland provides the most widely cited definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987: 43). Equity, both within and between human generations, is thus also a core component of sustainability. In other words, it is not sufficient to secure ecological protection if there is social marginalisation, vulnerability and an uneven distribution of the costs and benefits of human development (Adger and Jordan 2009: 7). One other important dimension of sustainability is that of participation. Given that the future is largely unknown and unknowable, society as a whole should be involved in debates about the kind of world we want to live in and bequeath to future generations (Meadowcroft 2007; Hysing 2010).

There has been a proliferation of definitions and framings of sustainable development, making it a highly complex and contested concept[10]. Despite its universal appeal, there remain many different perspectives on what sustainable development actually is, whether a well-honed principle, a social process, a practice, a normative idea or a discursive concept (Adger and Jordan 2009: 5). This ambiguity and malleability is seen as both a strength and a weakness. For example, Richardson (1997: 43) argues that:

> 'sustainable development is a political fudge: a convenient form of words... which is sufficiently vague to allow conflicting parties, factions and interests to adhere to it without losing credibility.'

For others, such criticisms miss the point. The malleability allows it to be an open, dynamic and evolving idea that can be adapted to fit different situations and contexts across time and space (Adger and Jordan 2009; Diaz-Chavez 2011). For these commentators, there is thus little value in securing universal agreement on the term when its greatest achievement has been the political contestation it has engendered (Hajer 1995; Rydin 1999; Meadowcroft 2007; Walker and Shove 2007; Dryzek 2005). Meadowcroft (2007: 300), for example, argues that sustainable development:

> 'was designed as a normative point of reference for environment and development policy making. Like other political concepts – such as 'liberty', 'democracy' and 'justice' – it helps to frame and focus debate, while being open to constant interrogation and re-interpretation.'

The inherent subjectivity and ambiguity of sustainable development allows those with different, even competing, interests to find common ground. In practice, however, integrating the interests of different actors as well as balancing environmental, social and economic concerns may involve trade-offs. Given that consensus is not always possible nor even desirable (Brown 2009), the (governance) focus should be on finding an appropriate balance between 'opening up' and 'closing down' wider policy discourse (Stirling 2006, 2008, 2009). This is particularly important given the uncertainty, ambivalence and risks inherent to both sustainability and the policy choices involved in the reorientation of human development. Stirling argues that there are three distinct ways of understanding the concept of sustainability: substantively, as a set of publicly deliberated goals; normatively, as a social process; and instrumentally, as a means discursively to support and justify narrow sectional interests (2009: 193). All of these imperatives can be seen in sustainability appraisals of biofuels, yet it has been the instrumental

[10] For a detailed discussion about the complexities of defining sustainable development see Faber et al. (2005).

imperative that has dominated policy debates, which has privileged certain knowledges, technologies and incumbents. This will be discussed in more detail in Section 4.3.

Turning now to governance, it is worth noting that, just like sustainability, it is a multidimensional and contested term. Governance is an umbrella term that encapsulates the changing form and function of the state, and draws attention to the fact that policies are increasingly implemented by a wider array of actors, including the private sector and civil society. This has led to new modes of governance, including voluntary agreements, market-based instruments and self-governance. Adger and Jordan (2009) identify three key characteristics of governance. Firstly, governing refers to social activities that 'seek to guide, steer, control or manage societies', whilst governance describes 'the patterns that emerge from the governing activities of diverse actors' (pp. 10-11). Secondly, governance is not the same as government; while the latter refers to state institutions and actions, the former incorporates non-state actors. Finally, unlike governing, governance is not restricted to specific places or time periods (see also Hysing 2010).

With specific regard to governance for sustainability, Meadowcroft (2007) defines it as:

> '...processes of socio-political governance oriented towards the attainment of sustainable development. It encompasses public debate, political decision-making, policy formation and implementation, and complex interactions among public authorities, private businesses and civil society – *in so far as these relate to steering societal development along more sustainable lines*.' (p.299, emphasis in original).

Sustainable development is at root a normative idea and, since the outcomes cannot be defined in advance in all places, governance must find ways of engaging with uncertainty, risk and ambiguity. Governance for sustainability is therefore an interactive and reflexive process of debate and dialogue (Voß et al. 2006; Meadowcroft 2007; Adger and Jordan 2009). It entails a deliberate steering of society in more sustainable directions, readjusting and reorienting as we progress. Government is central to governance for sustainability, yet the multiple challenges presented are beyond the scope of any single national government, which will require radical shifts in consumption and production patterns. The governance of sustainability therefore involves multiple actors (state, market and civil society), levels (international, supranational, national, regional and local), sectors (environment, society and economy) and policy instruments (market, regulation).

Governance for sustainability differs from previous approaches to environmental governance – not least in that it is broader than just environment, it also incorporates human development. Many of the environmental problems facing the world today are global by nature; issues such as a stable climate (a public good), fisheries management (a common pool resource) and acid rain (a transboundary problem) require cooperation across national borders. Another pressure for global governance of sustainability comes from the globalisation of the economy, wherein states face challenges because of the way that sustainability problems are embedded in production and consumption processes not under their control (Paterson 2009). These globalising processes have resulted in a shift in governance for sustainability, one that has mirrored wider economic paradigm changes. Governance has moved away from the top-down, command and control approaches that characterised the 1960s and 70s towards the market-based policy mechanisms that have prevailed since the late 1980s and early 90s (Glasbergen 2007; Paterson 2009). This shift has taken place at national and global levels, reflecting wider shifts from statism to liberalism in the governance of capitalism (Paterson 2009; see also Goldthau (2012) for a discussion of shifts in global energy governance). Paterson (2009) argues that governance for sustainability increasingly aims to promote a 'green capitalism' that enables private actors to pursue economic interests in ways that promote sustainability. This is also reflected in ecological modernisation which, as discussed in Chapter Two, also assumes an increased role for non-state actors and a move away from hierarchical modes of governance. However, the politically-driven nature of biofuels implies a dominant role for the state in their governance[11], both in creating the market and in regulating their use; albeit a role shaped by wider shifts in the global political economy. Yet the politicised nature of these mandated markets also creates opportunities for non-state actors to influence the form and structure of national and global biofuel markets (Pilgrim and Harvey 2010). In particular, concerns about the potential negative externalities associated with biofuels has led to intermediate, or hybrid, governance arrangements which reflect Goldthau's 'interventionist' (i.e. state-market) model of governance (2012). Under this mode of governance, biofuels are viewed as having strategic qualities in several policy fields (e.g. energy, environment, development) that cannot be delivered by the market alone. These issues will be explored in greater detail in subsequent sections, specifically in relation to the governance of biofuels by the EU.

[11] For the EU-27, however, it has been European institutions that have increasingly taken the lead in governing biofuels. This distinct characteristic of the EU, namely its 'hybrid supranational-intergovernmental polity', have led scholars to argue it should be treated *sui generis* (Afionis and Stringer 2012: 115).

An examination of the governance for sustainability literature reveals a number of interlinked characteristics that affect both the content and the structure of policy processes. These include: trade-offs, complexity, integration and polycentric governance. Firstly, achieving sustainability will not necessarily result in win-win outcomes. This perspective contrasts with ecological modernisation, which searches for a positive-sum relationship between economic growth and environmental protection (see Chapter Two). Governing for sustainability therefore requires making trade-offs not only between the three pillars of sustainability, but also between multiple, often conflicting, societal interests and values (Brown 2009; Hysing 2010). Trade-offs will have social, temporal and spatial dimensions, and will exist between short and long time horizons, the different pillars of sustainability, and different stakeholders within and between countries (O'Brien and Leichenko 2001; Brown 2009). Evaluating, negotiating and managing these trade-offs is a key concern of governance for sustainability (Brown 2009). Stirling (2006, 2008, 2009) argues for a broadening of and reflection over the inputs into the social appraisal of sustainability problems, whilst paying deliberate attention to problem framing and learning about the nature, depth and scope of incertitude. However, as Carter (2001: 191) cautions,

> 'the structural power of producer interests in capitalist societies... [means that] more often than not the interests of producer groups trump those of environmental groups and economic growth takes priority over environmental protection'.

Indeed, the seeming reluctance of states to withdraw support for biofuels in spite of the increasing evidence of environmental and social harm points to the triumphing of economic over other concerns. In addition, it suggests increasing institutional lock-in and related concerns about the loss of political capital as support for biofuels diminishes; I will elaborate upon this in relation to the development of European biofuel policy in Section 4.3.

Secondly, many of the sustainability problems facing decision makers are intrinsically complex and uncertain. Hulme (2009: 335) explains that 'wicked problems' (originally proposed by Rittel and Webber in 1973), such as climate change and fisheries management, 'defy rational and optimal solutions... due to complex interdependencies; a solution to one aspect of a wicked problem often reveals, or creates other problems which demand further solutions'. Wicked problems have exposed the uncertainties and limitations of science-based understandings, and different forms of knowledge (for instance, from other academic disciplines or non-Western knowledge systems) are seen to bring valuable perspectives (Walker and Shove 2007; Brown 2009; Palmer 2012). The precautionary principle – an injunction that in some circumstances uncertainty should not be invoked as a reason for inaction – has been widely invoked as a response to the uncertainty, ambiguity and ignorance that abounds in governing sustainability (Stirling 2009). For Stirling (2009) adopting a precautionary approach provides greater independence from vested institutional, disciplinary, economic and political interests. Stirling also emphasises the importance of problem framing, which he argues may determine the results of appraisal (p.275). He calls for 'reflexive' governance, which not only incorporates a broad range of policy inputs but also recognises that these issues will be conditioned by subjective values and interests (see also Voß et al. 2006). Reflexive governance will require monitoring, feedback and adjustment as wider processes, understandings, knowledge and values evolve (Walker and Shove 2007).

Thirdly, governance for sustainable development requires the integration of environmental issues and objectives across policy arenas. The argument goes that broadening the scope of environmental policy remedies the low political status typically afforded to environmental ministries (Bryant and Bailey 1997; Hysing 2010); others, however, argue that this approach carries the risk of fragmentation (Weale 2009). According to this perspective, environmental issues are best addressed by concentrated attention on a limited number of problems, creating tangible and achievable targets on which the necessary resources can be focused (ibid). However, as discussed, sustainability is broader than just the environment, embodying so-called 'wicked' problems, and requiring more radical changes in governance to support integration (Brown 2009). As we shall see, within the EU, the sustainability of biofuels has been narrowly framed as a predominantly GHG issue. This has resulted in the neglect of other social and environmental impacts, including livelihood outcomes, which are barely addressed by existing governance mechanisms (Afionis and Stringer 2012; Palmer 2012; Hunsberger et al. forthcoming). Further, in addition to integration across multiple policy arenas, governance for sustainability requires the integration of different kinds of knowledge, as discussed above (Brown 2009).

Finally, and related to the need for integration, is the shift towards polycentric governance arrangements. The assumption that concentrated authority led to adequate solutions has been challenged by the distinct characteristics of sustainable development and governments are no longer viewed as the sole guardians of the public interest (Weale 2009; Griffin 2012). There has been a shift from state-centric to polycentric governance networks that incorporate multiple actors interacting both horizontally across public and private spheres and vertically across spatial scales. Vertical, or 'multi-level', governance (Bache and Flinders 2004) is characterised by the dispersal of formal authority from nation states upwards, to supranational unions and international bodies, and downwards, to regional and local governments. Furthermore, a complex array of partnerships amongst public, private and civil society actors has emerged that operates across multiple policy levels. Such collaborative arrangements aim to structure stakeholder relationships around a sustainability issue, stepping in where governments are unwilling or unable to regulate (Glasbergen 2007; Visseren-Hamakers et al. 2007) or to prevent state regulation (Paterson 2009). By incorporating different perspectives, it is argued that these governance networks can increase legitimacy, helping to secure support for a policy and increasing efficiency and effectiveness (Meadowcroft 2007; Visseren-Hamakers et al. 2007; Adger and Jordan 2009). In contrast to those who argue that polycentric governance increases legitimacy, Partzsch (2011) contends that it may have the opposite outcome, particularly if certain (dissenting) voices are excluded. Partzsch also argues that such arrangements are 'de-facto' legitimated based on the outputs alone. According to this line of reasoning, as long as governance arrangements effectively support the common welfare and lead to a positive outcome, for example reduced deforestation, does it matter how it was achieved? This relates to Stirling's distinction between three types of sustainability imperative – normative, substantive and instrumental – here providing a clear example of an instrumental imperative wherein the ends may be used to justify the means. Furthermore, the distribution and diffusion of power across actors, sectors, policy levels and countries has also increased concern about the 'retreat' of the state in governance for sustainability (Jänicke and Jörgens 2009) and about private capture of public affairs (Visseren-Hamakers and Glasbergen 2007). Meadowcroft (2007), however, observes that while the state may deliver fewer services, it still retains 'considerable clout' and remains 'the only institution with a general mandate to promote the public good' (p.308).

Governing for sustainability is therefore an ambitious and difficult undertaking, one that involves addressing seemly intractable problems across multiple scales and policy domains. This requires not only political will, but also institutional capacity. Much of the scholarship on governance for sustainability is based on industrialised world contexts, which means the challenges for many countries in the global South have been underestimated. In particular the near absence of effective state apparatus, particularly at the local scale, poses difficulties (Brown 2009). Integrating economic, environmental and social objectives requires bringing together different actors and institutions with different world views, values and access to resources. Trade-offs, as discussed, are inevitable yet unproblematised in the literature (Brown 2009); in practice, it is apparent that (short-term) economic concerns are all too often privileged over environmental and/ or social goals. How power – whether discursive or material – is exercised will determine these trade-offs and thus the outcomes for sustainability (Griffin 2012; Chapter Two). Furthermore, addressing the equity dimension of sustainability will require the integration of multiple voices to avoid reinforcing existing social and economic inequalities. Just as issues of scale, marginalisation and power – introduced in Chapter Two – were central to political ecology, so they are shown here to be critical to governance for sustainability.

Biofuels provide a number of challenges for governance, many of which were discussed in detail in Chapter Two. State legislation has created enormous demand for biofuels, affecting global commodity markets and driving direct and indirect land use changes. The globalisation of biofuels has called into question the relevance of unilateral efforts to govern biofuels (Mol 2007; Partzsch 2011), especially for import-dependent markets such as the EU. This situation has opened up new opportunities for the polycentric governance arrangements discussed previously. The next section briefly introduces the global governance of biofuels, before focusing on the European governance framework and the development of sustainability regulations within the Union.

4.2. The global governance of biofuels

National governments have been critical in establishing demand for biofuels and, by 2013, more than sixty governments had established support mechanisms for biofuels, including targets and mandates, and had invested public resources in RD&D and commercialisation programmes. Many more countries are involved in the production of biofuel feedstocks for export markets.

The political institution of biofuel markets has been a key feature of the three major biofuel regions, Brazil, the U.S. and the EU. The specific drivers of biofuels vary according to each region: for the EU it is climate change mitigation and energy security; for Brazil, social and agro-industrial development; and for the U.S., energy security and farmer support (Rosillo-Calle and Johnson 2010). All three have set targets that a certain percentage of transport fuel is to be supplied by biofuels by specified dates, in effect guaranteeing a market of a given minimum size to investors and suppliers of biofuel. In 2003, the Brazilian government set an E25 blending mandate (i.e. a 25% ethanol/ petrol blend); however, the introduction of flex fuel vehicles (FFV), also in 2003, allowed for higher blends and in 2010 ethanol accounted for about 40% of total transport fuel (Sorda et al. 2010). In the U.S., the 2007 Energy Independence and Security Act mandated the consumption of 36 million gallons of biofuels annually by 2022. The Act requires increasing volumes of ethanol and other biofuels over time, and focuses on the use of advanced cellulosic biofuels which should account for 'not less than' 21 billion gallons (Sorda et al. 2010).

Finally, the EU has set a 10% target for renewable energy in transport fuels by 2020; this target applies to all Member States and will be discussed in more detail below. Table 5 outlines the biofuel targets of some key producer and importer countries.

Table 5. Selected national and supranational biofuel targets and potential feedstocks

Country/ region	Target	Tentative or implemented	Incentive	Biofuel focus (feedstock)
Argentina	B5 (2010) E5 (2010)	Implemented	Tax incentives, mandate	Biodiesel (soy)
Brazil	E25 (2003) B2 (2008) to B5 (2013)	Implemented	Tax incentives, subsidies, mandate	Ethanol (sugarcane) Biodiesel (soy)
China	E10 (2008)	Tentative	Tax incentives, subsidies, direct support for farmers	Ethanol (non-food feedstocks)
EU	B/E5.75 (2010) B/E10 (2020)	Implemented	Tax incentives, subsidies, mandate	Ethanol (various); Biodiesel (various)
India	B20 (2017) E20 (2017)	Implemented	Tax incentives, subsidies, mandate	Biodiesel (jatropha)
US	36 billion gallons (136.3 billion litres) annually by 2022	Implemented	Tax incentives, mandate	Ethanol (maize); longer-term support for advanced cellulosic biofuels

Notes: E10 denotes a 10% ethanol blend with petrol; B5 indicates a 5% biodiesel blend with diesel.

Compared to markets that emerge through innovation or consumer demand, mandated markets offer greater opportunities for state and non-state actors to influence, inform and shape the governance of that market (Pilgrim and Harvey 2010). NGOs have been very influential in the governance of biofuels, not only in raising awareness of the potential negative outcomes of biofuel production, but also in ensuring that sustainability concerns are embedded in policy frameworks – at least rhetorically, if not always in practice. However, the extent to which the voices of all actors, particularly those with dissenting voices and alternative claims in respect of ‘sustainability’, are incorporated is contested (e.g. Partzsch 2011). This raises concerns about ‘whose sustainability’ is considered when developing policy frameworks. Indeed, private actors have sought to influence policy, lobbying governments to maintain biofuel targets in spite of growing concern about the sustainability impacts of biofuels and, in some instances, playing a key role in establishing governance regimes to counter these negative impacts. The outcomes of such frameworks may therefore have inequitable consequences.

New modes of governance have emerged that reflect many of the characteristics outlined in the previous discussion and that typically involve multiple actors, scales and objectives. Most notable has been a proliferation of (voluntary) standards, meta-standards and codes of conduct which aim to minimise the negative impacts of biofuels across space and time. These range from standards that address a single technical issue to more comprehensive meta-standards that incorporate multiple environmental and social issues (Bailis and Baka 2011; Diaz-Chavez 2011). For example, some standards focus on a single feedstock (e.g. the Roundtable on Responsible Soy, RTRS), others on a particular market (e.g. Roundtable on Sustainable Biomaterials, RSB); other standards are concerned with production and process quality (e.g. ISO 14001), while still others focus on different geographical regions (e.g. the Californian Low Carbon Fuel Standard).

Globalisation means that supply chains increasingly traverse national boundaries; products may cross multiple boundaries before reaching the site of consumption, making it increasingly difficult for nation states to unilaterally regulate production processes. Within the globalising marketplace, regulations need to be multinational in both scope and applicability if they are to be effective (Hatanaka et al. 2005; Glasbergen 2007). Standards – or the requirements against which products and processes are evaluated – have emerged as a market-based response to concerns about the sustainability of production and reflect the broader shift from public to polycentric governance discussed earlier. These requirements are typically formulated as principles and indicators that are developed through multi-stakeholder processes. Stakeholder participation is therefore critical to the legitimacy and long-term acceptance of standards, yet many still lack meaningful participation from civil society and local stakeholders, particularly from the global South (Schlegel and Kaphengst 2007; Partzsch 2011; Hunsberger et al. forthcoming). Partzsch (2011) argues that standards tend to strengthen retailers' structural power at the expense of downstream farmers, producers and exporters.

Standards, labels and certification systems communicate to consumers, often via product labels, that a product has been produced using sustainably managed raw materials. Certification carries meaning across national borders, allowing consumers to differentiate between products and in the process construct 'alternative spheres of production, trade and consumption' (Hatanaka and Busch 2008: 77; see also Eden 2011). Compliance with a standard is assured through certification, which is typically carried out by an independent auditor against the criteria set in the standard and according to a set certification process. The audit process involves the use of clear quantitative indicators to avoid the incursion of any 'subjective' understandings and value judgements; in other words, the outcomes of an audit should be similar even if carried out by different auditing teams (Fortin and Richardson 2013). In general, it is the producer who is expected to meet the cost of the audit, which has tended to disadvantage producers in the global South (Hatanaka et al. 2005; Partszch 2011).

With regard to the governance of biofuels, these schemes have been met with both scepticism and enthusiasm. Supporters argue that continuous improvements to biofuel standards and certification schemes will be important drivers of change (e.g. Nuffield Bioethics Council 2011) while opponents maintain that they are reductive, making technical constructs of complex political-economic problems (e.g. Li 2011). In particular, Mol (2007) cautions that sustainability standards are likely to privilege the environmental concerns of 'cosmopolitans', such as climate change, over those of locals, such as water quality and soil degradation. Standards have also been criticised for their lack of effectiveness, for validating the practices of big business, for their inability to capture indirect and macro effects, for the creation of unequal markets for producers, and for their 'flat' interpretation of power between stakeholders (Glasbergen 2007; Gnansounou et al. 2007; Eden 2011; Partzsch 2011; Fortin and Richardson 2013). There is also an inherent and arguably irresolvable tension between global applicability and local relevance (Hunsberger et al. forthcoming). Finally, the global proliferation of standards means that they compete with each other for members and producers' certification fees. This can create incentives to lower the scheme's sustainability ambitions, potentially leading to a race to the bottom (Glasbergen 2007; Fortin and Richardson 2013).

Although many schemes have arisen in response to the perceived 'powerlessness' of governments, as the only way to extend the state's regulatory arm outside its borders (Glasbergen 2007), many remain dependent on national governments. As Glasbergen cautions, some issues cannot be addressed by private standards alone; he cites the example of deforestation which requires land use planning and formal policies against illegal logging (p. 19, see also Visseren-Hamakers and Glasbergen 2007). Fortin and Richardson (2013) also comment on the 'blurring' of the public-private divide by these modes of governance. For example, although the EU and Member States have not been formally involved in the development of standards and certification schemes for biofuels, distinguishing between schemes has created new market barriers. The requirement that biofuels sold in the EU can only count towards the 10% target or qualify for financial benefits if they comply with one of the recognised schemes is effectively a condition of market access. This arrangement has enabled non-state actors to promote sustainable biofuel production, endowing them with the status of watchdogs over the

EU biofuels market (Bailis and Baka 2011; Fortin and Richardson 2013). For Glasbergen (2007) this carries the risk that the most important incentive for participation becomes the assurance of market access, rather than the intrinsic value of sustainable production.

For the EU, the only region where the climate objective has been the dominant driver, the increasing evidence of the negative sustainability outcomes of biofuels has been particularly damaging. The bloc has responded by developing mandatory sustainability criteria to guide suppliers of biofuels. While compliance with these criteria is a legal requirement, it is monitored by multi-stakeholder certification schemes creating a hybrid mode of governance that relies on both state and non-state actors. Although this hybrid governance arrangement has been criticised (e.g. Levidow 2013), it has also been lauded for being innovative and progressive (e.g. German and Schoneveld 2012; EC2, September 2011). In the next section, I analyse how the EU has responded to the contested nature of debate on biofuels and the development of this hybrid governance arrangement. In particular, this section will focus on the development of the sustainability criteria, which has proven to be particularly contentious for the governance of biofuels in the EU.

4.3. Hybrid governance: the European approach to biofuels

Since the 1990s, the EU has been developing a legislative framework for biofuels, motivated by three broad policy objectives: GHG emission reductions, energy security and rural development. This framework has been strengthened over time – voluntary targets have been transformed into mandatory targets – whilst being guided and informed by broader debates on the sustainability of biofuels. However, and as will be demonstrated in the analysis that follows, EU biofuels policy appears to have been largely shaped by the interests of certain stakeholders, namely industry and some Directorate Generals (DGs).

4.3.1. Jumpstarting the biofuels sector, 1990s to 2003

Early biofuels policy in the EU was shaped by negotiations on the Kyoto Protocol, when concerns about climate change and environmental protection were high on political agendas (Afionis and Stringer 2012; EA1, July 2011; EC2, September 2011). Renewable energy was regarded as an immediate necessity, with biomass representing the greatest renewable energy potential (EC 2001b). The European Commission (hereafter referred to as the Commission) published several papers (EC 1997, 2000, 2001a, 2001b), which called for a significant increase of biofuel in transport fuel use in order to increase the share of renewable energy and meet climate objectives. The 2000 Green Paper on Energy Security considered the transport sector to represent 'the great unknown for the future of energy' (EC 2000, no page ref), principally due to growing transport demand and the sector's almost total dependence on oil. 'Replacing a few percent of fossil fuel with biofuels' was regarded as the 'simplest' option for decarbonising the transport sector, one which precluded more radical changes (EC 2000). Other benefits of biofuels included diverse production options, limited infrastructural changes, 'attractive' environmental impacts, innovation and job creation (bid). At this time, there was little discussion of the potential negative consequences of biofuels (EC2, September 2011; Dauvergne and Neville 2009; Sharman and Homes 2010). As one interviewee explained:

> 'The environmental benefits were assumed – it's bio, it's clean – biofuels were a niche market and were seen as better than fossil, we didn't have much experience on [a large] scale and all that was not really thought through... even if there were a few sceptical or opposing voices, I think they were, I'm not saying brushed aside, but it was a fight on all fronts and even NGOs didn't sound the alarm, in fact, just the opposite. Until a few years ago there was nothing.' (EC2, September 2011).

According to the communications, the key obstacle to an increased market share for biofuels was the price differential. Not only did biofuels represent the 'least competitive product from biomass' (EC 1997: 38), but there was a lack of interest in biofuels by industry and politicians, especially given the low oil prices of the latter half of the 1990s (EC 2001b). The 2001 Proposal for a Biofuels Directive (EC 2001a: 28) declared:

> 'There is no doubt that promotion of the use of biofuels in the EU is desired at the political level for reasons of sustainable development, carbon dioxide reduction, security of supply and the additional positive influence on rural development and agriculture policy.'

This is a fascinating statement by the Commission highlighting the political importance of biofuels, without passing judgement on whether the technology was itself desirable. In 2003, Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport was adopted (EC 2003). The Directive aimed to:

> '...promote the use of biofuels (or other renewable fuels) to replace diesel or petrol for transport purposes in each Member State, with a view to contributing to objectives such as meeting climate change commitments, environmentally friendly security of supply, and promoting renewable energy sources' (Article 1).

The Directive placed a requirement on Member States to set indicative, i.e. non-binding, targets for 2005 and 2007 for a minimum proportion of biofuel to be placed on the market. The targets were set at 2% by 2005 and 5.75% by 2010. While these targets constituted a 'moral commitment' by Member States, they did not represent a legal obligation (EC 2006a). The Biofuels Directive placed no sustainability requirements on the biofuels supplied, although it did require Member States to consider the overall climate and environmental balance of the various types of biofuels (Article 4). According to del Guayo (2008), from the outset, the Commission had been mindful that the main aim of the Biofuels Directive was to lay the basis for stronger action in the future. The Directive therefore contained a 'review clause', which enabled the Commission to reconsider whether a stronger system of targets would be required (EC 2003, Art. 4.2).

4.3.2. A new impetus for biofuels, 2004 – 2008

Only a few years after the adoption of the Biofuels Directive, it was clear that the indicative targets would not be achieved (EC 2005, 2006a, 2006b, 2006c, 2007). This stimulated a review of the measures that had been implemented at both EU and Member States' levels and provided impetus for changes to the policy and legal framework (del Guayo 2008).

During this period, climate change and energy security remained important drivers, while reforms to the Common Agricultural Policy (CAP) and to the EU sugar regime 'led to a wider appreciation of biofuels' advantages at the European level (EC 2005: 27). Reforms to Europe's sugar markets in 2006 had reduced the guaranteed price of sugar whilst liberalising the European sugar market to open it to least developed countries (Gibbs 2006) and had been strongly opposed by Europe's farm lobby (Sharman and Holmes 2010). Sharman and Holmes (2010) argue that during this time, the creation of a mandatory 10% biofuels target provided EU farmers with a 'compensatory measure' against the reduction of direct subsidies for sugar production, one which also created an alternative market for EU sugar production. During this period, therefore, biofuels were promoted as a price support; both food vs. fuel and ILUC could and should have been anticipated since a more liberalised sugar sector would, *ceteris paribus*, bring more land into cultivation (see also Chapter Two). In addition, innovation was an important driver; the 2006 Strategy for Biofuels argued:

> 'By actively embracing the global trend towards biofuels and by ensuring their sustainable production, the EU can exploit and export its experience and knowledge, while engaging in research to ensure that we remain in the vanguard of technical developments.' (EC 2006c: 5)

Despite the benefits of biofuels, the Commission recognised that biofuels remained more costly than their fossil fuel comparators; the market alone would 'do little' to develop the biofuels sector, and particularly advanced biofuels due to high development costs (EC 2007). The need for stronger legislative action was iterated and reiterated in communications from the Commission, particularly to provide investor certainty (EC 2005, 2006a, 2007). Despite the emphasis on agricultural development, biofuel policy ostensibly remained an environmental policy, in the words of Peter Mandelson, EU Trade Commissioner, 'driven above all by the greenest outcomes' (Mandelson 2007). In March 2007, the European Council endorsed the 10% biofuels target subject to three conditions: firstly, biofuels should be sustainable; secondly, second generation (or advanced) biofuels should become commercially available; and thirdly, the Fuel Quality Directive (FQD) should be amended to allow for levels of blending.

However, even as the Commission advocated binding targets for biofuels and the Council made political commitments, dissenting voices were beginning to appear, even within EU institutions. The European Economic and Social Committee (EESC), for example, questioned the purported benefits of biofuels and called for a careful analysis of the proposed 10% target 'so that by resolving one problem, further more serious ones are not created' (EESC 2008: no page ref). The European Environment Agency (EEA) also questioned the target, stating that it was 'overambitious… an experiment, whose unintended effects are difficult to predict and difficult to control' (2008: 1). Both of these reports seem prescient given the publication, that same year of Searchinger's paper on the ILUC impacts of biofuels, an issue which has undermined the assumed GHG benefits of biofuels and which will be discussed in the next section.

In January 2008, the Commission published a draft proposal for a new directive which would incorporate the renewable energy targets into legislation (EC 2008). As expected, the proposal aimed to establish an overall binding target of a 20% share of renewable energy sources and a 10% binding minimum target for biofuels in transport to be achieved by each Member State by 2020. Based on an impact assessment and stakeholder consultation, the proposal also recommended the introduction of criteria for environmental sustainability to ensure environmental protection.

4.3.3. Biofuels: is the cure worse than the disease? 2008 – Present

The Renewable Energy Directive (Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources (RED)) was adopted in April 2009 and set a mandatory 10% minimum target for the share of *renewable fuels* in the transport sector by 2020 (EC 2009a). Thus, in the fourteen month interlude between the publication of the proposal and the adoption of the RED the focus of the 10% target shifted; it was no longer a 'biofuel' target, but rather a 'renewable fuel' target. Under this heading, fuels such as electricity and hydrogen produced from renewable sources were now included. NGOs were extremely critical of this 'change in the narrative' (ENGO2, September 2011), which was considered a 'brilliant and smart change' that deflected attention from the negative externalities associated with biofuels, meaning the target could no longer be criticised on the grounds of it being a biofuels target (ENGO3, September 2011). Despite the shift from a biofuel to a renewable fuel target, it was widely acknowledged that in practice the 10% target 'mainly meant biofuels' (EC2, September 2011). Analysis of the National Renewable Energy Action Plans (NREAPs) submitted by Member States for compliance with the RED, supported this conclusion, demonstrating that biofuels were expected to contribute up to 92% of the 10% target (IEEP 2010). The rationale behind the change in terminology was the growing controversy about biofuels, tied to the publication of reports from 'renowned' institutions including the OECD (Doornbosch and Steenblik 2007) and the Joint Research Centre (JRC 2007); the latter, for example, concluded that the uncertainty of the indirect effects were 'too great to say whether the EU 10% biofuels target will save GHG or not' (p.2). The IEEP (2010) analysis, which was published a few years after the JRC report – once the indirect impacts of biofuels were acknowledged – quantified the GHG emissions associated with the NREAPs and concluded:

> '[the] use of additional conventional biofuels up to 2020 on the scale anticipated in the 23 NREAPs would lead to between 80.5% and 167% more GHG emissions than meeting the same need through fossil fuel use' (p.2).

To comply with the third condition set by the Council, the revised Fuel Quality Directive (FQD, Directive 2009/30/EC amending Directive 98/70/EC on fuel quality, EC 2009b) was adopted on the same day as the RED. Under the FQD, Member States were mandated to ensure that energy suppliers reduce lifecycle GHG emissions, per unit of energy from fossil fuels in 2010, by at least 6% by the end of 2020. This could be achieved through the use of biofuels, alternative fuels and reductions in flaring and venting at production sites. The FQD thus took a different approach to achieving emissions reductions in the transport sector; one characterised by technological neutrality and the setting of environmental (i.e. reduced carbon intensity) rather than technological (i.e. biofuel) targets. This approach was preferred by NGOs who argued that, unlike the RED, it provided 'a safeguard for preventing oil getting more dirty [sic]' (ENGO2, September 2011). Interviewees within the Commission acknowledged that it was 'not logical' to have two approaches, but pointed to 'internal dynamics' for the failure to agree on a single approach[12] (EC2, September 2011). This highlights the difficulties of integrating different perspectives, policy objectives, and working practices – integration being a key characteristic of governance for sustainable development – as well as the fragmented nature of EU policy making.

In the face of growing opposition and evidence of the negative impacts of biofuels, the question arises of why the RED introduced a mandatory 10% target. Previous sections provide some possible answers; since the 2003 Biofuels Directive, there is an evident trend towards the promotion of stronger legislative action in communications from the Commission. In particular, these communications highlighted the need for binding longer-term targets in order to provide the market with 'greater certainty for planning and investment' (EC 2006b: 24); investor certainty was also highlighted by interviewees (EC1, August 2011; EC4, September 2011). A stronger regulatory framework was also required to drive investment in advanced biofuels (EC 2009a, Para. 14); the commercial availability of these technologies being one of three conditions set by the European Parliament in March 2007. Advanced biofuels were incentivised in the RED through the double counting of biofuels from waste, residues, non-food cellulosic material, lignocellulosic material and algae (Art. 21(2)). Indeed, first generation biofuels are often presented as a stepping stone towards such advanced biofuels; however, there is often little connection between the technologies (IEA 2008). As one interviewee acknowledged:

> 'The whole second generation concept has been continuously used as a stop-gap when people argue against biofuels, but it has never showed any realistic prospect for commercialisation... you rely on completely different suppliers, different feedstocks and different technologies... it's complete nonsense to say it's a stepping stone – it's just the opposite, you are stepping in a hole, not on a stone!' (EC2, September 2011)

Despite this, the stepping stone narrative remains powerful and is frequently evoked in defence of biofuels (BP, June 2013).

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[12] Biofuel legislation was initially the responsibility of DG TREN, which was split in 2010 to form DG ENER (Energy) and DG MOVE (Mobility and Transport); the implementation of the RED now falls within the remit of DG ENER. DG CLIMA (Climate Action), which was also established in 2010 after splitting from DG ENV (Environment), leads international negotiations on climate and is responsible for the revised FQD. Other DGs involved in the biofuels regime include DG ENV (Environment), DG AGRI (Agriculture and Rural Development) and DG TRADE and the JRC.

In addition to providing new markets for EU farmers and the investor certainty that a binding target would create, interviewees and the literature revealed other rationales behind the target. Firstly, in the negotiations leading up to the 2009 Copenhagen Summit, the EU wanted to show leadership. This created political pressure to develop a climate 'package' prior to the summit – the '20-20-20' framework – and to do it 'as quickly as possible' (EC5, September 2011). One interviewee explained that the initial idea was to have three directives to cover electricity, heating and transport; when it was eventually decided to combine these in one directive, the 10% biofuels target was kept because 'it had already been endorsed by the prime ministers' (EC4, September 2011). Secondly, Sharman and Holmes (2010, see also Palmer 2011) identify an individual within the Commission who had a 'strong influence' on the decision to introduce a 10% target. They found that not only did the 'policy entrepreneur' – the overall architect of the RED – have a considerable degree of influence over the content of the Directive, but that this individual also acted as an 'information gatekeeper', ensuring that only information that supported the 'desired' outcome was considered in the decision-making process (p. 316). Several interviewees also commented on the perception, particularly of industry, that biofuels needed to be 'locked-in' before the technology could be marginalised by concerns about its sustainability (ENGO1, August 2011; EC2, EC4, ENGO3, September 2011). This implies that many actors wanted to lock-in biofuels, adopting a 'develop first, clean up later' strategy. Conversely, an industry interviewee was critical of the involvement of NGOs in the policy process, claiming that they had had an inordinate influence over policy formation. This influence, he argued, had negatively impacted the business case for biofuels (EP1, September 2011).

The RED also includes a review clause (Article 23(8)) that requires the Commission to present a review of the RED by the end of 2014, which will include a review of the feasibility of reaching the renewable fuel target whilst ensuring the sustainability of biofuels production and considering economic, environmental, and social impacts. Although some NGOs view this as an opportunity to remove the mandatory biofuel target (e.g. Econexus et al. 2011), interviewees closer to Brussels felt a moratorium was politically unfeasible. As one NGO explained:

> 'I won't be calling for a moratorium because I know that people will see me as ridiculous and I'll lose my credibility and I won't be able to meet cabinets and talk to them, because they'll just look at me and say "tell me something that the EU can do"' (ENGO2, September 2011).

The biofuels industry has, however, called for assurances that the 10% target would not be reduced (e.g. REA 2013b). An interviewee from industry, for example, argued that greater certainty would not only drive investment in advanced technologies, but would also provide assurances to EU farmers and thus drive innovation in agriculture (EP1, September 2011).

Policymaking appears to have concentrated on the interests of specific stakeholders, namely the agricultural and biofuel industries, and on a particular technology irrespective of the increasing evidence of the environmental and social harms. This has led some to argue that political imperatives have dominated over scientific evidence in the biofuels arena – a case of 'policy-based evidence gathering' to justify the 10% renewable fuel/ biofuel target (Sharman and Holmes 2010; see also Upham et al. 2013). This policy making process exemplifies Stirling's instrumental imperative (2006, 2008, 2009), discussed in Section 4.1, wherein evidence is used to justify a particular decision outcome – in this instance the 10% target – regardless of wider normative concerns. Even though the debate on biofuels is broader than just the carbon impacts, also encompassing food and energy security, land and resource rights, and rural development, the narrow framing of sustainability has essentially limited the debate to one on GHG emissions. As a consequence, the EU's efforts to ameliorate the sustainability impacts of biofuels have been similarly framed.

4.3.4. The Sustainability Criteria

In anticipation of the potential negative impacts of biofuels, the RED/ FQD established a 'comprehensive' sustainability scheme; only biofuels that meet the sustainability criteria would count towards the target or would be eligible for financial support. The criteria have been both criticised and lauded, but arguably represent the 'most progressive regulatory innovation of its kind' (German and Schoneveld 2012: 766).

The first criterion related to the GHG reduction requirements of biofuels. Article 17(2) states that biofuels must deliver GHG savings of at least 35% compared to fossil fuels. This proportion rises to 50% in 2017 and to 60% from 2018 for biofuels produced in new installations. 'Wastes' (which are not defined in the directives) need only meet 35% GHG savings. Other sustainability criteria placed restrictions on the types of land that may be used to grow the raw material for biofuels and bioliquids (from January 2008). In particular, biofuel feedstocks cannot be produced from land with high biodiversity value or from land with high carbon stock, which included wetlands, continuously forested areas, and peatland. At present, there are no social criteria, but the RED placed biennial reporting requirements on the Commission to monitor the social impacts (Art. 17(7)) as well as the impacts of cultivation (e.g. land use changes, including displacement, introduction of invasive alien species, biodiversity impacts, and effects on food production and local prosperity (Para. 78)). Although reports were required every two years, with the first reports due in 2012, the first Progress Report was not published until March 2013 (EC 2013a, 2013b). If the Commission finds evidence biofuel production has had an impact on food prices, then corrective action is envisioned. In this way, the RED could create incentives for producers to be attentive to social sustainability concerns (German and Schoneveld 2013).

Since the RED was framed as a climate policy, albeit one that delivered on other policy objectives, the sustainability criteria focus on GHG emissions and direct land use change. A focus on lifecycle GHG emissions was expected to incentivise more efficient production processes (EC4, September 2011), whilst minimising direct land use change (EC 2007b). Furthermore, there was an accepted methodology for calculating the life cycle emissions of biofuels making the GHG impact measurable. The Commission initially proposed a 10% GHG saving, which was raised to 35% following the 2007 stakeholder consultation. While the GHG threshold was raised, other criteria were left out, watered down or introduced as reporting requirements. For example, the definition of 'continuously forested areas' is:

> 'land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30%, or trees able to reach those thresholds in situ' (Art. 17 4b)

The percentage of tree canopy cover in this definition is therefore higher than the most widely accepted international definition, that of the FAO, which defines forest as 'land area of more than 0.5 ha, with a tree canopy cover of 10%' (FAO 2000). The FAO definition of a forest is therefore considered stronger since it encompasses more land. According to one interviewee (EC2, September 2011), the Commission wanted an even 'higher' percentage of canopy cover, but 'stopped at 30%' to keep within the Kyoto Protocol's definition of 10-30%. He went further, explaining that Brazil had exerted pressure to keep the percentage of canopy cover higher so that biofuels produced in the Cerrado[13] would not be excluded, but he argued:

> 'the energy people didn't have to be convinced, there was a very strong interest group in Europe who wanted to have access to cheap biofuels from abroad and they didn't necessarily want a strong definition. Especially countries who are import dependent – the Netherlands, the UK – they clearly were counting on imported stuff. And if it's imports, they'd rather have cheap stuff from Brazil than complicated, expensive stuff from Germany, and Europe wouldn't have much of

[13] The Brazilian Cerrado is the largest savannah-woodland system in South America. It is a biodiversity hotspot, but is also one of the least-protected ecosystems in Brazil.

> a surplus anyway, because everybody would need it because of the target' (EC2, September 2011).

Other criteria were excluded because of concerns about compliance with international law and the feasibility of linking impacts specifically to biofuel demand (German and Schoneveld 2013). On the former, the Commission did not want to create 'unnecessary' trade obstacles (Piebalgs 2007); however, discrimination on environmental grounds is permitted under Article 20 of the GATT, which meant that the GHG requirements were permissible (EA1, July 2011). Furthermore, according to interviewees, the Commission was under political pressure to 'wrap up' the Directive and other criteria (e.g. soil and water quality, food security and biodiversity) were not only more difficult to define – being localised issues – but also to measure (EC4, September 2011; also EC1, ENGO2). The inclusion of other criteria would arguably have placed a higher administrative burden on producers, as well as shifting the focus away from the Commission's key concerns about biofuels – namely GHG emissions and land use change. The 2013 Progress Report, which reported on the need for and feasibility of introducing criteria for soil, water and area, supported this decision. The Report found that, because many of the environmental impacts are dependent on factors such as the crop and region, the definition, application and enforcement of mandatory criteria for soil, water and air is infeasible. Furthermore, the risks were not specifically related to the production of biofuels, but to agricultural production in general (EC 2013a, 2013b).

Indirect Land Use Change

The emphasis on GHG emissions as the most important environmental characteristic of biofuels has meant that the issue of ILUC has been similarly framed and interpreted (Palmer 2012). This means that certain types of evidence carry more weight and those that wish to influence policy must have the ability to command technical knowledge. As one interviewee, speaking about the importance of the (2008) Searchinger paper to the ILUC debate, commented:

> 'In Brussels, if you can talk in hard numbers you get results. Because, allegedly, everyone cares about hunger and orang-utans and all the rest of it, but if you can talk about climate change and CO_2 and tonnes and technicalities, then your argument has more traction' (ENGO2, September 2011).

Although the risks associated with ILUC are greater than just carbon – also incorporating biodiversity loss, food insecurity, soil and water degradation and land rights infringements (Palmer 2012) – the narrow framing of ILUC as a predominately GHG issue has effectively limited the debate to a discussion of the climate impacts. Under the RED (Art. 19 (6)), the Commission was required to develop a methodology for the inclusion of ILUC in GHG calculations. Although the report was initially due at the end of December 2010, it was not published until October 2012.

That the ILUC debate is complex has been widely acknowledged (see Chapter Two), yet there is little agreement on what should be done to address it. NGOs have favoured the introduction of ILUC factors – a factor assigned to different crop groups to provide a quantitative approximation of the GHG emissions resulting from ILUC – which the biofuel industry has criticised for being based on 'unsound science' (REA 2013b). This recalcitrance is likely influenced by the fact that the introduction of ILUC factors would effectively rule out some feedstocks, particularly biodiesel from rapeseed, soy, sunflower and palm, although ethanol from sugar and cereals still potentially delivers net carbon reductions (Malins 2011). Since most EU biofuel production is biodiesel (EC 2013a, 2013b), without a grandfathering clause[14], ILUC factors would likely spell the end for much of the European biofuel industry. Instead the biofuel industry prefers measures that mitigate ILUC risks, such as controls on deforestation, rules on appropriate land use, and the production of co-products (REA 2013a). A common complaint by the biofuel industry is that ILUC is not just a phenomenon that affects the biofuel industry and has placed an excessive burden on biofuels (EP1, September 2011; REA 2013a). For industry, the issue is one of overall land use irrespective of end product and will only be addressed through a comprehensive global land use strategy. That biofuels was only a small part of the global agroindustrial complex was recognised by all I spoke to, but many argued that the 10% mandate had politicised the debate. For example, one NGO interviewee commented:

> 'For biofuels we have a mandate... we do lots of things that are bad for the environment – we fly, we eat beef – but nobody forces you to eat 10% beef each year, which is what we do with biofuels... we're not doing biofuels to feed ourselves but to drive our cars' (ENGO2, September 2011).

A common land use policy for Europe was considered beyond the ability of the EU, which meant that a global land use policy was simply 'out of the question' (EC2 September 2011).

Since the adoption of the RED, the Commission has come under immense pressure from all sides to address the ILUC issue. The hiatus and uncertainty that accompanied the delayed

[14] 'Grandfathering' is a legal provision which allows an old rule to continue to apply to some existing situations, while a new rule will apply to future situations

ILUC review was considered harmful not only for industry and/ or the global climate, but also to the EU's reputation and climate leadership. Leaked memos, delayed reports and accounts of conflicts between the DGs contributed to a sense that ILUC threatened not just the 10% target, but also the RED itself. Speaking in 2011 about a delayed modelling report on ILUC, which had been partially leaked, one NGO argued:

> 'By showing there will be a very high problem with ILUC and that it has to be tackled, it also threatens the target itself, the 10% target, and I think that's why they're so afraid of releasing these kinds of studies – it's the entire policy that is threatened by ILUC' (ENGO3, September 2011).

The Commission proposal to address ILUC was finally published in October 2012 and aimed to protect existing investments, to promote advanced biofuels and to improve the GHG balance of biofuels (EC 2012a). Four measures were included within the proposal:

1. An increase in the minimum GHG saving requirements for new installations to 60% from 1st July 2014.
2. A 5% cap in the RED for conventional biofuels (i.e. those with a risk of ILUC emissions).
3. Double and quadruple counting for advanced biofuels and waste in the RED.
4. The inclusion of ILUC factors in the reporting requirements by fuel suppliers and Member States.

The proposal thus signalled a potential end to the EU's support for conventional biofuels. Unsurprisingly, the draft proposal met with fierce opposition from the European biofuel industry, which called the draft law a 'masterpiece of irresponsible policymaking' and accused the Commission of 'purposefully causing the death of the whole EU biodiesel industrial sector' (EurActiv 2013a). The proposal was similarly criticised by environmental groups who argued that the ILUC reporting requirement stopped short of obligating suppliers to actually tackle emissions from ILUC (e.g. EEB 2012, T&E 2012).

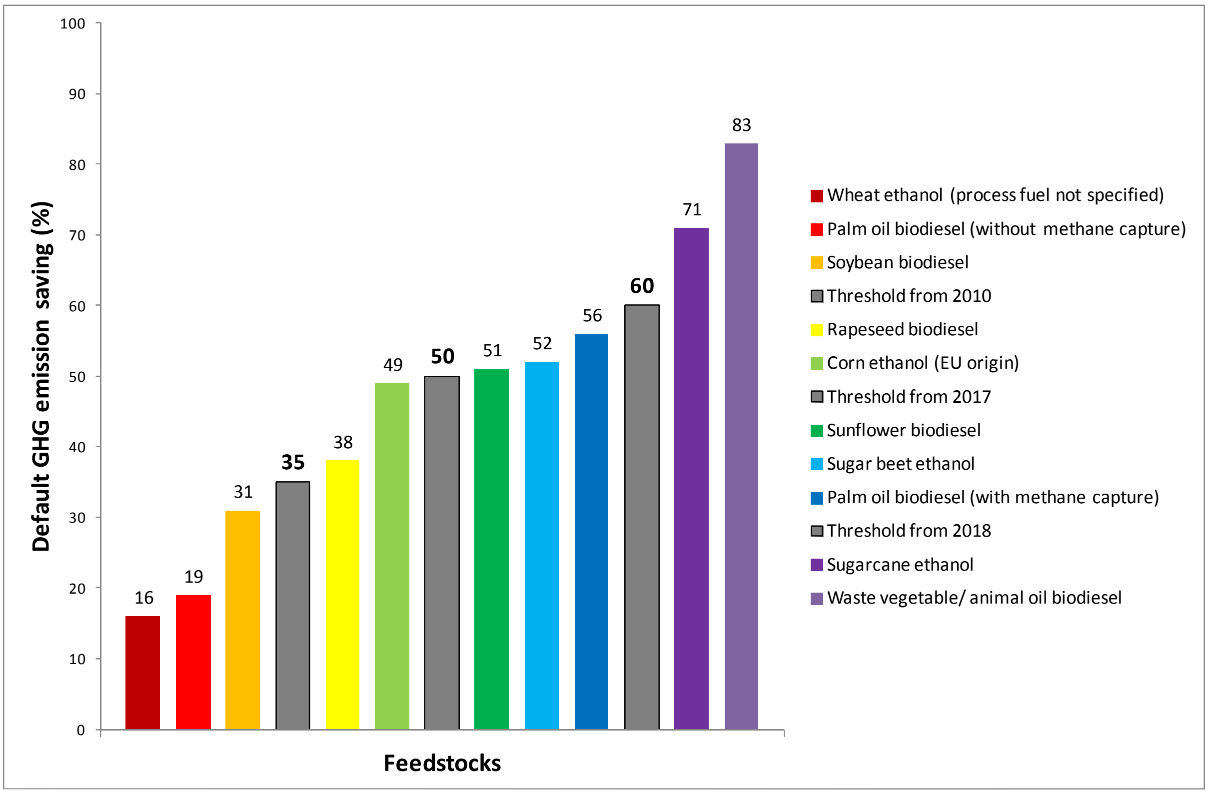
As the proposal makes its way through the EU's decision making procedures, the debate on how to address ILUC is far from over. In March 2013, Alejo Vidal-Quadras, rapporteur for the European Parliament's Industry and Energy Committee, dismissed ILUC factors on the grounds that there was 'not enough scientific evidence', arguing that their introduction would compromise the survival of the European biofuels industry (EP 2013a). Conversely, in May 2013, Corinne LePage, rapporteur for the Parliament's Environment Committee, presented amendments to the Commission's proposals, which suggested removing the 5% cap and replacing it with ILUC factors; a 'grandfathering clause' would protect existing investment and jobs (EurActiv 2013b). In September 2013, Members of the European Parliament (MEPs) narrowly voted to incorporate ILUC into EU biofuel legislation, but refused to grant a negotiating mandate to Le Page (European Voice 2013a). Parliament voted for the cap, which they raised to 6% – higher than the Commission's proposal of 5% – and also voted to include ILUC factors in the FQD, whilst adding non-binding ILUC factors to the RED. A second reading in October 2013 again denied Le Page a negotiating mandate, with the result that the legislation was likely to be delayed for at least a year (European Voice 2013b). It seems the ILUC debate is set to continue.

Compliance with the sustainability criteria

EU biofuels policy is not prescriptive; economic operators can decide how they want to meet the 10% renewable fuel/ biofuel mandate, but they do need to show compliance with the sustainability criteria. There are three options for compliance with the sustainability criteria: voluntary certification schemes, bilateral and multilateral agreements, or through national systems of compliance. All biofuels made from raw material produced in the EU, are also required to comply with existing agricultural sustainability rules. The first Progress Report, which evaluated data from 2010, found that for feedstocks produced within the EU existing environmental legislation and cross-compliance requirements were sufficient to prevent negative impacts on biodiversity, water, soil and air quality (EC 2013a, 2013b). With regard to bilateral agreements, even though they are permissible under the Directive they were considered 'unrealistic'; such agreements would require mutual recognition of the other's agriculture 'without spot-checking' (EC2, September 2011). The U.S. had, however, approached the Commission 'regarding an agreement that would recognise U.S. environmental protection laws (German and Schoneveld 2013). Default values for a variety of biofuels are specified in Annex V of the RED (Annex IV of the FQD), which may be used as an alternative to a case-by-case analysis to show compliance with the sustainability criteria (Figure 9). Producers therefore have a choice about whether they use default or actual emissions savings. Some biofuels, including palm oil without methane capture, do not meet the GHG threshold using the default values, in which case economic operators are likely to prefer to calculate the actual values.

The final option is compliance with an approved certification scheme, and it is expected that the vast majority of biofuels consumed in the EU will be certified through such voluntary schemes (German and Schoneveld 2012). It is here that new modes of governance, those involving multiple actors across multiple scales and geographies, have emerged to monitor the sustainability of biofuels. The first seven schemes were approved in July 2011 and by September 2013 a total of fourteen sustainability schemes had been approved by the Commission (EC 2013). More detail on each of the schemes is given in Table 6.

Figure 9. Default GHG emission savings for selected biofuels compared with threshold values



Source: EC (2009a, 2009b)

The approved schemes have been developed by a range of different stakeholders, ranging from single actors (e.g. Greenergy) to industry consortia (e.g. 2BSvs) and multi-stakeholder roundtables with representatives from NGOs, governments, research institutions and industry (e.g. RSB). As a result the schemes have different objectives, focusing on different crops and on different regions. Many of these schemes were established prior to the RED/ FQD and have subsequently been revised in order to comply with the European sustainability criteria. Three schemes increased their coverage during 2010, the International Sustainability and Carbon Certification, the Roundtable on Sustainable Palm Oil (RSPO) and the Roundtable on Responsible Soy (RTRS) (EC 2013b). In terms of supply chain verification, economic operators are required to use a mass balance chain of custody (EC 2009a, Art. 18(1)). The mass balance approach

Table 6. Description of EU-accepted sustainability schemes

Sustainability scheme	Year accepted	Feedstocks (geographic focus)	Promoter	Description
International Sustainability and Carbon Certification (ISCC)	2011	All feedstocks (global)	Multi-stakeholder association	Established in 2006, the ISCC is an international initiative that involves diverse interest groups. The ISCC is globally applicable to all feedstocks.
Bonsucro EU Production Standard	2011	Sugarcane (Latin America)	Multi-stakeholder association	Established in 2005, Bonsucro (formerly known as the Better Sugarcane Initiative), focuses on sugarcane cultivation in Latin America.
Roundtable on Responsible Soy (RTRS)	2011	Soy (Latin America)	Multi-stakeholder association	Established in 2006, the RTRS EU RED complements its existing scheme, which focuses on soy-based biodiesel from Latin America.
Roundtable on Sustainable Biomaterials (RSB)	2011	All feedstocks (global)	Multi-stakeholder association	Established in 2006 as the Roundtable on Sustainable Biofuels (changed to the Roundtable on Sustainable Biomaterials in March 2013) the RSB comprises members from diverse interest groups and is globally applicable to all feedstocks.
Biomass Biofuels Sustainability Voluntary Scheme (2BSvs)	2011	All feedstocks (global)	Industry consortium	Developed by a consortium of French biofuel companies and associations, specifically for the RED.
Abengoa RED Bioenergy Sustainability Assurance (RSBA)	2011	All ethanol feedstocks (global)	Private industry scheme	Developed by Abengoa, whose bioenergy subsidiary is the largest biofuel producer in Europe.
Greenergy Brazilian Ethanol Verification Programme	2011	Sugarcane (Brazil)	Private industry scheme	Developed by Greenergy, a private fuel supply company, this scheme focuses on ethanol sourced from Brazilian sugarcane.
Ensus	2012	Feed wheat (UK/ EU)	Private industry scheme	Developed by Ensus, one of the world's largest cereal grain biorefineries.
Red Tractor Farm Assurance Scheme	2012	Cereals, oilseeds, sugar beet (UK)	Industry association	The Red Tractor scheme is an industry initiative, which focuses on combinable crops produced in the United Kingdom.
Scottish Quality Farm Assured Combinable Crops (SQC) scheme	2012	Wheat, maize, oil seed rape (Scotland and North England)	Industry association	Developed by the SQC, an industry association, the scheme focuses on combinable crops produced in North Great Britain.
RedCert	2012	All feedstocks (EU)	Industry consortium	Developed by a consortium of German biofuel companies and associations, RedCert certifies EU-produced biomass
NTA 8080	2012	All feedstocks (global)	Multi-stakeholder association	Based on the Dutch Cramer criteria, NTA 8080 operationalises the criteria, turning them into verifiable requirements.
Roundtable on Sustainable Palm Oil (RSPO)	2012	Palm oil (global)	Multi-stakeholder association	Set up in 2003, the RSPO extended its sustainability scheme to fulfil the requirements of the RED.
Biograce GHG Calculation Tool	2013	All feedstocks (global)	Academic consortium	Biograce ran from 2010 to 2012 and aimed to harmonise GHG emission calculations of biofuels.

requires a physical link between all stages in the supply chain (i.e. from feedstock cultivation through to consumption), although it does allow the mixing of sustainable and other raw materials (Ecofys 2012; EC 2013b).

It is beyond the scope of this thesis to provide a detailed review of the environmental, economic and social criteria that are covered under the various voluntary schemes, which have been analysed in detail elsewhere (e.g. Tomei et al. 2010; Diaz-Chavez 2011; Scarlat and Dallemand 2011; German and Schoneveld 2012; Fortin and Richardson 2013; Hunsberger et al. forthcoming). However, in order to comply with the RED, all schemes must meet the legal minimum sustainability requirements i.e. GHG emission reductions and restrictions on land use. Most schemes exceed the minimum standards set by the EU and also include biodiversity conservation, air, water and soil impacts; not all schemes, however, include social criteria (German and Schoneveld 2012) and none at present address ILUC. The multi-stakeholder initiatives are generally considered to be more comprehensive in their sustainability objectives than industry-led schemes.

However, since the first certification schemes were only recognised in 2011, there is still little literature on how they work in practice and in particular whether producers adopt more sustainable production processes as a result of these schemes. While the Progress Report concludes that, by including requirements for good agricultural practice, voluntary schemes encourage best practice (EC 2013a), German and Schoneveld (2013) are more cautious about the purported impacts. These authors argue that the failure of some schemes, particularly industry-led schemes, to incorporate social sustainability may legitimise socially unsustainable projects (see also Hunsberger et al. forthcoming). Further, they caution that more comprehensive and therefore more complex schemes, such as that of the RSB, are likely to attract only those companies that are already largely compliant and able to benefit from the reputational gains at minimum cost. Similarly, Glasbergen (2007) cautions that when such schemes are a requirement of market access, such as in the EU, the incentive to participate is likely to shift away from normative concerns about sustainable production.

Exporter countries

The role of exporter countries as suppliers of biofuels to the EU market has shifted as EU biofuels policy has evolved. Although the provision of alternative markets for EU farmers has been a key driver of EU biofuel policy, an autarkic approach to meeting EU demand for biofuels was never regarded as either possible or feasible (EC 2005). In early communications from the Commission, the implications for exporter countries were regarded only in terms of the positive trade impacts, including the provision of alternative markets for some sugar-producing countries (e.g. EC 2001a, 2006). However, impact assessments, which modelled the potential economic and environmental impacts of various policy choices, failed to account for the specific contexts of producer countries and thus to consider many of the impacts that would later prove so divisive.

As shown in Table 7, five countries account for the majority of EU imports – the U.S., Brazil, Argentina, Indonesia and Malaysia (EC 2013a, 2013b; Ecofys 2013). In 2008 and 2010, Guatemala provided 0.6% of ethanol consumed within the EU, equivalent to 14 ktoe. While this is perhaps an insignificant amount for the EU, it represented all of the fuel ethanol produced within Guatemala in those years.

Table 7. Origin of biofuels on the EU market, 2008 and 2010

Biodiesel					**Bioethanol**				
Region/ Country	**2008**		**2010**		**Region/ Country**	**2008**		**2010**	
	ktoe	%	ktoe	%		ktoe	%	ktoe	%
EU	5622	83.0	8270	83.2	EU	1402	77.7	2243	79.7
USA	780	11.5	61	0.6	Brazil	289	16.0	234	8.3
Argentina	133	2.0	1003	10.1	USA	-	-	121	4.3
Indonesia	165	2.4	285	2.9	Bolivia	19	1.1	20	0.7
Malaysia	35	0.5	123	1.2	Egypt	14	0.8	15	0.6
Other	34	0.6	196	2.0	Peru	13	0.7	26	0.9
					Guatemala	11	0.6	14	0.6
					Other	57	3.1	141	4.9
Total	**6769**	**100**	**9938**	**100**	**Total**	**1805**	**100**	**2814**	**100**

Source: Ecofys (2011, 2013)

The Progress Report (Ecofys 2013) found that since 2008 the major exporting countries have strengthened their environmental practices in biofuel-related areas, which may lead to the conclusion that biofuels are a 'good thing' and that current measures to address sustainability are adequate. Yet the report has very little to say on those countries that export smaller quantities of biofuels, which includes countries such as Guatemala, the case study focus of this thesis. Continued attention only on those countries that have large and well-established biofuel sectors means that it is highly likely that the outcomes for smaller producing countries will be overlooked. The focus on major exporters is understandable given time and resource constraints, but it is also vital to understand the outcomes for those countries that are not the focus of international pressure and criticism.

4.4. Conclusions

The question of whether the sustainability impacts of biofuels were foreseeable was raised in Chapter Two, yet remains a difficult one to answer. Interviewees commented that it had taken a long time for the negative impacts of biofuels to crystallise, with early Life Cycle Assessments (LCA) missing 'all kinds of elements' (EC2, September 2011). It has clearly taken time to establish an evidence base and to develop the methodologies to measure and assess the impacts of the policy, many of which are still contested. However, from the outset, the narrow framing of the sustainability problems of biofuels as unforeseen GHG emissions has restricted the debate, affecting what has been asked, the proposed solutions and how the outcomes have been interpreted (Stirling 2008; Palmer 2012). Since the 1990s, biofuels have been the preferred choice of policymakers, offering a drop-in technology that ostensibly met multiple policy objectives. As one interviewee explained:

> 'Biofuels at first seemed like a dream come true, like real magic. You make farmers happy and at the same time you reduce emissions. And it's easy for the oil industry, they know how to deal with liquid fuels, it's easy for car manufacturers because they don't have to do so much on efficiency and everyone jumped on the bandwagon. They think you just change the fuel and that's it, the whole thing will be resolved... it was a technology hype' (ENGO2, September 2011).

The focus on 'scientific' and technical evidence has privileged certain types of knowledge and limited participation to those who are able to talk in 'hard numbers' (ENGO3, September 2011). The EU policy entrepreneur (described in section 4.3.3) also provided a platform that advantaged particular instrumental interests, specifically those who wanted to see the lock-in of biofuel technologies. Selective, poor and possibly biased analysis of the evidence base also meant that analysts failed to understand the systemic impacts, particularly the land use and global food market implications, of increased demand for biofuels. Continued debate about the merits of biofuels has made it difficult for biofuel advocates to obtain policy closure and threatens to undermine not only support for biofuels, but arguably also the EU's renewable energy target. A series of delayed, blocked, selectively released and leaked reports have further undermined the Commission's credibility. Even with the benefit of hindsight, it is difficult to know whether the adoption of a more precautionary and/ or participatory approach to the appraisal of biofuels would have revealed all potential impacts. However, by broadening the scope and inputs to policy appraisal, by 'opening up' rather than the 'closing down' (Stirling 2006, 2008, 2009), more robust understandings of the technical, social and environmental complexities of biofuels would arguably have been revealed sooner.

There is clearly a trade-off to be made between producing assessments that are generalisable – and therefore policy-relevant – and those that are specific to a particular context. However, political ecologists have demonstrated the importance of dynamic interactions between scales; interactions which render the place-specific outcomes of global policies unique and unpredictable (Gezon and Paulson 2005). The sustainability outcomes of biofuels in a given context will depend not only on the model of production (i.e. feedstock, agricultural system, processing etc), but also on the political-economic conditions and governance arrangements within which they are situated. Of interest here is whether the governance arrangements and reporting mechanisms, such as those outlined in the RED, can adequately capture and address the sustainability impacts in producer countries. In order to begin to address this question, the following chapter describes the Guatemalan case study in more detail. The chapter aims to convey key features of Guatemala's history and contemporary context in order to contextualise debates about the sustainable development of biofuels that form the focus of Chapters Six to Eight. It also sets out the power dynamics that have shaped and constrained the country's development, focusing on the country's agrarian history and the role of Guatemala's elites, which, as later chapters show, are critical to the development of biofuels today.

5. Guatemala: a land of beauty and violence

Previous chapters have introduced the promise, the practice and the governance of biofuels. This chapter, the first of four that focus on Guatemala, examines the history and contemporary dynamics of Guatemalan society in order to contextualise debates about the sustainable development of biofuels. Across the various groups of actors interviewed during this research (see Chapter Three), many emphasised the importance of history for an understanding of contemporary Guatemala and the outcomes of biofuel development for different social groups. They argued: 'if you want to understand Guatemala, we need to go back five hundred years, back to the arrival of the Spanish...' While this thesis is not the place for an in-depth analysis of Guatemala's complex colonial or indeed more recent history, like my interviewees, I believe that an understanding of Guatemala's history is vital for an analysis of biofuels and their distributional and sustainability outcomes. This chapter therefore introduces Guatemala. It draws on a rich literature that details the history and political economy of Guatemala, supported by interview data, to provide an overview of the country's (agrarian) history, which is brought up to date with a description of two sectors of most relevance to biofuels: agriculture and energy.

The rest of this chapter is divided into five sections. The first section introduces twenty-first century Guatemala and describes the country's social, political and economic context. Beginning with colonisation, a process which established a pattern of dominance and subordination that persists today, the second section describes Guatemala's history. The 36 year civil conflict and the peace process that followed are shown to have left a series of legacies that continue to shape contemporary Guatemala. Given the centrality of land and agriculture to any social research on biofuels, the following section then examines land use and the agricultural sector, focusing on the inter-linkages between poverty and inequality. The next section provides an overview of the energy sector and demonstrates that the inequalities inherent in the agricultural sector are also relevant to energy. This section concludes with a short introduction to the Guatemalan biofuels sector, before the chapter concludes.

5.1. Introducing Guatemala: state, society and economy

Guatemala is bordered by Mexico to the north and west, Belize to the East and Honduras and El Salvador to the southeast (see Figure 10). With a land area of 108,889 km^2 and a population of almost 15 million people, Guatemala is the most populous nation in Central America (INE 2011a).

Figure 10. Political and administrative map of Guatemala

Source: Vidiani (2013)

The last national census revealed that 59% of the population were Ladino[15] and 41% were indigenous; there are more than 21 distinct Mayan peoples in Guatemala (INE 2003).

[15] In the 18th century, Ladino referred to Hispanicised indigenous peoples or people of mixed heritage-*mestizo* elsewhere in Latin America. By the late 19th century, Ladino came to signify non-indigenous in culture and descent (Warren 1998).

Guatemala is a constitutional democratic republic and is divided into twenty-two administrative departments.

Guatemala has an incredible diversity of climates and ecosystems, primarily due to a chain of mountains and volcanoes that passes through the country from the northwest to the southeast. Three quarters of the population, and most of the cities, are concentrated along this volcanic chain, especially on the Pacific side. This chain also defines the various geographic and climatic regions of Guatemala: the fertile Pacific coastal plain and piedmont, the western and eastern highlands, the Atlantic coastal plain, and the Petén rainforest (Handy 1994). Guatemala is a geologically and meteorologically volatile country; volcanic eruptions and earthquakes are common, and during the rainy season (May to November) tropical storms are frequent. The frequency of extreme weather events is increasing and Guatemala is one of the ten most vulnerable countries to climate change (UNISDR 2009; GG9, April 2012)[16].

With a Gross Domestic Product (GDP) of USD 46.9 billion and a per capita income of USD 3,184 Guatemala is considered a lower middle income developing economy (World Bank 2012a). Prior to the 2008 financial crisis, Guatemala had maintained GDP growth rates of more than 5%. However, declines in exports, foreign direct investment and remittances caused GDP growth to fall to 0.5% in 2009. The economy has, however, shown signs of recovery, with growth reaching 3% in 2012 (World Bank 2013). Guatemala has the lowest tax base (10.5%) in Latin America and the Caribbean, with the exception of Haiti, which means that state institutions are chronically underfunded (Sanchez 2009). This has placed considerable constraints on Guatemala's development potential and basic services, such as education, health and the criminal justice system. In many rural regions, state institutions are minimal or absent.

Guatemala has the lowest Human Development Index in Latin America and the Caribbean after Haiti (UNDP 2012). The country is characterised by high levels of poverty, extreme inequality and low social development indicators. It is the third most unequal country in the world in terms of income distribution (USAID no date). The richest 10% account for 47% of the country's income, while the poorest 10% account for just 1% (Taft-Morales 2012). Furthermore, more than half the population lives below the poverty line and, of these, 13% live in extreme poverty (INE 2011b). Social and economic marginalisation disproportionately affects Guatemala's indigenous population: three quarters of Guatemala's indigenous people are poor,

[16] Droughts or floods that cause loss of crops or damage to roads, that limit that limits access to markets can push marginal households into acute food insecurity.

which is double that of the non-indigenous population (Shapiro 2006). Furthermore, one in two children under the age of five suffers from chronic malnutrition – rising to 80% in indigenous areas (UNICEF 2009). Some of the most striking inequalities are evident with respect to the ownership of land, as shown in Table 8.

Table 8. Distribution of farmland in Guatemala, 1979 to 2003

Size of plot	1979		2003	
	% number of plots	% arable land	% number of plots	% arable land
Below subsistence (< 1.4 ha)	54	4	68	8
Sufficient for subsistence (1.4 - 3.5 ha)	24	7	19	8
Medium size plots for internal markets (3.5 - 45 ha)	19	25	12	27
Large, export-oriented farms (> 45ha)	3	64	2	57
Total	100	100	100	100

Source: INE (2004)

As shown in Table 8, there has been an increase in the number of *fincas* (plots) that are not large enough for subsistence farming (INE 2004), which Taylor (2005) defines as plots smaller than 1.4 ha[17]. The percentage of subsistence and below subsistence farms increased from 78% of *fincas* in 1979 to 87% in 2003. The last agricultural census, taken in 2003, shows that just 2% of agricultural producers (with an average of 194 ha) controlled 57% of arable land, while 87% of producers (with an average of 1.2 ha) occupied just 16% of arable land (INE 2004). The highly skewed distribution of land was one of the root causes of Guatemala's 36 year civil conflict, yet decades after the apparent resolution of the conflict little has been done to address the country's land inequalities.

In addition to gross inequities, Guatemala faces a number of other significant challenges. Security issues affect every stratum of society. Organised crime, drug trafficking and gangs are the main facets of this insecurity, although lynching, femicide and attacks on human rights defenders have also increased in recent years (International Crisis Group 2010; Brands 2011). The failure of successive governments to investigate human rights abuses, crime and corruption has perpetuated a culture of impunity within Guatemala. As a result,

[17] The amount of land required for subsistence farming inevitably depends on quality of land resources, the crops grown, topography, as well as access to markets and other institutional arrangements.

conversations with Guatemalans almost inevitably turn into a discussion about insecurity, citizens' rights and the inability of the state to address the mounting violence. In 2011, Guatemala was ranked the lowest country in Latin America in terms of support for democracy, with only 36% regarding it as the preferred form of government (Latinobarómetro 2011). Support for *la mano dura* (a strong hand) led to the election of ex-general Otto Perez Molina in early 2012. He is the first military leader to have been elected since the end of civil war.

5.2. A land of poverty amidst plenty

Like most Central American countries, Guatemala experienced a turbulent twentieth century and arguably experienced the region's bloodiest conflict. The Guatemalan civil war lasted 36 years and formally ended in 1996 with the signing of the Peace Accords. The conflict claimed more than 200,000 lives and led to the displacement of over one million people (REMHI 1998; CEH 1999). During the worst years of the violence – a two-year period under the military dictator Efraín Rios Montt – more than 600 massacres were committed by government forces against civilians in predominantly Mayan areas, leading the UN-led Truth Commission to conclude that the government had committed acts of genocide (CEH 1999: 890). However, whether or not genocide occurred remains a deeply divisive issue in Guatemala; one that has its roots in the country's colonial past.

5.2.1. An agrarian history of Guatemala

The fabric of pre-colonial society was fundamentally transformed by the arrival of the Spanish in the early sixteenth century. The establishment of colonial structures, which lasted well into the nineteenth century, was accompanied by integration into the world capitalist system and a period of primitive accumulation (Robinson 2003). The Spaniards profoundly altered the human and natural environment; land, once intensively cultivated, converted to jungle as the native population declined. The economy became externally oriented and elite-controlled as the region's human and natural resources were exploited to produce goods for trade amongst the colonies and with Spain. The Spanish established a system designed to exploit the indigenous population who were forced to construct and relocate to *pueblos de indios* (indigenous villages). These *pueblos* guaranteed a captive labour force and tax-paying population. Land was parcelled out by the Spanish crown to the *pueblos* so that they could provide their own subsistence and pay tribute in the form of textiles, beans, cacao and other goods. They also had to supply a *reparto*[18], which involved labouring on Spanish-owned plantations. It was during this period that the traditional pattern of landed property was established, one common throughout Latin America. Essentially, colonial development created two principal types of agricultural systems: *latifundios* or large capitalist estates, oriented towards export markets, and *minifundios*, comprised of small family farms which produce for the subsistence sector and are often subdivided for subsequent generations (Faber 1988). The vast inequalities in land created by this system still exist today as one interviewee explained:

> 'When the Spanish came and conquered this part of Latin America, they created a landowning class and, at the same time, smallholdings – the *minifundios*. It was the landowners that really produced wealth – they created products for export – whilst the small *minifundios*, on their small parcels of land, they produced food for subsistence. And little by little their situation was worsened – initially there was one owner, but when he died he would leave four children, each of whom were entitled to a proportion of that land. And they would also have four children, who would each have three children and so on until each was left with only a very small portion of land' (GP12, February 2012).

This quote also highlights the importance of population growth to land access, since land was often divided amongst legitimate offspring, leading to properties too small to be viable (Williamson 1992). The gross inequality in land distribution created a socially irresponsible elite, one which remains one of the most intransigent in Latin America (Robinson 2003; Oglesby 2004, 2010; Krznaric 2006). It was also during this period of colonial rule that 'a new racial configuration' emerged (Booth et al. 2006: 43). This essentially consisted of a highly unequal, two-class society wherein those of Spanish descent[19] constituted the ruling class and everyone else 'a downtrodden lower class' (ibid). Attempts by the Spanish crown to abolish slavery were repeatedly rejected by the ruling class, who feared a free labour system, one which would require the payment of salaries. Colonial structures were maintained well into the nineteenth century, despite independence in 1821 (Robinson 2003).

Participation in the global economy deepened during the nineteenth century with the introduction of coffee and other agricultural exports, including bananas, cotton, sugar and beef (Robinson 2003; Booth et al. 2006). Modernisation further concentrated wealth in the hands of

[18] Literally 'distribution', the system of *repartamiento* involved the distribution of indigenous labour amongst Hispanic landowners (Williamson 1992).

[19] In Guatemala, the term *Ladino* is used to refer to those with an exclusively European identity; indigenous people were, however, able to become Ladino by 'giving up' the cultural traits that mark them as Indians.

the elites, and increased external economic dependency, leaving Guatemala subject to world market price swings and prone to cyclical recessions. The expansion of coffee created an insatiable demand for land and labour, providing the Guatemalan state with the motive to enact reforms. New laws encouraged the division and transfer of communal property to private title. Competitive bidding for land pushed rental prices beyond the reach of subsistence farmers, concentrating the best lands in the hands of plantation owners. Forced labour laws were also enacted, including the *mandamiento*, which obligated communities to provide labourers to plantations. The seasonal demand of coffee created a semi-proletarianised workforce, where workers were waged for three months and engaged in subsistence agriculture for the remainder of the year (Dore and Weeks 1992). The agro-export elites came to dominate both the economy and politics, opposing socio-economic reforms whilst institutionalising the inequalities between Ladinos and indigenous peoples. Foreign control of the economy increased during the early decades of the twentieth century, with one company more than any other epitomising this influence. The United Fruit Company (UFCO), a Boston-based banana company, came to control vast extents of land in Guatemala and across Central America. By 1930, the UFCO was the largest landowner, employer and exporter in Guatemala (Schlesinger and Kinzer 2005).

5.2.2. Reforms, repression and a state formed through terror

During Guatemala's 'Ten Years of Spring' (1944 – 1954), two democratically elected governments presided over a series of political and social reforms (Grandin et al. 2011). Agrarian reforms allowed rural peasants, or *campesinos*, to claim large expanses of uncultivated land. Landowners were compensated with government bonds, but because compensation was dependent on declared tax values, which landowners had consistently undervalued to avoid taxes, typically amounted to little. The reform was designed to shift economic power to campesinos, leading to growth in rural peasant organisation and empowering them to demand higher wages. In turn, this was expected to encourage investment and greater efficiencies by planters who had historically depended on cheap land and labour. Handy (1994) estimates that as much as one sixth of the population benefitted from the land reforms. The U.S. was alarmed by these developments and, in 1954, supported the overthrow of the democratically elected government (see Schlesinger and Kinzer 2005; Slater 2010; Grandin et al. 2012). Much of the land expropriated during the reforms was returned to its original owners after the coup (Lovell 2011).

For the next forty years, Guatemala was ruled by a series of elected presidents, all of whom were military men. Guatemala was a nominal democracy and a counterinsurgency state (Grandin et al. 2011; Way 2012). In the wake of the military coup, U.S. and multilateral aid programmes promoted economic modernisation through the financing of extensive infrastructure development. Created in 1960, the Central American Common Market promoted Import-Substitution Industrialisation (ISI) and the expansion of agro-export crops as a means to industrialise Central American economies. The aim of ISI was to achieve economic self-sufficiency through the promotion of domestic industries. The state placed high tariffs on imported goods and stimulated demand for domestically produced goods by controlling wage and price levels. During this brief period of macroeconomic growth, income distribution worsened and the poor experienced a fall in real wages while unemployment rose. Moreover, far from increasing autonomy, ISI led to greater insertion in the global economy as the process required the import of technology and expertise, as well as massive capital investment (Williamson 1992; Robinson 2003). According to Williamson (1992: 338) the most damaging effect of ISI was the 'transfer of capital from agriculture to industry', which eroded agricultural productivity but left the problem of unequal land tenure intact. Indeed, land concentration increased during military rule, particularly in the Pacific coast where export agriculture – cotton, sugar and coffee – expanded. The rural crisis also affected the highlands, causing people to out-migrate to city slums or to public lands in Petén and Ixcan, which were opened to colonisation. Much of this land was, however, amassed by military officers and politicians (Ybarra 2010), a legacy still evident today and one which, as we shall see in Chapter Six, has had implications for the expansion of palm oil – a potential biodiesel feedstock.

Successive administrations attempted to modernise the agricultural sector, but all excluded progressive land reform policies. For example, in 1970, US Agency for International Development (USAID) launched a USD 143 million Rural Development Plan. The Plan aimed to promote agricultural modernisation through the establishment of cooperatives that would disseminate new technologies, introduce new farming methods and provide access to credit. While the plan brought wealth to some new stakeholders and diversified agricultural production into non-traditional crops (Way 2012), it failed to recognise critical social and political realities – namely the highly unequal distribution of land. When the oil price increased in 1973, Guatemala's 'Green Revolution' stalled as farmers were no longer able to buy the agricultural inputs and production declined once more (Copeland 2012). By the late 1970s, medium and large-scale producers were responsible for more than half of basic grain production; an increase achieved at the expense of small-scale producers (Klepek 2012). Land inequality also increased during this period, as demonstrated by the increase in the share of below-subsistence plots from 44% in 1964 to 54% in 1979 (INE 2004).

One consequence of this land inequality was that people had little land on which to produce staple crops and, as pursuance of the Green Revolution created a crisis in basic grains, malnutrition became ‘a way of life’ for many Guatemalans (Way 2012: 128). The global oil crisis, an earthquake in 1976 and the suspension of U.S. military aid to Guatemala catalysed a re-emergence of political activism. In 1980, major strikes were held against plantation owners on the Pacific Coast. The strike, organised by the Committee for Campesino Unity (CUC), brought exports of sugar and cotton to a standstill during the harvest, and succeeded in raising the minimum agricultural wage (see Figure 11).

Figure 11. “Widespread unrest on the South Coast”

CONCENTRACION. — Numerosos campesinos que ayer tarde se concentraron en el ingenio Santa Escuintla, para protestar porque no se les aumenta de salarios. (Arévalo)

Cunde la zozobra en poblacione de la costa sur, por la agitación

Source: Prensa Libre, 29 February 1980

This strike was significant because, until then, the plantation owners had relied on racial differences to forestall union organising. The strike, however, represented an alliance between seasonal, mainly Mayan, workers and full-time, mainly Ladino, plantation workers and therefore represented a threat to elite interests (Oglesby 2004; Grandin et al. 2011). This rare victory for the union movement was soon followed by the brutal repression of community leaders and trade unionists and the early 1980s witnessed the most violent period of the civil war, during which an estimated 150,000 people are believed to have been killed or disappeared (CEH 1999). Rural, specifically indigenous, communities were victims of genocide wherein entire villages were massacred having been defined as 'internal enemies', the legacy of racism having 'nourished an attitude towards Indians as different, separate, inferior, almost less than human and outside of the universe of moral obligations' (ibid: 890). Since the agricultural strikes of the 1980s, plantation owners have sought to eliminate union influence by shifting from a permanent plantation workforce to a reliance on seasonal, non-unionised labourers. The labour force is thus unable to exert much influence over wages and working conditions (Oglesby 2004; Krznaric 2006). This remains a feature of the export-oriented agricultural sector and will be discussed specifically in the context of palm oil (Chapter Six) and sugarcane cultivation (Chapter Eight).

5.2.3. The transition to democracy

By the early 1990s, poor economic performance had diminished elite support for the military. The counterinsurgency had wrought disastrous consequences on the economy, which in 1990 was experiencing capital flight, unemployment, rising inflation, falling productivity and decreases in the value of traditional export crops (Lovell 2011). The standard of living of the majority of the population had also fallen and unemployment was growing, particularly in the agricultural and industrial sectors (McCleary 1999). However, unlike other countries, the transition to democracy in Guatemala was not a result of 'revolution from below' (Paige 1997: 7), but rather was a strategic choice by the military, one supported by the oligarchy. Briscoe and Rodriguez-Pellecer (2010) argue that this top-down transition also occurred as a result of a realignment of power between different sectors of the elites, with an increasing influence of what Robinson (2000, 2003) calls 'transnational' elites i.e. those with ties to global capital.

These domestic changes coincided with the growing influence of the 'Washington Consensus', which promoted neoliberal economic reforms and structural adjustment policies as a means to solve Latin America's debt and development crisis (Fine 2001). This crisis was viewed as a failure of the state by International Financial Institutions (IFIs), which promoted a programme of neoliberal reforms to encourage private sector participation in the economy (McIlwaine and Willis 2002). Neoliberal reforms included the privatisation of the electricity and telecommunications sectors, budget cuts, trade liberalisation and the expansion of new economic activities, including *maquila* textile production and a new financial sector linked to international banking (Robinson 2003; Booth et al. 2006; Hamill 2007). However, while broader restructuring reduced debt burdens and led to economic growth, it is widely accepted that these macro-economic improvements took place at the expense of increased poverty and income inequality (e.g. McIlwaine and Willis 2002).

While structural reforms reduced the profitability of agro-export activities in other Central American states, such reforms did not have the same impact in Guatemala. Although non-traditional export crops (such as snow peas, flowers and pineapples) had gained economic importance, they did not displace the privileged position of traditional export crops (e.g. coffee, sugar, bananas etc) (Linares et al. 2013). Indeed, as we shall see in the following empirical chapters, one sector that emerged relatively unscathed from the conflict was the sugar industry, which to this day remains dominated by a small number of landowning families (Oglesby 2004, 2010; Krznaric 2006). The sugar sector also benefitted from the collapse of the cotton industry in the 1980s, which enabled it to expand into new territories on the Pacific Coast (Mirón 1998; Klepek 2012). The benefits of structural reforms accrued largely to the country's plantation elites, while many of the costs were borne by smallholder agriculture. In particular, the abandonment of state agricultural extension services, the loss of access to credit for subsistence farmers and the downsizing of the Ministry of Agriculture (MAGA) negatively affected smallholders (Klepek 2012). The rural economy, already fundamentally altered by the counterinsurgency, was thus further impacted by the neoliberal reforms.

In December 1996, a comprehensive peace agreement was signed, signalling the formal end to almost four decades of war. The Peace Accords were meant not only to end the war, but also to restructure state and society in order to address some of the root causes of the conflict, namely the legacy of racism, extreme poverty and unequal land access. The Accords included a comprehensive treaty on human rights, the expansion and institutionalisation of a democratic system, the curtailment of military authority, tax reforms and – of most relevance to this thesis – market-assisted land reform. Drawing on World Bank thinking at that time, agrarian reforms were eschewed in favour of market-assisted land reforms on the premise that:

> 'once distortions in land and credit markets are corrected, market forces will reallocate land from large [land]owners to more productive small farmers, thereby advancing both efficiency and equity' (Gauster and Isakson 2007: 1520).

In order to facilitate the process of market-assisted land reform, a land trust fund, FONTIERRAS, was established to provide subsidised credit, financial support and technical assistance to landless and near-landless families. Further, to minimise corruption and harness market efficiencies, FONTIERRAS did not select land for redistribution or determine land prices, but rather co-ordinated negotiations between willing sellers and buyers. Together with the Land Registry and the Secretariat for Agrarian Affairs (SAA), the fund was also supposed to manage the programme of land regularisation and titling (Gauster and Isakson 2007; Alonso Fradejas 2012b). However, the impacts of the fund have been disappointing. Between 1997 and 2005, just 4.3% of Guatemala's arable land was reallocated to 17,822 families (Gauster and Isakson 2007). Since 2009, families have no longer been able to buy land but can only lease it on an annual basis (Alonso Fradejas 2012a, 2012b). The failure to promote a policy of progressive land redistribution has been subject to much criticism particularly by academics and NGOs. These groups have argued that market reforms largely ignored the country's political and cultural context and have failed to redress the country's concentrated agrarian structure (e.g. Gauster and Isakson 2007; Grandin et al. 2011; Alonso Fradejas 2012a). It has also been argued that market-led land reforms overlooked Mayan customary land tenure arrangements, favouring individual property to the detriment of communal property (Ybarra 2010).

Seventeen years since they were signed, key elements of the Accords remain elusive and the root causes of the conflict remain untouched and untouchable. That the wounds of the war are still not healed was highlighted by the formal indictment of Ríos Montt in late 2012 for genocide and crimes against humanity. His trial began in March 2013 and, after numerous appeals, legal wrangling and delays, in April 2013 the General was found guilty and sentenced to 80 years in prison. However, just ten days after the ruling, the landmark decision was partially annulled by the Constitutional Court. Ríos Montt will face a new trial in 2015 (for more information on the trial see Rios-Montt Trial 2013; International Crisis Group 2013). The events surrounding the trial highlighted the deep divisions that remain in Guatemala, divisions that have their roots in the country's colonial and agrarian history.

5.2.4. The new struggle for justice: megaprojects and monocultures

The ratification of the International Labour Organisation's Convention 169 in 1996 demonstrated the Guatemalan state's recognition of the central role that land plays in indigenous identity (Shapiro 2006). The Convention includes the rights of communities to be consulted about the use of natural resources within their territories. While these rights are rarely enforced, the Convention has given activists 'rhetorical backing' in confrontations with the state and private companies (Grandin et al. 2011). However, one Q'eqchi community activist explained:

> 'Even though we have the Peace Accords, and even though there's a law of *pueblos indigenas* – the [ILO] Convention 169, they don't respect it. We're [the indigenous people] not respected... What happens when the landowners come and see that there's good land available? They ask the state to evict us. And that's how they obtain it, their lands. So, that's why I say that the armed conflict is still alive' (Doña Lucia, FV12, January 2012).

In recent years, vertical (i.e. against private companies and/ or the state) and horizontal (i.e. amongst peasants) struggles over land and natural resources have escalated (Alonso Fradejas et al. 2011). Land occupations by *campesinos*, a common form of everyday resistance, have increased and have typically been met with violence and repression, as Chapter Eight will discuss in greater detail. What was evident from field research was that *campesinos*, and particularly indigenous peoples, were still depicted as being uneducated, 'backward' and unwilling to modernise. The following quote highlights the paternalistic attitude that was held by some of the respondents interviewed, in this case, an actor from the private sector:

> 'They [indigenous people] are not educated, they have their own culture, their own economy and traditions, but the fact they have no education limits them. It closes doors to their participation in development, development that – why not say it? – could lead to progress. So, if at some level we're [ladinos] behind, then these people are much, much further behind' (GP12, February 2012).

Such attitudes, which have their roots in Guatemala's colonial history, provide an explanation for commonly held views that land struggles were unjustified and that *campesinos* were standing in the way of 'development'. Such development took the form of transnational 'megaprojects', including large infrastructure projects, the extractive industries, the expansion of monocultures – which included biofuels – and hydroelectric developments, all of which have become the new foci of popular protest (see for example El Observador 2008, 2010; Grandin et al. 2011; Urkidi 2011). Many interviewees who worked with rural communities also spoke of the 'criminalisation' of the struggle for land and for justice. These issues will be discussed in more detail in Chapters Six to Eight.

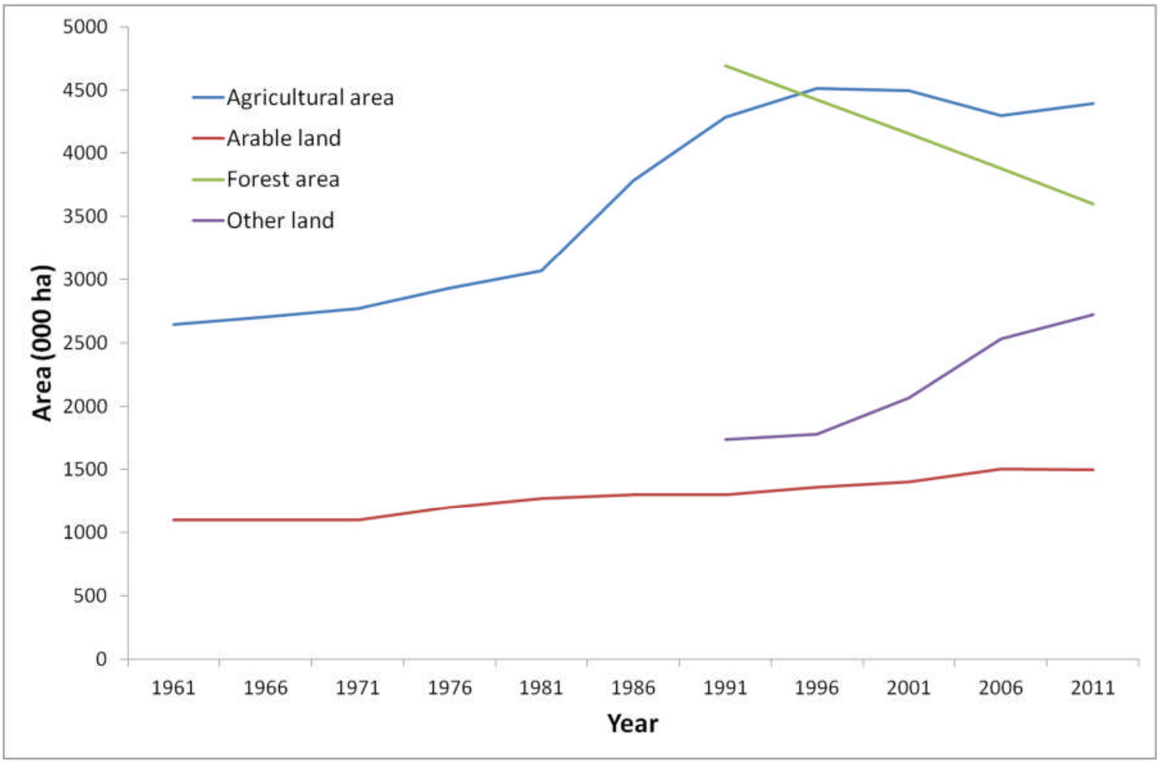
This section has discussed Guatemala's history, with a focus on the development of its agrarian economy. It has revealed that there have been clear winners and losers in Guatemala's agrarian history. Colonisation established a highly unequal system of land ownership, characterised by the *latifundio*/ *minifundio* system yet there have been few efforts to redress this inequity and most have failed to recognise the country's political, economic and cultural context. As we have seen, both the structural reforms and the Peace Accords further cemented the dominance of the ruling elites. In particular, market-led land reforms have institutionalised the ideas and practices of private land ownership, whilst ignoring other conceptualisations of land and land rights. As we shall see in subsequent chapters, these land inequalities also have implications for biofuels, in particular in determining which actors are able to benefit from production. In order to bring this discussion up to date, the next section describes land use in Guatemala and the agricultural sector as it exists today.

5.3. Agriculture and land use

According to statistics from the UN's Food and Agricultural Organisation (FAOSTAT 2013), the share of agricultural and arable land in Guatemala has increased since 1960 and there has been a concurrent reduction in forested area. Arable land increased from 1.1 million hectares (Mha) in 1961 to 1.5 Mha in 2011 while the forest area fell from 4.7 Mha in 1990 to 3.6 Mha in 2011 (see Figure 12). Although deforestation is commonly blamed on subsistence activities, particularly fuelwood harvesting, the picture is more complicated. A comprehensive assessment of environmental issues in Guatemala identified multiple drivers of deforestation, including cattle rearing, small, medium and large-scale agriculture (the latter tied to the production of monocultures), forest fires, illegal logging and narcotrafficking (IARNA 2012a).

Despite decreasing forest cover, forests and protected areas still account for a third of land use. In 2011, agricultural area accounted for 41% of total land area (FAOSTAT 2013). National land use maps estimate that less than half of Guatemala's land is suitable for farming, with only 26% apt for agriculture and 21% apt for permanent pasture (see Figure 8). However, as discussed in Chapter Three, an interview with MAGA revealed that these maps may underestimate agricultural capacity. This will no doubt have important implications for the biofuels sector; however, given the results of this new study have not yet been published, it was not possible to investigate this issue further.

Figure 12. Land use change in Guatemala, 1960 to 2012



Source: FAOStat (2013)

Within Guatemala zones of land usage differ greatly: the humid Pacific coast, which has the most fertile land in the country, is an expanse of sugarcane plantations, interspersed with cattle ranches and groves of rubber and African palm. In the highlands, where the majority of the population live, most arable land is divided into small plots that cross the mountains in a patchwork of beans, maize and vegetables. Some of the best land in the highlands, however, belongs to large landowners who grow coffee and non-traditional crops. Maize production remains of essential cultural and material importance to Mayan indigenous communities. Traditional maize, and to a lesser extent, bean cultivation continue to dominate subsistence production. The other key crops, in terms of land use are coffee, sugarcane and cardamom all of which are cultivated principally for export. In 2012, three traditional export crops – coffee, sugar and bananas – accounted for 23% of total exports, a share that has remained roughly constant over the past decade (Linares et al. 2013). Although maize is the principal crop produced in Guatemala, only very small quantities are exported. By price, sugarcane was the most important agricultural commodity produced in Guatemala in 2011 (FAOSTATS 2013). Table 9 shows land area under the principal crops.

Table 9. Land area under agricultural production (thousand hectares), 2001 – 2010

Crop	Year										
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Maize	592	593	602	602	602	590	577	688	856	822	822
Coffee	273	263	262	248	248	247	247	249	249	249	250
Beans	127	216	217	217	218	219	220	224	229	236	236
Sugarcane	179	185	187	194	200	189	216	216	234	235	240
Cardamom	19	24	27	31	31	31	32	31	31	n.d.	n.d.
Banana	18	40	35	37	39	40	42	57	62	63	64
African palm	19	24	27	31	31	32	34	49	49	58	60
Total area	**1508**	**1593**	**1630**	**1634**	**1644**	**1653**	**1702**	**1847**	**2026**	**2059**	**2092**

Source: CEPAL (2013). n.d. = no data.

This table shows that over the past decade, the land area under agricultural production has increased for all major crops. Two of the crops listed in Table 9, sugarcane and African palm, are of particular relevance to this thesis due to their potential as biofuel feedstocks. Sugarcane cultivation constituted about 20% of the area under annual crops, which made it third only to the production of maize and beans. However, the greatest increases in cultivation were for banana and palm oil; as we shall see in the next chapter, the rapid expansion of African palm has been a source of tension and concern (particularly from local and international NGOs), creating new conflicts over land, especially in the north of the country. The sugarcane and African palm sectors will be described in greater detail in Chapter Six, but it is important to highlight here that these crops are cultivated in large-scale agricultural plantations, mainly for export markets. Further, ownership of both sectors is dominated by Guatemala's domestic elites; the thirty or forty families who make up the 2% of the population that control 57% of the land (INE 2004; Oglesby 2004; Krznaric 2006).

In spite of the neoliberal reforms of the 1990s, the agricultural sector has remained important to the national economy, accounting for 15% of GDP in 2011 (CABI 2011) and employing 34% of the labour force (Linares et al. 2013). The continued contribution of agriculture to national development led the Bank of Guatemala to call the sector 'a fundamental pillar' of the economy and an important tool in the fight against poverty (Banco de Guatemala, cited in GREPALMA 2012). However, not everybody is so sanguine about the contribution of agriculture to national development. Krznaric (2006), for example, asks why rural poverty remains so severe despite strong growth in the agro-export sector. The answer to this question lies in the historical and continued exclusion of marginal rural groups, the power of Guatemala's economic elites and the relative weakness of the Guatemalan state. For example, numerous attempts to develop a law for rural development, which would promote land rights, develop economic, social and labour policies, as well as strengthening measures to promote food security, have been blocked. The most recent effort, in December 2012, met with opposition from large landowners who saw it as a veiled attempt at land reforms (Valladares 2012). Way (2012) also argues that Guatemalan capital enterprises – both big and small – have developed within the historical context of labour exploitation have come to rely on an underpaid, seasonal labour force, leading them to eschew mechanisation and efficiency. As he succinctly puts it 'why get a washing machine when a servant will launder by hand for pennies? Why buy a forklift when workers will haul loads with tumplines?' (p. 37).

The persistence of rural poverty in Guatemala, combined with the high proportion of the population employed in agriculture, reveals the low productivity of much of the sector (Krznaric 2006; Linares et al. 2013). While there has been growth and expansion in some parts of the agricultural sector (specifically large-scale monocultures, such as sugarcane and palm oil, and non-traditional crops), others have languished. In 2011, more than one in every three workers was formally or informally employed in the sector (INE 2011a). Agriculture generates low incomes: in 2006, 93% of agricultural workers earned less than the minimum wage (Linares et al. 2013). Agricultural salaries therefore fail to meet basic needs and national statistics show that three out of every four people working in agriculture live in poverty, with one in four living in extreme poverty (INE 2011b; Linares et al. 2013). In addition, the majority of agricultural workers have low levels of education, with an average of just three and a half years of schooling (INE 2011a). Table 10 shows the distribution of people employed in agriculture; almost a third of workers were smallholders and, as illustrated in Table 8, many of the plots of land are not large enough to support subsistence farming.

Table 10. Number and percentage distribution of people by occupation in the agricultural sector, 2006

Occupation	Number of people	Percentage
Employee	1,229,212	67
Smallholder	576,626	32
Employer	20,892	1
Total	**1,826,730**	**100**

Source: Linares et al. (2013)

Just 11% of those who work in the agricultural sector are formally employed (Linares et al. 2013). Only formal employees have access to the state's limited social security system – the

Instituto Guatemalteco de Seguridad Social[20] (IGSS) – and many workers do not receive other non-wage benefits, such as *Bono 14*, a 13 month salary bonus. This leaves a majority of rural labourers without access to vital safety nets such as healthcare. This trend looks set to continue as large landowners move away from hiring permanent workers; an issue I will discuss in more depth in Chapter Eight specifically in relation to the sugarcane sector (see also Oglesby 2004; Krznaric 2006).

Although prohibited under Guatemala's labour law (*Código de Trabajo*, MINTRAB 2013), child labour is also a feature of Guatemala's agricultural sector. In 2011, more than 190,000 children under the age of 15 were employed in agriculture. According to the 2011 National Employment Survey (INE 2011a), children earned less than a quarter of the minimum wage and had low levels of schooling. This phenomenon was not, however, restricted to smallholder agriculture and in 2012 a report highlighting the use of child labour on sugarcane plantations was published (Arce and Rodriguez-Pellecer 2012). What was perhaps most shocking about the report was that one of the plantations was owned by Otto Kuhsiek, then President of Guatemala's Chamber of Agriculture, an organisation that aims to promote best practice in agriculture, including labour. The report, however, raised little consternation amongst the Guatemalan press and politicians and Kuhsiek saw out the remainder of his presidential term.

In terms of agricultural trade, Guatemala is a signatory to two free trade agreements: the Dominican Republic-Central America Free Trade Agreement (CAFTA-DR) with the U.S., which was ratified in 2006; and the Association Agreement between the EU and Central America, which entered into force in August 2013. Both of these agreements aim to facilitate trade, investment and employment amongst signatories. For the EU, Central America has not traditionally been an important trading partner – the region represents less than 0.5% of total imports and exports – and the Agreement cites that the Agreement will deliver only 'negligible' welfare and employment benefits for the EU (European Parliament 2012). The interest therefore lies in the provision of a 'level playing field' with the U.S., since the Agreement ensures EU interests are not disadvantaged by preferences granted to Central America's Northern neighbours. For Central America, most exports already had preferential access to EU markets under the Generalised Scheme of Preferences[21] (GSP+), but agriculture is one sector that is expected to

[20] The Guatemalan Institute for Social Security
[21] The GSP allows developing country exporters to pay lower duties on their exports to the EU for particular products; the GSP+ involves the full removal of tariffs for those same product groups.

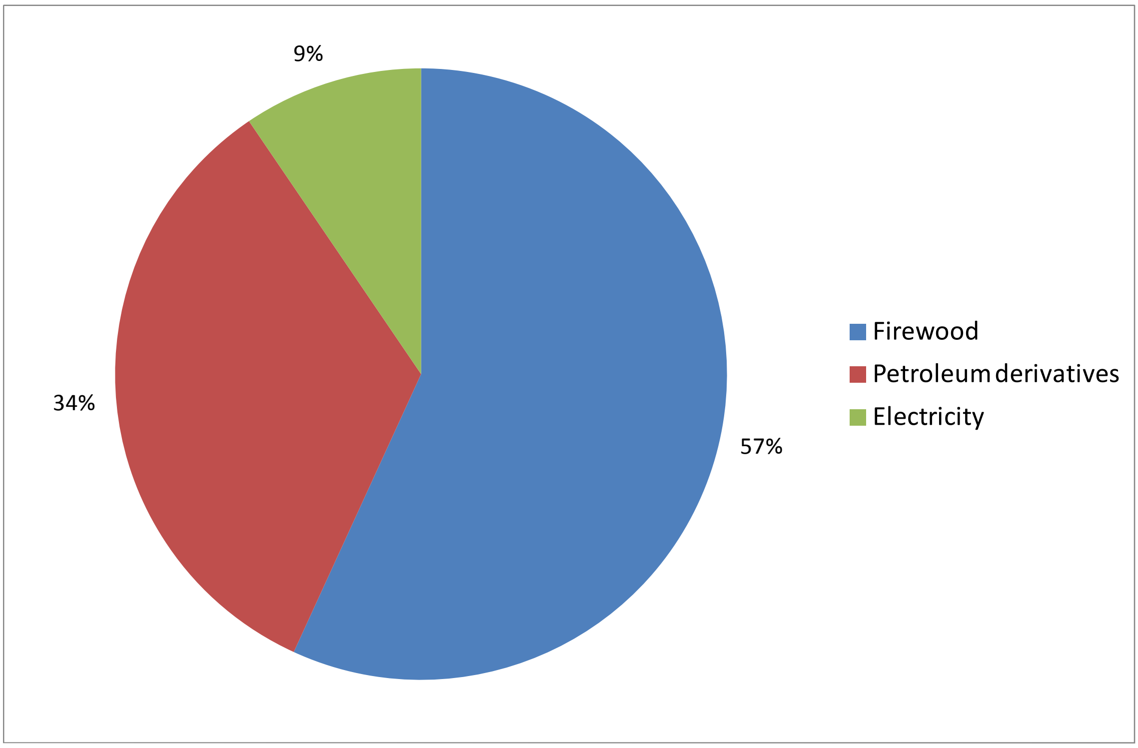
benefit from the Agreement. Although the Agreement contains human rights clauses and provisions on sustainable development, NGOs have expressed their concern that it will enable European companies to operate under less scrutiny. In particular, the predicted growth of agricultural output following the Agreement has created unease about the increased pressure on land and water, especially for the production of 'controversial' commodities such as ethanol (European Parliament 2012: 16; see also FOEI 2012; Deciding our Future 2012).

Given the centrality of land and agriculture to any analysis of biofuels, this section has examined Guatemala's historical agrarian dynamics and relations. It has revealed Guatemala's agricultural sector to be modern and 'anti-modern', industrialised and traditional, export-oriented and subsistence. This has clear implications for the research presented in this thesis and the distribution of costs and benefits of biofuel production. As outlined in Chapter Two, the scale of production matters, as does the ability of the state to control, and to benefit from, biofuel developments (Dauvergne and Neville 2010). This research therefore requires an understanding of both ends of the agricultural spectrum in order to investigate the implications of increased biofuel production. It also requires an analysis of the material and social factors that enable some social groups to capitalise on the opportunities from emerging biofuel markets. However, also integral to this analysis is a discussion of Guatemala's energy landscape. As the following chapters go on to discuss in greater depth, the lack of a domestic biofuels market mean that the Guatemalan biofuels debate largely centres on issues related to the agricultural systems that produce them, rather than the energy systems that consume them. For the markets that Guatemalan biofuels supply, however, the debate is one of energy, particularly one of 'securing' climate-compatible energy. Exploring the Guatemalan energy sector is highly instructive, since it brings into sharp relief the issues of scale and marginalisation that run throughout this thesis. As with the agricultural sector – Guatemala's energy sector is characterised by both the 'modern' and 'traditional'. For instance, while Guatemala is partner to a highly ambitious plan to interconnect the electricity markets of the Central American economies to better ensure domestic supply security (*Proyecto SIEPAC*), it also possesses a vast population that secures its basic energy needs through the unhealthy and unsustainable use of firewood, dung and crop residues. The following section explores some of these issues in detail.

5.4. Energising Guatemala

Like many countries in the global South, Guatemala faces three critical energy challenges: firstly, to increase access to modern energy services; secondly, to reduce petroleum import dependence; and thirdly, to mitigate and adapt to climate change. Addressing these challenges is complicated by the country's relatively small size and the dependence of the majority of the populace on traditional fuel sources. Figure 13 illustrates Guatemala's energy mix for 2012, which reveals a primary energy matrix, typical of other developing world regions, with high levels of biomass dependence.

Figure 13. Final energy consumption, 2012

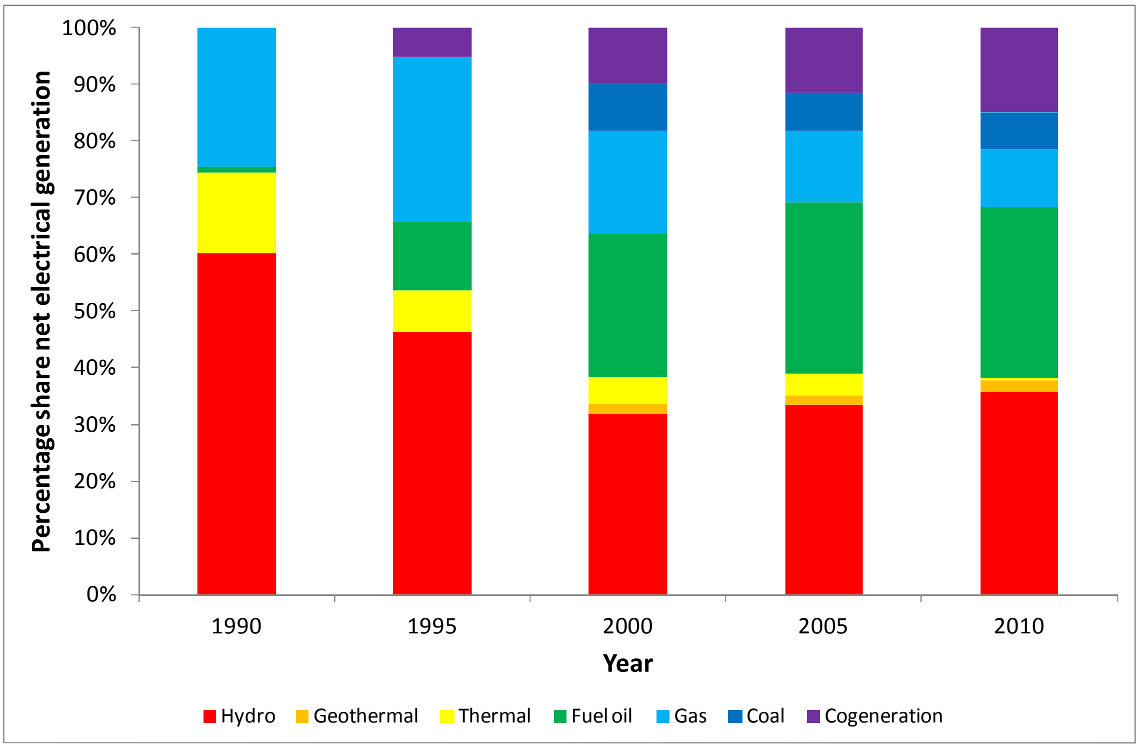


Source: MEM (2013)

Installed electricity capacity has more than tripled since 1990, increasing from 811 MW to 2,591 MW in 2011; maximum electricity demand has similarly increased. Energy consumption is expected to increase across all sectors of the economy (CEPAL 2012). In 2010, carbon emissions were 0.8 metric tonnes per capita, well below the global average of 4.7 metric tonnes per capita (World Bank 2013). Per capita energy use was 715 kg of oil equivalent (ibid); however, this figure masks vast disparities in energy consumption and access across income and geographical lines.

One of the sectors transformed by the neoliberal reforms of the 1990s was the energy sector. In 1996, the World Bank financed reform programmes in Guatemala, leading to the unbundling of vertically integrated utilities. Initially generation capacities and later distribution networks were opened to competition (Barnes and Waddle 2004; Martin and Posadas 2012). Net private ownership of electricity generation increased from nil in 1990 to 33% in 1995 and since 2005 has remained at around 70% (CEPAL 2012). Liberalisation led to the diversification of Guatemala's electricity generating mix (see Figure 14) and, in particular, to a decline in the share of hydroelectricity and concurrent increased dependence on fossil, specifically fuel oil, resources (Lecaros et al. 2010; Reinstein et al. 2011; CEPAL 2012). Fuel oil (*bunker*) generation presented lower perceived risks for private investors than renewable electricity generation due to lead times and upfront costs (Reinstein et al. 2011). However, fuel oil generation has locked Guatemala into higher costs in the longer term due to reliance on imported fossil fuels, and has increased exposure to international price volatility (Lecaros et al. 2010).

Figure 14. Percentage share of net electrical generation by source, 1990- 2010



Source: CEPAL (2012)

In 2013, the Ministry of Energy and Mines (MEM) published an energy policy for 2013-2027, which explicitly acknowledged the risks of reliance on imported fossil fuels. Proposed solutions included the promotion of Guatemala's considerable renewable energy resources, as well as the exploration and exploitation of national hydrocarbon reserves with a view to self-sufficiency (MEM 2013). According to the Inter-American Development Bank's 2013 Climatescope report, Guatemala was ranked twelfth in the Latin American region for clean energy and climate-related business development, which included biofuels (IDB 2013). The report showed that, between 2006 and 2011, around USD 120 million had been invested in biomass and biofuels in Guatemala (IDB 2013). Many of Guatemala's sugar mills cogenerate electricity from bagasse – the fibrous residue left from milling the sugarcane. In 2010-11, cogeneration accounted for 19% of net generation (Castillo 2011).

In addition to increasing reliance on imported oil, the Guatemalan energy sector faces a number of other challenges. Firstly, Guatemala has a relatively small energy market, which does not provide a sufficiently large demand base to support competition in generation (Tomiak and Millán 2002). This is a challenge common to all six Central American states and the regional integration of electricity markets has been proposed as a solution (see Ruffat 2005). Integration is argued to enhance competition, secure electricity supplies where generation deficits exist, help countries to match supply and demand more efficiently, while economies of scale would lead to gains in efficiency and lower costs (Lecaros et al. 2010). However, some critics have questioned the extent to which the expanded infrastructure would benefit populations currently without electricity access (e.g. Taylor 2005; El Observador 2008). Highlighting the disconnect between centrally planned electrification programmes and rural energy realities, Taylor (2005) argues that for many in rural Guatemala:

> 'electrification does not equate to electric stoves and appliances. Rather, electrification is synonymous with a single light bulb hanging in a house where wood-burning stoves boil water from local streams' (p. 181).

Thus, reliance on traditional biomass represents another energy challenge for Guatemala. Since the 1990s the state has pursued aggressive electrification plans and access has increased from 36% in 1990 to 85% in 2010 (CEPAL 2012; MEM 2013). Despite these improvements an estimated 2.2 million people were still without electricity access in 2010 (CEPAL 2012). While government policy focuses on the electricity grid and the exploitation of the country's limited reserves of petroleum, the 'real' energy matrix is dominated by traditional biomass consumption (GNGO5, December 2010). As Taylor's quote above highlights, firewood remains a key energy resource for many Guatemalans, particularly for those residing in rural areas. The negative impacts of traditional biomass, including high levels of indoor air pollution and time spent collecting fuelwood are well documented and particularly affect women and children (e.g. Sovacool 2012; see Figure 15). There are few up to date statistics on the use of biomass, although it is estimated that fuelwood may account for between 50 and 57% of Guatemala's energy consumption (IARNA 2012a; MEM 2013). According to respondents within MEM, the ministry has no mandate to address the traditional use of biomass, which is largely viewed as a rural development issue (GG1, December 2010; GG4, March 2012).

Figure 15. Women and children return home after collecting fuelwood, Escuintla, Pacific Coast

Source: Author's own

There are few state-run programmes that promote the rational use of biomass (CEPAL 2007; GG1, December 2010). This may, however, be changing as one of the axes of the recent energy policy is to reduce the use of fuelwood, for example through the promotion of improved cookstoves and the substitution of other energy sources for traditional biomass (MEM 2013). Although the collection of fuelwood is not the principal cause of deforestation, it is a contributing factor (IARNA 2012a). It is estimated that in Central America, on average 92% of total wood production is used as fuelwood with just 8% going to industrial uses (CEPAL 2007); the annual consumption of fuelwood in Guatemala was estimated at 27 million cubic metres (GA8, April 2012). Partly to drive the rational use of community forests and also to incentivise sustainable forestry, in November 2010 the Guatemalan Congress passed the PINPEP law[22]. PINPEP provides incentives to land managers to manage their forests in a sustainable way, even if they do not have legal ownership, for example through agroforestry, avoided logging and as

[22] *Ley del Programa de Incentivos para Pequeños Poseedores(as) de Tierras de Vocación Forestal o Agroforestal* (PINPEP)

‘energy forests’. Community forests, although individually small (many extend less than one hectare), account for 30% of Guatemala’s remaining forest (GNGO9, February 2012).

This overview highlights that just as the agricultural sector is characterised by stark contrasts, so too is the energy sector. Energy statistics mask vast disparities in energy consumption and access; near universal electricity access in Guatemala’s cities contrasts with reliance on traditional fuel sources in rural areas (see Figures 15 and 16).

Figure 16. Rural energy realities: a traditional stove run on fuelwood, Community Nueva Alianza, Retalhuleu

Source: Author’s own. To the bottom right of the photo is a traditional millstone used to grind maize. A single light bulb is also visible to the top left.

As we saw in Chapter Two, the small-scale production of biofuels has been posited as a solution to rural energy needs, for example as a replacement fuel for diesel generators or kerosene lamps. Yet, this section has shown that rural dwellers may have other more pressing and rudimentary needs than access to ‘modern’ energy sources. Taylor (2005), for example, finds that while the Guatemalan government has invested heavily in electricity grid expansion programmes, rural households often prioritise access to water, roads and markets over electricity. Further, the purported benefits of small-scale biofuel production assume that rural households have the land and resources required for biofuel production. However, the small size of the majority of plots (see Section 5.1) means that the promotion of small-scale biofuel production would most likely divert land from basic crops with potentially negative consequences for household food security. Nonetheless there are a few projects that are exploring the potential of small-scale biofuel production in Guatemala, particularly from jatropha, which will be discussed in the following chapter. Biofuels in Guatemala are therefore most likely to be used in the transport sector and it is to this sector that the final section of this chapter now turns.

5.4.1. Biofuels and the transport sector

In 2012, the transport sector accounted for almost 20% of total energy consumption (MEM 2013; World Bank 2013). Although Guatemala is an oil producer, these activities are very small scale (an estimated 736,000 tonnes were produced in 2009, compared to Venezuela's 151 billion tonnes) (McGlade 2013). Since the country has no oil refining capacity, the majority of production is exported and Guatemala is a net importer of petroleum products (CEPAL 2011). In 2010, the value of oil imports was USD 2.23 billion, with most of this used in the transport sector (ibid). As discussed above, an objective of Guatemala's most recent energy policy is the exploitation of hydrocarbons, which could also be used within the transport sector. However, alongside hydroelectricity developments and the expansion of monocultures, the extraction of hydrocarbons is a highly contentious issue in Guatemala (see Section 5.2.4).

Guatemala's petroleum market was liberalised in 1998 in order to keep the price of transport fuels low and government policy remains one of non-intervention in the market (UNCTAD 2007; GG4 March 2012). In 2010, Guatemala's vehicular park stood at two million vehicles (Hart Energy 2010a); a figure which is increasing by an average 50,000 vehicles per year (GG4, March 2012). In 2010, the average vehicle in Guatemala was about 13 years old, with models registered prior to the year 2000 accounting for almost 60% of vehicles (Hart Energy 2010a). The transport fuel market is roughly split between gasoline consumption, which in 2009 amounted to 1.3 billion litres (44% of the market), while diesel consumption was 1.6 billion litres (56% of the market) (Hart Energy 2010a). Diesel vehicles also included heavy transport including buses, pickups, trucks and freight vehicles.

Within the energy sector biofuels could have a role to play in reducing reliance on imported petroleum for transport fuels, thereby increasing national energy security. This notion of 'energy security' is understood from the perspective of Guatemala's exposure to fluctuating international oil prices. Indeed, one of the axes of the 2013 energy policy was the security of fuel supply. The development of a law to promote alternative fuels, including biofuels, was one of the actions proposed under the policy (MEM 2013). As this suggests, there is currently no domestic market for biofuels in Guatemala and successive attempts to establish a mandate have failed, the reasons for which will be explored in detail in Chapter Seven. Despite this, fuel grade ethanol from sugarcane is already being produced on an industrial scale (see Chapter Six). Between 2006 and 2011, the production of biofuels in Guatemala increased from almost nil to more than 103 million litres per year in 2011/12, although this production has since declined. Nearly all of this production was destined for the EU market.

5.5. Conclusions

This chapter has explored Guatemala's agrarian history, highlighting the disparities between rich and poor and the central role played by land in both historical and contemporary struggles. It has described the historical processes that have shaped Guatemala's social, cultural, economic and political structures and shown how colonisation established many of the structures and practices that persist today, particularly land and income inequalities and ethnic discrimination. The protracted civil war, which disrupted the country's social fabric and destroyed a generation of activists and community leaders, also led to transformations in the rural economy. The traditional plantation elites were one group that emerged relatively unscathed from the conflict and, as subsequent chapters will show, have since sought to promote themselves as a 'modernising' sector (Oglesby 2004) and as a fundamental pillar of Guatemala's economic development (GREPALMA 2012). Yet many of the root causes of the civil conflict remain and Guatemala is today a country of extremes or, as one respondent observed, 'a country with many countries within' (GA8, April 2012). These extremes are evident in both the agricultural and energy sectors, both of which stand to be affected by the production and consumption of biofuels. Within Guatemala, biofuels have been framed as both 'extraction' (e.g. Alonso-Fradejas 2011) and 'development' (e.g. UNCTAD 2007), which points to the highly contested nature of this fuel source. Much of this contestation relates to issues that have been described in this chapter, but particularly the highly skewed distribution of land, income inequalities, the intransigence of Guatemala's elites, and the weak nature of the Guatemalan state. This makes Guatemala a fascinating setting in which to investigate how issues of scale, power and marginalisation – themes that were outlined in Chapter Two – relate to biofuels. The next chapter turns to an examination of Guatemala's biofuel sector, focusing on three crops that have been mentioned in this chapter: sugarcane, African palm and jatropha.

6. Three models of biofuel production: sugarcane, jatropha and African palm

No analysis of conventional biofuels would be complete without an understanding of the agricultural systems that produce them. This chapter therefore builds on Chapter Five's analysis of Guatemala's agrarian history to address the second research objective: '*to discuss the mechanics of biofuels production in Guatemala, as embedded within historical and contemporary agrarian political economies*'. Drawing upon interview data, document analysis and field visits, this chapter identifies three potential biofuel models. It shows that, at present, the issue of biofuels in Guatemala is primarily one of ethanol from sugarcane, the production of which has arisen in response to the opening up of global, specifically European, biofuel markets. For the sugarcane sector the production of fuel ethanol is a part of an industry-wide transition away from sugar mills (and the production of a single commodity (i.e. sugar)) and towards biorefineries (i.e. the production of multiple products, including food, chemicals, fuel and energy). By contrast, the production of biodiesel is in its infancy and production is largely small-scale. Despite this, biodiesel from palm oil has attracted criticism from NGOs and academics who argue that growing demand for biofuels has precipitated a new wave of primitive accumulation. Much of this debate is rooted in the agricultural systems that produce the feedstocks; systems which, as Chapter Five demonstrated, helped to establish a system of dominance and subordination that continues in the present day.

The chapter is divided into six sections, with a closing summary. The first section identifies three possible biofuel models: large-scale ethanol from sugarcane, large-scale biodiesel from palm oil, and small and medium-scale biodiesel from various feedstocks. Subsequent sections discuss each of these biofuel models in turn, focusing on the cultivation of the three key biofuel feedstocks: sugarcane, jatropha and African palm. The next section draws together key themes explored in this chapter, and asks whether biofuels are currently a driver of land use changes and other sustainability concerns in Guatemala. It finds that while biofuels have the potential to deliver rural development and livelihood benefits, historical factors and socio-economic realities make such benefits unlikely to be realised in the Guatemalan context, at least in the short term. The final section provides a discussion of a distinctive feature of the Guatemalan biofuel sector, the role of domestic capital, before the chapter concludes.

6.1. Biofuels: an abundance of ethanol and a drop of biodiesel

There are three potential biofuel production models in Guatemala: large-scale ethanol from sugarcane; large-scale biodiesel from palm oil; and small and medium-scale biodiesel from various feedstocks. The scale of biofuel production is dependent on a number of factors, including: scale of feedstock production, type of cultivation system, financial investments, potential volume of biofuel production and end markets. As a result, these scales of production are relative rather than absolute. Table 11 outlines some key characteristics of these different scales of biofuel production in Guatemala; these are discussed in greater detail throughout this chapter.

Table 11. Characteristics of small, medium and large-scale biofuel production, Guatemala

	Feedstock (biofuel)	Average farm size (ha) [1]	Production capacity ('000 litres/ day)	Key actors	Markets/ end-use
Small	Multiple (biodiesel)	< 3.5	0.5	Individuals, NGOs	Community
Medium	Multiple (biodiesel)	3.5 – 45; also waste products	5	Individuals, private companies	Municipalities, private clients
Large	Sugarcane (ethanol) Palm oil (biodiesel	> 45	> 50	Private companies	Export

[1] Categories of farm size are drawn from Table 8

These models are not mutually exclusive nor are all models of production taking place. Specifically, there is no large-scale production of biodiesel, although there is some small and medium-scale biodiesel production for use by local communities, commercial fleets and municipal vehicles. Indeed, as one respondent commented:

> 'Here, the issue of ethanol is king, while biodiesel is something that hasn't really got off the ground yet' (GP1, November 2010).

As the above quotation highlights, and as I discovered during the research, the issue of biofuels in Guatemala is one of sugarcane ethanol. While there is some interest in promoting its production and use, biodiesel from palm oil has yet to be developed for reasons that will be explored in this chapter. Yet sugarcane and African palm – as agroindustrial crops – are often tarred with the same brush. In particular, the expansion of both crops is typically blamed by NGOs on global demand for biofuels (ActionAid 2008, 2012; Alonso-Fradejas et al. 2008; Solano 2008; Hernández and Casteñada 2011). The large-scale production models which, as we shall see, are controlled and dominated by the country's economic elites, are subject to fierce criticism – at least within some NGO and academic circles. The concerns voiced by these actors about the agroindustrial model of biofuel production echo many of the wider concerns about biofuels that were discussed in Chapter Two – particularly those regarding so-called land grabs, the loss of food security, as well as environmental impacts, such as deforestation. Many of these impacts stem from the agricultural systems that produce the biofuel feedstocks and the concentration of ownership and land that such systems entail (see Chapter Five). Biofuels are part of a far more complex and contested landscape that brings issues of scale, power and marginalisation to the fore. The remainder of this chapter is therefore dedicated to an analysis of the specific agricultural production systems within which biofuel feedstocks are produced in Guatemala. The first of the models to be described, and the most important for current biofuel production in Guatemala, is the large scale production of ethanol from sugarcane.

6.2. Sugarcane ethanol

Although sugarcane has been cultivated in Guatemala since the sixteenth century, it was not until the 1980s that the sector took on the importance it has today. This transformation was aided by two events: firstly, the collapse of the cotton industry provided the opportunity for the sugar industry to expand production; and secondly, a concurrent collapse in the international sugar price forced the sector to consolidate and ultimately to modernise (GP12, February 2012; Mirón 1998). Private sector respondents emphasised that, in spite of Guatemala's small size, the sugarcane sector was 'world-leading' (GP1, December 2010) and 'globally competitive' (GP17, March 2012). One interviewee explained:

> 'Guatemala – with the size that we are – is today one of the top five global exporters of sugar, the most efficient in milling and second in terms of sugar yields. This industry has expanded to such an extent that today it also produces ethanol and generates electricity and has become an immense source of employment and wealth' (GP12, February 2012).

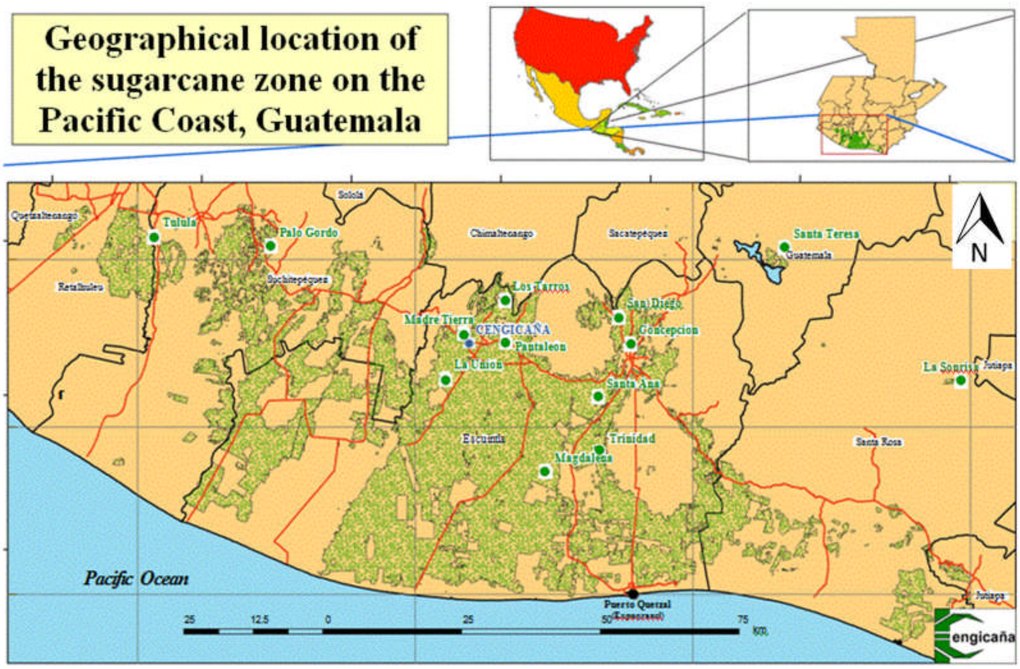
Industry data reveal that in 2011, Guatemala was the second largest exporter of sugarcane products in Latin America (after Brazil) and fourth in the world, representing 3% of total world exports (GP7, November 2011; ASAZGUA 2011). National statistics also show the importance of the industry to the national economy, with sugarcane products accounting for 21% of agricultural exports, or 8% of total exports, and 3% of national GDP (ASAZGUA 2009; Linares et al. 2013). The sector is also an important employer with 60,000 permanent employees, and a further 350,000 employed either directly or indirectly during *la zafra* (harvest), which runs from November to May (GP7, November 2011; GP17, March 2012).

In 2012-13, the majority (75%) of the sugar produced in Guatemala was exported (key export markets included Korea, Mexico and the U.S.), while the remainder was consumed domestically (CENGICAÑA 2013). In 2011, exports of raw sugar represented 59%; the industry was increasingly focused on the export of refined sugar, a higher value-added product. Domestic consumption was split between 28% industrial and 72% human consumption; the soft drink industry was the major industrial consumer of sugar in Guatemala (USDA 2010).

6.2.1. Sugarcane production

The sugar sector forms a cluster at the cultivation, processing and export stages of the value chain, with all but one of Guatemala's thirteen sugar mills located in five departments along Guatemala's Pacific Coast (see Figure 17). This allows for easy access to the country's principal port, Puerto Quetzal, and EXPOGRANEL, the loading terminal for sugar exports. There is an average of 65 km between the mills and the port, which was considered an advantage over countries like Brazil, where typical distances were 600 to 800 km (GP7, December 2011).

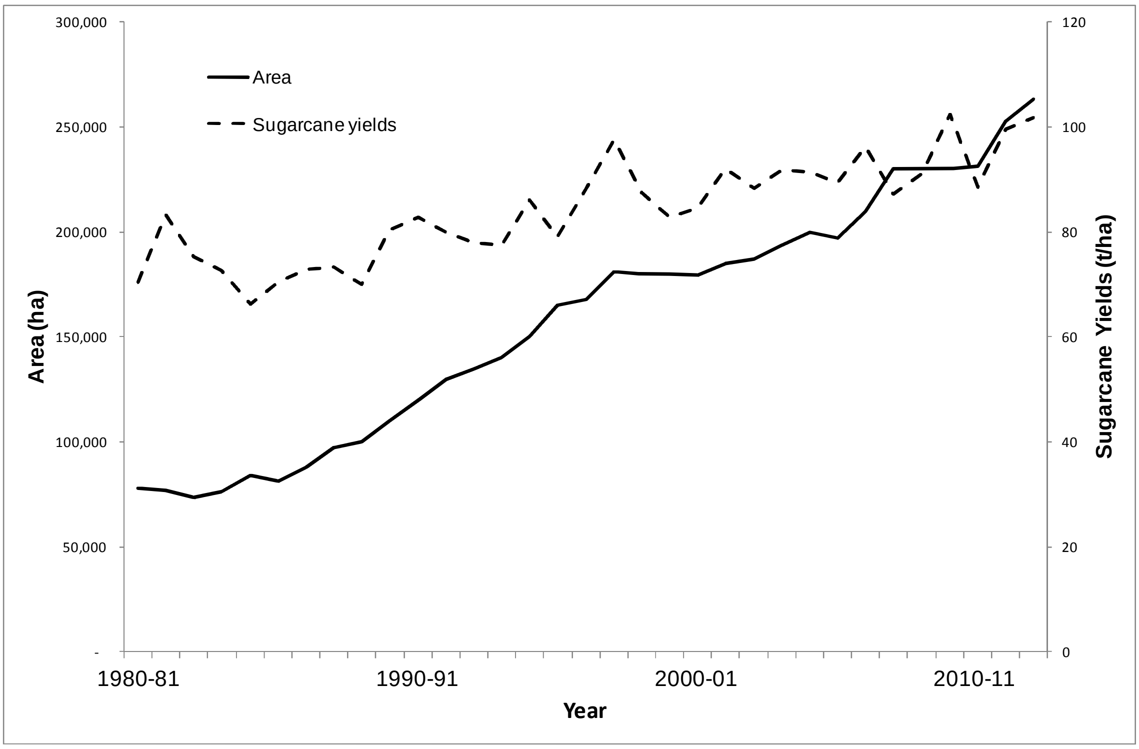
Figure 17. The geographical location of the sugarcane cluster on Guatemala's Pacific Coast



Source: adapted from CENGICAÑA (2008)

Along the Pacific Coast, the area planted with sugarcane has increased steadily since the 1980s (see Figure 18). Sugarcane cultivation has increased from 78,000 hectares (ha) in 1980-81 to 263,056 ha in 2012-13 (CENGICAÑA 2013); equivalent to 2% of Guatemala's arable land (Ecofys 2011). As Figure 18 illustrates, since the 1980s, sugarcane yields have increased by nearly 50%. In 2012-13, sugarcane yields reached 101 tonnes per ha, making Guatemala the second most efficient sugarcane producer in Latin America after Peru (CENGICAÑA 2013; FAOSTATS 2013). This achievement was largely attributed by industry respondents to the Guatemalan Sugarcane Research and Training Centre[23] (CENGICAÑA), a private research centre set up and funded by the sugar mills.

Figure 18. Evolution of Sugarcane Production in Guatemala, 1980-81 to 2012-13



Source: adapted from CENGICAÑA (2013)

As discussed in Chapter Five, the Pacific Coast (where the majority of sugarcane is cultivated) has some of the most fertile land in Guatemala and, as a result, export-oriented agriculture has long been concentrated in this region. Competition for land on the Pacific Coast is fierce, both within the sugar sector (i.e. amongst the mills) and with other agricultural sectors including African palm, banana and rubber. Industry respondents acknowledged that there was

[23] *Centro de Investigación y Capacitación de la Caña*

only limited opportunity for sugarcane cultivation to expand on the Pacific Coast; as one interviewee explained:

> 'The sugar zone [i.e. the Pacific Coast] is saturated, there's no more land and we're competing with other crops – palm, banana – so, what's going to happen? I think we'll do some R&D to see if we can expand into other zones, it would be good for the economy to move, to be able to go to a zone like Uspantán [Quiche]' (GP7, December 2011).

As a result of land availability constraints, in 2007 one of the sugar mills – Guadalupe (which was subsequently renamed Chabil Utzaj or 'Good Sugar' in Q'eqchi') – relocated eastwards to the Polochic Valley. Located in the departments of Alta Verapaz and Izabal, the Polochic was favoured for its proximity to the Atlantic coast and lower land values. However, for a number of reasons, including a lack of infrastructure, unsuitable land and climatic conditions, and mismanagement, sugarcane cultivation failed and it was not until early 2013 that the mill was able to harvest for the first time. Yet it was not the economic and agronomic failure of the Chabil Utzaj that garnered most criticism, but rather the impacts on local indigenous communities, in particular land concentration and the displacement of traditional cropping systems (ActionAid 2008; Mingorría and Gamboa 2010; Bird 2011; OACNUDH 2013). While the events in the Polochic Valley will be referred to again in this chapter, this case is examined in depth in Chapter Eight.

In addition to the research of CENGICAÑA, industry respondents attributed the agricultural success of the sector to the Pacific Coast's fertile volcanic soils, favourable climatic conditions, and the industry's willingness to innovate and adopt new agricultural practices. Many of those I spoke to in the private sector praised the sector's research capacity; research having led not only to increased yields, the adoption of integrated pest management, and gains in agricultural and industrial efficiency, but also to improvements in environmental management. A representative of ASAZGUA, for example, spoke of the gains made in water management:

> 'Water management has been one of our successes. There are mills that now dry mill the sugarcane – that's to say they no longer use water to mill the sugarcane. That's an impressive advance. They use a machine that cuts the cane into tiny pieces – La Union was the first mill to use it, and it won a prize for it. Although there is an additional cost, over time that cost is compensated for by the reduction in water use' (GP7, December 2011).

Such innovations are important for a sector which has long been criticised for poor environmental management practices; for instance, the mills historically disposed untreated production waste and wastewater into rivers and streams (GP4, November 2011). Growing awareness of the potential impacts of climate change, particularly on water resources, has led the sugarcane sector to set up and fund the Private Institute for Climate Change Research[24] (ICC). This awareness was heightened by unfavourable climatic conditions during 2010-11, which caused yields to fall to 86 tonnes per ha from 102 tonnes per ha the previous year (see Figure 18). While not all sugar mills are 'convinced' that climate change is an issue that will affect sectoral productivity, an interviewee at the ICC explained that the Guatemalan mills work as a group – where one goes, the others eventually follow. He spoke of how he had found economic arguments most persuasive in garnering support for the work of the ICC (GP4, November 2011). Some mills are also working with multinational corporations, including Coca-Cola, to improve the environmental sustainability of sugarcane production (GP11, January 2012; see also Bovarnick et al. 2010; Coca-Cola 2011). However, during interviews representatives of the mills cautioned that while they were able to exert 'tight controls' over the land directly managed by the mills, they had little influence over the production practices of independent producers (GP11, January 2012; GP14, March 2012; also GP4, November 2011). The mills directly manage around 80% of all sugarcane plantations on the Pacific Coast; of this, some of the land is owned outright, some is leased, and the remainder is managed by the mills. The remaining 20% is accounted for by independent producers (GP4, November 2011), most of whom are large landowners themselves (Oglesby 2004; Krznaric 2006; Hart Energy 2010b). Thus, there is little, if any, small-scale production of sugarcane in Guatemala. The absence of opportunities for smallholders to be involved in sugarcane production is a consequence of the country's land history and the concentration of land in the hands of a small minority (see Chapter Five).

Structure of the sugar sector

Over time the sugar sector has become vertically integrated and increasingly concentrated. In 2002, there were seventeen mills; a decade later, industry consolidation had reduced this number to thirteen mills. Guatemala's extant sugar mills are listed in Table 12.

[24] *Instituto Privado de Investigación sobre Cambio Climático*

Table 12. Principal characteristics of the Guatemalan sugar mills

Sugar mill	Founded	Milling capacity (tonnes, 2011)	Controlling family
Concepción	1961	1,203,539	Herrera Ibárgüen
Pantaleon	1870	3,920,387	
Palo Gordo	1962	895,358	Gonzalez Bauer/ Gonzalez Hertzsch
Madre Tierra	1963	1,364,332	Campollo
Tululá	1914	689,593	Botrán
San Diego	1890	473,506	Vila
La Sonrisa	1958	19,507	Pivaral Aguilar
La Unión	1969	2,389,221	Molina Calderón
Santa Ana	1967	2,071,233	Botrán
Guadalupe (Chabil Utzaj)	1981 (2008)	No data (286,683)	Widmann (Grupo Pellas)
Magdalena	1975	4,042,816	Leal
El Pilar	1975	1,710,380	Weissemberg/ Campollo
Trinidad	1990	913,287	Vila

Sources: Krznaric (2006); Solano (2008); CENGICAÑA (2011a, 2013); Prensa Libre (2013a)

Guatemala's sugar mills are owned by the major landowning families who constitute some of Guatemala's elites (see Chapter Five). For example, the largest sugar company is Pantaleon, which is owned by the Herrera Ibárgüen family who also have holdings in real estate and some of Guatemala's largest banks. Since the 1980s, the Pantaleon group has acquired three other mills within Guatemala (Concepción in 1984, Monte Rosa in 1998 and El Baúl in 2000) and control 60,000 ha, almost a quarter of the total area cultivated with sugarcane (GP11, February 2012). The Pantaleon group also has sugar operations in Nicaragua and Honduras, as well as an alliance with the Manuelita Group (Colombia) and UNIALCO (Brazil) for sugar and ethanol production in Brazil making the company one of the biggest sugar producers in Latin America (GP11, January 2012). The Campollo family, who own the Madre Tierra mill, also own holdings in banks, the petrol industry and electricity production (Krzanic 2006; El Observador 2007). More generally, these 'sugar families' (Oglesby 2004) also have investments that span the economy, with interests in African palm, banking, real estate, electricity generation, telecommunications and mining (Krznaric 2006; Solano 2008).

Despite competition between the mills, particularly for land and for labour, there is also collaboration amongst them. Several private sector respondents highlighted this cooperation as key to the strength of the industry. For example, united in the Guatemalan Sugar Producers

Association[25] (ASAZGUA) the sugar families has been able to negotiate a protected, high-priced internal market with the state. Furthermore, as discussed, the close relationship between agro-industrial activities and financial capital as well as the importance of the sugar industry to the national economy means that the sector is able to wield significant political and economic influence within Guatemala (Oglesby 2004; Krznaric 2006; Briscoe and Rodriguez-Pellecer 2010). Krznaric (2006) argues that the political privilege enjoyed by ASAZGUA has enabled the mills to 'mould' state policies in their favour, for example in the negotiation of high tariffs on sugar imports.

Industry respondents highlighted that the industry receives no state subsidies ('the government doesn't really help us with anything, thank goodness!' GP7, December 2011; see also Wagner 2005). Rather, a transfer of state responsibilities to the sugar mills can be observed. For example, through the sugar sector's social foundation – FUNDAZUCAR – the mills provided schools, health centres and infrastructure, such as roads, to communities within their zones of influence – specifically, the Pacific Coast and the highlands (where many of the temporary workers live) (GP17, March 2012). The neoliberal reforms of the 1980s and 1990s (see Chapter Five), which saw the 'roll-back' of state institutions and the 'roll-out' of neoliberal forms of governance, have provided the underlying rationale for this transfer of responsibilities (Oglesby 2004; see also Peck and Tickell 2002). The services provided are as good, if not better, quality as those that would have been provided by the state; however, this transfer contributes to an already weakened state and creates a public sector dependent on private sources of credit (Oglesby 2004). This highlights the wedded nature of the Guatemalan state and the domestic private sector, a theme that I return to in Chapter Seven. The role of FUNDAZUCAR, will also be discussed in more detail in Chapter Eight, particularly with regard to the social sustainability of the sugarcane sector.

6.2.2. From sugar mills to biorefineries

The mills are not just producers of sugar and sugar derivatives. Interviews with representatives of the sugar industry revealed a sectoral trend towards biorefineries i.e. the production of multiple bio-based products, including energy, fuel and value-added products. As one industry respondent explained:

[25] *Asociación de Azucareros de Guatemala*

> 'The sugarcane plant is very blessed in the sense that it has many by-products... We produce sugar and alcohol, from the wastes we cogenerate electricity, the vinasse serves as fertilisers in zones that are low in phosphorous... There are a lot of by-products that allow the mills to spread the costs and diversify risk. We're of the idea that a mill that wants to survive in the next few years is going to have to be able to produce alcohol, sugar and energy, because it's through this diversity that market opportunities lie' (GP7, December 2011).

Seven sugar mills co-generate electricity from bagasse (a by-product of the milling process), which is used within the mills and the surplus sold to the national grid. During 2010-11, the sugar sector generated approximately 779 GWh of electricity, equivalent to 19% of net generation (see Chapter Five; Castillo 2011). Ultimately, the decision about which end product to produce i.e. whether crude or refined sugar, fuel or potable ethanol, bioenergy or biogas – is based on domestic and export market prices and each company's business strategy (GP4, November 2011; GP7, December 2011). One respondent observed:

> 'It's a question of markets. Depending on the price, the mills decide more of this, less of that. Sugar is the primary product and will continue to be so, but they increasingly have other markets' (GP13, February 2012).

The biorefinery concept can be illustrated using the example of the Tululá industrial complex. In addition to a sugar mill and distillery, the complex also produces carbonic gas (which it sold to an on-site subsidiary, CARBOX), electricity (in 2010-11, 34 GWh was generated on-site; 16.4 GWh was sold to the national energy grid and the remainder was consumed internally (Castillo 2011), and biogas (from vinasse) to power internal processes and, eventually, the company's vehicle fleet (FV11, March 2012). According to interviewees, Tululá aimed to 'close the circle' (GP15, March 2012), creating a sustainable industrial system wherein 'waste' products became inputs for value-added products and industrial processes (GP14, 15 and 16, March 2012).

6.2.3. Ethanol production

One such value-added product is ethanol. While the sector has been producing ethanol from molasses on a small-scale for about twenty years, large-scale distilleries have only been in operation since 2006. The industry uses molasses as an ethanol feedstock, rather than cane juices (GP6, GP7 December 2011; FV10, FV11, March 2012); by comparison, about 75% of the ethanol produced by Brazil is from cane juices (USDA 2011). Private sector respondents saw this as a key strength of the industry, as one interviewee explained:

> 'The majority of our ethanol production is from molasses. It's not from cane juice. We continue producing the same amount of sugar and it's from a by-product – the molasses – that we obtain ethanol. It's less efficient to use molasses, but for our purposes its fine because we're not damaging the production of sugar' (GP6, December 2011).

Originally considered a waste or low value by-product, the addition of fermentation and distillation capacity had created internal demand and competition for molasses. Indeed, a representative of a mill identified availability of molasses as a potential stumbling block in the 'additional' fuel ethanol market (GP14, March 2012).

In 2011-12, five of the thirteen mills were producing ethanol, while others are expected to add alcohol distilleries in the future. As shown in Table 13, in that year only two sugar mills (Pantaleon and Tululá) had capacity to produce fuel ethanol, although other distilleries in Guatemala produced potable and industrial ethanol. In 2011-12, the sector produced 94 million litres of fuel grade ethanol per year; therefore, around 40% of the ethanol produced in Guatemala was destined for fuel markets. The significant investment required to construct the distillation and dehydration plant had so far proved prohibitive for other mills (GP7, December 2011). However, this interviewee also argued that as the mills shifted towards becoming biorefineries others were likely to diversify into ethanol production.

Table 13. Ethanol production in Guatemala, 2011-12

Distillery	Sugar mill	Production (l/ day)	Estimated annual production (l/yr)	Type of alcohol produced	Year operational
Mag Alcohol	Magdalena	300,000	69,000,000	Industrial	2007
Bio Etanol	Pantaleon/ Concepción	150,000	24,000,000	Industrial, fuel ethanol	2006
		360,000	57,600,000		2011
Palo Gordo	Palo Gordo	75,000	11,250,000	Industrial	1984
Destiladora de Alcoholes y Rones	Tululá	250,000	62,500,000	Potable, Industrial	2006
		50,000	12,500,000	Fuel ethanol	2010
Total		**1,185,000**	**236,850,000**		

Source: CENGICAÑA (2011b)

In 2011-12, nearly all of the 1.19 million litres of ethanol produced per day was exported, principally to the EU, the U.S. and Mexico. However, if a domestic market for biofuel were established, the sugarcane sector was expected to be able to 'easily' meet domestic demand for a 10% blend without the need to increase sugarcane cultivation (GP1, December 2010; GP6, December 2011; see also Chapter Seven; USDA 2010, 2012). However, for reasons that will be explored in Chapter Seven, at present there is little sectoral interest in the development of a domestic biofuels market.

For the sugar mills, the decision to produce fuel ethanol is motivated by economic drivers, rather than environmental or social considerations (GP6, December 2011). For example, one private sector respondent, who was not at all critical of the sector's focus on profits, stressed the economic rationale for ethanol:

> 'Up until now their [the sugar mills'] business is with Europe and the U.S. and the price of fuel alcohol has an additional profit [makes the money sign]. That's their concern – they're not at all interested in the environmental benefits, not at all, what they want is the money. The greatest profit' (GP13, February 2012).

However, the economic benefits are less certain than this quote suggests. The production of ethanol – whether potable, industrial or fuel – represents an industrial strategy, rather than an energy or climate policy. As a result, the economic sustainability of the sector is dependent upon international market prices. For example, despite a USD 3 million investment in a dehydration plant (shown in Figure 19), DARSA, which owned the Tululá sugar mill, had not produced fuel ethanol since late 2010 due to low international market prices for this product. As one respondent explained:

> 'Everything looked good, but then the price of petrol fell and so did the price of biofuels. By the end of 2010 we were no longer selling dehydrated ethanol – there was a small sale of 4 million litres, but mainly to ensure the plant was still functioning. In 2011, the prices were terrible, terrible, so we only had one small sale of 5 million litres and indeed we didn't even sell it as dehydrated ethanol, but as industrial as the prices were dreadful. So, in 2012 we have been following the markets, but really it's not worth it – the price is around 75 cents, while potable alcohol sells for 90 cents... This year the plant has stopped operating, indeed last year it was only operational for a month' (GP15, March 2012).

Figure 19. Dehydration plant at DARSA, March 2012

Source: Author's own

For DARSA, the decision to invest in biofuel production had not yet proved profitable. However, for this company, which is also Guatemala's leading producer of rum and liquors, fuel ethanol is a relatively minor co-product; the distillation plant had existed prior to the biofuel investment. By comparison, the other fuel ethanol producer, Pantaleon, had invested USD 15 million in distillation and dehydration capacity and the plant produces only industrial and fuel grade ethanol. In an informal interview, I was informed that Pantaleon had shifted their production from fuel grade ethanol to industrial ethanol in response to the low prices. However, the relatively large size of the company made it better able to take investment risks and to ride out fluctuations in international commodity prices (GP7, December 2011). One interviewee suggested that over-production had caused the fall in prices for fuel ethanol, specifically the opening of biofuel plants in the U.S. (GP15, March 2012). He argued that in Guatemala the development of legislation to promote the use of biofuels had not kept pace with the increase in production capacity; again, the governance of biofuels will be discussed in Chapter Seven.

6.2.4. Social and environmental sustainability of sugarcane ethanol

Many of the criticisms of fuel ethanol relate to the social and, to a lesser extent, the environmental impacts of sugarcane cultivation. The ownership of the sector by Guatemala's economic elites is also a key point of contention. While Chapter Eight will provide a more detailed analysis of the local level sustainability implications of sugarcane ethanol, this section introduces the key sustainability issues that emerged from the interviews, specifically land access, labour and environmental issues.

Land access

As described in Section 6.2.1, along the Pacific Coast the mills compete both with one another and with other agricultural sectors for land. Increasing demand for land means that subsistence farmers and local communities are increasingly unable to rent land on which to produce basic grains, particularly maize and beans (FV14, FV15, April 2012). This loss of land access has resulted in the reduced ability to maintain adequate livelihoods, with the result that farmers and their families have become increasingly dependent on monetary income. Often this means seeking employment on the very sugarcane plantations that have deprived them of land; as such rural communities have become dependent upon agroindustrial systems over which they had no control (e.g. Bryant and Bailey 1997). However, whether the expansion of sugarcane is due to demand for biofuels is contested. For example, private sector actors argued that, as a relatively minor co-product and one produced from what was previously regarded as a waste (i.e. molasses), the production of ethanol had not been a key driver of sugarcane expansion and, by extension, land use competition (GP1, November 2010; GP4, November 2011). One private sector respondent emphasised this point:

> 'The production of biofuels has doubled in two years – and this is important – without the need to cultivate more sugarcane, because our ethanol is produced from molasses. That means that none, of the sugarcane grown in this country is for the production of ethanol – none – everything is for the production of sugarcane. So, the issue of land expansion for biofuels doesn't exist here' (GP1, November 2010).

Supporting this argument are land use figures that show that only 9% of the total area under sugarcane is used for the production of ethanol; just 1% of this land is dedicated to fuel ethanol for the European market (Ecofys 2011). However, this argument also ignores the broader impacts of increased competition for land, including land concentration and the loss of land access for local communities. Furthermore, if ethanol makes sugar production more profitable, as the interviews with industry referenced above suggested it would, this may create additional pressure for land expansion.

Labour

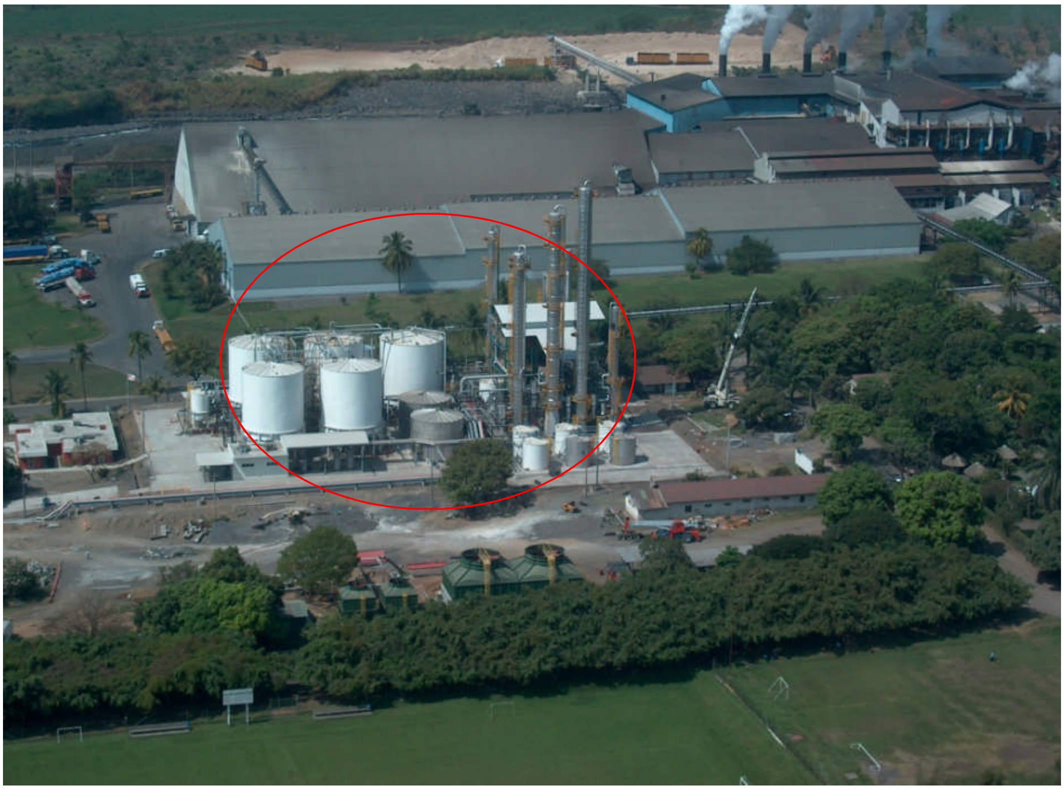
The sugarcane sector is an important employer within Guatemala, particularly during the six month *zafra* when many people migrate to the Pacific Coast to work as temporary labourers[26]. Industry interviewees acknowledged the sector's 'rotten' labour history (Sieder, pers. comm.), but argued that much had been done to improve working conditions (GP4, November 2011; GP17, March 2012). The additional benefits that sugarcane workers received were emphasised, which included healthcare, food, accommodation, education and other benefits, such as savings accounts (GP4, November 2011; GP17, March 2012). While the sugar mills do not employ women and children to work on sugar plantations, industry interviewees explained that the mills had little control over the production of sugarcane by independent producers (GP4, November 2011; GP15, March 2012). The difference between labour conditions on land managed by the sugar mills and land managed by independent farmers was highlighted by the exposé by Arce and Rodriguez Pellecer (2012) that was referred to in Section 5.3. Most NGO and many academic respondents, however, remained extremely critical of the sector, highlighting the poor remuneration of temporary workers and the policy of payment according to labour productivity (see also Oglesby 2004). Interviews and field visits revealed that the average worker is able to harvest five tonnes of sugarcane per day by hand, for which they are paid between GTQ 14 and GTQ 18 per tonne (USD 1.80-2.30) depending on the sugar mill (FV3, November 2011; FV10, FV11, March 2012). This is an average of GTQ 70-90 per day (USD 8.90-11.40), higher than the agricultural minimum wage of GTQ 68 per day (USD 8.60) (MINTRAB 2011). Some workers are able to harvest up to 11 tonnes per day and these 'champion' workers are rewarded with prizes that range from monetary rewards to bicycles (FV3, November 2011; FV11, March 2012). Industry respondents attributed gains in labour productivity to technological changes, specifically the use of a heavier machete (*machete australiano*) (GP17, March 2012), although

[26] During the six month *zafra* (November to May), the mills are operational 24 hours a day, seven days a week, stopping for just one day at Christmas. This means that the mills have to be supplied with a constant supply of raw material – any halt in milling represents an economic loss to the mill. The six month non-harvest period is therefore dedicated to ensuring that the *zafra* ran smoothly; this includes completely dismantling and making repairs to the mill's machinery, carrying out inventories, and planning the next *zafra* – including the burning of sugarcane plantations (FV3, November 2011; FV11, March 2012; see also Mirón 1998).

others argued workers were made to work harder and longer (GNGO10, February 2012; GA8, April 2012).

In contrast to the wider biofuels literature, which posits that biofuel production can be an important source of employment in producer countries (see Chapter Two), in Guatemala the production of fuel ethanol has generated less than fifty additional direct jobs (GP5, December 2011; FV10, March 2012). All of the posts created have been at BioEtanol, which is located within the highly technified industrial complex at Pantaleon (see Figure 20); the dehydration plant at DARSA has not created direct employment (GP15, March 2012). The vast majority of the jobs created at BioEtanol are permanent posts for skilled workers, typically engineers, who oversee the day-to-day operation of the plant. It is possible that the increased production of ethanol has produced more additional jobs indirectly, but I was unable to obtain data on this impact.

Figure 20. The location of BioEtanol (circled) within the Pantaleon industrial complex, Santa Lucia Cotzumalguapa



Source: Espinoza (2011). The fermentation units are located to the left of the photo, while the distillation towers are located towards the centre of the photo; the dehydration unit is not visible.

Environmental impacts

The environmental pressures exerted by sugarcane cultivation were also discussed by interviewees and spanned deforestation, water use and pollution, and the emission of greenhouse gases (GHG). However, a key constraint on understanding the environmental sustainability of sugarcane is a paucity of scientific evidence specific to the Guatemalan context. For example, the only study of the GHG emissions of Guatemalan sugarcane production uses default data and, as an industry publication, is for internal use only (GP4, November 2011). In addition to the typical factors that influence the carbon balance of agricultural products (i.e. agricultural inputs, land use change), two country-specific factors are likely to influence the carbon balance of fuel ethanol produced in Guatemala: sugarcane burning and the co-generation of electricity from bagasse. With regard to the first of these, the vast majority (87%) of the sugarcane is burnt prior to harvesting to facilitate the manual harvest of the crop, with the remainder harvested mechanically (CENGICAÑA 2011a, 2011c). While the burning of sugarcane leaves and tops prior to harvest facilitates the manual harvest, this practice has been shown to lead to increased GHG emissions in Brazil (e.g. De Figueiredo and La Scala 2011). In Guatemala, full mechanisation of the crop is precluded by the region's topography and the sensitivity of the sugarcane to cutting; if the cane is cut too high, sucrose may be lost, while cutting too low causes bacteria from the machete to infect the roots, killing the plant (Mirón 1998; Oglesby 2004). An additional reason preventing full mechanisation was given by an industry respondent who argued that, while mechanisation was more efficient and therefore more cost effective, the negative impacts on Guatemala's rural economy also prevented full mechanisation. He explained:

> 'If you were to go to the highlands and explain to a sugarcane cutter that you were going to replace them with a machine they wouldn't understand you... [During the *zafra*] there's an important migration from the highlands to the Pacific Coast. They live here and with the money that they save not only do they fix their homes, but it helps them to sow their own crops, buy some land, buy a cow, it helps them to prepare for the six months of the year when there is no *zafra.* Their local economies are based on the *zafra,* we can't take that away from them' (GP7, December 2011).

Other respondents were, however, more sceptical that the industry would prioritise such social concerns over profit margins if full mechanisation was possible (GA8, April 2012). This quote also reveals important issues relating to the importance of sugarcane to local economies; a theme which will be explored in greater detail in Chapter Eight.

Direct deforestation is not a key concern for the sugarcane industry, which had long been concentrated on the Pacific Coast with the result that expansion has largely occurred at the expense of pasture and competing cash crops, including cotton, bananas and maize (GP4, November 2011; GP13, February 2012). It is likely that there are indirect impacts as crop production is displaced to other areas, although there is no research on this issue. There is, however, anecdotal evidence that the relocation of Chabil Utzaj to the Polochic Valley has contributed indirectly to the loss of natural habitats as peasant farmers have invaded the *Sierra de Las Minas* biosphere reserve in order to produce basic grains (GNGO5, November 2010).

As mentioned previously, the contamination of waterways has been a key issue for the sugarcane sector, but increased awareness of the environmental impacts of production has led to stricter environmental practices (GP4, November 2011). However, water use remains an issue for the sector, particularly since sugarcane is a water intensive crop; according to one estimate the production of 1 kg of refined sugar required 1,782 litres of water (Mekonnen and Hoekstra 2011). While innovations, such as dry milling (mentioned above), have improved water management, other stages of the cultivation and production process still require large quantities of water (GP4, November 2011; GP7, December 2011). In Guatemala, around 65% of the crop is irrigated, with the remainder rain-fed (GP4, November 2011; see also Ecofys 2011). A key concern amongst NGOs working with local communities is the diversion of water from lakes and rivers to irrigate agricultural plantations; a practice which leaves local communities without access to water during the dry season, and at risk of flooding during the rainy season (GNGO15, GNGO18, March 2012).

Despite these negative sustainability impacts, many of Guatemala's sugar mills have been certified by the International Organisation for Standardisation (ISO), while the ethanol produced by both DARSA and Pantaleon is certified by the International Sustainability and Carbon Certification (ISCC) scheme (see Figure 21); one of the certification schemes recognised by the EU (see Chapter Four; GP4, November 2011; GP11, February 2012; GP14, GP15, March 2012). However, whether the ethanol produced in Guatemala is 'sustainable' is questionable; Chapter Eight will explore these issues in greater detail.

This section has introduced the principal model of biofuel production in Guatemala – that of large-scale fuel ethanol from sugarcane. This model is one in which the benefits accrue to a handful of actors, the sugar families that constitute Guatemala's economic elites. The production of fuel ethanol in Guatemala was initiated in response to increasing global demand for biofuels, a market that represents an economic opportunity for the country's sugar mills. Moreover, the lack of a domestic market for biofuels means that all of the fuel ethanol produced in Guatemala is exported. Although not all of the mills are producing ethanol, there has been a sectoral shift towards biorefineries of which fuel ethanol is one possible product. Many of the criticisms of this biofuel model are associated with the agricultural production system, as well as the ownership of the sector by Guatemala's economic elites. The following section now turns to an analysis of the two other biofuel models that were listed in Section 6.1.

Figure 21. Advertising sustainability: ISCC seal of approval at the Tululá sugar mill

Source: Author's own

6.3. Biodiesel: a nascent industry

In contrast to ethanol, Guatemala produces only small quantities of biodiesel. UNCTAD (2007) argues that while the volume produced is not significant, it presents an important economic opportunity for small users and low-tech producers, such as local communities. Guatemala has several small and medium biodiesel plants, which run on a variety of feedstocks, including jatropha, used cooking oil (UCO) and tallow. There is no large-scale biodiesel production from palm oil. It proved difficult to find accurate and up-to-date figures on biodiesel production in Guatemala. Many companies, including *Pollo Campero* (one of Latin America's largest fast-food chains), produce biodiesel from UCO for use in their own vehicle fleets and for such plants production data are not publicly available (GP1, December 2010). Although several NGO respondents claimed that one or two palm oil companies were running their fleets on biodiesel (e.g. GNGO8, GNGO11, February 2012), it was not possible to substantiate these claims. Several studies have provided estimates of biodiesel processing capacity, which range from 15,000 litres per day (USDA 2010, 2012b) to over 25,000 litres per day (Hart Energy 2010a; ACR 2011). Table 14, which draws on several reports and interview data, presents an estimate of installed biodiesel capacity. The total capacity is likely an underestimate as various private companies, such as those mentioned above, are not listed.

Table 14. Estimated installed biodiesel production capacity, 2011

Company	Estimated capacity (litres/ day)	Feedstock	End use
Octagon (Biocombustibles de Guatemala) *	3,780 – 6,800	Jatropha, UCO	Private clients
Combustibles Ecologicos	2,273	UCO	n.d.
Nueva Alianza *	190	UCO	Local community
Biopersa	3,780	UCO, tallow	Municipal vehicles, private clients
Empacadora Toledo	6,800	UCO	Corporate fleet
Fuerza Verde	190	UCO, tallow	Private clients
Guatebiodiesel	5,680 – 6,800	Jatropha, UCO	n.d.
Helios	1,090	Jatropha, UCO	n.d.
Technoserve/ SG Biofuels	1,090	Jatropha, UCO	Local communities
Total	**24,800 – 29,000**		

Sources: GP2, December 2010; Hart Energy (2010a); Espinal Corrales (2011). * Indicates the biodiesel plant was no longer operational by 2012. n.d. = no data.

Table 14 illustrates that UCO is the principal biodiesel feedstock, much of which comes from restaurants and the food industry. An interview with the director of a medium-scale biodiesel plant that was no longer operational revealed his frustration with the biodiesel industry:

> 'When we had our refinery, we were producing 50,000, 60,000 gallons per month; 90% of that came from fried food restaurants, from used oil. The logistics were very complicated, but it wasn't that that proved our undoing – if I was selling five cents below the price of diesel, everyone would buy from me – everyone – but if my price was one cent above diesel, I wouldn't sell anything. The conclusion, Julia?, Guatemalans are not interested, not even remotely, in their environment' (GP12, February 2012).

The lack of environmental awareness amongst the general population was also cited by other respondents as an obstacle to the development of a domestic biofuel market (e.g. GA2, November 2010; GP1 December 2011) and will be discussed in more detail in Chapter Seven.

It was not just commercial enterprises that had encountered difficulties in producing biodiesel, as the example of *Nueva Alianza* demonstrates. The community of *Nueva Alianza* is located in the department of Quetzaltenango and since 2006 had operated a small-scale biodiesel plant that ran on UCO. The feedstock was initially donated by a local theme park, although as demand for UCO had increased, the park had begun to charge for the feedstock. The biodiesel produced had been used to run community vehicles and to power a generator (see Figure 22). Despite being hailed as a 'success' story (GP1, December 2010) and cited in various publications (e.g. USDA 2010; Hart Energy 2010a-b), by the time I visited the community in December 2011, the plant was no longer in operation.

Figure 22. The hut housing the now defunct Nueva Alianza biodiesel plant

Source: Author's own

The reasons for the failure of this plant were multiple, and included the increasing cost of the feedstock, community power dynamics, as well as the departure from the community of the biodiesel 'champion' i.e. the individual who had been trained to operate and run the plant. Furthermore, the rising cost of the feedstock meant that it had cost more to produce the fuel than to buy it at the pump (FV9, December 2011; IO4, January 2012).

Jatropha is also a potentially important feedstock, but production is incipient and small-scale. There were no estimates of the longer-term potential of this small to medium scale biodiesel production model; although respondents across actor groups thought it was unlikely to be able to provide a significant share of the diesel market (GNGO8, GP12, February 2012; GG8, March 2012). Rather, the feedstock with greatest potential is considered to be palm oil. The USDA (2010), for example, estimates that the long-term potential for biodiesel in Guatemala based on palm oil is close to 370,000 litres per day – almost thirteen times the estimated production capacity in 2011 (see Table 14). In the following sections, I focus on two potential biodiesel feedstocks – jatropha and palm oil. I have chosen to focus on these feedstocks not because they were necessarily the most important for the Guatemalan biofuels sector, but because they epitomised broader debates in the biofuels literature as well as within Guatemala about issues of scale, power and marginalisation.

6.3.1. *Jatropha curcas* L.

Central America is the centre of origin for jatropha which is known locally as *piñón* or *tempate*. It has traditionally been used as a living hedge, since it is unpalatable to livestock (Figure 23; FV1, November 2010; FV8, November 2011). Within Guatemala, there is some private and public interest in jatropha, particularly given the potential of the plant to grow on degraded and 'marginal' land (GA1, FV1, November 2010; GNGO8 February 2012; GG8, March 2012). According to one estimate, in 2010, there were nearly one thousand hectares planted with jatropha in Guatemala (ACR 2011). Estimates of the land available for its cultivation range from 206,000 ha to 623,000 ha, with much of this cultivation expected to occur on land classified as marginal or degraded (UNCTAD 2007; Ecofys 2011). Competition with other crops is therefore considered unlikely, since much of the expansion of jatropha is expected to occur in 'underdeveloped' areas (GG8, March 2012; GP1, December 2010; see also Ecofys 2011).

Both private and public organisations have undertaken field trials for the cultivation and processing of jatropha in Guatemala. While some actors are motivated by the potential capacity of this feedstock to provide additional livelihood benefits for subsistence farmers, others are interested in local and external market opportunities. For example, the public university, the University of San Carlos (USAC), has received government funding to investigate the intercropping of jatropha with food crops along the *Corredor Seco* (dry corridor) (Figure 24, GA1 and FV1, November 2010). This semi-arid region was chosen because it is home to some of Guatemala's poorest people, and is characterised by low agricultural productivity due to the extremely poor soil quality. Those involved in the project saw intercropping as a necessity, not only because food security is a key concern in the region, but also because the plant was able to benefit indirectly from the irrigation and fertilisers used for the co-crops.

Figure 23. The use of jatropha (foreground) as a hedge to protect sugarcane plantations

Source: Author's own

Another project, which ran from 2009 to 2013, was led by a U.S. NGO, Technoserve. This NGO also worked with local communities in the *Corridor Seco* to establish jatropha. The project had a total of 108 hectares of jatropha, with each farmer cultivating the crop on an average of 0.8 hectares. A representative of the NGO explained that jatropha was always grown in association with food crops – 'no-one only sows jatropha, because the cost of maintenance and harvest is too high, the numbers don't add up' (GNGO8, February 2012). She went to explain that jatropha had reduced soil erosion, especially in hillside communities that had been established on previously forested land (see also Figure 24), while defoliation during the dry season helped to return valuable nutrients to the soil. However, adverse climatic conditions in the initial years of this project's establishment had resulted in lower than expected yields, which represented a risk to the long-term viability of small-scale jatropha production. Although they were time-bound interventions, both the USAC and Technoserve projects aimed to provide lasting benefits for the communities beyond the lifespan of the project. However, uncertain crop performance and doubts about the economic viability of these projects made it difficult for those who were promoting jatropha to encourage farmers to grow the crop.

Figure 24. Intercropping of jatropha with pineapple and papaya in the *Corredor Seco* (dry corridor), Camotan

Source: Author's own.

As has been the case elsewhere in the world, initial expectations for jatropha had fallen after agricultural trials suffered setbacks (GP12, February 2012; GP16, GA6, March 2012). Montes et al. (2012) caution that jatropha is essentially still a wild species that has yet to benefit from crop improvement programmes; they also argue that the crop agronomy is poorly understood. Highlighting this new reality, many interviewees referred to the bankruptcy of the company, *Biocombustibles de Guatemala*; in particular as an example of the lack of viability of the large-scale production of jatropha (e.g. GP1, December 2011; GNGO8, GP2, February 2012).

Financed with foreign capital and operating under the tagline 'environmentally committed', *Biocombustibles de Guatemala* was established to investigate and commercialise the cultivation of jatropha for biodiesel (Biocombustibles de Guatemala 2010). In 2010, the company had more than 600 hectares of jatropha in ten plots around Guatemala. The largest of the plantations, which was located on the Pacific Coast, was virtually destroyed by Hurricane Agatha in 2010 and the company declared bankruptcy later that year (FV5, April 2012). An interview with the company director revealed another reason behind the company's failure, the difficulty of harvesting the seed which rendered production economically unsustainable. He explained:

> 'Not all the fruits mature at the same time and we are only interested in the mature, brown seeds – the oil content of the immature seeds is too low – so we had to harvest by hand. We experimented with various methods, we tried to mechanise to find the most efficient way to harvest, but we reached our limit – it's not efficient... we were never going to be able to produce profitably' (GP12, February 2012).

The cost of harvesting jatropha was estimated to be USD 1,500 per hectare by one interviewee (GA6, April 2012). The manual harvesting requirement and general crop maintenance meant that, prior to its bankruptcy the company had been an important employer in the area, employing more than 200 staff. In spite of these setbacks, the company had continued operating, albeit under a different guise. Having developed a new variety of jatropha, the company had decided to focus on research into hybridisation and crop agronomy. The majority of the land owned by the company had been leased to a sugar mill for sugarcane cultivation, while a small proportion (c. 40 hectares) was dedicated to field trials of jatropha (FV5, April 2012; see also Figure 25).

SG Biofuels, an energy crop company based in the U.S., had undergone a similar transformation. The company had begun operations in Guatemala in 2008 motivated by the jatropha biodiesel 'boom' (GP16, March 2012). However, it had quickly transpired that more research was required to make the crop economically viable; the company therefore transitioned from a focus on the industrial production of jatropha oil to one on research and development to domesticate the plant. SG Biofuels had 87 hectares on Guatemala's Pacific

Figure 25. Jatropha field trials

The difference that fertilisation and irrigation can make to jatropha. The specimens on the right of the photo were chosen for 'special treatment' as this particular variety had more biomass than others – the specimen on the left is left to fend for itself, but is still more compact and less wiry than most wild types.

Biocombustibles de Guatemala had collected several hundred specimens of jatropha, from across Central America. Each furrow was sown with a different variety to ascertain the characteristics of different wild types. The company also cultivated varieties from different parts of the world (e.g. India, Ghana, Vietnam, Brazil) in another part of the plantation.

Jatropha is dioecious i.e. each plant is either male or female and produces either male or female flowers. The company was interested in plants that produced a lot of flowers because they are more likely to produce a lot of seeds. Further, since it is only the female plants that produce seeds, the company wanted more female than male plants. The photo on the left shows male flowers (with the yellow stamen clearly visible); the photo on the right shows female flowers.

Source: Author's own

Coast where it was field-testing hybrid varieties of jatropha. After only eighteen months, the company had made 'significant progress' in the identification of high-yielding varieties; other attributes of the improved cultivars included low toxicity, improved stress tolerance and early flowering (GP16, March 2012). Over time, jatropha oil was expected to become the secondary market, with bioenergy and feed markets becoming more important to both the company and its clients (GP16, March 2012). SG Biofuels had also supported the community-level production of jatropha led by Technoserve. The company had donated (unimproved) cultivars to the project and had committed to purchasing the oil produced by the project for a period of five years (GNGO8, GP16, February 2012). None of the respondents I interviewed that were involved in the commercial production of jatropha thought that small-scale, community-level production was viable or economically sustainable (GP12, GP16, February 2012; GA6, March 2012). They cited a number of reasons, including low yields, the prohibitive costs of maintaining and harvesting the plant, the lack of end markets, and the 'myth' that jatropha would grow well on marginal soils. One interviewee who had been involved in a project to commercialise jatropha commented:

> 'Social policies that say that *campesinos* can have their jatropha plantations on the edges of their plots, or on land that is not adequate to produce crops such as maize and beans, because they're going to be able to extract oil which will give them a better quality of life, they're not true. India failed. China failed. African countries failed, because this concept of small-scale production is not true... Jatropha is not going to generate income for these families, but it will generate additional work' (GP12, February 2012).

Such perspectives contrasted with those of respondents involved in promoting small-scale projects who were obviously more hopeful that longer-term rural livelihood opportunities could be delivered. One interviewee, for example, expressed her continued hope that jatropha could benefit local communities:

> 'There are so many myths about jatropha, but I still have faith in jatropha and I continue to believe that it offers a good solution for the people... even if it doesn't produce lots of oil, there are other benefits' (GNGO8, February 2012).

Regardless of whether these small-scale projects are able to benefit local communities, such projects are few and far between in Guatemala. Furthermore, whether communities were likely to continue to cultivate jatropha beyond the lifetime of individual projects, particularly in the absence of outside support and local markets, was uncertain. This echoes calls for a greater focus on the local level context within which biofuel production is embedded, and particularly on the needs and capabilities of rural communities (e.g. Ariza-Montobbio et al. 2010; Hunsberger 2010; Hodbod and Tomei 2013). In Guatemala, the small-scale, community-led production of biofuel feedstocks was considered a laudable but marginal activity; one divorced from 'real rural dynamics' (GNGO3, December 2010) and the large-scale, agro-industrial model of production that had developed elsewhere in the country. The expansion of African palm provides a case in point and is the focus of the next section.

6.3.2. Palm Oil: 'not one drop of biodiesel'

The most recent USDA report (2012a) states that the Guatemalan palm oil industry has 'significant' potential for biodiesel production due to the country's high yields of palm oil (see Figure 26). The report highlights the efficiency of Guatemalan African palm production, which has yields of 7 tonnes/ ha compared to the global average of between 3 and 4 tonnes/ ha. According to the Guatemalan Palm Oil Association[27] (GREPALMA), the country's 'agrarian reality', specifically the limited land availability, had encouraged the industry to be more efficient in order to minimise its socio-economic impacts (GP10, January 2012).

Figure 26. African palm plantation, Valle del Polochic, Alta Verapaz

Source: Author's own

Compared to other agroindustries in the country, the palm oil sector is relatively new, with the first plantations established after the collapse of the cotton industry in the late 1980s. Since then the cultivated area has increased from around 3,000 hectares in 1990 to 110,000 hectares in 2012 (IARNA 2012b; USDA 2012; GREPALMA 2013). According to interviewees, the expansion of palm oil began to accelerate in the early 2000s, reaching its peak during the middle

[27] *Gremial de Palmicultores de Guatemala*

of the decade. The data shown in Table 15 support this view. A representative of the industry cited a study by MAGA which estimated that there were potentially 700,000 ha suitable for palm oil plantations; she argued that the crop currently occupied just over 15% of this potential (GP10, January 2012). However, it should be noted that broad estimates of land availability may be misleading as they mask existing land uses, whether virgin or secondary forest, pastureland or smallholder agriculture; indeed, such claims are reminiscent of those in the biofuels literature about the potential for 'marginal' or 'idle' land (see Chapter Two).

Table 15. Evolution of palm oil cultivation, 2003 – 2010

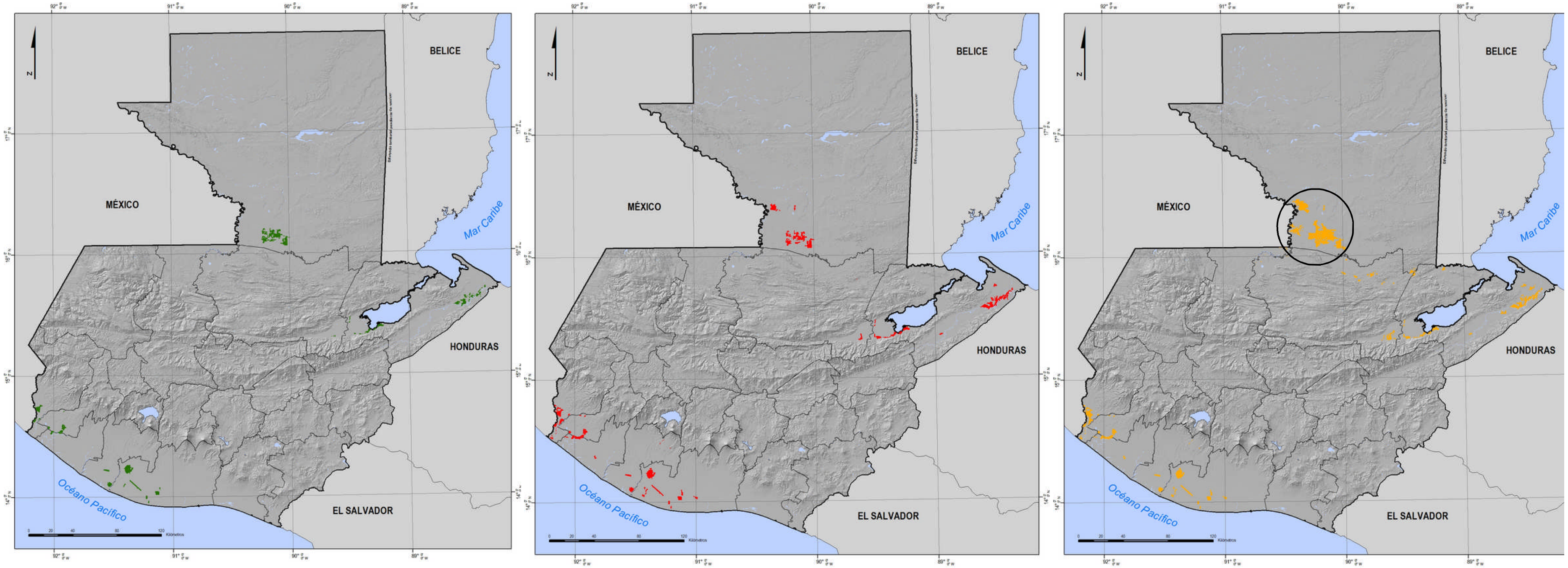
Year	Land area (ha)	Estimated growth rate (ha/ year)
2003	31,185	-
2005	38,094	3,455
2006	53,906	15,812
2007	65,340	11,434
2010	93,513	9,391
2012	110,000	8,234

Sources: IARNA (2012b); GREPALMA (2013)

In 2012, African palm occupied between 2 and 3% of cultivatable land in Guatemala. This figure was contrasted to the 45% of agricultural land used for basic grains (principally maize and beans) by industry representatives who used it to dispel the 'myth' that African palm was a threat to food security (GP10, January 2012). This figure again masks not only the spatial concentration of African palm (see Figure 27) but also the scale and speed of the sector's expansion. In the municipality of Sayaxche, Petén, for example, African palm represents 58% of harvested land (Alonso-Fradejas 2011).

As with the sugarcane sector, ownership of the palm oil sector is highly concentrated. In 2008, there were an estimated forty companies involved in the production and processing of palm oil, but the sector was dominated by just seven companies (ActionAid 2008; Solano 2008). In 2012, these companies controlled an estimated 73% of the land cultivated with African palm. Table 16 lists these companies; independent producers are not included in the table. Many of Guatemala's economic elites are major shareholders in palm companies (some have holdings in both sugar mills and palm oil companies (Solano 2008)) and only one company, Palmas del Ixcán,

Figure 27. Expansion of African palm in Guatemala, 2003, 2006 and 2010



2003 2006 2010

Source: IARNA (2012b). The municipality of Sayaxche is circled on the figure representing 2010.

was, until 2011 financed with foreign capital. According to Oxfam (2013: 6), the companies operate 'like a cartel, avoiding competition and dominating production, sales and price'. Many NGO respondents, typically critical of the sector, commented on the difficulties of accessing those in the palm oil industry; indeed, I considered myself fortunate to have been granted an interview with GREPALMA. However, even then the interview was expertly guided by the official who used it as an opportunity to dispel the 'myths' associated with the production of African palm.

Table 16. Guatemalan palm oil companies, 2012

Company	Family	Hectares	Location of plantations
Olmeca	Molina	40,000	Esquintla, Coatepeque (Quetzaltenango), Ocós (San Marcos), Sayaxche (Petén)
NaturAceites (formerly INDESA)	Maegli Mueller	14,920	El Estor (Izabal), Panzós, Chisec, Fray Bartolomé de Las Casas, and Chahal (Alta Verapaz)
AgroCaribe	Torrebiarte and Arriola Fuxet	9,414	Izabal
AgroAmérica	Bolaños Valle	9,000	Izabal
Palmas del Ixcán	Torrebiarte and Arriola Fuxet	6,700	Sayaxché (Petén), Ixcán (Quiché), Chisec municipality (Alta Verapaz), Lachuá (Alta Verapaz)
NAISA	Köng	5,000	Sayaxche (Petén)
Tikindustrias	Weissenberg	5,000	Aldea Arenas and Sayaxche (Petén)
Total		**80,620**	

Sources: ActionAid (208); Oxfam (2013); RSPO (2013)

In terms of end markets, all of the palm oil produced in Guatemala is sold to the food processing sector (GP10, January 2012; USDA 2012). Of the 197,000 tonnes produced in 2011, 30% was sufficient to supply domestic demand and the remainder was exported (USDA 2012). Key export markets are Mexico and other Central American countries; the EU also imports a small proportion. Some respondents contended that 'not one drop' of palm oil was used to produce biodiesel in Guatemala (GP1, November 2010; GP10, January 2012; GG8, March 2012), although this assertion was disputed by other actors, typically NGOs (GNGO3, December 2010; GNGO8, GNGO11, February 2012). For example, in one interview an NGO told me:

> ‘Palm oil here in Guatemala is used to produce biofuels. The owner of Olmeca – Señor Molina – produces biodiesel for his fleet and they sell it too. It’s very difficult to access these people, but the biggest palm companies, yes they’re producing biodiesel’ (GNGO8, February 2012).

One possible explanation for this confusion was the sector’s early interest in biofuels. For instance, in 2007, the company, Palmas del Ixcán, was established as a subsidiary of the U.S. company Green Earth Fuels – a biodiesel producer. Originally the company planned to produce and export biodiesel, but just four years later the U.S. investors withdrew. The failure of the project was blamed on a number of factors including, the global economic crisis, the withdrawal of U.S. government support for palm oil biodiesel, as well as negative publicity surrounding land conflicts, which presented a risk to investment (GP10, January 2012; Oxfam 2013). As will be discussed in Chapter Seven, increasingly vocal opposition to the expansion of the sector, which many NGOs blame on global demand for biofuels, has reduced sectoral interest in the production of biodiesel.

The interviewee at GREPALMA contended that while there was still some interest in promoting the use and production of biodiesel, food markets were both more profitable and more certain than fuel markets. The additional investment required to produce biodiesel was simply not merited (GP10, January 2012; see also UNCTAD 2007). The importance of economics to the decision of whether or not to produce biodiesel was emphasised by one private sector interviewee who commented:

> ‘The demand for edible oil is so high that the industry cannot produce enough to satisfy existing demand... what is left over to produce biodiesel? In reality, nothing. The truth is that if they do produce biodiesel it’s from the wastes, but for use in their own fleets. On the other hand, the price of edible palm oil is too high to justify its use as a biodiesel feedstock’ (GP12, February 2012).

This perspective very much echoes that of the sugarcane industry, discussed earlier in this chapter, wherein the ultimate driver for ethanol production is profitability.

When I questioned biofuel opponents about the lack of domestic palm biodiesel production they were unfazed, highlighting the global connectedness of commodity markets and the indirect effects of global biofuel demand on vegetable oil markets. These actors argued that increased demand for biodiesel had led to the diversion of palm oil from food markets, creating a shortfall in supply that companies in smaller producing countries, such as Guatemala, would gladly meet. They also pointed to the likelihood that some of the crude palm oil that the country exported would be used as biodiesel feedstock in countries with blending mandates (GNGO3, December 2010 and March 2012; GNGO4, December 2010; GNGO11, February 2012; see also Oxfam 2013). However, and as discussed in Chapter Three, ascertaining the extent to which biofuel demand has influenced the expansion of palm oil in Guatemala would have been very difficult and beyond the scope of this thesis. Nonetheless, for these individuals, whether or not there was large-scale production of biodiesel from palm oil, global demand for biofuels was an important contributory factor in the process of land concentration that was underway in Guatemala.

Environmental impacts of African palm expansion

Most of the expansion of African palm is concentrated in the north of the country in the departments of Petén, Alta Verapaz and Izabal, although there are also plantations on the Pacific Coast (see Figure 27). These are areas characterised by majority indigenous populations, many of whom are internal migrants who fled to these regions in order to escape army repression during the civil war (GNGO16, March 2012). Further, these departments, and particularly Petén, are frontier zones and since the 1970s have undergone dramatic changes with respect to demographics, land use and ownership, and economic activities (Shriar 2011). As a result, they are amongst the most insecure and violent regions in the country; in May 2011, the massacre of 27 farmhands on a cattle ranch in northern Petén led the government to declare a state of martial law and highlighted the increasing lawlessness of some parts of the country. That the expansion of African palm in these regions was referred to in the same way as narcotrafficking and illegal logging, highlights that many view palm as a grave threat to local communities.

A frequent concern expressed during interviews was that the palm oil sector was driving deforestation, particularly in the Petén (GNGO3, December 2010; GG5, March 2012; GA8, April 2012). Land use statistics show that forest cover in Guatemala fell from 64% in 1950 to 34% in 2010; between 2006 and 2010, the net annual deforestation rate was 1%, equivalent to a net loss of 38,597 ha per year (IARNA 2012a). Much of this deforestation is taking place in the northern department of Petén, which until recently contained one of the largest remaining areas of tropical forest in Mesoamerica (Shriar 2011). However, the palm oil sector refuted that plantations were being established on forested areas or areas of maize cultivation, arguing instead that most expansion was taking place on unproductive and disused cattle ranches (GP10, January 2012).

In an effort to quell criticisms, the palm oil sector had worked with a university research institute to analyse the dynamics of crop expansion (GA4, November 2010; GA7, April 2012; IARNA 2012b). One interviewee thought the initial motivation for the study was not only to dispel criticisms of the sector, but also to demonstrate compliance with the EU's sustainability criteria, should the sector later wish to supply EU biofuel markets (GNGO3, December 2010; see also Chapter Four). However, if that was a motivation, it proved misguided. Drawing on satellite images and aerial photos, and supplemented by field visits, the report demonstrated that, of the 93,513 ha cultivated with palm oil in 2010, more than a quarter (24,172 ha) had taken place at the expense of forest and, of this, 93% had occurred in Petén. Furthermore, almost a quarter (22,967 ha) of palm oil plantations were found within protected areas; three quarters of these had been established between 2006 and 2010 (IARNA 2012b). Other analyses have shown that almost a third of the area cultivated with African palm in 2011 had been used for maize production a decade earlier (Oxfam 2013). It is therefore unlikely that biodiesel produced from Guatemalan palm oil would comply with the EU's sustainability criteria and, in particular, the requirement for no land use change prior to 2008 (see Chapter Four).

In terms of other environmental impacts of African palm, the relative newness and the closed nature of the palm oil sector meant that there are few studies of the environmental impacts of production. An industry representative contended that the environmental impacts of African palm plantations were positive and included the reforestation of degraded areas, improved soil quality, reduced soil erosion and carbon capture and storage (GP10, January 2012). The argument that palm oil plantations deliver benefits similar to those of natural forest ecosystems is a common defence of the sector, not just within Guatemala (e.g. MPOC 2007; Tan et al. 2009). In 2010, attempts by the European Commission to classify palm oil plantations as forests to allow palm oil biodiesel to meet the sustainability criteria met with criticism from environmentalists and were eventually thwarted (EU Observer 2010). Critics, however, pointed to the diversion of watercourses, deforestation and the use of agricultural inputs, such as fertiliser and pesticides (GNGO16, March 2012; GA8, April 2012). Respondents also highlighted that the Ministry of Environment (MARN) only required companies to carry out an Environmental Impact Assessment (EIA) of the area immediately surrounding the processing plant (GNGO3, November 2010; GG3, March 2012). EIAs were not required for changes in agricultural land use; this, they argued, meant that the environmental impacts on the soil, surrounding vegetation and biodiversity were not accounted for. However, it was not the environmental impacts of palm oil that critics of the sector were most concerned about, but rather the changes in agrarian dynamics that were underway.

Sayaxche: 'they tricked the people'

The municipality of Sayaxche in Petén has become the focus of resistance to the palm oil industry (Sayaxche is circled in Figure 27). Like many parts of rural Guatemala, Sayaxche has a complicated land history. Originally belonging to the army, in the 1980s the land had been occupied by campesinos fleeing the repression of the counterinsurgency. After the signing of the Peace Accords in 1996 the campesinos had faced a long legal battle to obtain titles to the land they had by then occupied for decades. In 2002, people began to receive the legal land titles; each family being awarded half a *caballería* (22 ha) for cultivation and 40 square metres on which to construct their *lote* (house) (GNGO11, February 2012). However, interviewees explained that no sooner had the families received the titles to their land, than the palm companies arrived:

> 'As soon as the companies knew that the land was in the hands of the campesinos, they came and offered to buy it. They tricked the people. They offered them things – 'if you sell me your land, I'll give you work' – they offered development, they offered employment, and they began to give them 50,000 quetazles [USD 6,300] for each piece of land. For a campesino that's a lot of money. And they said to them 'you can go and buy a car, you can buy a piece of land elsewhere and nobody will lose out. And here I'm going to give you work, I'm going to give you development – a drainage system, urbanisation, electricity, work – and you're going to be free because you're not now'. And so the people began to sell their land, partly because of poverty, partly because they were tricked' (GNGO16, March 2012).

As the above quote highlights, for rural people accustomed to living on a dollar or so a day, the amounts offered by these companies and their intermediaries (known as *coyotes* or *contratistas*) must have seemed like an inordinate amount, yet was below the true value of the land. Although it was not long before communities and civil society organisations became aware of what was taking place, by then much land had already exchanged hands. Respondents also noted the difference in the time it had taken the campesinos to gain formal land rights (i.e. years) and the time it had taken for the palm companies to expropriate it (i.e. six months); an example, they argued, of how the state favoured private interests over those of the people, particularly those of the indigenous majority (GNGO4, December 2010; GNGO11, February 2012; GNGO3, March 2012). The speed with which African palm expanded is highlighted by figures which show that in Sayaxche the cultivation of palm oil increased from 465 hectares in 2000 to 14,986 hectares in 2006 and to 40,391 hectares in 2010 (Alonso-Fradejas 2011).

Many of the land titles in Sayaxche are held individually, rather than as communal land, which was cited as one of the reasons that this transfer of land was able to take place so quickly (GNGO16, March 2012). Other municipalities where land is held communally have been more successful at resisting palm oil companies (see Ybarra (2010) for an analysis of the importance of communal land titles). The palm oil companies employ a number of strategies to gain access to land including, the direct purchase of land, long-term leases – under which companies make annual payments over a 25-year period – and outgrower schemes. The latter were promoted through PROPALMA, a subsidiary of the PRORURAL programme for agricultural modernisation (GA3, November 2010). Recognising that the biggest limitation for independent producers was the upfront cost required to establish the crop, and to provide farmers with an income before the tree bore fruit, PROPALMA was established to provide economic and technical assistance. The premise was that the fruits would then be sold to palm oil companies to transport and process. Producers were not, however, provided a guaranteed purchase price for their crop and were dependent on a single company; problems with buyback contracts, including lack of compliance and transparency, are also highlighted in the biofuels literature as a common concern (Hodbod and Tomei 2013). These small-scale producers, many of whom had less than a hectare on which to cultivate African palm, were unable to capitalise on the economies of scale required to make palm oil production profitable (GA3, November 2010). The PROPALMA programme was dismissed by critics as corporate policies 'disguised' as public policy and was discontinued after only a year (GA3, November 2010; see also Hernández and Casteñada 2011; Oxfam 2013). NGO respondents also described more insidious methods that palm companies had employed to pressure smallholders to sell their land, including direct threats, the enclosure of communities and subsequent denial of the right to transit (GNGO2, GNGO3, December 2010; GNGO8, GNGO11, February 2012; see also Alonso-Fradejas 2011; Hernández 2011; ActionAid 2012; Oxfam 2013).

The impacts of this rapid concentration of land are multiple. The price of land has increased and, as a result, campesinos that have sold their land are then unable to buy or rent land to cultivate. No longer able to earn a livelihood from the land, many families have migrated to urban areas or found work on African palm plantations (GNGO11, February 2012). The transition from subsistence farming to temporary labourer has meant families have become more dependent on monetary income with consequences for their diets and for food and economic security. In particular, those working with local communities highlighted the loss of land to produce maize and beans:

> 'The palm oil companies have come to destroy our land. For them it's just business, but they reduce the ability of families to survive, because they no longer have land to produce maize' (GNGO18, April 2012).

By contrast, the industry highlighted the contribution that palm made to national food security. For example, an industry representative described the importance of vegetable oils to the human diet and highlighted the high oil yields of African palm, which made it the most efficient oilseed crop (GP10, January 2012). Palm oil was argued to contribute to food security by strengthening the oil and fats industry in Guatemala, thus enabling the population to buy vegetable oil and processed products at a 'reasonable price' (GP10, January 2012). However, many were critical of this argument and highlighted the loss of food security, specifically the loss of local food production for local consumption mentioned previously. As one interviewee explained:

> 'So, they go to work, carry out their tasks – weeding, harvesting, replanting – for which they're paid by the company. And with the money they receive they buy grains or processed food such as tinned beans, so the dynamics of consumption and nutrition have changed with the changes in land use' (GA3, November 2010).

In many instances, families have become locked into a new cycle of dependency: no longer able to produce basic grains, they are reliant on their meagre wages to feed their families of perhaps six or eight children, and when the money runs out, they buy foodstuff on credit. One respondent likened this to a new cycle of debt bondage, one reminiscent of the colonial era (GNGO7, December 2011). The daily importance of maize to the diets of rural people, and particularly for indigenous communities for whom maize also has cultural importance, was emphasised by many respondents. The following quote captures the central role of maize for rural communities:

> 'The people here in Guatemala depend on maize for every meal. A day when they don't have maize is a day that they don't eat. Because the people in the countryside, fundamentally what they eat are tortillas. Beans too, but they can go without beans. A rural family cannot go without maize' (GNGO5, December 2010).

Most recently, however, the issue that has caused the greatest concern has been that of working conditions on African palm plantations. Respondents explained that the *la lucha* (the struggle) had changed: the expansion of palm oil had slowed and it was accepted that the companies would be there for the life of the plantations (i.e. at least the next 25 years) (GNGO3, GNGO16, March 2012). The focus, therefore, was now on ensuring that workers were provided with 'dignified and humane' employment. In the words of one respondent:

> 'We've told [the companies] what we want is the truth. We recognise we are not going to take their land and we are not going to get rid of them. What we want is a fair salary, fair treatment, no layoffs... that the workload isn't excessive, that we're given tasks a human can do – not harvesting 30 quintales[28] (1,360 kg) as they expect us to – that they pay us per day not by the amount harvested. That's what we want' (GNGO16, March 2012).

To demonstrate the indifferent, even inhumane, treatment of workers by the palm oil companies, this respondent used the example of the transportation of workers to and from plantations. He explained how workers were typically transported in trucks; vehicles very similar to, if not the same as, those used to transport palm fruits (GNGO16, March 2012; see Figure 28). Traffic accidents involving these vehicles are unfortunately not uncommon.

Figure 28. Transportation of palm fruits and temporary workers, Petén

Source: CONDEG (2012)

In 2011, the palm oil industry generated 17,300 direct jobs and another 45,000 indirect jobs (GREPALMA 2012). An industry respondent argued that the year-round employment opportunities represented an important source of labour in areas characterised by low agricultural productivity (GP12, January 2012). However, many questioned the types of employment generated by palm oil, where the majority of the workforce is temporary, poorly skilled and badly remunerated. In 2012, for example, an investigation of working conditions on palm oil plantations revealed that many companies paid their non-permanent employees an average of just GTQ 50-56 (GBP 6.30–7.10) per day, when, by law, the minimum wage was GTQ

[28] In Guatemala, 1 quintal = 45.35 kg

68 (USD 8.60) for an eight hour day (GP11, February 2012; GNGO3, March 2012). As in the sugarcane plantations, workers are not paid a flat rate but rather are paid according to productivity. While this means some workers are able to earn more than the minimum wage, others – particularly women and children – earn far less. As one author of the investigation explained:

> 'By law, agricultural workers have to earn Q68 per day. It's nothing, but they don't even earn that much, they earn Q50. If they manage to do everything they're assigned, but these tasks – for example, one activity is weeding around the trees. A worker has to weed 60 trees per day to earn Q50. If you don't weed the 60, then they revise the amount taken home. One company, increased the earnings to Q63, but at the same time they increased the task, it was no longer 60 trees per day but 80. So the people said, it's impossible, it's impossible to earn that much' (GNGO11, February 2012).

Many companies also use *contratistas* (intermediaries) in the employment of temporary workers. Such individuals are typically community leaders, who are contacted by companies and paid a set amount per worker recruited by the palm companies (GTQ 2-5). The use of *contratistas* was criticised by respondents who argued that it allowed the companies to 'separate' themselves from any responsibilities to their non-permanent workers (GNGO11, February 2012; also GNGO10, February 2012). As described in Chapter Five, this included government-legislated benefits, such as *Bono 14* (a 13 month salary bonus) and social security benefits. One interviewee spoke of how she had been contacted by the director of a palm oil company prior to the publication of an investigation into the working conditions on African palm plantations. She described his 'spontaneous' reaction as one of alarm as he read the report. The report exposed what she called the 'dark side' of the industry, namely the contracting of temporary workers (GNGO3, March 2012). This account highlights the importance of reputational risk to these companies, a theme I will return to in the next section.

However, it was not just the below-minimum wages and use of *contratistas* that concerned those investigating the impacts of African palm, as one NGO representative explained:

> 'As with any crop of that magnitude, there's a whole host of problems – they don't respect the minimum wage, workers do not have the right to unionise – for example, if you're working on a plantation and you ask for minimum wage what [the companies] do is put you on a black list. They put you on a black list so that you can't work for that company, nor for any other company

> in the sector. And basically working on a palm plantation is all the work you have, because you've sold your land' (GNGO11, February 2012).

This suggests that workers are essentially 'trapped' – not only do they have limited bargaining power with which to fight for improved labour conditions, but most are unable to return to previous subsistence activities. The choice for these *campesinos* is therefore stark: 'sell your labour power or starve' (Bernstein 2010: 27). The increased landlessness of rural campesinos led Alonso-Fradejas et al. (2008) to describe the expansion of African palm in Guatemala as a new cycle of primitive accumulation.

In December 2011, the issue of labour conditions was formally raised when a *denuncia* (complaint) was filed with the Ministry of Work (MINTRAB). The complaint focused on working conditions on African palm plantations in Sayaxche and cited the violation of labour rights, the failure to comply with minimum wage and social security benefits, the violation of rights of women and minors, and the lack of health and safety measures on plantations (GNGO16, March 2012). The complaint was signed by representatives from 79 communities, as well as various NGOs. In February 2012, MINTRAB, with the human rights prosecutors' office (PDH) and the UN High Commissioner for Human Rights attempted to carry out an inspection of the African palm plantations named in the *denuncia*. However, the inspectors were only allowed access to one plantation, and were prohibited from interviewing workers or from carrying out an inspection. According to one interviewee:

> 'I know one of the UN accompaniers [on the inspection] who told me that officials from MINTRAB were very subservient to the companies, that they were not nearly forceful enough. In spite of having a legal mandate and a constitutional right to enter, when they were told by the security that they were not allowed to enter they simply agreed to come back another day. They simply accepted no for an answer' (GNGO3, March 2012).

This quote highlights the weakness of state institutions, particularly when it came to monitoring compliance with and enforcement of the law, in this instance labour conditions. The weakness of the state will be discussed in more detail, specifically with regard to the development of a domestic biofuels market, in Chapter Seven. According to a subsequent investigation by Oxfam (2013), the palm oil companies responded to the complaint by requesting 'presidential authorisation for the presence of police and military forces' (p. 51) and by blacklisting those they saw as the instigators of the original complaint – a common response to those who seek access to better wages (GNGO11, February 2012). The use of force and repression in response to protests by workers and local communities has been a recurrent theme throughout Guatemala's labour history (see Chapter Five). This most recent episode undermined claims by the sector that it sought to 'establish and safeguard a just labour policy' (GREPALMA 2013); rather, it highlighted the continued practice of labour exploitation on African palm plantations.

Certification and reputational risk

As discussed above, while domestic markets are important to the palm oil sector, the majority of the palm oil produced in the country is exported. These global markets are increasingly shaped by concerns about the social and environmental impacts of primary production – as evidenced by the proliferation of standards and certification schemes, such as the Roundtable on Sustainable Palm Oil (RSPO) which was discussed in Chapter Four. Four of the six palm oil companies listed in Table 16 are members of the RSPO, although none are certified; NaturaAceites hoped to certify their first mill in 2013 (RSPO 2013). Since 2011, three companies[29] had been certified by the Rainforest Alliance, whose standards are based on the guiding principles established by the Sustainable Agricultural Network. Compliance with the standard is audited by the Inter-American Foundation on Tropical Investigation[30] (FIIT). Given the multiple, largely negative, impacts of African palm cultivation that were discussed in previous sections, it is unclear how these companies have managed to obtain certification. There are a number of possible explanations: firstly, there are likely to be leaders and laggards within the palm oil industry. Industry differences were acknowledged by the representative of GREPALMA, who saw the promotion of best practice across the industry as an important part of her role (GP10, January 2012). It is therefore possible that those certified by the Rainforest Alliance are industry leaders. Secondly, claims about the working conditions on African palm plantations may be exaggerated; however, given the agricultural sector's poor labour rights record in Guatemala and history of silencing dissenters this seems unlikely. Finally, it could also highlight the limitations of certification as a mode of sustainability governance (see also Chapter Four), perhaps through complicity between the assessor and the company being audited (e.g. Fortin and Richardson 2013). I return to the issue of governance in the next two empirical chapters with regard to the biofuels sector (Chapter Seven) and to the implications for sustainability governance in Guatemala (Chapter Eight).

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[29] NaturAceites, AgroAmérica and AgroCaribe (SAN 2013). Available at: http://sustainablefarmcert.com/certified-producers-2/ [Accessed July 2013].

[30] *Fundación Interamericano de Investigación Tropical*

The respondent at GREPALMA discussed the sectoral tendency towards certification, particularly amongst the bigger palm oil companies. Those companies that wished to supply 'first world' markets increasingly viewed certification as an obligatory requirement for market entry; a requirement which had provided the motivation to develop and implement environmental management systems. She described global environmental concerns as a 'wave' and argued that it was important to have environmental systems in place before it threatened to 'drown us'. She also pointed to the health, education and infrastructural benefits that the palm oil companies delivered to local communities (GP10, January 2012). However, many areas of African palm cultivation are characterised by the near absence of the state at the local level, and these benefits represent the transfer of (ostensibly) state responsibilities to the private sector; an issue that was acknowledged by the respondent:

> 'It falls to the companies to build schools, to build bridges, to build roads. These are costs that they have to assume and in reality this shouldn't be their responsibility... eventually [the absence of the state] will have to be addressed, but I think this is something that also needs private sector involvement' (GP10, January 2012).

Given the increasing importance of global markets to the palm oil industry, the negative publicity surrounding the sector poses substantial risks. Indeed, the investment and reputational risks associated with land conflicts in areas of African palm plantation have already led one foreign investor to withdraw from Guatemala. For a sector that seeks to promote itself as a 'modernising' industry – one that espouses values such as 'respect', 'transparency' and 'sustainability' (GREPALMA 2013) – reports of land grabs, poor working conditions and deforestation are potentially very damaging. Certification provides a powerful marker for these companies; one which enables them to effectively 'rubber stamp' their agricultural and social practices. This legitimising action therefore provides companies with a powerful rebuttal to claims about the negative social and environmental impacts of the palm oil industry. This raises questions about whether certification schemes are able to capture those impacts that are most salient to the Guatemalan context; a question I will return to in Chapters Seven and Eight.

6.4. Are biofuels a concern for Guatemala?

The evidence presented in this chapter has painted a complex picture of Guatemala's nascent biofuels sector yet, at the same time, one that is startlingly simple. Only one company, Pantaleon, is currently producing biofuels on a large-scale (see Section 6.2.3); all of the sugarcane ethanol the company produced is exported, principally to the EU. Economic drivers provide the primary motivation for involvement in biofuels and while export markets remain profitable there is little interest in the development of a domestic market. Unlike ethanol, biodiesel is only being produced at a small to medium-scale; large-scale production of biodiesel palm oil has yet to get off the ground. Unlike fuel ethanol, the development of biodiesel at all scales is hampered by the lack of a domestic market, by uncertain economics and, in the case of jatropha, by low crop yields.

Given this situation, a pertinent question might be: are biofuels an issue for Guatemala? The answer to this question lies in the perspective from which it is viewed: while one respondent thought that Guatemala 'didn't have many stories to tell' regarding biofuels (GNGO6, December 2010), other interviewees argued otherwise, pointing to biofuels as an important driver of land concentration, dispossession and marginalisation (GNGO4, December 2010; GNGO7, December 2011). The production of biofuels may be limited to one company, but the wider debate within Guatemala touches upon important issues, many of which find resonance in global debates on biofuels. These include the relationship between subsistence farmers, labourers and agroindustrial elites, access to and control over land, and the unequal distribution of the costs and benefits of biofuels. Contrary to what is posited by proponents of biofuels (see Chapter Two), the large-scale model of biofuels that is developing in Guatemala is extremely unlikely to deliver pro-poor benefits. Rather, it is the well-capitalised economic elites who are most likely to benefit from and capitalise upon the economic opportunities presented by increased global demand for biofuels.

Although both sugarcane and African palm are censured, the most vehement criticism is reserved for the palm oil sector (e.g. Hernández and Casteñada 2011; ActionAid 2012; Oxfam 2013). Arguably this is due to the relative newness of the industry, which presents an opportunity to influence and shape the biodiesel sector as it develops. As discussed above, the expansion of African palm has largely taken place over the past decade and has expanded into regions afflicted by conflict, poverty and insecurity. The cloud of repression under which civil society lived during the civil war has (to some extent) lifted and, aided by the global connectedness of social movements (e.g. Mol 2001), civil society organisations have been able to witness, document and assist local communities in resisting the strategies employed by palm oil companies to acquire land. Whether or not biofuels are to blame (and the evidence presented in this chapter suggests not), this commodity has provided these organisations with a strong narrative with which to garner international attention. That biofuels provide a powerful conduit for critiquing shifting agrarian dynamics was acknowledged in an informal interview with an NGO. This human rights activist acknowledged that biofuels in Guatemala were just one driver of agrarian change amongst many, but explained that his organisation had made a strategic decision to use biofuels to raise awareness of human rights abuses. His hope was that by using a topical issue, in this instance biofuels, they would attract international attention and put pressure on the state and individual companies to protect communities affected by the expansion of monocultures (GNGO17, March 2012).

By contrast, much of the criticism of the sugarcane industry is focused on the events that took place in the Polochic Valley (e.g. ActionAid 2008; Mingorría and Gamboa 2010; Rosenthal 2013). The cultivation of sugarcane on the Pacific Coast has received far less attention, despite being the only place where biofuels are actually being produced. There are a number of possible reasons for this relative lack of attention. Firstly, the cultivation of sugarcane is clustered in Guatemala's agricultural heartland, which has a long – albeit turbulent – history of export-oriented agriculture (see Chapter Five). Secondly, the indigenous population of this region is far lower than that of the Polochic Valley (INE 2003). Although the region's largely Ladino population also suffered during the civil conflict and has more recently been affected by the expansion of sugarcane, the NGO community has tended to focus on Guatemala's indigenous population. For example, a recent report on sugarcane expansion on the Pacific Coast focuses on the impacts on the region's minority Tz'utujil population (Winker 2013). Finally, and as I will argue more extensively in Chapter Eight, since the strikes of the 1980s and the country's deepening insertion into the global economy (Robinson 2003), the sugarcane industry has sought to reposition itself as a modernising sector. By tapping into powerful (international) discourses of 'development', 'social responsibility' and 'sustainability', this industry has found favour with international institutions, including the World Bank (Oglesby 2004; Krznaric 2006). While many interviewees remained deeply sceptical of this rebranding, the sugarcane sector has drawn much less criticism than the palm oil sector and arguably provides the model that other agroindustries seek to emulate.

6.5. The role of domestic capital

The issues raised in this chapter echo many of the debates in the wider literature on biofuels, namely land access, food security and environmental impacts. However, two characteristics of the Guatemalan biofuels sector stand out: the role of domestic capital; and the absence of the Guatemalan state. This section focuses on the first of these, while the second provides the focus of Chapter Seven.

With regard to domestic actors, many of the criticisms of biofuels focus on the role of transnational capital. In the literature on land acquisitions, for example, most attention has been paid to the role of foreign investors in the global South (e.g. Oxfam 2011; Global Witness 2013). By contrast, the development of biofuels in Guatemala has been led by domestic capital; only one biofuels project, Palmas del Ixcán, had been part-financed with foreign capital. One NGO interviewee explained how this feature of biofuels had initially hindered her organisation's efforts to attract attention to the changes underway in Guatemala:

> 'All the impacts we were witnessing here – the loss of land, of forest, of biodiversity, impacts on food security – were also happening elsewhere, but it took a lot of effort to get two lines about Guatemala in the [international NGO's] publication. Because in Africa and in Asia land grabs are happening in a different way – there it's the state that is giving transnationals land for cultivation, here land grabs are by landowners with Guatemalan capital' (GNGO3, November 2010).

Indeed, it was not until the events that took place in the Polochic Valley in March 2011 that the international community began to take note of what was happening in Guatemala. Since then, there has been a fairly steady stream of international attention paid to biofuels within Guatemala (e.g. Rosenthal 2013; Vidal 2013; Oxfam 2013). For example, in January 2013, an article in the New York Times brought international attention to the negative impacts of global demand for biofuels in Guatemala. The article pointed to growing competition for land and rising food prices, specifically maize prices, and argued that 'the average Guatemalan is now hungrier because of biofuel development' (Rosenthal 2013). As this chapter has shown, the reality is rather more complex than this and the local-level impacts of biofuels will be returned to in the final empirical chapter.

While transnational corporations, such as Monsanto and BP, may not yet invest in the Guatemalan biofuel sector, Guatemala's domestic elites have expanded their operations into other countries. As discussed in Section 6.2, Pantaleon has operations in several other Latin American countries, including Nicaragua, Honduras and Brazil. Similarly, the owners of the Madre Tierra sugar mill have extended into Costa Rica and the Dominican Republic (GP7, December 2011). Scholars have tended to focus on the role of transnational rather than domestic corporations (e.g. Bryant and Bailey 1997), yet this transnationalisation of Guatemalan capital highlights the increasing importance of economic and trade linkages between countries of the global South (Dauvergne and Neville 2009).

6.6. Conclusions

This chapter has identified three possible models of biofuel production. It has shown that, at present, the issue of biofuels in Guatemala is primarily one of ethanol produced from sugarcane. While African palm and jatropha have been cited as potential feedstocks, the incentives are not yet in place to motivate their use as biofuels. Many of the sustainability concerns that were discussed in Chapter Two are relevant to the Guatemalan context, including issues of land access, food security and environmental change. However, this chapter has also questioned whether biofuels are indeed an issue for the country, given that they were just one of many possible products and markets. While biofuels may not have been a key driver of the changes underway in the country, struggles around biofuels provide a useful arena in which different actors vie for the privileging of certain interpretations of social and environmental sustainability. In Guatemala, however, the potential for non-elite actors to influence policy is limited due to the significant ties between the state and private sectors. The Guatemalan state has so far been conspicuous in its absence from this analysis. Chapters Two and Four discussed global experiences of biofuels and highlighted the importance of the nation state in creating both the demand for biofuels and the institutional frameworks that govern their use. While this argument applies to many countries, it does not in the Guatemalan context. The near absence of the state is a distinctive feature of biofuels in Guatemala. The next chapter turns to an exploration of the institutional traits that have prevented the development of a domestic biofuels market. By focusing on the different actors involved in biofuels, it aims to understand the material and social factors that allow some actors, but not others, to influence the way in which the biofuel sector has developed.

7. Developing biofuels in the absence of the state

The previous chapter identified and described three potential models of biofuel production. It demonstrated that biofuels in Guatemala are driven not by the state, but by private interests in response to increasing global demand for biofuels, as well as the sugarcane sector's shift towards biorefineries and the production of multiple products. This chapter builds on this finding in order to address the third research objective of this thesis: *to investigate the motivations of the different actors involved in the development of Guatemala's nascent biofuel sector and the consequences for the governance of the sector*. An obvious starting place for an analysis of the governance of biofuels would be official government documents (e.g. Ariza-Montobbio et al. 2010; Montefrio and Sonnenfield 2011). However, as Chapters Five and Six have argued, the near absence of the Guatemalan state in the biofuel sector means that few such documents exist. Furthermore, as the biofuels sector is dominated by private companies there are few, if any, publicly available documents that outline company policy or motivations for involvement in the biofuel sector. This analysis therefore draws upon interview data, as well as personal observations and documents provided during or after interview or from archival research.

The first section of this chapter draws on documentary evidence and interviews to describe previous efforts by the Guatemalan state and other actors to promote a domestic biofuels market. Having set the scene, the next section identifies and describes the key actors involved in promoting and opposing biofuels in Guatemala, revealing an array of motivators and barriers, which differ according to the actor, scale of production and type of biofuel being promoted. This chapter finds that this constellation of actors have vastly different influence over what enters the policy arena and that, in particular, the alignment of private sector and state interests determines whose voices are heard and whose are excluded. However, this analysis also shows that, despite several attempts to develop a national biofuels law, there is no domestic market for biofuels and little prospect that one will be developed in the short to medium term. The third section specifically examines two key barriers to a domestic biofuels market, namely the weakness of the Guatemalan state and the lack of buy-in from key stakeholders. In the absence of the Guatemalan state, the subsequent section raises questions about the governance of the sector and in particular the efficacy of international governance arrangements, while the final section concludes the chapter.

7.1. Historical perspectives

In common with many countries, interest in biofuels in Guatemala was sparked during the oil crises of the 1970s. This, combined with low international prices for sugar, led in 1985 to the publication of *Decreto 17/85*, or *Ley del Alcohol Carburante* (Decree 17/85, Law of Fuel Grade Alcohol) (Congreso de Guatemala 1985). The law proposed the substitution of petroleum products with energy produced from renewable domestic sources, which would encourage investment in agribusiness and create employment opportunities. It established an E5 mix (i.e. 5% fuel ethanol in the gasoline mix) in order to guarantee a domestic market with defined prices and fixed quotas. The Ministry of Energy and Mines (MEM) would have responsibility for controlling production, commercialisation, purity and quality of the ethanol. Under Article 34, ethanol producers were subject to a quarterly tax payment, equivalent to 2.5% of alcohol production, which had to be paid in advance. The annual sales price would be fixed by a technical committee, which would include representatives from MEM, the ministries of finance and the economy, as well as ethanol producers. No single sugar mill would be permitted to supply more than 20% of domestic demand, except under certain (unspecified) conditions. Under Article 31, ethanol producers would be exempt from import taxes, and custom duties on machinery, equipment, supplies and additives associated with the production of fuel alcohol (Congreso de Guatemala 1985). In the event, only one sugar mill – Palo Gordo – applied to supply the domestic market with ethanol and after only a year, the law was obsolete (GP13, February 2012). Interviewees cited several reasons for the failure including, increasing sugar prices, the inability to agree on the sales price of alcohol, technical problems, opposition from the hydrocarbon industry, and the reduction of international petroleum prices (GP1, November 2010; GG1, December 2010; GP8, December 2011).

Since 1985, further efforts to develop a national biofuels policy have faltered due to opposition from petroleum importers and lack of buy-in from key stakeholders. For example, in 2006 a draft bill – the *Ley de Oxigenación de Combustibles con Etanol Carburante* (Oxygenation of Fuel Grade Ethanol Law) – was proposed, which aimed to create a mandatory blending requirement, thus creating domestic demand for biofuels (Congreso de Guatemala 2006). However, the law is still with Congress, seemingly in limbo and unlikely to be approved in the near future (GP1, December 2011). Another state-led effort to promote biofuels was the creation, in 2007, of the *Comisión de Biocombustibles* (National Biofuels Commission). The Commission was driven by concerns about energy security, particularly the reduction of imported fossil fuels, increasing the use of renewable energy, and capitalising on potential export markets. The Commission was led by MEM with officials from the Ministry of Environment and Natural Resources (MARN), the Ministry of Agriculture (MAGA) and the Ministry of the Economy (MINECO). One of the few available documents on the Commission states that its aim was to develop guidelines for a future biofuels law:

> '[The Commission will] develop a Biofuels Law that will establish a legal framework designed to promote research, development and implementation of technology for the cultivation, production, processing, marketing and use of biofuels' (MEM 2007).

However, by the time of this research, an array of factors, including a lack of political capital, decision-making capacity, time and human resources, had rendered the Commission ineffectual. As one representative of MAGA, who sat on the Commission, explained:

> 'The problem is that our hands are tied because, one, we're not a group that is able to make decisions, those that make decisions are higher up in the ministry. And, two, [staffing] instability means that at any moment they can take us off the Commission so all the knowledge is lost' (GG8, March 2012).

This quotation highlights not only the relatively low status of the Commission (underscored by the appointment of junior officials), but also the negative impact of staff turnover on the development of plans and policies to promote biofuels. With regard to the first of these issues, although individuals on the Commission participated in cross-ministerial meetings and spoke at conferences and workshops, they could not act upon the recommendations made at such events. Those decisions were to be made (or not) by ministers and vice-ministers who knew little about biofuels. Furthermore, those involved in the Commission explained that their work on biofuels was carried out in addition to their official duties (GG4, GG8, March 2012). While the Commission still nominally existed at the time of the field research, the change of administration in early 2012 oversaw the loss of key personnel from across government departments, which further reduced the relevance of this state-led initiative.

The last couple of years have again witnessed a renewed interest in biofuels, however, this time driven largely by external actors, principally the Organisation of American States (OAS), which is working with the Brazil-U.S. Memorandum of Understanding (MOU) to Advance Cooperation on Biofuels (IO5, April 2013; see also Chapter Two). Under the MOU, the U.S. and Brazil have agreed to work jointly to 'bring the benefits of biofuels to select third countries', beginning with Central America and the Caribbean (US State Department 2007). The role of the OAS in the MOU is to support efforts in the development and use of 'sustainable bioenergy' in

Central America. In Guatemala this support has largely consisted of technical and policy support (IO5, April 2013), including financing for a U.S. consultancy to draw up a proposal for a new *Ley de Biocombustibles para Guatemala* (Biofuels Law for Guatemala). This proposal was published in late 2010 (Hart Energy 2010a, 2010b), but had gained little traction for reasons will be explored in this chapter.

Thus, at present, there is no domestic market for biofuels in Guatemala. Yet, as we have seen in Chapter Six, fuel grade ethanol from sugarcane is already being produced on an industrial scale. Supply is not therefore a constraint on the development of a domestic market – at least not for ethanol. Indeed, many private sector proponents of biofuels argued that current ethanol production would be sufficient to supply a domestic requirement for a 10% ethanol/ gasoline (E10) blend (GP1, November 2010; GG1, December 2010; GP13, February 2012; see also USDA 2010, 2012a; Hart Energy 2010a). For biodiesel production capacity, the picture is more complex due to the embryonic status of the biodiesel industry (see Chapter Six). Table 17 illustrates current transport fuel consumption in Guatemala as well as the projected demand that an E10 blend and 2% biodiesel blend with diesel (B2) would require.

Table 17. Fuel consumption and projected biofuel demand

Potential fuel/ biofuel blend	Demand (million litres/ year)			
	Fuel consumption (2009)	**Projected biofuel demand**	**Production capacity (2011)**	**Surplus production**
E10	1270	127	237	+ 110
B2	1591	32	9*	- 23

Source: Hart Energy (2010a); CENGICAÑA (2011a). *estimated biodiesel production, see Chapter Six.

In order to explain the absence of a domestic biofuels market, the next section details the key actors involved in promoting or contesting biofuels, identifying their motivations and concerns for the developing sector.

7.2. Actors: motivators and barriers

An understanding of how biofuels have developed in Guatemala requires a focus on the characteristics, motivations and associations between the different actors involved both directly or indirectly in the sector. This actor-oriented approach also allows an exploration of power dynamics and, in particular, of how power facilitates some framings, narratives and values whilst marginalising others (Bryant and Bailey 1997; Ariza-Montobbio et al. 2010). An appreciation of the actual exercise and effects of power on the sector will also allow a greater understanding of the successes and limitations of the market-led governance of biofuels in Guatemala (Partzsch 2011; Griffin 2012; Fortin and Richardson 2013). This section therefore explores the motivations and attitudes of key actors towards the production and use of biofuels in Guatemala; Table 18 identifies the broad actor groups associated with biofuels.

Table 18. Actors with an interest in the biofuels sector

Private sector	Public sector	Civil society	International organisations
Agroindustry	Government ministries	Universities	International Financial Institutions
Business associations	Government agencies	National NGOs	Aid agencies
Small and medium enterprises	Congress	Rural communities/ public	International NGOs
Oil companies	Local government	Media	

It should be noted that the actors listed in Table 18 do not constitute homogenous entities; rather, each group should be understood to encompass different values, cultures, and perspectives (Lewis 2003; Hunsberger 2010; Rafey and Sovacool, 2011). Furthermore, there will be complex linkages between the different groups, which will also be characterised by asymmetrical power relationships. Recognising this diversity, the actors are nonetheless clustered here to look for key commonalities and differences within and between groups. The following sections discuss the characteristics and motivations of the actor groups listed in Table 16 in turn; particular attention is paid to the state and civil society, since biofuel producers (i.e. the private sector) were the focus of Chapter Six.

7.2.1. The Private Sector

The private sector has, to date, been the driving force behind the Guatemalan biofuels sector (see Chapter Six). There was, however, considerable range in the nature, scope and scale of private sector activities. There were few private sector actors that were focused solely on biofuels, although a notable exception was the Association for Renewable Fuels[31] (ACR), an industry-led association set up to promote the domestic consumption of biofuels in Guatemala. Interviews revealed that the attitudes of private sector actors towards biofuels were based primarily on economic arguments. For example, while agribusinesses, motivated by the

[31] *Asociación de Combustibles Renovables*

economic opportunities, were conditionally in favour of biofuels, oil companies, who potentially stood to lose a share of the fuel market, were opposed. The environmental and, to a lesser extent, social rationales were cited by private sector respondents, but these should be understood as strategic and supplementary to the underlying economic rationale.

Agribusiness: sugarcane and African palm

The production of biofuels within Guatemala was dominated by the sugarcane sector. As described in Chapter Six, two sugar mills had invested in distillation and dehydration plant in response to the opening up of international, specifically European, demand for biofuels. At a sectoral level, interviewees were neither in favour nor opposed to the creation of a domestic biofuels market; rather, the emphasis was on the opportunities for product diversification since fuel grade ethanol offered an additional market for a co-product of sugar processing. That only two sugar mills had invested in dehydration facilities, one of which was unsuccessful, suggested that the other mills were waiting to see whether the investment paid off (GP6, GP7, December 2011; GP15, March 2012; see also Section 6.2).

The other key actor with the potential to produce biofuels was the palm oil sector. However, the evidence presented in Chapter Six suggests that, at the time of writing, no biodiesel was produced from palm oil (GP1, December 2010; GP10, January 2011). Although many NGOs contested this claim, the key markets for palm oil remained food markets since a higher price was paid without incurring the extra processing cost required to produce biodiesel. According to the interviewee from GREPALMA, palm oil companies recognised that biodiesel represented an opportunity to diversify production, but considered the additional investment required to produce biodiesel unjustifiable. She observed:

> 'There is no incentive to find other uses of palm oil... Let's say the market signals are not worth it, we haven't found a market attractive enough to make an incursion into the biodiesel market' (GP10, January 2012).

Rather, like many sugar mills, these companies were keeping a watching brief on biofuel markets. Interviewees from the private sector also blamed the lack of interest in biodiesel on widespread criticism of the palm oil sector by NGOs, which had published several reports blaming palm oil expansion on international demand for biofuels (e.g. ActionAid 2008, 2010; Hernández and Casteñada 2011; Oxfam 2013). As one interviewee explained:

> ‘Studies such as these [*she points to a copy of an NGO report critical of biofuels*], kill biodiesel before its even been born. There are all these reports that link the expansion of palm oil to the production of biofuels and it’s not true’ (GP1, December 2011).

Ascertaining whether palm oil is used for biodiesel was complicated by the closed nature of the sector and the availability of data (see Chapters Three and Six). However, these comments suggest that if there was interest in biodiesel production, it was very much viewed as a potential consideration for the future.

Private small to medium-scale biodiesel producers

In addition to agribusiness actors, there were a number of small to medium-scale biodiesel producers (see Section 6.3). Used Cooking Oil (UCO) was used as the principal feedstock although oilseeds, including soya and jatropha, were also used (FV6, FV7, November 2010; FV9, December 2011). The motivations for the small-scale production of biodiesel varied: one company was partly motivated by the desire to raise awareness of the environmental consequences of people’s fuel consumption (e.g. Biopersa), others wanted to make use of their waste oil (e.g. Serandi), while others were motivated by profit (e.g. Biocombustibles de Guatemala) (GP1, GP2, December 2010; GP12, January 2012; GP16, March 2012). These actors viewed the development of a domestic market for biofuels favourably, although they had little faith that one would be established in the short to medium term (GP2, GP12 February 2012). For those not producing biodiesel for use in their own fleets, the emergence of new biodiesel producers had increased competition for UCO. These actors identified the increasing price of UCO as the biggest risk to the nascent biodiesel sector (FV6, November 2010; FV9, December 2011). Another company has developed an alternative chemical process to produce biodiesel. Rather than producing biodiesel through a process called FAME (Fatty Acid Methyl Esterification), this company has developed a process called ‘High Enthalpy Biofuel’ (HEBF), which uses a fatty nitrate rather than methanol. According to the inventor of this process, it is truly ‘green’ unlike FAME biodiesel (GP9, January 2012). In 2012, the company sold the intellectual property rights to a venture capitalist and hoped to eventually produce 4,500 litres of biodiesel per day (GP9, January 2012).

The Association for Renewable Fuels (ACR)

The ACR was the key actor involved in advocating and promoting a domestic biofuels market. This not-for-profit business association was established by companies interested in promoting biofuels in Guatemala, which included potential producers of both ethanol and biodiesel. Many respondents pointed to an individual person within the ACR who they argued had done more than anyone else to promote and raise awareness of biofuels within Guatemala. This individual was known by everyone connected to biofuels – be they advocate or opponent – and had worked to champion biofuels in Guatemala, particularly amongst state actors. She was a gatekeeper and an information hub[32]; the ACR had made documentaries (which were shown on national television) and had organised conferences and training days to raise awareness of biofuels particularly amongst civil servants, decision-makers, universities and the private sector. The capacity to raise and to shape policy debates gave this individual 'charismatic authority', an informal mode of power that stemmed from her ability to network with diverse actors (Griffin 2012).

Although the ACR wanted government legislation to create a domestic market for biofuels, the many barriers to this were recognised and the association had adopted a pragmatic approach:

> 'We are never going to replace the use of petrol entirely, but what we hope to achieve with biofuels is to little by little replace its [petroleum] use and to depend less each year on imported fossil fuels' (GP1, December 2010).

The ACR argued that the benefits of biofuels were multiple and included positive environmental (the reduction of greenhouse gas (GHG) emissions and replacement of MTBE[33]), health (improvements to air quality) and economic (import substitution) impacts. The risks associated with biofuels were acknowledged, but dismissed by a representative of the ACR. She argued that the certification by the EU-approved International Sustainability and Carbon Certification (ISCC) scheme of the two sugar mills that were producing ethanol was evidence that production was sustainable. Although the ACR representative acknowledged concerns about labour rights and deforestation in Guatemala, she argued that these should be kept 'separate' from discussions of biofuels since they affected agriculture as a whole (GP1, December 2011).

[32] As mentioned in Chapter Three, this individual was interviewed on four occasions between November 2010 and April 2013.

[33] MTBE (methyl tertiary-butyl ether) is used as a fuel additive in petroleum. It has been used as a replacement for lead since the 1970s since it is an oxygenate that helps petroleum to burn more completely, thus reducing harmful tailpipe emissions. However, MTBE is thought to be carcinogenic and, because it mixes well with water, a water contaminant. Ethanol has been proposed as a replacement for MTBE (EPA 2012).

Ultimately, however, the interests of the ACR were dependent on those of its members, which were profit motivated.

Oil Companies

The final private sector actors with an interest in biofuels were national and international oil companies. I was unable to interview oil industry representatives (see Chapter Three), but this group was identified as a key barrier to the establishment of a domestic market for biofuels (GP1, December 2010; GP8, December 2011; GP12 January 2012). Citing the loss of market share that a biofuels mandate would entail, one private sector interviewee observed:

> 'If today you had 100% of the gasoline market, would you let me sell off 10% of your market? [...] Transnational oil companies fight daily for each percent of their market share, because every percent signifies a lot of money in sales and in business. So, at no point are they are going to be interested in renewable fuels, in environmentally-friendly fuels or whatever epithet they are given' (GP12, February 2012).

This interviewee also suggested that, since the petroleum industry provided tax revenue, the state was reluctant to alienate oil companies. For these private sector respondents, the influence of the oil companies materialised in only lukewarm state support for biofuels in the face of evidence of the many 'benefits' that biofuel could provide. Given the political privilege that the sugarcane sector elites and other domestic oligarchs enjoy, this is an interesting perspective; I will return to the relationship between state and private actors in the next section.

7.2.2. The Public Sector

Like many countries in Latin America, since the mid-1980s Guatemala has undergone a shift of power and responsibility away from central government towards municipal governments (Tulchin and Selee 2004). In 2012, just over 10% of Guatemala's national budget was allocated to municipal governments (GG10, April 2012). A representative of the Secretariat for Territorial Planning and Programming[34] (SEGEPLAN) explained that the policy priorities of municipalities tend to focus on the provision of local services, including waste management, forest management, education and roads, rather than on long-term planning (see also Andersson 2006). Her office was, however, working with local governments and community representatives to develop visions and strategies for municipal development (GG5, March

[34] *Secretaría de Planificación y Programación de la Presidencia*

2012). In the few plans that had been developed, biofuels were mentioned only with reference to African palm and the need to develop an 'agricultural balance' between the needs of large and small scale producers. As a result, the responsibility for the promotion of biofuels is located within national government; this analysis therefore also focuses on central government.

A number of state ministries were involved in the promotion of a domestic market for biofuels, including MEM (with overall responsibility for biofuels), MAGA, MARN, MINECO and the Ministry of Finance (MINFIN). Biofuels were represented in the legislative branch of government through the Congressional Commission on Energy and Mining. Biofuels were not a priority of the Congressional Commission, however, which was focused on mining and petroleum and, in particular, on attracting foreign investment in these sectors (GG6, March 2012).

The different policy functions and responsibilities of each ministry reflected ministerial interests in and attitudes towards biofuels. One government actor recognised the multiple drivers of biofuels:

> 'Biofuels can be seen from lots of different perspectives, for example as economic development for the country, creating a better environment and obviously updating our energy matrix, reducing dependence on fossil fuels. These are three important factors. Obviously the world is evolving, new markets and new products are developed and we have the opportunity to produce this class of products. We see great potential that we must take advantage of – something that offers social benefits and can generate new employment opportunities. Furthermore, in the future, we know that this technology will develop and we will be able to have to develop our capacity in ethanol and biodiesel. So, we too have to move at the same pace as globalisation' (GG1, March 2010).

For MEM (GG1, December 2010; GG4, March 2012), the principal drivers were reduced dependence on fossil fuels, import substitution and the replacement of MTBE. Another motivator was the use of biofuel as a measure for tackling contraband. The illegal flow of fuel from Mexico, which had a subsidised fuel market, to Guatemala, with a liberalised fuel market, was increasing. It was argued that the use of biofuels in petrol would enable state authorities to detect contraband fuel (GG4, March 2012). However, it was also acknowledged that an E10 blend would be likely to increase the price of fuel, a policy that would likely prove unpopular (GG4, March 2012).

Biofuels were largely viewed positively by interviewees at MAGA (GG7, GG8, GG9, March 2012). Although there was scepticism about the benefits of large-scale biofuel production, these participants believed that, if done well, some biofuel crops could deliver rural development opportunities for local communities. Crops such as sorghum and jatropha were viewed by officials as vehicles for delivering agricultural extension services to subsistence farmers, potentially offering beneficiaries not only new markets and economic opportunities, but also new agricultural knowledge. MARN, one of the newest and smallest ministries (GG11, April 2012), was focused on the environmental benefits of biofuels, particularly those related to GHG emissions reductions. However, whilst I was in Guatemala, I was unable to speak with anyone at MARN responsible for the ministry's engagement with biofuels. The change in administration had meant that the person previously responsible for their promotion had 'moved on' and was no longer contactable (pers. comm.). While I was able to interview someone at MARN about other issues, particularly environmental impact assessment (EIA), he professed a lack of knowledge about biofuels (GG3, March 2012). This did not surprise others who commented:

> 'I'm sure that they replaced him. There used to be an engineer who was the advisor to a vice-minister, but I'm sure that now the vice-minister has gone he has too' (GG4, March 2012).

Staffing turnover was identified as a barrier to the establishment of a domestic biofuels market. Not only did it lead to a loss of knowledge, but it also meant there were few people capable of 'championing' biofuels within government. Indeed, it was difficult to find someone within each ministry nominally responsible for their promotion. In response to my observation that I was finding it difficult to locate government officials who knew anything about biofuels, one respondent replied:

> 'That's because not many people know about it [biofuels], or rather they enter their post and they don't have the faintest idea about what's happening so it's difficult to get a sense of the state's position on biofuels' (GNGO11, February 2012).

The lack of continuity had consequences for establishing and building networks of biofuels with several respondents expressing their frustration about the need to 'start from scratch' each time there was a change in administration (GP1, March 2012; IO5, April 2013). A comparative study by Antonio Florian (2011) of policy change and civil service reform in Mexico and Guatemala, similarly found a relatively high turnover of civil servants in Guatemala, which contributed to a lack of specialisation amongst state workers. Florian also finds that with a change in government, personnel not affiliated to the newly elected political party are 'automatically' transferred to other government institutions (2011: 128; see also Sánchez 2008; Briscoe and Rodríguez Pellecer 2010).

None of the participants I spoke to reported any inter or intra-ministry conflicts over biofuels. While it was acknowledged that each ministry had its own, often multiple motivations for pursuing biofuels, they were not (yet) perceived to compete or conflict in any way. This suggests that, unlike other energy sources which may create tensions between, for example, those ministries tasked with combating poverty and those with promoting national economic development, biofuels did not. There were a number of possible explanations for this including the relative newness of this energy resource, the ostensible win-win outcomes, the lack of interest because of perceived irrelevance, and the participation of established sectors. However, several respondents spoke of the challenge of working across the policy domains, which required cooperation amongst different government ministries. Compounding this issue was the fact that there was no single ministry, department or individual charged with overseeing the development of biofuels. Although MEM was nominally in charge, the requirement for integration across policy domains resulted in a lack of ownership by any single ministry. While the cross-ministerial National Commission on Biofuels (see Section 7.1) was meant to fill this integrating function, it had met only a couple of times since it was established in 2006 and was largely obsolete by the time this research took place.

Public sector actors acknowledged the critical role of government in legislating demand for biofuels. However, as will be discussed in Section 7.3, few interviewees from government or other sectors thought a domestic biofuels market was a possibility in the short or even medium term. Despite this, some international organisations were trying to promote the domestic use of biofuels as the following sub-section explores.

7.2.3. International Organisations

International organisations, specifically the OAS and Inter-American Development Bank (IDB), were seen as key influencers of the development of a domestic biofuels market in Guatemala. For those actors promoting the domestic use of biofuels, such as ACR, this support was absolutely critical:

> 'I don't think that the OAS will rest until there is a new [biofuels] law – consensual obviously. This alliance helps us a lot, it helps that the diplomatic body is helping us to say 'do it, do it', this [support] is going to be very important' (GP1, March 2012).

The 2007 MOU between the U.S. and Brazil was regarded as a driving force behind the Guatemalan state's interest in biofuels (GG1, December 2011; GP1 March 2012). As part of its support, the OAS had organised several workshops in Guatemala, the most recent in May 2013, to generate consensus on the need to integrate biofuels in the energy matrix. At one such international workshop, held in May 2012 in which several Central American states participated, Guatemala was the only participating country that had made no progress on the development of a domestic biofuels market (GP1, April 2013). The OAS was also working with the ACR to set up a pilot project to raise awareness of biofuels in the capital city. The project would involve running a number of vehicles with different blends of ethanol, which would also be emissions tested. Although this pilot was first mentioned in an interview in December 2011, eighteen months later there had been little progress on the project (GP1, December 2011, April 2013; IO5, April 2013). Those involved in the pilot argued that a key benefit would be increased public awareness of biofuels, which was regarded by some state and international actors as a barrier to their adoption (GG4, GG8, March 2012; GP12; February 2012; GP1, April 2012).

Another international organisation mentioned by interviewees was the IDB, which had provided MEM with USD 400,000 of 'technical cooperation funding' to support the development of an action plan on biofuels (GG1, December 2010; IDB 2010). The OAS had also funded research into the potential for biofuels in Guatemala (Hart Energy 2010a-b). International organisations were credited with enabling research that would not otherwise have taken place (GG1, December 2010; GP1 December 2011). According to one interviewee, this meant that the state, specifically MEM, already had information on how to develop and implement a biofuels law, but what was lacking was the political will and capacity to do so (GP1, December 2011). Without the impetus provided by these IFIs, it was argued that the likelihood of developing a domestic biofuels market would be greatly reduced – as one private sector actor surmised:

> 'What's important right now is the support from the U.S. and Brazilian embassies and the OAS to develop a regional biofuels programme. For me, this is a window of opportunity, it's a light at the end of the tunnel, because perhaps the state is going to say 'they're right, we have to do it' (GP1, March 2012).

This, of course, leaves these activities vulnerable to a shift in priorities of international organisations, which could affect the future development of biofuels policy in Guatemala. A number of other international organisations were involved in the biofuel sector, although less directly. For example, several organisations have published reports on biofuels in Central America and Guatemala, including IICA (2009), CEPAL (2004, 2007) and UNCTAD (2007). Other organisations, including USAID, the EU Delegation and the FAO, worked on issues that may be affected by increased demand for biofuels, including land tenure and food security, but were not directly involved in their promotion.

7.2.4. Civil Society

There were several civil society actors with both direct and indirect links to biofuels in Guatemala, including NGOs, academia, the media, trade unions and communities. Social activism, however, was limited and civil society fragmented and weak (GA2, November 2010; GNGO7, December 2011; GA9, April 2012; see also McCleary 1999; Sanchez 2009). As one NGO explained:

> 'One of the biggest problems in Guatemala is that civil and social expressions are dispersed, hidden and lacking coherence' (GNGO7, December 2011).

This was not only a legacy of the civil war, which destroyed Guatemala's social fabric (Robinson 2003), but also a consequence of the country's growing insecurity and culture of impunity (see Chapter Five). Nonetheless, many civil society organisations had mobilised around the issue of biofuels and typically represented the dissenting voices. However, this group was not universally opposed to biofuels; depending on the scale, ownership and governance of the biofuel activity, some civil society organisations were cautious proponents. Excluded from national policy making processes, these organisations had taken advantage of international networks to draw attention to the alleged impacts of biofuels within Guatemala.

Non-Governmental Organisations

Many NGOs with different official mandates and priorities ranging from social justice to rural poverty alleviation to environmental conservation were working on biofuels. There was a distinction between NGOs working on environmental issues and those focusing on social matters, with very few of the former working on biofuels. Although the environmental impacts of biofuels elsewhere were recognised by NGOs, biofuels in Guatemala were largely viewed as a social issue, one that had negative consequences for rural livelihoods and communities. However, instead of focusing on potential synergies, environmental and social NGOs were often in conflict. One respondent explained that this situation arose after the 1989 Law of Protected Areas[35], which saw internationally-funded environmental NGOs (or *conservacionistas*) 'simply

[35] *Ley de Áreas Protegidas*, 1989

draw rings on a map' around those areas they thought should be protected (GNGO13, March 2012). These organisations were criticised by interviewees for their continued failure to take into account the presence of communities and for privileging nature over the rights of local people (GA9, April 2012; GNGO13, March 2012; see also Alonso-Fradejas 2011).

Although the nature, scope and scale of their activities varied, only one NGO was working directly to cultivate and promote the use of biofuels at the local level. Technoserve, an American NGO, was working with local communities to grow jatropha on land that was unsuitable for food crops and then to process it in local facilities (GNGO8, February 2012; see also Chapter Six). Other NGOs working on biofuels were large international NGOs, such as ActionAid and Oxfam, while still others were local, grassroots organisations focused, for example, on the rights of those displaced during the conflict. Many of the NGOs were at least partially supported by international donors – both governmental and non-governmental – which left them open to claims of international interference in sovereign matters, particularly economic development and human rights. One private sector interviewee observed:

> 'What happens is that NGOs – funded by Europeans, by Norwegians – are opposed to everything without actually having been to see what they're against. They have to be opposed to everything in order to satisfy their bosses – the donors' (GP13, February 2012).

No NGO I interviewed supported the large-scale production and use of biofuels based on monocultures. Those I spoke to believed that the way the biofuel sector in Guatemala was developing had little to do with the environment and more to do with profits and the exploitation of natural resources. As a result, many participants used the term 'agrofuel' rather than 'biofuel'. For one individual, the term 'biofuel' was a misnomer: the prefix 'bio' implied life, while 'agro' emphasised the non-natural and extractive nature of feedstocks produced in monoculture systems (GA3, November 2010). NGOs were concerned about the potential negative impacts on local communities and ecosystems, but also critical of the neoliberal model that was promoting the production and use of biofuels. One NGO representative described how agrofuels represented a new 'logic' of capitalist development:

> 'In Guatemala, the model of capitalist accumulation has three axes one of which is the installation and multiplication of crops for the production of industrial oils and agrofuels. In Guatemala, there are two crops – sugarcane and African palm – that have expanded as a result of this new logic of agrofuel production... The second axis is the exploitation and commercialisation of natural resources, which fundamentally includes petroleum, different types of minerals, forests and water... The final

> axis consists of megaprojects, which is nothing more and nothing less than the development of infrastructure that facilitates the creation of profits' (GNGO7, February 2012).

The use of a neo-Marxist lexicon was common, particularly amongst those NGOs who sought to promote an alternative development model for Guatemala, one that was not dependent on extractive industries and so-called megaprojects. However, the use of such discourse further excluded these organisations from influencing national level agendas, particularly because, since the 1990s, the Guatemalan state has embraced neoliberal reforms and has deepened the country's insertion into the global economy (see Chapter Five). The alignment of private sector and state interests continues to privilege and promote the neoliberal model of economic development. Many in the private sector dismissed arguments against biofuels as purely ideological; for example, the respondent from the ACR argued that NGOs would oppose biofuels even when faced with evidence about their positive impacts:

> 'There is a lot of land available, it doesn't matter what the land is used for – it could be for maize, plantain or banana - just the same the NGOs are going to be against it' (GP1, March 2012).

Despite their vocal opposition to biofuels, few NGOs had any input into the policy development process. For example, while the National Commission on Biofuels had sought the involvement of other sectors, including from the private sector and universities, there was no NGO involvement (GG1, December 2010). According to one academic, civil society organisations had to circumvent a large number of obstacles in order to make their voices heard. He felt that that despite NGO efforts to influence policy making, they generally achieved very little and particularly in those instances where corporate interests were at stake (GA9, April 2012). As discussed in Chapter Six, with their concerns overlooked at the national level, some NGOs had turned to international movements to draw attention to these local issues (GNGO3, November 2010; GNGO17, March 2012). By tapping into international campaigns on biofuels local NGOs had overcome their disadvantageous position at the national level. For these organisations, biofuels provided a powerful hook, one which enabled them to mobilise international support and therefore to reach audiences that belied their otherwise limited resources (Griffin 2012). For example, the 2013 ActionAid UK campaign, 'Food not Fuel', highlighted the plight of communities in the Polochic Valley that were evicted by the relocation of the Chabil Utzaj sugar mill. The campaign tied European demand for biofuels to the 'expansion of crops that can be turned into biofuels in areas already facing severe food insecurity' (ActionAid 2013). However, and as I will discuss in Chapter Eight, the sugar mill concerned was not actually producing biofuel;

this suggests that critics of NGOs were to some extent justified in their concerns about international involvement and exaggerated reporting on biofuels in Guatemala.

Academia and the research community

The research community in Guatemala is perhaps one of the most difficult set of actors to describe. Not only was it the most disparate in terms of the type of research (i.e. engineering, science, social science), but this actor group also had the most overlap with others. A key example would be CENGICAÑA, the private research institute set up and funded by the sugarcane sector, since it straddled both private and research sector. The presence of CENGICAÑA led one respondent to argue that there was 'basically nothing to investigate' with regard to ethanol, while much remained to be done for biodiesel (GP1, November 2010). However, this perspective overlooks the different motivations for research funded by private versus public actors, as well as the different onus on publishing and transparency.

Since 2007, the Guatemalan state had funded several small-scale biofuel-related projects (CONCYT 2013), the majority of which focused on crop agronomy, microalgae and engineering challenges for biodiesel production. Despite this, the lack of state funding for research – not just on biofuels – was commented upon by many respondents from across actor groups. It was argued that improving the state's capacity for innovation, research and development was vital for national development, but was not yet a priority for government (GP1, December 2011; GP12, February 2012; GA9, April 2012; IO5, April 2013). This is perhaps unsurprising given the low tax revenues discussed in Chapter Five, and the other arguably more pressing needs faced by the Guatemalan state. One private sector actor complained about the lack of state funding for research specifically for biofuels, stating 'Guatemala hasn't even invested five cents in it... what we need is money for research, research, research' (GP1, November 2010; also GA5, December 2010). Further, as observed by another private sector actor, the process for obtaining state funds was considered to be overly lengthy for what amounted to small funds:

> 'There is a national research council in Guatemala, but to apply for funds it take five years so that they give you twenty thousand dollars' (GP13, February 2012).

Limited state resources meant that much research funding came from international or private sources. Several actors argued that research commissioned by the latter carried the risk that any findings may or may not be made available for others to review and was likely to gloss over the potential negative impacts of biofuel production (GA4, December 2010; GP1, December 2011; GA8, April 2012). One academic who had been involved in research that documented land use change in Guatemala, funded by international sources, stated that:

> 'There is no official information about land use change because there is no money. There are no resources to put together a project of this sort… we also see that there is no interest in the political decision-making sphere in making this sort of information available for everyone to use' (GA8, April 2012).

Conversely, private sector actors argued that NGO research funded by international donors was highly partisan and therefore should not be taken at face value (GP1, December 2011; GP10, January 2012; GP13, February 2012).

Other civil society actors

There were a number of other civil society actors which have so far played only a minor role in the biofuels debate, including the media and the wider public. The mainstream media, for example, has yet to engage critically with the issue of biofuels. In 2009, Guatevision, a national news channel, aired a documentary promoting the use of biofuels, which was entitled '*The best kept secrets... biofuels in Guatemala*' (2009). This documentary was funded by the ACR and presented a uniformly positive picture of biofuels, making no mention of the potential negative impacts. Several visits to the national newspaper archives did not uncover any articles on biofuels, even published at the time of the ratification of Decree 17/85. More recent articles had focused on the outcomes of reports on biofuels e.g. '*OAS pilot pushes for ethanol*' (Prensa Libre 2013b). The Guatemalan online news website, Plaza Pública, had not focused on biofuels, but had published investigations into monocultures, including the report which exposed child labour in sugarcane plantations (Arce and Rodriguez Pellecer 2012).

As with many other countries, there was very little awareness of biofuels amongst the general population. Several respondents cited the lack of public awareness as a barrier to their wider adoption; these interviewees argued that the lack of knowledge meant it was easy to create 'myths' about biofuels (GP1, December 2011; GG4, March 2012). These 'myths' concerned the possibility of damage to car engines from the use of biofuels[36] rather than the potential negative social and environmental impacts of biofuels.

[36] Blends of up to 15% ethanol can be used without damaging car engines, which meant that an E10 mandate would require no changes to the vehicular park (GP1, November 2010; GG8, March 2012).

Finally, in terms of rural communities, many of those I visited that lived in the vicinity of fuel ethanol plants were typically unaware of their presence (FV13, FV14, FV15 April 2012). This was perhaps not surprising given that the cultivation of sugarcane has a long history on the Pacific Coast and that the sugar mills were an integral part of the landscape. Distillation and dehydration plants would have represented additional infrastructure in what were already large industrial complexes (see Figures 17 and 18). These local perceptions of the sugarcane sector will be discussed in detail in Chapter Eight.

7.3. Motivators and barriers to Guatemalan biofuels

Drawing on the above analysis, as well as information presented in Chapter Six, Table 19 presents a summary of domestic and international factors that respondents identified as having facilitated or inhibited biofuels in Guatemala.

Table 19. Summary of perceived influences on biofuels in Guatemala

	International	Domestic
Motivators	Climate change	Air quality (substitution of MTBE)
	Global fuel blending mandates (especially EU and U.S.)	Energy security (reduced dependency on fossil fuels)
	Peak oil	Desire for import substitution
	Promotion of trade	Industrial strategy (profits)
		Rural development (including employment)
		Anti-contraband measure
Barriers	Low international biofuel prices	Lack of domestic market for biofuels
	International NGO anti-biofuel campaigns	Lack of buy-in from key stakeholders
		Weakness of the state
		NGO anti-biofuel sentiment
		Limitations in research capacity, knowledge and infrastructure
		Infeasibility of small-scale production

This analysis reveals a complex picture in which actors – motivated by different objectives and operating under different assumptions and constraints – articulated very different perceptions, hopes and concerns regarding the development of biofuels in Guatemala. Some actors viewed biofuels as little more than an opportunity for economic diversification; others spoke of the multiple environmental, economic and social benefits that biofuels could deliver; while still others expressed their concern that the large-scale production of biofuels would only benefit economic elites while further disadvantaging rural communities. As this chapter has suggested, the limited capacity of the Guatemalan state and the political and economic resources of certain actor groups had provided unequal opportunities for those seeking to influence the development of biofuels in Guatemala. It has highlighted the highly asymmetrical power relations between those actors seeking to influence the policymaking process. In particular, the alignment of state and domestic private sector actors determines what enters the policy arena and what does not, thus reinforcing existing inequalities (Bryant and Bailey 1997). This means that the perspectives of many NGOs, typically those representing the dissenting voices, have been excluded from the policymaking process. It has also meant that the policy debate has centred on the creation of a large-scale market for biofuels, rather than on smaller scale production that, given the right legislative framework, could deliver rural livelihood benefits.

Scales of production

The motivations and barriers differed according to the scale of biofuel production and use. Unlike Hunsberger (2010) who found that there was competition between small and large-scale in respect of jatropha-led development in Kenya, in Guatemala these models co-existed. Not only were the actors involved in promoting the two models different, but the feedstocks, drivers and challenges also differed. There was therefore little overlap between the two models and arguably little potential for conflict. The small-scale biofuel model was driven by objectives relating to poverty reduction and agricultural development. This model was supported by some civil society actors and government departments (see section 7.2.2.), motivated by the potential rural development opportunities offered by biofuels. Only a small number of projects had been developed under this model, most focusing on the small-scale, local-level production of jatropha. As discussed in Chapter Six, low yields, the prohibitive costs of maintaining and harvesting the plant, and the lack of end markets were identified as important barriers to the success and longevity of the projects operating under this model. The absence of end markets meant these projects typically focused on increasing agricultural productivity and on generating household income. The potential contribution of small-scale biofuels to household and community energy security had been a motivator of just one project (see also Chapters Two and Five).

By contrast, the large-scale model was promoted by a range of private, state and international actors, and was motivated by objectives such as import substitution, commercial production for export, and reductions in carbon emissions. This model of biofuels development was particularly evident in the large-scale production of ethanol from sugarcane that was underway in Guatemala. For the mills that were producing ethanol, the actual end market, i.e. whether national or international markets, potable or fuel markets, was unimportant (see Chapter Six). Other actors, from both the private and public sector, articulated a longer-term vision in which a percentage of domestic transport fuel would be replaced by domestically produced biofuels (GG1, December 2010; GP1, December 2011, April 2012; GP11, January 2012; GP12, February 2012; IO5, April 2013). However, while the sugarcane sector was already producing sufficient ethanol to supply a 10% ethanol/ petroleum blend, the nascent biodiesel sector faced several critical challenges. First and foremost was the lack of feedstock: as we have seen, jatropha remained years from commercialisation, demand for UCO had already outstripped supply and, in the case of palm oil, food markets were more profitable than biodiesel markets. Further, in the absence of domestic production, there were few import substitution benefits. Biodiesel therefore made little macroeconomic sense, a situation exacerbated by the availability of cheap contraband diesel (GG4, March 2012).

7.4. The absence of the state: a domestic market for biofuels?

In Chapter Two I argued that the lack of natural markets for biofuels has meant that both the demand and the institutional frameworks to govern their use have had to be created. Governments have therefore played a key role. However, as this chapter has demonstrated, in Guatemala there was no domestic biofuels market and the state had played only a minor role in supporting the sector – whether large or small-scale. Rather, it had been left to private actors to develop the biofuels sector, specifically the sugarcane industry (see Chapter Six). The development of biofuels in Guatemala should therefore be viewed not as an energy or climate change policy, but rather as an industrial strategy. Although government officials expressed interest in their development, and despite support from international organisations, the likelihood of a domestic mandate for biofuels in the short to medium term was considered remote by those I interviewed. Table 19 provides some possible explanations for the absence of the state in Guatemala's biofuel sector, including a lack of buy-in from key stakeholders and the weakness of the state. These two issues are discussed further in the following section.

7.4.1. The weakness of the state

Many of the barriers to the development of a domestic biofuels market related to the perceived weakness of the Guatemalan state. This had many facets, but most obviously manifested in a mistrust of the state. Complaints of corruption, venality and cronyism were common. Many NGOs were deeply critical of the state which they argued only represented the interests of Guatemala's economic elites, further reinforcing existing inequalities. Moreover, scarce public resources and a bureaucratic state restricted the capacity of state institutions to enforce and monitor compliance with the law.

For proponents, biofuels were argued to have fallen foul of endemic short-term thinking in Guatemalan politics. Respondents were extremely critical of the failure of successive governments to develop long-term policies, for instance, in the case of the energy sector. As one actor explained:

> 'I think the biggest problem in Guatemala – not just in energy policy – is the lack of long-term policies. If you look at the judiciary, at exports, at energy we don't know where we're going. If we want to have a modern energy matrix we have to diversify, reduce oil dependency, we need targets and indicators, but there's no vision' (GP7, December 2011).

Exacerbating the lack of long-term planning was a high turnover of civil servants, particularly at more senior levels. This was especially true after elections, wherein those considered favourable to the old administration were removed from their posts to be replaced by those sympathetic to or with links to the new administration (see also Florian 2011). As one respondent, who worked for an international donor, explained:

> 'When there is a change of government, there is usually a complete change of personnel, not only of the higher ranking civil servants – which I could understand – but also of the lower ranks. This means that there is a complete lack of continuation and that knowledge building has to start from scratch. It takes two years to get the civil service up to speed, a year to focus on policies and a year to think about the next political campaign' (IO2, March 2012).

While policy priorities will always shift with changing administrations, the high turnover of civil servants, as the above quote indicates, signified a loss of knowledge and experience. This meant that with each administration there was a need to start over. Furthermore, the lack of policies and plans to promote biofuels led one actor to question the government's understanding of biofuels, arguing it had no 'real concept' of what biofuels were, 'nor where they come from, nor of what they can do' (GP13, February 2012). Consequently, there was no single, unifying biofuels narrative behind which state actors could unite.

The chronic underfunding of state institutions was also commented upon by many respondents. As one respondent explained 'there's no shortage of laws' (GG4, March 2012), rather the issue was one of institutional capacity to enforce and monitor compliance with the law. These constraints on capacity were financial, political, human and professional, and had deep historical origins (see Chapter Five). As discussed in Chapter Six, this had created a public sector dependent on private sources of credit and also affected the provision of basic services (Oglesby 2004). Interviewees explained that scarce resources meant the government 'had other priorities' and biofuels were low down on that list. One private sector respondent argued:

> 'It's not that biofuels don't matter to government, but it has other priorities – security, health, education – and I agree that first we have to address those. There are people going hungry and how are we going to say to them 'here's a biofuels project that needs a million dollars'? So it's a vicious circle' (GP12, February 2012).

The low priority afforded to biofuels was accentuated by a lack of political will. Briscoe and Rodriguez-Pellecer (2010) characterise the Guatemalan state as a 'political marketplace', one in which public policies are open to both formal and informal channels of influence. The sense that policy and politics were 'up for sale' (Sanchez 2008, 2009) was also expressed by several respondents who argued that in Guatemala politicians were primarily motivated by personal interest. One interviewee felt that as long as politicians perceived no tangible, personal benefit from the promotion of biofuels there would be no political support (IO5, April 2013). While domestic actors, who were more locally embedded than transnational corporations, for instance, were unlikely to disinvest or close down a plant if they did not approve of legislative changes, they were able to withdraw political support (and payments) for politicians promoting unpopular legislative changes (see also Bryant and Bailey 1997). One academic referred to this process as the 'privatisation' of national policy (GA8, April 2012). Moreover, close political contacts at senior levels of government provided economic elites with political power, highlighting the close relationship between the state and domestic elites (Oglesby 2004, 2010; Krznaric 2006; Briscoe and Rodriguez Pellecer 2010; see Chapters Five and Six).

7.4.2. Lack of buy-in from key stakeholders

Another challenge for the development of a domestic biofuels market was the lack of buy-in from key stakeholders. This was closely tied to the weakness of the state and, in particular, the alignment of state and domestic private sector interests. Although an official at MEM argued that the state could develop a biofuel policy without the involvement of other sectors, he acknowledged that, given the failure of *Decreto 17/85* and the various barriers to the development of a domestic market, taking unilateral action without engaging in dialogue with other stakeholders would be imprudent (GG1, December 2010). However, as suggested in Section 7.2., no sector was yet motivated to lobby for the domestic consumption of biofuels. For the principal producers, the sugar mills, as long as export markets were profitable and accessible there was simply no motivation to support the creation of a domestic market. The other large agricultural sector with a potential interest in biofuels, the palm oil sector, had more profitable markets in food and therefore had little interest in the creation of a domestic market for biofuels (GP10, January 2012; see also Chapter Six). Those actors who would like to see such a market created, which included smaller-scale biodiesel producers, lacked the political capital to lobby for the creation of local demand. Furthermore, opposition from the petroleum industry – an influential sector which stood to lose a potential share of their market – suggested that, without lobbying from agribusiness, policy change was unlikely (GP12, February 2012; GG10, May 2012).

An interviewee at MEM explained that one of the key challenges for the state would be negotiating a price for ethanol with the sugar mills (GG1, November 2010). He acknowledged that international prices would likely be higher, but that a domestic market would have the advantage of being both guaranteed and stable. Given that a motivation for developing a domestic biofuels market was import substitution, a related challenge would be obligating fuel suppliers to use domestically-produced ethanol, especially if it was cheaper elsewhere (GG4, March 2012). It therefore appears that many of the factors that rendered *Decreto 17/85* obsolete almost thirty years earlier remain pertinent today; an implication being that once there was interest from Guatemala's economic elites the likelihood of a domestic market would increase. Given the weakness of the Guatemalan state, particularly in terms of it being a 'political marketplace', the lack of buy-in from key stakeholders meant there was little political and economic support for biofuels. As a result, no respondent thought that a domestic market was a possibility in the short to medium term. Indeed, one government official argued that only when a 'powerful economic actor' took interest in creating domestic demand for biofuels would it be possible. Until then, he argued, the government would continue to adopt a 'wait and see' stance (GG10, May 2012). Therefore, the state was neither showing leadership nor following what others were doing, but rather appeared to be keeping a watching brief on biofuels.

7.4.3. An exogenous solution?

The question therefore arises of why the Guatemalan government was still expressing an interest in biofuels. An example of this continued interest was the most recent energy policy, published in February 2013. The policy aimed to 'introduce alternative fuels' i.e. natural gas and biofuels in order to ensure supply security at competitive prices. The corresponding action was to 'present' a policy and regulatory proposal that would incentivise the use of biofuels (MEM 2013: 42). However, as discussed in Section 7.1, there have already been several such initiatives, including the proposed *Ley de Oxigenación* in 2006 and the draft law developed by Hart Energy and funded by the OAS in 2010. Whether this most recent stated intention will be any different remains to be seen; the timeframe for implementation of the energy policy was 2013 to 2027, a sufficiently long period to allow the government to monitor the situation without the need for immediate action.

It appears that just as ethanol producers were responding to international demand, so state actors were responding (rhetorically at least) to the global drive for biofuels. State actors had diverse reasons for maintaining the status quo and it was not (yet) in either their political or economic interest to create domestic demand for biofuels. At the same time, as long as there were international funds available to promote biofuels in Guatemala, as evidenced by continued investment by international actors, it was worth continued (rhetorical) support for a domestic market. Biofuels therefore represented an exogenously imposed solution; one that found some purchase, but not enough to garner sufficient political and economic support.

7.5. Governing biofuels in the absence of the state

The absence of the Guatemalan state in the biofuels sector has had consequences not just for demand for biofuels, but also for its governance. In particular, in the absence of the state, it has been left to private sector actors to determine the direction of the sector's development. Driven by economic interests, the domestic private sector has pursued a large-scale, export-oriented production model, which has led to concentrated private benefits rather than diffuse public benefits. This situation means that it has principally been the market, rather than the state, that has dictated the economic, social and environmental conditions that biofuels produced in

Guatemala must satisfy. Whether or not biofuels produced in Guatemala are considered 'sustainable' is therefore determined, not by those with specific knowledge of the Guatemalan context, but rather by international governance instruments.

As the principal market for Guatemalan biofuels, the hybrid governance arrangement of the European Union (EU) has assumed an important role in determining the standards with which Guatemalan biofuels must comply. As discussed in Chapter Six, the ethanol produced in Guatemala met the requirements of the International Sustainability and Carbon Certification (ISCC), one of the EU-approved certification schemes. It was therefore labelled 'sustainable' by the EU, which one respondent considered to be 'one of the toughest sustainability regimes in the world' (IO5, April 2013). This provided the sector with a powerful rebuttal to those who questioned the model of sugarcane and ethanol production that had developed. However, as this chapter has revealed, whether biofuels produced in Guatemala are sustainable is deeply contested and has contributed to a polarised debate on their development. This raises questions about whether the polycentric instruments developed to govern the sustainability of biofuels are able to capture issues relevant to local contexts; questions that will be explored in the final empirical chapter.

7.6. Conclusions

This chapter has focused on the actors involved in the promotion and opposition to the production and use of biofuels in Guatemala. It has also examined the political and economic factors that afford some actors greater influence over the direction of biofuels development than others, effectively determining what enters the policy arena. It has shown that while the country has a relatively long history of interest in biofuels, there is no domestic market for biofuels and little likelihood that one will be developed in the short to medium term. The near absence of the Guatemalan state in the biofuel sector contrasts with the situation in other countries, where governments has been responsible for the creation of both the demand for biofuels and the institutional frameworks that govern their use. Two of the barriers identified in this analysis provide a rationale for this absence, namely the weakness of the state and the lack of buy-in from key stakeholders. It has therefore been left to private sector actors, specifically the sugarcane sector, to develop and shape the biofuel sector. Motivated primarily by economic interests, the large-scale, export-oriented model of biofuel production that has emerged must, however, meet the requirements of international markets. For the EU, Guatemala's principal biofuel market, sustainability is a key component. In the final empirical chapter, I turn to an examination of whether the EU's approach to governance for sustainability can capture those issues that are salient to the Guatemalan context and specifically to local communities affected by the cultivation of sugarcane.

8. Governing for Sustainability: labour, land and environment

The previous two empirical chapters have focused on the mechanics of the production systems that produce biofuel feedstocks (Chapter Six) and on mapping the Guatemalan biofuel sector and the diverse perspectives, barriers and drivers of the development of a domestic biofuel market (Chapter Seven). This final empirical chapter builds on these analyses to examine the sustainability implications of sugarcane production at the local level. In so doing, it addresses the final two research objectives that were set out in the introduction to this thesis: *to examine the outcomes of sugarcane ethanol for different social groups;* and, *to assess whether the European Union's approach to governance for sustainability captures those issues that are salient to the Guatemalan context*.

As discussed in Chapter Two, biofuels were originally posited to deliver carbon benefits, as well as to provide opportunities for rural development. However, as we have seen, doubt has since been cast on these benefits and an increasingly critical literature suggests that the outcomes, particularly social and environmental, may be more damaging than beneficial. Previous chapters have suggested that the (economic) benefits have been concentrated in the hands of a few – the domestic elites who have long dominated politics and economy – while local communities suffer the negative consequences of feedstock production. According to interviewees within the sugarcane sector, few difficulties were encountered in complying with the International Sustainability and Carbon Certification (ISCC) standard. This means that Guatemalan ethanol can be considered 'sustainable' according to one of the world's 'toughest' governance regimes (IO5, April 2013). Yet critics argued that fuel ethanol produced in Guatemala was highly unsustainable, driving changes in land use, exacerbating social inequalities and weakening already fragile rural livelihoods. This chapter draws on interview data, field visits and document analysis to investigate these claims and to assess the sustainable development of the sugarcane sector in the Pacific Coast and the Polochic Valley.

The chapter is divided into four sections; the first section describes the two sites of sugarcane production in Guatemala and provides an account of the lived experiences of some of those affected by the cultivation of this crop. The following section focuses on three issues which emerged from interviews and field visits as particularly important to the Guatemalan context: labour, land and local environments. To do so it interweaves the narratives of local communities affected by sugarcane production, with those at the national level, including those charged with ensuring Guatemalan biofuel production complies with the EU's sustainability criteria. The final section concludes with a discussion of whether exogenous governance frameworks, particularly that developed by the European Union (EU), are able to capture those issues that are salient to the Guatemalan context.

8.1. Sites of sugarcane cultivation

As discussed in Chapter Six, there are two sites of sugarcane cultivation in Guatemala: the Pacific Coast and the Polochic Valley. These two regions have very different social, economic and environmental characteristics, yet despite their differences both are undergoing a process of (re)concentration of land driven by the expansion of monocultures, including sugarcane and African palm. The consequences of this (re)concentration were also similar in the two regions, although manifested in different ways. In this section, I introduce the two regions, but focus on complex events in the Polochic Valley, which have attracted considerable international attention in recent years.

8.1.1. The Pacific Coast

> 'Personally, I like the place where they [the sugar mills] are, it's magical. I like the sun there, everything is very green and, besides, the mysticism of the sugar mills is very attractive. The people that live there are very content, because I often ask myself – are they okay? And I ask them if they are sure and, yes, they tell me they do belong, and that's really positive' (GP7, December 2011).

> 'I have lived in this community my whole life, but now we are fighting for access to our land... All the big companies, the landowners have come and taken away what was ours and we're fighting to see if we can get it back' (Doña Cayela, FV14, April 2012)

The above quotes highlight the different perspectives of sugarcane cultivation on the Pacific Coast. While some – typically those affiliated with the sector – viewed sugarcane as a key contributor to local development, others – especially local communities and NGOs – felt that sugarcane was negatively impacting on livelihoods and land. As we have seen in Chapters Two and Six, debates about biofuels are intertwined with the production systems upon which they are based and these contrasting perspectives were also illustrative of the highly polarised nature of the biofuels debate in Guatemala. This chapter, however, aims to contribute a more nuanced discussion, one that goes beyond discussions of 'good' and 'bad' and that situate the debate within the country's complex agrarian history.

Sugarcane cultivation has historically been located along Guatemala's Pacific Coast. The region has a long history of export agriculture, one in which the country's landowning elites have taken advantage of the fertile volcanic soils, stable climate and plentiful water resources (see Figure 29). The region is home to 14% of Guatemala's population (SEGEPLAN 2011), a population which swells during the six months of the *zafra* (harvest) as people migrate from the highlands in search of temporary employment on the coastal plantations. Entire families migrate to the coast during the *zafra*, disrupting schooling and communities, but enabling families to make ends meet. An estimated 800,000 to 1 million Guatemalans migrate on a seasonal basis each year, although not all migrate to the Pacific Coast (Alwang et al. 2005).

Figure 29. Sugarcane cultivation on the Pacific Coast

Source: FUNDAZUCAR (2012)

Almost one third of the population of the seven departments[37] on the Pacific Coast is indigenous and there are considerable differences between these departments. In 2003, the indigenous population of Quetzaltenango was 54%, while that of Santa Rosa was just 3% (INE

[37] San Marcos, Quetzaltenango, Retaleheu, Suchitepequez, Escuintla, Santa Rosa and Jutiapa.

2003). Around half of the population live in poverty, with 10% living in extreme poverty (PNUD 2011); while still high, these figures are below the national average (see Chapter Five). Fisheries, tourism, agriculture and commerce are key economic activities in the region. Concessions to foreign companies for the extraction of iron from the iron-rich, black volcanic sands along the Pacific Coast was identified as a key threat to local economies and environments (GNGO15, March 2012; GA8, April 2012).

Most of the region's urban centres are located along the C2 highway (see Figure 30), which runs along the coast from Mexico to El Salvador. Away from the highway, many communities subsist in isolated places; economic activities consist of artisanal fishing and subsistence and small-scale farming, typically on land rented from large landowners. Lacking basic services, such as roads, schools and health centres, economic opportunities in these communities are scarce and many people, particularly men, have left these communities to find work in the capital or other urban centres.

Figure 30. Map of Guatemala's Pacific Coast

Source: adapted from MAGA (no date). Figure not to scale.

Sugarcane cultivation is concentrated in three departments: Escuintla, Suchitepéquez and Retalhuleu (see Figure 17). Together with the mills and the country's main port, Puerto Quetzal, the sugarcane sector represents an agricultural cluster (see also Chapter Six). Many in the private sector attributed the region's economic development to the sugar mills and cited their importance to local economies not just in terms of direct employment, but also in terms of the indirect impacts (GP11, January 2012; GP14, GP15, GP17, March 2012). According to interviewees in FUNDAZUCAR, local cutters represent 43% of those employed by the sugarcane sector, with migrants – particularly from the highlands – accounting for the remainder (GP18, March 2012). As one respondent explained:

> 'We're the principal source of employment, that's to say they [local communities] depend on us – us [Tululá], the other mill [Santa Ana] and there's also a Pepsi Cola plant, these three companies employ 80% of the workforce, the other 20% is commerce. Here, there's a phenomenon where on pay day the municipality is converted into a market – there's people, clothes, food, shoes, medicine... people come from all over' (GP14, March 2012).

However, field visits and interviews with NGOs working with rural communities along the Pacific Coast (see Chapter Three) revealed a different perspective. In particular, those I spoke to in the communities were less sanguine about the (economic) benefits of sugarcane cultivation. They complained of a loss of access to land for growing maize, beans and other crops for subsistence; unable to rent land, many families, particularly the men, sought work on the plantations. However, even this was precarious as much of the work was seasonal, temporary and poorly paid. Due to the physical demands of the work, there was a preference for younger men, i.e. those under 40, which meant there were only limited employment opportunities for older men and women. Although mechanisation of the harvest was limited, it had nonetheless reduced the size of the workforce (GP4, November 2011). Even though the communities along the Pacific Coast were accustomed to the production of monocultures, not just sugarcane, there was a perception that the situation had worsened in recent years. One woman explained:

> 'Now it's all just sugarcane, everything is sugar, all around us. There's no maize, there's nowhere to work. Before when there was cotton, we would work in the cotton fields, but now it's just sugarcane. It doesn't even need people, they just use machines; it's only machines, so there's no work here and each year it gets worse. The rich have a strategy, they use machines so that they don't have to employ people' (Doña Rosaria, FV15, April 2012).

This quote also highlights the sense that these communities were marginalised by landowners. When I asked one man whether the owner of the plantation he worked on had ever visited the municipality, he scornfully replied:

> 'The owners of the companies don't come here! They fly over us in their helicopters, but they're not going to talk to us, absolutely not. They do nothing for us' (Don Julio, FV14, April 2012).

This perception also extended to government, of whom those in the communities I visited were extremely critical. As Doña Maria Emilia commented:

> 'Governments have come and gone and they have all treated us as though we were rubbish. They only worry about us when they're announcing their candidacy, but they're all the same... It's thanks to us that they get into power, but they don't do it for us, they do it for themselves' (FV15, April 2012).

Many residents also commented on a transformation in the social fabric of their communities. While there had never been a 'golden age' – indeed many of these communities suffered as a consequence of the 1980 agricultural strike (see Chapter Five) – there was a sense that the expansion of large-scale agriculture and the concurrent loss of traditional livelihoods had weakened community and family ties. Way (2012) argues that across Guatemala the lack of employment opportunities and continued low wages have forced families to find other ways to survive, creating 'ephemeral' households and the breakdown of the traditional family unit. Supporting this, residents spoke of how, unable to find land to farm, men increasingly sought work on the plantations or left their communities to find work in the capital city or other urban centres. Women explained that they too had sought additional income where they could, taking on washing, ironing and setting up small shops, in order to support their families. The lack of employment opportunities meant that narcotrafficking and gangs offered a 'way out', particularly for young men in the communities. On the Pacific Coast, many spoke of the need for their communities to come together and to 'organise' in order to stem the changes that were underway. However, they also discussed divisions within their communities caused by some being employed by the plantations, while others sought to fight against them. The fear of blacklisting provided a powerful disincentive to protest: how could they complain when their complaints could cause others to lose their jobs? Despite these concerns, many were working with national peasant movements and other grassroots organisations to resist the onslaught of more powerful actors – the rich, the big landowners and the companies. This involved education and awareness raising, participation in national protests, and the election of spokespeople to voice concerns and represent the concerns of the community to national peasant assemblies (GNG10, February 2012; GNGO14, March 2012; GNGO18, April 2012). Residents spoke of the sense of empowerment and of their hope that by organising they could give their children a better future:

> 'The problem is that they won't give us, the *campesinos,* work, but nor is there land to cultivate, to sow the basic grains that we need to subsist... that is why we're organising. We're certain that by organising we're going to achieve our aims. If we don't fight, what sort of country are we going to leave to the next generation? We're fighting so that in the future our children have a

better quality of life, so that they have the opportunities to work and to survive' (Don Francisco, FV14, April 2012).

Seemingly oblivious to these concerns, those I spoke to in the sugar sector felt that they maintained a good relationship with local communities. Indeed, one interviewee described how the mill she worked for routinely measured community perceptions and found 'a good level of acceptance'. She explained that representatives of the mill also attend local community meetings in order to listen to and address potential complaints (GP11, Feb 2012). This was echoed by another respondent who worked for the sector who argued that he would not work there if he did not believe that the sector 'could make a positive difference' (GP7, December 2011). Through the social welfare arm of the sector, FUNDAZUCAR, a health clinic, schools, educational programmes and various infrastructure projects had been established not just along the Pacific Coast, but also in communities in the highlands where many sugarcane cutters and their families resided (Figure 31).

Figure 31. "Developing an educational programme for academic remediation, another project from the Pantaleon Foundation", publicity for the Pantaleon Foundation, Nebaj, Quiche

Source: Author's own

The work of FUNDAZUCAR was from 'the gates of the mill outward', representatives of the foundation explained; its function was to replicate 'the conditions within the mills in communities'. In essence, the vision was for 'everyone to have the opportunity to satisfy their basic needs' and it would do this by promoting 'social and economic development' in Guatemala (GP17, March 2012). The absence of the state provided an additional rationale for the involvement of the private sector in social issues, particularly those pertaining to their employees and their communities (GP7, December 2011). This was a model to be replicated by other industries within Guatemala, as well as by the sugar sector in other countries. The successes of FUNDAZUCAR were widely publicised in the media; for example, the campaign 'How many teaspoons of sugar..?' publicised the five hundred families benefitted by the foundation's health centre. ASAZGUA and FUNDAZUCAR also ran regular trips to various mills to show to foreign dignitaries, media and others the working conditions. Figure 32 shows some publicity material.

Figure 32. "Today we'll learn... what's behind a teaspoonful of sugar?"

Source: FUNDAZUCAR (2012)

However, many were critical of the work of FUNDAZUCAR, highlighting the increased healthcare costs in the hospital run by the foundation (GNGO14, March 2012), the focus only on those areas within the sectors 'zones of influence' i.e. the Pacific Coast and highlands (GA8, April 2012), and the transfer of authority from the state to the private sector (GNGO7, December 2011; see also Oglesby 2004). For one academic interviewee, the 'abandonment' of rural communities by the state provided a perfect opportunity for the private sector to step in. He explained:

> 'Their logic is one of "because the state has abandoned you, you're going to be certain that what I'm doing for you no-one else is going to do, you're going to be besotted with me and you're going to defend me. I'm going to give you teachers, I'm going to give you schools and feed you well so that your children will also want to work for me"' (GA8, April 2012).

This quote reflects the deep scepticism that many interviewees had of the sector's discourse of social responsibility. There was a sense that social investments were only made by the sector because they delivered economic benefits; what appeared to be altruistic initiatives were ultimately motivated by concerns for profits and reputation.

During field visits, residents of local communities explained that they had no contact with FUNDAZUCAR nor had they benefitted from any of the foundation's programmes. While this may have been due to the communities' locations (i.e. they were too far from urban centres and the mills themselves where most of the social projects were situated), residents were extremely critical of the sector's 'propaganda'. Several argued that the sector's publicity was a 'hoax' to show other countries that there had been 'big improvements' within Guatemala; none of which had been felt by the communities themselves. This chimes with Elizabeth Oglesby's observation that the presence of FUNDAZUCAR and other private sector foundations in the Pacific Coast risks creating an impression that it is not a 'critical need region' (2004: 567). Indeed, representatives of FUNDAZUCAR were keen to highlight the positive changes in living standards on the Pacific Coast, much of which were attributed to the 'organised work' of the private sector, including the sugar industry (GP17, March 2012). However, and as discussed earlier in this section, while levels of poverty along the Pacific Coast are lower than elsewhere in the country, half of the regional population lived in poverty. Certainly the sentiment of the communities themselves was that they were poor and marginalised, forgotten by government and exploited by private companies and landowners.

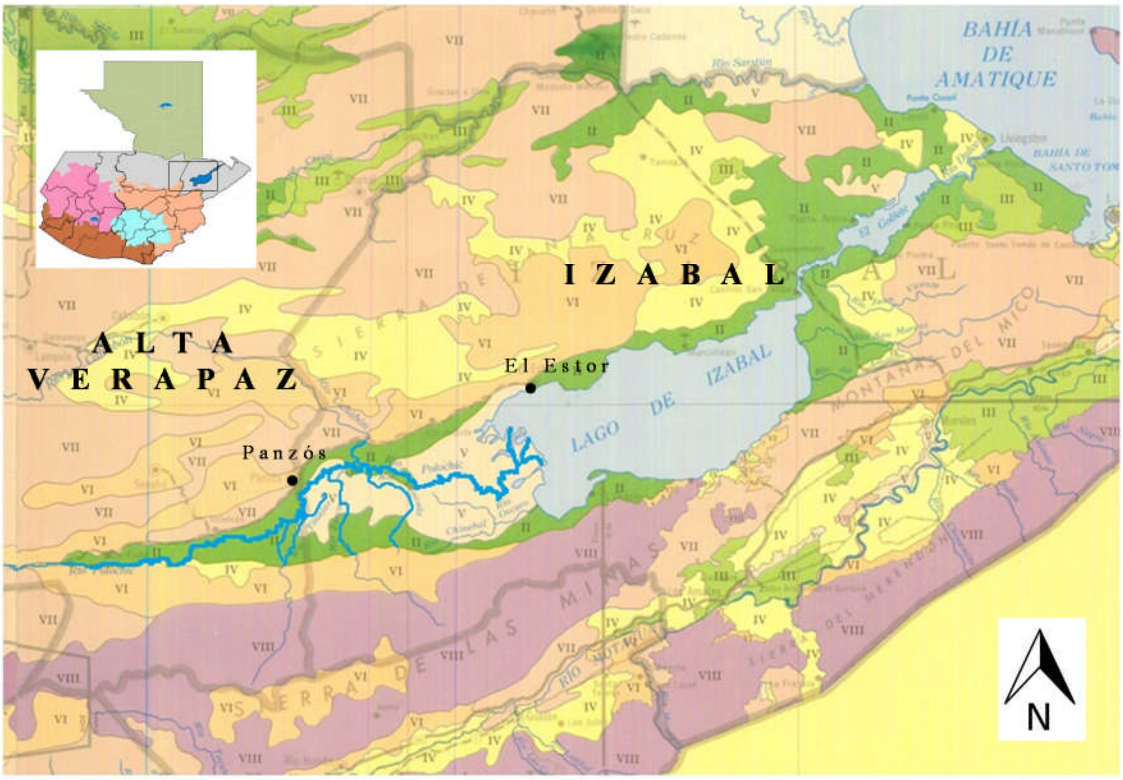
As described in Chapter Six, while the Pacific Coast has traditionally been the sugar sector's homeland, in 2007 increasing competition for land led one sugar mill to relocate eastwards to the Polochic Valley. It is to this region that this discussion now turns; as the following section reveals, this area has been the focus of international condemnation about the localised impacts of sugar production.

8.1.2. The Polochic Valley

Biofuels in Guatemala first made international headlines in March 2011 after thirteen indigenous communities were forcibly evicted in the Polochic Valley (e.g. Bird 2011; Rights Action 2011; Valladares 2011; ActionAid 2013). Blamed on increasing international demand for 'agrofuels', such coverage masked a far more complex and tragic reality.

The Polochic Valley is located in the departments of Alta Verapaz and Izabal, to the northwest of Guatemala (see Figure 33). With a population of almost 300,000, of whom 89% are indigenous, the region is one of the poorest in Guatemala. Between 65 and 85% of children under the age of five suffer from chronic malnutrition in the Polochic (OACNUDH 2013).

Figure 33. Map of the Polochic Valley



Source: MAGA (no date). Map not to scale.

The processes of colonisation to which the indigenous Q'eqchi' population was subject were 'particularly cruel' (GG2, February 2012) and resulted in the concentration of land in the hands of a small minority. Native populations, deprived of their land and the means of production, were forced to work on plantations of coffee and bananas as *mozos colonos*[38]. Although the Q'eqchi' briefly benefitted by the land reforms of the 1950s (see Chapter Five), the war that ensued led to the further concentration of land. During the 1960s and 70s, attempts by indigenous communities to have their land rights acknowledged were met with violence and land was instead awarded to those with close ties to the military and local politicians. In 1978 more than 50 people, including women and children, were massacred by the army as they gathered in Panzós to protest against land inequalities (Sanford 2001; Hurtado 2008). The massacre continues to cast a long shadow over the valley. Over the past decade, the Polochic has witnessed what has been called a 'reconcentration' of land, this time due to the expansion of monocultures, specifically sugarcane and African palm. In just over a decade, the production of these two crops increased from almost nil to 9,000 hectares (Alonso-Fradejas et al. 2008; Mingorría and Gamboa 2010; OACNUDH 2013). It was the relocation of the Guadalupe sugar mill to the Polochic Valley that initiated the most recent conflict.

A new agrarian conflict

In 2006, Carlos Widmann – the head of one of Guatemala's elite families, who owned the Guadalupe mill, and is married to the daughter of then president Oscar Berger (2004-2008) – secured a loan from the multilateral development bank, the Central American Bank for Economic Integration[39] (BCIE), for USD 20 million. The Widmann family invested a further USD 30 million. The rationale for the translocation of the mill was increasing competition for land on the Pacific Coast (see Chapter Six) and lower land values in the Polochic Valley (GP7, December 2011).

Prior to the arrival of the mill, several private landowners in the Polochic had been looking to sell their land. A combination of factors, including the collapse of international coffee prices in 2003, increased imports of basic grains, and shifts in farming culture, had reduced the profitability of farming in the Polochic. This offered a unique opportunity for indigenous communities to access land, many of whom were ex-*mozos colonos* or children of *mozos colonos* on those same *fincas*[40]. As a result, several communities had opened negotiations with FONTIERRAS (see Chapter Five) to secure the loans that would enable them to purchase the land. However, the relocation of the mill presented direct competition with the communities.

[38] A social relationship between a landowner and a worker. In return for work on that farm, workers would receive wages and a small plot of land for housing and the cultivation of crops (Hurtado 2008).
[39] *Banco Centroamericano de Integración Económica*
[40] Finca means farm, plantation or ranch.

As one *campesino* explained, Widmann was able to offer landowners, exhausted by FONTIERRA's bureaucratic and lengthy procedures, a more rapid and more profitable sale:

> 'We found some land and we approached FONTIERRAS and agreed a loan for 3 *caballería*[41]. So we began to negotiate and, pfff, it took a long time – almost 3 years. After 3 years, the negotiations were concluded... because we knew the area and we knew that a part of the land regularly flooded and wasn't suitable for cultivation, we managed to negotiate a total price of GTQ 1.2 million [USD 0.15 million]. All we needed was for FONTIERRAS to pay and they said they would pay within 5 months, but it took them more than a year... Then the owner said 'enough, I'm going to find another buyer'. He told us he found another buyer, a sugar producer, who would pay him more than we would. So, after 3 years it was all over. That was in 2008... [Widmann] paid GTQ 2.3 million [USD 0.3 million] for the *finca*' (Don Micario, FV12, January 2012).

By 2008, the Widmann family had bought or leased 37 *fincas*, equivalent to 5,000 ha. Thus, almost overnight, Carlos Widmann became the largest landowner in the Polochic. Moreover, his involvement in the valley closed the window of opportunity for rural communities to secure land.

The mill – renamed Chabil Utzaj ('Good Sugar' in Q'eqchi') – harvested sugarcane for the first time in 2009. However, in August 2010, an article appeared in the national press announcing the public auction of the 37 *fincas* and machinery owned by Chabil Utzaj. The mill had been unable to meet its loan repayments and the BCIE was calling in its debts (El Periódico 2010; GG5, March 2012). Explanations for this failure varied, although poor planning and research, inadequate infrastructure, and the use of land unsuitable for the cultivation of sugarcane were all cited by respondents.

Although the auction was never held, fourteen communities – prevented from accessing land for subsistence – took the decision to occupy the land owned or leased by the company. In the words of one *campesino*, poverty had driven them to occupy the land:

> 'We occupied those lands because we are poor. We had nowhere to grow crops, nowhere to teach our children how to cultivate maize, beans, chilli, rice... We had to teach our children how to farm, how to grow basic grains' (Don Samuel, FV12, January 2012).

[41] In Guatemala, 1 caballería = 44 hectares.

In November 2010, a dialogue was set up to address agrarian conflict in the Polochic in which government, the communities and their representatives, and the owners of Chabil Utzaj were all represented. However, according to the Secretariat for Agrarian Affairs[42] (SAA), the perspectives of those involved in the dialogue were poles apart, creating vast divisions between those who sought to find a solution. Indeed by the time of the last meeting, which was held in March 2011 – the day before the first evictions – the representatives of Chabil Utzaj were no longer participating. Unbeknownst to the communities, which were negotiating with the SAA, legal procedures to evict them were already underway (GG2, February 2012).

The evictions: 'they removed us by force'

In the early hours of the 15th March 2011, the first community was evicted. By the 18th March, a further twelve communities had been evicted by more than 1,000 police, military and private security forces. One *campesino* was killed and several more were injured during the evictions. Their homes, possessions and, perhaps most importantly, their crops were destroyed. The communities had received no prior warning, while the participation of non-state actors, legal inconsistencies in the eviction notice and the unnecessary use of force led the UN High Commission for Human Rights in Guatemala to conclude that human rights abuses had been committed during the evictions (OACNUDH 2013, see also OHCR 2007). In ordering the evictions, the state had made no provisions to relocate or re-house the 732 evicted families, many of whom had no choice but to live by the side of the road until they could find alternatives:

> 'When we were evicted in March 2011, the chief of police came and asked who the leader was, then he handed him the eviction notice. Then they set light to our houses. We weren't able to take anything with us, we lost everything. We lost our harvest. All we took with us was our lives. Carlos Widmann arrived to enjoy our eviction. We lived by the road for a while and we're still suffering' (Don Jorge, FV12, January 2012).

> 'On the morning of the 18th March, we realised that they were already there to remove us, that's how we knew. If we had known earlier, we would have taken our belongings, our animals. Instead we knew nothing, we couldn't do anything... They used a lot of smoke [tear gas] to get rid of us and they removed us by force. But we said nothing, we didn't attack them, we left quietly without taking anything... If there had been only a few police we would have been able to collect our belongings, instead there were so many police and military, there were also private security guards... We were born there and my parents were born there. Our parents left us that

[42] *Secretaria de Asuntos Agrarios*

> land and that's why we were there, but other people took it from us' (Don Miguel, FV12, January 2012).

Compounding the misery in which these communities found themselves was the fact that many families had taken out loans to buy the agricultural inputs, including seeds, fertilisers and tools, required to cultivate the land. Since the loans were to be paid off with the sale of the harvests, the loss of their crops just days before they were due to be harvested exacerbated an already dire situation.

> 'I took out a loan for GTQ 4,200 [USD 534] with Genesis, because it was the only option I had left. With the money I sowed maize and beans. But the company came and destroyed everything... I have no idea how I'm going to pay the debt. My idea was to sell a part of my harvest to pay back the loan, but the company came and destroyed everything. The only option I have is to leave my children and go and find work elsewhere' (Doña Rosaria, FV12, January 2012).

Widmann, cited in a newspaper article published after the evictions, claimed that the land occupations had prevented the mill from initiating the harvest, leading to the loss of 1,800 hectares of sugarcane – equivalent to the loss of USD 4 million (El Periódico 2011). For Widmann and the state, the economic impacts of the occupations justified the use of force and subsequent loss of life and livelihoods. This demonstrates the privileging of economic over social concerns in Guatemala and the wedded nature of Guatemala's state with domestic elites.

On the 6th April 2011, the BCIE agreed to restructure the company's debt when Grupo Pellas, one of Nicaragua's largest private companies, bought an 88% share of the mill. A condition of this purchase was the resolution of the land conflicts (GG2, February 2012). The first harvest of sugarcane under the new ownership took place in January 2013; nearly 300,000 tonnes of sugarcane were milled (Prensa Libre 2013). Even with plans to increase milling to half a million tonnes per annum, this made Chabil Utzaj one of Guatemala's smallest sugar mills (see Chapter Six, Table 12). The company planned to increase sugarcane production in the Polochic to 7,000 ha, which would generate 2,000 direct jobs, most of these during the *zafra* (see Figure 34). According to the new owners of Chabil Utzaj, together with the Compañía Guatemalteca de Niquel (CGN), Mayaniquel (both nickel mining companies) and Natura Aceite (African palm, see Chapter Six), these companies would deliver social and economic development of the region

(Grupo Pellas 2011, 2012; OACNUDH 2013). However, all of these companies have been the subject of ongoing protests in the Polochic Valley[43].

Figure 34. Promotional material for Chabil Utzaj

Source: Chabil Utzaj (2012). The text reads "*The Chabil Utzaj sugar mill, which means* good sugar *in Q'eqchi', is a modern, environmentally friendly company that above all else is committed to the people*'. Below that is a quote by Miguel Maldonado, the general manager of the mill, which says '*we're building a model sugar mill that will be an example to new generations*'.

As we saw in Chapters Five and Seven, the argument that such industries – the so-called megaprojects – could deliver 'development' to rural Guatemala was common. Indeed, many I spoke to could not comprehend why rural and indigenous communities would want to maintain their traditional livelihoods; employment and, to a lesser extent, education were frequently touted as solutions to these communities' poverty (GP1, GP7, December 2011; GP12, February 2012). Carlos Widmann perhaps epitomised this perspective; he was interviewed whilst observing the evictions:

[43] In August 2013, the Canadian courts ruled that Hudbay Minerals – the owners of CGN – could be tried in Canada for alleged human rights abuses committed by the company's private security guards in the Polochic Valley. The suits include the murder of a community activist, the gang rape of 11 women during an eviction and the shooting and paralysis of a local resident. The ruling set a precedent, making it possible for Canadian companies to face liability in Canada for incidents that take place abroad (Rights Action 2013).

> 'Someone said to me 'but there's a food security crisis' – for the love of god, don't come to me with these stories! We're here [in the Polochic] to combat poverty and the food crisis, we're generating 2,000 jobs and with all the indirect impacts that an investment of 50 million dollars implies in a little valley like this. That is combating poverty. This [points to traditional production] is to condemn poor people to poverty. What are they going to do with a patch of land [*maizito*] that size?' (Carlos Widmann, speaking in Guatevision (2011).

However, many others, including most vociferously the communities themselves, argued that such perspectives failed to understand the intimate connections between land (*Madre Tierra*) and livelihoods. I will return to these different perspectives of land and development in the next section.

A legitimate struggle or an illegal invasion?

Undoubtedly, there are those who were in favour of and who benefitted from Chabil Utzaj, including employees, local businesses and politicians. Yet even those in the sugar industry appeared to distance themselves from the mill, highlighting it was not yet a member of ASAZGUA (GP7, February 2011; GP17, March 2012). Those promoting biofuels in Guatemala were quick to point out that issues of land tenure and social justice needed to be addressed, but that these issues should be treated as separate from discussions of biofuels. For instance, one private sector actor argued that the sugar produced in the Polochic was 'not for ethanol' and was keen to disassociate biofuels from the negative international coverage of the conflict (GP1, December 2011). While it was true that the mill had no fermentation and distillation plant, during the 2013 harvest, more than two million gallons of molasses were produced as a by-product of the milling processes (Prensa Libre 2013). As we have seen in Chapter Six, ethanol in Guatemala is produced using molasses, which meant that the mill at least had the feedstock with which to produce biofuel. What was done with the molasses was not clear; it may have been sold to other mills either in Guatemala or within Grupo Pellas, which had investments in ethanol production in Nicaragua (Wallengren 2008).

Meanwhile, the families who were evicted continue to live precariously (OACNUDH 2013). Just a week before I visited the Polochic Valley for the second time, two communities had again been evicted. According to interviewees, these latest evictions were carried out not by the state, but by Chabil Utzaj's private security forces; an action that contravened international human rights (OCHCR 2007). A member of one community that had just been evicted explained that they kept returning to the land because many of the families simply had nowhere else to go:

> 'We've been evicted many times since March. Up to 1,000 military arrive to evict us, private security forces too. We always keep some things outside of the community, by the side of the road, so they evict us and we wait for them to go, then we occupy the land again, there's nowhere else to go. We no longer have crops, it's all just sugarcane' (Don Jorge, FV12, January 2012).

Figure 35. The Chabil Utzaj sugar mill, January 2012

Source: Author's own

Many of those I spoke to reported intimidation and persecution by Chabil Utzaj's private security forces, who continued to patrol the valley (the mill is shown in Figure 35). They also described tactics used by the company to divide and spread discontent amongst the now dispersed communities, which included attempts to buy community leaders, the spreading of rumours and the sowing of fear within the community. Labelled 'invaders' by other landowners in the valley, community members spoke of the difficulties of finding paid work in the valley and the challenges of feeding their families. The UN High Commission for Human Rights in Guatemala reported a high incidence of chronic malnutrition amongst the evicted families, particularly affecting children (OACNUDH 2013). Community members also spoke of their sense of abandonment by the state, both contemporary and historical. Although the arrival of Chabil Utzaj had precipitated the most recent agrarian conflict, the state's history of favouring elite over *campesino* interests was referred to by many, who also made frequent reference to the 1978 massacre in Panzós. It was not only the perception that the state had sided with the Widmanns and Chabil Utzaj, but also the failure to ensure that the communities received shelter, food and recourse to legal remedy in the days, weeks and months following the evictions. Community members described receiving a few pounds of maize and beans, which was sufficient only to feed their families for a few days:

> 'So far [the government] has only given us a few bags of *maseca*[44], but we want the seeds to be able to farm. We also need clothes, soap, saucepans, everything, because they destroyed everything and we were left with nothing. More than anything though, we want land. When this government goes, there will be another one who will promise us everything, but will deliver only lies' (Don Samuel, FV12, January 2012).

> 'Colom's Government is responsible for what happened to us. They're the ones who ordered the destruction of everything we owned. It's as though we weren't Guatemalans – why else would they have done this to us? We don't know yet whether this new government will treat us as children of Guatemala or not – only God knows, because we haven't seen anything yet, because if the government took us into consideration and gave us the land we need, we would be appeased. It's true that they've given us something, but only enough for 2 or 3 days. But we would be much calmer if we had land, somewhere to work, somewhere to grow food for our children' (Don Miguel, FV12, January 2012).

The above quotes highlight the sense of powerlessness and marginalisation felt by many *campesinos* and the complex relationships between rich and poor in Guatemala. It is also suggestive of the country's legacy of racism, wherein indigenous peoples are viewed as 'separate' and 'inferior' (CEH 1999). A dominant narrative saw the evicted families referred to as invaders, criminals and terrorists; these were families with no legitimate claim to the land, but rather who had violated sacrosanct private property rights. A counternarrative, however, provided that the failure to acknowledge ancestral and usufruct land rights meant that it was the *campesinos* who had been deprived of land that was legitimately theirs. According to this counternarrative, the legal framework – and therefore private property – had been established

[44] Processed maize flour

by the oligarchy to acquire land, embedding a system which systematically excluded the poor and indigenous.

Across Guatemala, efforts by the state to delegitimise and criminalise social protests further isolated rural communities; in the Polochic this contributed to a sense that the civil conflict continues, albeit under a different guise:

> 'The Widmann came to the Polochic Valley and they dispossessed us of the land. The state sold them the land without consulting the *pueblos indigenas* [indigenous communities]... the armed conflict is still alive, we're still living it, only now they have new strategies... the Peace Accords only led to divisions... we, los *pueblos indigenas*, we believed them because we were innocent, because we are illiterate, we believed that there would be peace' (Doña Maria, FV12, January 2012).

Although many of the evicted families faced uncertain futures, there was, however, some hope. Organised by the *Comité de Unidad Campesino* (CUC), in March 2012, thousands of indigenous people and *campesinos* had marched over nine days, travelling 212 kilometres from Cobán, in Alta Verapaz, to Guatemala City, in defence of land and community. The organisers succeeded in winning a number of concessions from the government, including the resolution of the agrarian conflict in the Polochic Valley. In September 2013, 158 families evicted two and a half years earlier were awarded land, after FONTIERRAS had negotiated the purchase of two *fincas* in the Polochic (Siglo21 2013). Within three years of the CUC march, all families were to be awarded land (GNGO19, July 2012).

The recent agrarian conflict in the Polochic Valley was triggered by the expansion of monocultures, which NGOs blamed on increased global demand for biofuels. However, the roots of the conflict went far deeper than this, touching on Guatemala's colonial history and its legacy of land inequality, discrimination and exclusion. The power dynamics between sugarcane plantation owners and *campesinos* were essentially the same as those that existed between colonial coffee plantation owners and indigenous communities five hundred years earlier. In the Polochic Valley, land ownership was held by a powerful minority who refused to acknowledge the land rights of the indigenous communities.

This section has discussed the two regions where sugarcane is cultivated in Guatemala: the Pacific Coast and the Polochic Valley. Despite the socio-economic and agro-ecological differences between the regions, there are many similarities; in both sites of production, the issue of land access emerges as an especially important concern for local communities affected by the expansion of sugarcane and other export-oriented agricultural crops. Whilst not a new phenomenon, the marginalisation and abandonment of these communities by a state in thrall to the country's domestic elites is also evident. The next section now turns to an examination of the sustainability of the sugarcane sector, focusing on three issues that emerged from field visits and interviews: land, labour and local environments.

8.2. A modernising sector: land, labour and environment

Since the end of the civil conflict, the sugarcane sector has undergone substantial changes. The modernisation of the sector refers not only to organisational change and technological innovations, including mechanisation, but also to social and, to a lesser extent, environmental reforms. According to interviewees within the sector, reforms have arisen in response to both internal pressures and international market requirements. I will discuss the former specifically in relation to labour practices in the next section, but first want to explore the role of international and market-led pressures as drivers of change in the sugarcane sector.

Many reforms, but especially those pertaining to environmental practices, have originated in the market. (External) consumers concerned about the impacts of their consumption have driven changes in production practices, which has led to environmental and social improvements (Mol 2001; Eden 2011). As discussed in Chapter Four, (voluntary) standards and certification schemes have emerged as an important mode of governance; one that aims to provide assurances that a product meets certain quality controls and social and environmental requirements (Hatanaka and Busch 2008). In Guatemala, the requirements of corporate clients, particularly the soft drinks industry – one of the sector's most important clients, had provided the initial push for compliance with standards (GP11, January 2012). One respondent argued that as the sector sought to extend its product portfolio and to supply new markets, compliance with norms and standards would become ever more important (GP7, December 2011). The expectation was that those mills that were able to comply with the requirements of markets would succeed, while those who struggled would eventually fail. Global demand for biofuels provides an example of a new market for Guatemala's sugar mills. Several respondents within the sugarcane sector identified the environment as one of the key areas where improvements needed to be made. One interviewee explained:

> 'I think our biggest sustainability challenge is the environment... we need to be able to practice good environmental management and not contribute to a changing environment, because that puts production at risk. The environment is a challenge for two reasons: one, we need to be able

> to continue producing efficiently without damaging the environment. And two, because we need to meet international standards... When I was in Brussels, I was told 'today I would buy from two of your mills because they comply with the [sustainability] standards'' (GP7, December 2011).

Another interviewee argued that the sector had already made considerable progress, citing changes in water consumption, but that 'it still had some way to go' (GP4, November 2010). Furthermore, the respondent from ASAZGUA argued, just as it had taken time to persuade some mills of the need to implement social reforms, so it would take time to change environmental practices (GP7, December 2011).

As discussed in Chapter Six, the vast majority of fuel ethanol produced in the country was exported to the EU, a market which went 'hand in hand' with sustainability (GP1, December 2010). Originally perceived as a protectionist measure, one designed to protect EU producers, the EU's sustainability requirements had since found acceptance within the mills producing biofuel (GP14, March 2012). That the two mills which had been certified sustainable by the ISCC had encountered 'little difficulty' (GP11, January 2012) in meeting the requirements of the scheme surely had much to do with this shift in acceptance. Further, there was the expectation that the cost of compliance would be recouped through the greater efficiencies of improved practices (GP15, March 2012). The mills were also seeking compliance with the U.S. Renewable Fuel Standard 2 (RFS2), which would provide an additional market for the biofuel. Being able to supply both European and U.S. markets would enable the mills to obtain the best price for their product (GP11, January 2012).

With regard to European markets, the mills had opted for the ISCC rather than Bonsucro or the Roundtable on Sustainable Biomaterials (RSB), other schemes accepted by the EU and applicable to sugarcane-based ethanol. The ISCC was principally chosen because it was the scheme requested by the mills' clients. However, one respondent explained that it was also easier to demonstrate compliance with the ISCC (Appendix III lists the Principles of the ISCC certification scheme). Principle Two, for example, states that:

> 'Biomass shall be produced in an environmentally responsible way. This includes the protection of soil, water and air and the application of Good Agricultural Practices' (ISCC 2011: 14).

Demonstrating compliance with this principle required evidence of management plans and policies to promote good agricultural practices, but has no indicators. By contrast, similar principles for Bonsucro (Principle 4: actively manage biodiversity and ecosystem services; and

Principle 5: continuously improve key areas of the business), list indicators, which require the mills to measure various aspects of production. The same respondent showed me a spreadsheet which used a traffic light system to demonstrate for each principle and criterion how the mill performed with respect to the ISCC and Bonsucro. For the majority, the mill scored a green with the ISCC and an amber or red with Bonsucro. She acknowledged that if the mill's clients had requested Bonsucro, they would not have been certified. This had, however, spurred the mill to begin measuring certain aspects of production in order to see what changes could be made. She explained:

> 'On the basis of this [spreadsheet], we want to begin to measure some of Bonsucro's indicators even though we're not going to certify with them, because right now they're buying our biofuel with [the certification] we already have [ISCC]' (GP11, January 2012).

This raises clear questions about the sustainability ambitions of different schemes. While the range of ambitions has been acknowledged (see Chapter Four), that both biofuel producers and their (prospective) clients opt for the weakest standards means that it is unlikely that European standards alone will drive the sustainable development of the biofuel sector – at least until the weakest schemes are ruled out.

Compliance had been facilitated by the mills' previous experience with other standards, including ISO 9001[45] and HACCP[46], which meant that the EU's sustainability requirements required just an 'extension' of existing policies. Both mills were able to comply with the ISCC within just six months (GP11, January 2012; GP14, GP15, March 2012). For some, that the sector had encountered few difficulties in meeting the 'toughest standards in the world' was proof of its sustainability (IO5, April 2013; also GP1, April 2012). Yet others, typically NGOs and local communities, were far more critical of both the sector's impacts and the capacity of the EU's governance framework to capture such impacts. One respondent, for example, argued that standards and certification schemes served only the needs of industry, providing window dressing for highly unsustainable social and environmental practices (GNGO15, March 2012). Moreover, argued one critic, sustainability schemes were founded on developed world experiences of the state and hugely underestimated institutional capacity in countries like Guatemala; as a result, they failed to account for Guatemalan realities (GNGO3, March 2012).

[45] The International Organisation for Standardisation's ISO 9000 'family' addresses various aspects of quality management. ISO 9001 is the only standard that can be certified.
[46] The Hazard Analysis and Critical Control Point (HACCP) is a system of control for food safety management.

Changes in agricultural and social practices also only applied to land directly cultivated by the mills. As discussed in Chapter Six, around 20% of Guatemala's sugarcane production was cultivated by independent landowners and, according to interviewees within the sector, the mills had little or no say over the production practices on these lands. Competition between the mills was cited for not obligating independent producers to comply with sectoral best practice since such demands would simply cause them to sell their product to another mill (GP11, January 2012; GP14, March 2012). The ISCC certification therefore applied only to the land cultivated directly by the mills. Those outside the sector, however, made little distinction made between the practices of the mills and those of independent producers. For example, the exposé of child labour on sugar plantations (Arce and Rodriguez Pellecer 2012) referred to land owned by an independent producer rather than a sugar mill.

Interviews with residents revealed three sustainability issues that were of concern to local communities: labour, land and environment. In the following sub-sections, each of these themes is discussed in relation to the requirements of both the sustainability criteria of the EU's Renewable Energy Directive (RED) and the principles and criteria of the ISCC – the standard to which both ethanol producers had demonstrated compliance.

8.2.1. Labour: 'dignified and decent' employment

The labour requirements of the EU's Renewable Energy Directive (RED) require the producer country to have ratified and implemented key International Labour Organisation (ILO) Conventions. These relate to forced or compulsory labour (No. 29), freedom of association (Nos. 87 and 98), equal remuneration for men and women (No. 100), the abolition of forced labour (No. 105), discrimination (No. 111), and child labour (Nos. 138 and 182); the ISCC criteria are therefore also drawn from these ILO Conventions (EC 2009a; ISCC 2011).

For much of its history, the sugarcane sector has had a 'rotten' labour rights record (Sieder, pers. comm.). However, after the strikes of the 1980s, which paralysed the Pacific Coast for more than 20 days, major changes in labour relations were initiated by the owners of some sugar mills (see Chapter Five; GNGO19, April 2012). As discussed in Section 8.2, where one mill goes the others are likely to follow and these changes eventually spread throughout the sector. Prior to the reforms, the mills were reliant on unionised, resident workers (as with the *mozos colonos* of the Polochic Valley, these employees both lived and worked on the sugarcane plantations); the workforce was augmented during the six month *zafra* by migrant workers from the highlands. As discussed in Chapter Six, full mechanisation of the harvest was not an option for the mills, which therefore required a stable, but temporary labour force. Since labour costs were an important component of production costs, by reducing the number of permanent employees the mills were able to not only lower costs, but also to lessen the threat of strike action. However, this required 'new strategies to control labour market flexibility' (Oglesby 2004: 559); in other words, the mills needed to ensure that they could recruit sufficient workers to work on the sugar plantations during the *zafra*. This would be guaranteed by working both from the 'gates of the mill inwards', to improve working conditions, and from the 'gates of the mill outward', through social institutions such as FUNDAZUCAR (Oglesby 2004; see also Figures 31 and 32). An interviewee at ASAZGUA explained that the reforms were instigated by two of the sector's 'visionary leaders' – Julio Herrera (Pantaleon) and Ramiro Campollo (Madre Tierra) – who recognised that the sector needed to modernise (GP7, December 2011). He described how, while not all of the mills were initially persuaded by the labour reforms, practice had shown it made 'economic sense' to treat employees well, since well qualified and motivated workers would return year after year. Sectoral representatives pointed out that the motivations for these reforms was not about the redistribution of wealth – something that is an anathema to Guatemala's elites – but rather about 'creating the opportunities so that every individual is capable of generating their own wellbeing' (GP17, March 2012).

Of the approximately 35,000 cutters employed during the *zafra*, 43% were local while the remainder migrated from other regions of Guatemala (GP17, March 2012). In order to attract migrant workers, the mills provided accommodation, food, clothes washing facilities, educational programmes, healthcare and leisure activities; part of the cost of these facilities was deducted from employee earnings. Local workers, however, were expected to return to their communities each evening and were not entitled to these provisions (GP17, March 2012). The high demand for seasonal employees had created competition between the mills for workers; mills offering the best working conditions (and the highest wages) could expect to attract the 'best' and most productive workers (GP14, March 2012). Favourable working conditions had been shown to translate into greater worker productivity; as this respondent explained:

> 'So we will give to the cutter – well, in increments – but the cutter has to produce more – that's the vision. The vision is to reduce costs, it's all about improving, becoming more efficient. That's to say that when a person is well fed, well rested, well he has to yield more. That's the point. We've invested relatively little compared to production costs' (GP14, March 2012).

This quote also highlights the *quid pro quo* that underlay the labour reforms; in return for the improved working conditions, labour output was expected to increase. Take-home wages were also dependent on how much the worker was able to harvest each day. During the 1980s, the average worker would have cut around one tonne of sugarcane per day (Oglesby 2004); by the time of this research, each worker was expected to harvest five tonnes per day, although the best workers could harvest up to eleven tonnes per day (GP14, March 2012). Incentives, such as money and bicycles, were given to 'champion workers' i.e. those who were able to harvest greater quantities (FV3 November 2011; FV11, March 2012). As discussed in Section 8.1, typically only men under the age of 40 were employed as cutters on sugarcane plantations since younger men were expected to have higher outputs.

Various reasons were given for this impressive increase in worker productivity including, the use of the *machete australiano* (see Chapter Six), the mechanisation of the cane loading, improved working conditions (including half an hour for lunch and regular water breaks whilst on plantations), but also getting workers to work harder for longer. According to several NGOs and *campesinos* many workers, especially younger men, took drugs which enabled them to increase their output (GNG10, February 2012; GNGO14, March 2012); unsurprisingly, such reports were denied by those in the sector[47]. Seasonal employees typically worked from 7am to 3pm, six days per week, including Sundays and holidays for which workers were paid double. FUNDAZUCAR (2012) estimates that, including benefits, workers earned an average of GTQ 3,000 per month (USD 381); almost a third more than the minimum monthly wage stipulated by law.

For those in the sugarcane sector, therefore, these conditions provided everything that could be asked for in 'dignified and decent' employment (GP17, March 2012). However, NGOs and those in the communities themselves questioned the purported benefits, suggesting that seasonal work on sugarcane plantations was akin to exploitation. Since efforts had focused on raising labour productivity, workers may have earned more on paper but they were effectively doing more for less (GNGO3, November 2010; GA8, April 2012). Respondents pointed to the inadequate remuneration for what was backbreaking manual labour in extreme heat. One interviewee stated:

[47] In December 2011, the international media reported on the increased incidence of kidney disease amongst agricultural workers in Central America; those working in sugarcane were amongst the worst affected. The evidence pointed to heat stress as well as use of agrochemicals as possible causes of the disease. Between 2005 and 2009, there were 1,084 deaths from chronic kidney disease in Guatemala alone (ICIJ 2011). When asked about the disease interviewees in the sugarcane sector denied kidney disease was an issue amongst employees, citing adequate water breaks and the availability of rehydration drinks in the plantations (GP17, March 2012).

> '[The mills] provide work for those who need it, but not under conditions fit for a human being – it's not decent work, it's not well remunerated and it's very difficult. Every time they discuss the minimum wage their position is that they should only pay for productivity, they're not willing to pay [a set amount] per day... All the benefits they provide – health, food, medicine – are disguised as gifts, but the workers pay for it, they pay for it out of their own pockets' (GNGO14, February 2012).

Interviews with residents of rural communities also cast doubt not only on the sector's claims that they paid the minimum wage, but also that workers received the social benefits mandated by law. Even when workers earned more than the minimum wage, many questioned whether it was sufficient to cover the *canasta básica* (i.e. the cost of basic goods and services for households) required for an acceptable standard of living (GNGO2, November 2010), as one respondent explained:

> 'The narrative of business people is to say 'we're going to create employment and through those jobs you're going to earn a good income', but it's a campaign of lies, because what they offer isn't enough to subsist. It's not enough for a worker to contemplate being able to educate his children, or to get healthcare or to provide a good home, because the situation in which these people live is actually pretty precarious' (GNGO18, April 2012).

Other research has also documented labour rights violations in the sugarcane sector (COVERCO 2005; Winkler 2013).

This discussion has suggested that the labour reforms and improvements in working conditions were made largely because they would eventually pay dividends. The mills were motivated less by the need to provide their workers with 'decent' employment and labour conditions, than by the need to ensure a stable, productive, yet temporary workforce. The reforms have enabled the sector to present itself as a socially responsible actor and to draw on influential global narratives of sustainable development and corporate social responsibility. Oglesby (2004) argues that this status has enabled the sugarcane sector to draw on additional flows of international finance and to become a powerful actor within civil society. The sector's critics argue, however, that this has left the 'wolf in charge of the flock' (GNGO15, March 2012). I will return to this discussion in Section 8.3, but first turn to one issue where the sector struggled to comply with the ISCC's sustainability criteria – freedom of association – to illustrate the way in which certification may not always guarantee sustainable labour practices.

Trade unions and the right to organise

By law, all workers have the right to form trade unions, yet only one sugar mill, Palo Gordo, had a union (Luxner 2013). Regina Wagner (2005) argues that the 'positive changes' implemented by the sugarcane sector had meant that, since the 1980s, trade unions had steadily lost their power and influence. However, interviews revealed alternative rationales for the absence of unions in the sugarcane sector. Chapter Five and the previous section have suggested that within Guatemala there was strong anti-union sentiment. The country is the second most dangerous place in the world to be a trade unionist after Colombia; since 2007, 64 trade unionists have been murdered in Guatemala, trade union leaders routinely face harassment and threats, and blacklisting is common (GO3, October 2012; ILO 2013). The criminalisation of activists was often referred to by respondents, especially those actors belonging to or working with local communities, as the discussion of the events in the Polochic Valley has highlighted. On the Pacific Coast, many of the residents I spoke to had themselves been targeted, or had relatives who had been disappeared or killed, by the military following the strikes of the early 1980s. Many were still affected by the repression and violence of the civil conflict, and some *campesinos* spoke of the fear that many in their community had of organising. Further, the limited employment opportunities on the Pacific Coast meant that many needed to work on the plantations and were unwilling to run the risk of being blacklisted. In addition, the temporary nature of employment on sugarcane plantations provided a disincentive to unions, as one respondent asked:

> 'The *zafra* only lasts five months, why would they form a union? They aren't thinking about that, they're there to work' (GNGO10, February 2012).

The freedom to join labour organisations and to perform collective bargaining is one of the requirements of the ISCC standard[48] (see Appendix III); however, this was highlighted by one interviewee as one of the key challenges of compliance. She explained:

> 'Here, trade union [*un sindicato*] is a bad word. We encountered a lot of resistance from upstairs [i.e. the mill owners] – their initial reaction was 'you're crazy!' But we did some research, we benchmarked against other companies with similar standards and we came across a coffee company certified by the Rainforest Alliance. We established that they would hold meetings with

[48] Workers have the freedom to join labour organisations or organise themselves to perform collective bargaining. Workers must have the right to organise and negotiate their working conditions. Workers exercising this right should not be discriminated against or suffer repercussions (ISCC 2011).

> their employees and that each week they would choose a representative and that person would represent his colleagues and bring suggestions for improvements to each meeting. We've tried to replicate that model here and it's called a 'moment for dialogue'. Every week, or fortnight, or month – they [the workers] decide how often – they [the workers] choose a representative and he represents others at these dialogues. And they [the ISCC] accepted our suggestion' (GP11, January 2012).

However, given the sugarcane sector's history and anti-union sentiment, it is doubtful whether employees would feel able to express their discontent with working conditions in such a setting. Yet, in this way, this mill was able to effectively bypass the right to unionise. This denial of commonly accepted workers' rights runs the risk of the EU being seen as supportive of labour practices that would not be accepted within EU Member States and that break the laws of producer countries. Rather than providing a benchmark to which biofuel producers should conform, the ISCC's sustainability certification effectively rubber stamped questionable labour practices. This example also raises the possibility that other criteria may similarly be bypassed not just by this company, but also by others within Guatemala and elsewhere in the world.

8.2.2. Land access, livelihoods and the (re)concentration of land

One of the most contentious aspects of increasing global demand for biofuels has been the socio-economic impacts of land use change. This debate encompasses land and resource rights, as well as food security and other livelihood impacts (see Chapters Two and Four). While the RED has no mandatory social criteria, there is a requirement to monitor the impacts of biomass cultivation on social sustainability, which includes land use rights (EC 2009a Art. 17(7)).

The dynamics of land concentration were different on the Pacific Coast and the Polochic Valley, as discussed in Section 8.1, but for communities in both regions land access was a critical concern. Guatemala's history of land inequality meant that land was concentrated in the hands of a few, leaving the majority to subsist on small plots of land (see Chapter Five). On the Pacific Coast, communities had traditionally relied on leasing land from landowners to produce basic grains; however, increasing competition from sugarcane and other agribusiness had effectively forced subsistence and small-scale farmers out of the market. In the Polochic Valley, the most recent chapter in the region's long history of land conflict had led to indigenous communities being forcibly evicted from land to which they had ancestral claims. The following quotations illustrate the perceived livelihood changes brought about by the expansion of sugarcane production:

> 'A few years ago it was peaceful here, we had land to cultivate, we didn't have to pay rent, we would pay with our harvests, but now, imagine! It's all just sugarcane. We, the poor, no longer have anywhere to work' (Doña Rosaria, FV13, March 2012).

> 'Before I worked on the sugarcane plantations, I worked on the land, on my own harvest. I rented perhaps three *manzanas* [2.1 ha] and I grew maize and all sorts of vegetables. But the company has taken all the land, there's no longer land available [to rent], but there's a lot of sugarcane, a lot of African palm' (Don José, FV15, April 2012).

> 'In the place where we used to live, now you only see sugarcane, but you can't eat that. Before we grew maize, beans, rice... We have no land on which to cultivate, we have no access to work, we have nowhere to live, we have few resources... What will happen to our children?' (Don Martín, FV12, February 2012).

As discussed in previous chapters, the increased reliance on monetary income had affected household food security, leading to changes in diets as families became more dependent on processed goods (GA3, November 2010; GNGO7, December 2011). However, biofuel proponents argued that food security was not an issue for Guatemala since biofuels were not produced from food crops, such as maize (GP1, November 2010; GP8, December 2011). The argument that the cultivation of sugarcane had reached its limit on the Pacific Coast was also made by those in the sugarcane sector (see Chapter Six); if there was expansion, it was because *fincas* had shifted from pasture and cattle ranching to sugarcane cultivation (GP14, March 2012). However, the testimonies of those living in the Pacific Coast and Polochic Valley indicated otherwise; for these communities, the recent expansion of sugarcane had resulted in a concurrent reduction in land available for *campesinos* to cultivate basic grains, affecting food security and livelihoods.

Many NGOs have documented the rapid rural transformation, i.e. the (re)concentration of land, that is underway throughout Guatemala; a process that had accelerated since 2005 (ActionAid 2008, 2012; Alonso-Fradejas et al. 2008; Hurtado 2008; Mingorría and Gamboa 2011; Winkler 2013). The Polochic Valley, which was discussed in Section 8.1, provides a particularly illustrative case of how land use changes had led to abrupt and violent changes in rural livelihoods. Although I have questioned whether these and other events have been caused by global demand for biofuels (see Section 8.1 and Chapter Six), it is unlikely that, even if they were, such impacts could be captured under either the EU RED or the ISCC. The lack of social sustainability criteria within the RED means that it is the sustainability schemes that assess whether land rights abuses have taken place. Land rights are addressed under Principle 5 of the ISCC. Requirement 4.5.1 states:

> 'The producer can proof [sic] that the land is used legitimately and that traditional land rights have been secured' (ISCC 2011: 29).

Demonstrating compliance requires biofuel producers to show documents that demonstrate 'legal ownership or lease, history of land tenure and actual legal use' (ibid). This chapter, however, has highlighted that while Guatemala's sugar mills demonstrated compliance with this requirement, the complex changes in land use that are underway are not captured by the ISCC.

On the Pacific Coast, communities do not have legal ownership of the land rather they rent from large landowners. These landowners lived not in the communities, or even nearby, but in the capital city or Miami; attracted by the higher rents offered by the mills and other agribusinesses, they increasingly opted not to rent their land to local communities. As a result, rural households found themselves unable to access land, serving to further marginalise these rural communities. Equally, in the Polochic Valley, the evicted communities did not have, indeed have never had, formal land tenure, but here the issue was one of competing conceptualisations of and claims to land. The 1996 Peace Accords had instituted a system of market-based land reform (see Chapter Five), which privileged private property over other customary land rights and which primarily benefitted Guatemala's elites (Gauster and Isakson 2007; Grandin et al. 2011). As the events in the Polochic Valley demonstrate, indigenous land rights continue to be trumped by corporate interests; excluded from legal avenues of justice, everyday resistance by communities takes the form of land occupations, sometimes with tragic outcomes. In both regions, the mills have 'legal ownership or lease' of land as required by the ISCC, yet this masks the (re)concentration of land that is underway, one tied to historic land inequalities. This raises the question of whether such schemes should be expected to capture, even to address, these macro-level changes in land use. I will return to this issue in Section 8.3, but first turn to the environmental impacts of land use change.

8.2.3. Environmental impacts: air, water and land

Environmental impacts, specifically the greenhouse gas (GHG) and land use change impacts, are key to the EU's sustainability framework for biofuels. As discussed in Chapter Four, for biofuels to count towards the EU's 10% renewable fuel target, fuel suppliers must demonstrate that biofuels deliver emissions savings. This requires quantitative data, including the measurement of GHG emissions to demonstrate that biofuels deliver emission reductions. As discussed in Chapter Four, these assessment methods are themselves fraught with assumptions, errors and uncertainties. Since the EU's default data for sugarcane show an 83% emission reduction (Figure 9), there was little need for Guatemala's sugar mills to measure actual production values (GP11, January 2012). Indeed, the only report on the sector's GHG emissions used international data to arrive at an estimate of sectoral emissions. Using these generic data the report showed the sector had a net positive impact, capturing 4.2 million tonnes of CO_2 per annum. However, one recommendation of the report was the development of nationally specific data, given the different climatic, soil and technological conditions (GP4, November 2011). While several NGO interviewees mentioned the climate impacts of the sugarcane crop (particularly the contribution of burning the crop prior to harvesting, see Chapter Six), this was not a concern cited by residents. Rather, it was the local level environmental impacts, including those on air, water and habitats, that received most comment. This chimes with Mol's (2007) observation that sustainability standards privilege the concerns of 'cosmopolitans', i.e. climate change, over those of locals. Further, the costs of environmental degradation were borne disproportionately by those living in the vicinity or downstream of sugarcane cultivation – in other words, the already marginalised local communities.

With regard to the impacts on water resources, on the Pacific Coast the diversion of water resources to irrigate fields (not just sugarcane) had led to droughts in the dry season and floods in the rainy season (SNDP 2010). Residents described the 'robbery of our rivers' (Don Raúl, FV14, April 2012) namely the diversion of rivers to irrigate sugarcane plantations. Sugarcane is a water intensive crop and traditional practice has been to flood the fields after sowing, without regard for the quantity of water used (GP4, November 2011). The diversion of water courses has not only changed the course of local rivers, but also water flows. During the rainy season, rivers burst their banks, flooding communities and destroying crops, while during the dry season the rivers run dry. Residents spoke of the livelihood impacts, including reduced access to safe drinking and bathing water and the loss of food security and income as fish populations declined:

> 'Twenty years ago, a quarter of the community lived off the wealth of the rivers. Today, no-one makes a living from fishing, because there aren't any fish. Year after year they're killing the fish' (Don Lauro, FV14, April 2012).

> 'Before, there was more water in the rivers. I used to wash clothes in it, we used to bathe in it, but now it's dirty, all the chemicals enter the water and kill the fish. It smells horrible. All the

> rivers are polluted, it wasn't like that before. Pantaleon throws all its chemicals in there' (Doña Marta, FV13, March 2012).

This second quote also highlights the perception that the mills were responsible for polluting the water. Those in the sugarcane sector admitted that the disposal of waste products and chemicals into waterways had until recently been common practice, but argued that significant improvements had been made (GP4, November 2011; see also Mirón 1998; COVERCO 2005). Many by-products previously considered 'waste' were now used as organic fertiliser or used to cogenerate electricity, while further changes had been made to reduce the sector's water consumption, including dry milling and precision irrigation (see Chapter Six). However, it was widely recognised that a key barrier to the rational use of water was the lack of a national policy for water. This meant that every municipality, company and individual could use water as they saw fit. Climate change was likely to worsen the impacts on communities (GA8, April 2012) and many actors were calling for integrated watershed management that would take into account both the upstream and downstream consumers (GP4, November 2011; GNGO15, GNGO18, April 2012; GA8, GG9, April 2012).

Another key concern was the use of agrochemicals, particularly the aerial spraying of crops. Although the requirements of sugarcane are lower than other crops, cultivation still requires fertilisers, pesticides and maturants. The environmental impacts of agrochemicals are well documented and include contamination of water resources and soil, the loss of natural predators and pollinators, and impacts on human and ecosystem health. Through the R&D of CENGICAÑA, the sector had developed integrated pest management programmes, precision agriculture and improved varieties of sugarcane (GP3, December 2011). While these innovations had undoubtedly reduced the agrochemical requirements, local communities were nonetheless affected by their use. Many houses were located just metres away from sugarcane plantations (see Figure 36) and residents spoke of their kitchen plots and animals being affected by the spraying of agrochemicals. People also complained of the loss of traditional crop varieties, particularly maize and plantain.

Figure 36. Households located within metres of sugarcane crops, Escuintla

Source: Author's own

Developments in computer technologies and software increasingly allowed the mills to predict and take into account meteorological conditions, particularly wind. As a result, the mills were better able to plan aerial spraying away from communities and minimise drift (FV11, March 2012). Despite this, the close location of many communities to sugarcane plantations meant that some contamination was inevitable. Within the mills and on the plantations, respondents in the sector explained that many of the management plans and policies had already been in place prior to compliance with the ISCC. Compliance had, however, required the mills to implement a number of changes, including providing workers with appropriate equipment, such as protective gear, and the storage and tracing of agrochemicals (GP11, January 2012; GP14, March 2012).

Air pollution caused by the burning of the sugarcane crop prior to harvest was another concern for local communities. As stated previously, full mechanisation of the harvest was not possible; this meant that some of the crop had to be burnt prior to manual harvesting. Careful planning was required to ensure that there would be a constant supply of sugarcane to the mills (FV3, November 2011; FV11, March 2012). As a result, during the six month *zafra* the air was filled with ash; returning from field visits to the Pacific Coast, my skin and clothes would be covered with a fine layer of black soot. While this has long been a feature of life on the Pacific Coast, residents complained that the ash and smoke irritated their eyes and respiratory systems:

> 'When they burn the cane, it gives off a strong heat and there's so much dust. It ruins our eyes and our lungs. They ash enters everywhere, even our homes... because we're exposed to it year after year, the damage gets worse, but they're always going to burn the cane, that won't change' (Doña Marta, FV13, March 2012).

However, there were few studies of the human health impacts of burning practices and none that I was able to obtain. As with the aerial spraying of agrochemicals, the mills now planned the burning to have as little impact on local communities as possible. Under the ISCC the only requirement for burning was that it would be carried out with the permission of the 'competent authority' (ISCC 2011), for which it had been straightforward for the mills to demonstrate compliance (GP4, November 2011). More generally, the reliance of the ISCC standard on management plans and policies, rather than quantitative or qualitative indicators, meant that demonstrating improvements in environmental practices was difficult. While impacts on water, soil and air are mentioned in the EU RED, there are no mandatory reporting requirements; rather, it is the direct land use changes that are the focus of the EU's sustainability framework for biofuels. I want to focus on the land use change that mattered to local communities – the impacts on 'invisible' trees and mangrove forests.

Land use change: invisible trees and mangroves

The EU's sustainability criteria have been designed to address the loss or destruction of natural habitats; the RED refers specifically to forests and land with high biodiversity value or of high carbon stock (see Chapter Four). As stated in Chapter Six, these sorts of direct land use changes were not an issue for sugarcane ethanol in Guatemala since both regions where sugarcane was cultivated had long histories of agricultural use. For example, referring to the Pacific Coast, one interviewee commented:

> 'Sugarcane has existed in Guatemala for more than 100 years. I've never known the Pacific Coast as jungle, no-one who is alive does. It must have been beautiful jungle, even better than in the North [Petén], because the land is so fertile. It must have been so varied – all sorts of flora and fauna, but it doesn't exist anymore!' (GP13, February 2012).

While there may have been no direct deforestation as a result of sugarcane expansion, there was anecdotal evidence of indirect deforestation, specifically in the Polochic Valley. One respondent explained that the expansion of sugarcane and African palm in the valley had caused some communities to move into the *Sierra de las Minas* national reserve in order to find land on which to cultivate basic grains (GNGO3, December 2011). Moreover, if the sugarcane sector was to expand into new regions of Guatemala, for example the Uspantán in El Quiché (see Chapter Six), both direct and indirect land use changes were a distinct future possibility. Although land use change as defined by the RED was not currently relevant to the Guatemalan context, interviews with local communities revealed other impacts of land use change, both direct and indirect, that were; namely, the loss of 'invisible' trees and the degradation of mangrove forests. With regard to the former, Sovacool and Drupady (2012) argue that invisible trees do not have sufficient mass to appear on a map, rather they:

> '...exist not in dense patches but spread around fields, next to houses, and along roads. These trees do not show up on most satellite images of forests or in national forest surveys' (p. 56).

Thus, it is not always forests that are affected by land use changes. These invisible trees exist in hedgerows, along the side of roads and dotted within fields. They provide important services, including fuelwood, shade and habitat for local flora and fauna, they also act as protective buffers and have an aesthetic value; their loss also causes changes in local ecologies (GNGO15, March 2012; GA8, April 2012). While such trees were not a problem for cattle ranches or for small scale and subsistence farmers, they were an inconvenience for the cultivation of sugarcane and other industrial monocultures. The placement of a tree in the middle of a field made agricultural tasks, such as mechanical sowing and harvesting, more difficult. The expansion of monocultures was therefore contributing to the loss of these invisible trees; Figure 37 shows felled trees in a field that had been recently been leased to the Palo Gordo sugar mill. According to respondents, the wood was then transported to the mills where it would be burned in the mills' boilers, providing a cheap substitute for bunker fuel (GNGO15, March 2012; GA8, April 2012).

In the grand scheme of things, the loss of one or two trees may not seem like a key issue, yet it was symbolic of the weakness of the Guatemalan state. One private sector interviewee argued that there was no deforestation on the Pacific Coast because the mill needed to ask for

Figure 37. The felling of 'invisible' trees on the Pacific Coast

Source: Author's own

permission from the Forestry Commission[49] (INAB) to cut down trees, which had prevented them from doing so (GP14, March 2012). However, others argued that government bodies responsible for overseeing the protection of local habitats, including forests, were too weak and under-resourced to be able to fulfil their official mandates (see also Chapter Seven). After all, asked one interviewee, how were such organisations supposed to take care of a few trees when they did not know how they were going to pay next month's salaries? Furthermore, he argued:

> 'If the state can't protect the jewel in the crown [the Mayan Biosphere Reserve], then how can it protect a few quartz crystals?' (GA8, April 2012).

Community members also described their efforts to prevent landowners from felling trees without permission. This had involved standing in front of mechanical loggers and diggers in order to give officials from the Ministry of the Environment and INAB time to arrive and assess

[49] *Instituto Nacional de Bosques*

the situation. On more than one occasion, they explained, the landowner had been found to be at fault and was forced to replant the felled trees (FV14, April 2012).

In addition to the loss of invisible trees, mangrove forests were also threatened by agricultural expansion. According to one study, Guatemala has 26,170 ha of mangrove forest (IARNA 2012); an important ecosystem that provides services including coastal resilience and biodiversity, as well as contributing to livelihoods (Wetland International 2013). By law, the state reserves the right of ownership of a strip of land 3 km in areas adjacent to the oceans, which covers the natural distribution of mangroves (GNGO15, March 2012). While land may be leased to individuals, private ownership is not permitted. Figure 38 shows some mangrove forest on the Pacific Coast.

Figure 38. A man fishes in mangrove swamps, Escuintla

Source: Author's own

The mangroves, however, were extremely vulnerable to changes upstream, particularly the diversion of watercourses and contamination, as well as to the development of coastal areas for tourism, mining and agribusiness (GNGO15, March 2012). Representatives of one community that had formed an organisation to protect the local mangrove forest explained:

> 'The mangroves are protected by the state, which means there should be no agriculture from the sea to 3,000 metres away to protect the mangrove, there should be no land use change, but

> this isn't respected. As you saw, they [i.e. private landowners] are cultivating watermelon right on the edge of the mangrove, there's a shrimp farm right on the end of the mangrove. Although we've complained to the Ministry of the Environment, they're not interested. No government has been interested in protecting the environment, all their interested in is business; (Don Nelson, FV14, April 2012).

Despite their national and global importance, mangrove forests are not explicitly named in the EU RED and it is also unclear whether they fall under the definition of 'high biodiversity value' land. While sugarcane did not appear to form a direct threat to this ecosystem, agricultural practices had indirectly affected Guatemala's mangrove forests. The narrow framing of indirect land use change (ILUC) as a primarily GHG issue (Palmer 2012) risks overlooking other indirect impacts of biofuel feedstock production; this includes the downstream impacts on endangered ecosystems, such as mangrove forests.

This section has focused on three issues which emerged from the field research and subsequent analysis as important to the Guatemala context – labour, land and environment. In concluding this chapter, I discuss the capacity of the EU's governance framework for biofuels to capture those issues salient to the Guatemalan context.

8.3. Governance for sustainability: Guatemalan sugarcane ethanol

Over the past thirty years, the Guatemalan sugarcane sector has made substantial improvements in economic, social and environmental practices. These changes have been driven by a combination of internal and external factors, but most importantly labour relations and international market pressures. Through its social institutions, principally FUNDAZUCAR, the sector has positioned itself as a socially responsible industry, providing a model for other (agro)industries to follow. Operating virtually independently from the state, the sector has also articulated an agenda for future development (Oglesby 2004); one that involves not the redistribution of wealth, since this would be unpalatable to Guatemala's elites, but one that enables people to find a route out of poverty for themselves (GP17, March 2012). Further, as discussed in Chapter Six, Guatemala's sugar mills have embraced the biorefinery concept, and the increased global demand for biofuels has presented an opportunity to supply new markets. The relative ease with which two of Guatemala's sugar mills were able to demonstrate compliance with the requirements of the ISCC, provided additional 'proof' of the sector's transformation. It may be concluded, therefore, that Guatemala's sugarcane sector is socially responsible, environmentally sustainable and economically robust. Yet the evidence presented in this chapter suggests a more complicated reality.

Although in many respects the sugarcane sector had undergone a transformation, this had yet to be felt by the local communities. As far as the *campesinos* I spoke to were concerned, the expansion of sugarcane was a threat to their livelihoods, communities and local environments. For these local communities, however, the actual crop grown on the land that they used to cultivate did not matter; it may just as well have been biofuel feedstocks, such as sugarcane or African palm, or food crops for export, such as bananas or watermelon. What did matter were the wider agrarian system and the highly skewed distribution of land in Guatemala. While the concentration of land has long been a feature of the rural economy (see Chapter Five), the failure of market-assisted land reforms and rising land prices meant that *campesinos* were increasingly unable to access land for subsistence farming. Those living in both the Pacific Coast and the Polochic Valley spoke of their sense of abandonment by a state which continued to privilege the concerns of the elites over those of the poor majority. Few of those I spoke to in the communities had heard of biofuels and yet, as with African palm (see Chapter Six), for NGOs working with these communities, the debate around biofuels provided a way of drawing international attention to the changes in agrarian economies underway in Guatemala. For these NGOs, however, standards and certification schemes offered little prospect for change since they were designed by technocrats in the global North who had little understanding of the histories and political economies of producer countries. Whether or not biofuels are the driver of these changes in Guatemala's agrarian economies, and the evidence presented in this thesis suggests they are not, certification schemes focused solely on one feedstock inevitably overlook wider land use changes. Heeding this note of caution, it is important to emphasise here that while this chapter has focused on sugarcane as the only crop currently being used to produce biofuels for export, attributing the environmental and land use changes to sugarcane alone is not possible.

This chapter has revealed two areas of concern for the EU's sustainability governance framework. The first relates to the sustainability ambitions of individual schemes, and the second to the ability of the framework to capture the issues that matter to Guatemalans. With regard to the first of these, the ISCC, while not the weakest of the EU-approved certification schemes, is also not the strongest (German and Schoneveld 2012). Although the ISCC was chosen by the mills' European clients, rather than the mills themselves, it is debatable whether compliance would have been as easy had another scheme been preferred. The mills were no doubt aided by the lack of quantifiable indicators in the ISCC scheme, but also by the acceptance of questionable working practices; the issue of trade unions provides a case in point. This raises concerns not only about the auditing process, but also about the efficacy of the scheme itself.

Turning to the second issue, as the preceding sections have suggested, the EU's governance framework for biofuels failed to capture many of the issues that mattered most to local people, namely land access, environmental impacts and labour practices. These are issues for which biofuels have been widely criticised and which hybrid modes of governance, such as standards and certification schemes, have emerged to address (see Chapter Four). In Guatemala, while (sustainability) standards had driven some positive changes in the sugarcane sector, they had also endorsed highly questionable practices, strengthening the position of domestic elites whilst negating the rights and concerns of local communities and civil society organisations. Again, nowhere was this clearer than in the sector's ability to effectively bypass the principle of freedom of association. The EU's governance framework for biofuels also relies on the state to enforce domestic laws; yet this thesis has repeatedly drawn attention to the weakness of the Guatemalan state and its capture by domestic elites, which includes the sugarcane families. Not only may the capacity of the state to implement and enforce the law be questioned, but also the willingness of governments to sanction the elites on whom political futures may depend. This governance gap essentially places the concerns of the EU above those of local people. Carbon has become the dominant metric for evaluating the performance of biofuels produced by exporting countries, such as Guatemala, whilst the social and other environmental impacts are neglected.

8.4. Conclusions

This chapter has described the two regions where sugarcane production is taking place in Guatemala – the Pacific Coast and the Polochic Valley. Despite (agro)ecological and socio-economic differences, rural communities in both regions have been impacted by the expansion of sugarcane and other monocultures; the events that took place in the Polochic Valley in particular present a harrowing picture of human rights abuses in the name of 'development' and 'modernisation'. Whether or not the expansion of sugarcane in Guatemala has been driven by increased global demand for biofuels, as many NGOs have claimed, it has led to a (re)concentration of land with negative consequences for food security, land access and local environments. Yet, the ethanol produced by Guatemala's sugar mills has been certified 'sustainable' by the EU – a market that, for some, was synonymous with sustainable development. For proponents, certification by the ISCC provided a powerful demonstration to the rest of the world that the ethanol produced in Guatemala was sustainable. However, this chapter has painted a far more complex picture. While reforms implemented by the sugarcane sector had led to improvements in working conditions and, more recently, environmental practices, Guatemala's *campesinos* argued that they had yet to experience the benefits. The evidence presented in this and in other chapters has highlighted the social and environmental inequalities embedded in Guatemala's agricultural system; a system that privileges local elites via a legal and regulatory system that recognises only private property rights, whilst ignoring inherent inequalities and customary land rights. The EU's governance framework for biofuels cannot capture these complex debates and in so doing risks exacerbating the plight of Guatemala's already marginalised rural communities.

9. Conclusions

Prior to this thesis there had been few studies on biofuels in Guatemala; those that existed took a somewhat partial view of biofuels. One purpose of the research was to provide evidence to inform a more nuanced discussion that would go beyond 'good' and 'bad' portrayals of biofuels. In so doing, this analysis sought to develop a more holistic understanding of the multiple factors influencing biofuels. It also sought to understand the actually and potentially conflictive outcomes of increased global demand for biofuels for different social groups within Guatemala.

This final chapter sets out the main research findings and identifies the empirical, conceptual and methodological contributions of the research. The chapter firstly reflects on the multi-scalar methodology used to address the research aim and objectives, highlighting the insights that can be obtained from a qualitative approach to research on sustainable energy. The three sections that follow synthesise the research presented in this thesis, highlighting throughout the original contribution of the research to knowledge. These findings are organised under three main themes. 'Politicised Biofuels' integrates the findings on global biofuels governance and highlights the importance of research on countries like Guatemala, which are small net contributors of biofuels. Under 'Biofuels in Guatemala', I tie together the key findings on the Guatemalan biofuels sector, focusing on the key drivers, the role of the state and the implications for the way the sector has developed to date. Finally, in 'Governing Sustainability' I draw conclusions on the effectiveness of the European Union's approach to biofuels governance and suggest some ways forward. The chapter concludes with some suggestions for future avenues of research.

9.1. A multi-scalar approach to biofuels

Biofuels are a complex phenomenon. The complexity relates to the array of biofuel value chains, to the multiple drivers, discourses, scales and territories of biofuel production and use, and to the inter-relationships between biofuels and other sectors, including food production. This complexity, together with the polarised nature of debates on biofuels, has attracted much scholarship in recent years. However, publications on the sustainability of biofuels tend to focus on high-level and general statements about potential outcomes (e.g. Clancy 2007) or assessment of life cycle impacts, typically using quantitative assessment tools (e.g. Davis et al. 2009; de Boer et al. 2012). Research on the place-specific, local level livelihood outcomes of biofuels is scarce (Hodbod and Tomei 2013). By eschewing a technical approach to questions about the sustainability of biofuels, this evidence presented in this thesis contributes to this critical, yet under-researched topic. It thereby provides new insights, for example charting the location-specific power relations that shape biofuel production and use, and the outcomes for different social groups within Guatemala.

Heeding Blaikie's call for a more 'applied' political ecology (2012), this research takes into account both the discursive and material factors that influence the ways in which global biofuel discourses intersect with local contexts. Discourses, which provide a 'shared way of apprehending the world' (Dryzek 2005: 9), set the boundaries for how issues are constructed, interpreted and analysed; determining what constitutes legitimate knowledge, and in so doing shaping policy and practice (Adger et al. 2001; Dryzek 2005). Utilising Dryzek's typology of environmental discourse to understand and conceptualise the emergence and subsequent development of biofuels, this research argues that while no discourse of biofuels is hegemonic overall, a Sustainable Development discourse currently dominates. Since this discourse espouses networked approaches to governance for sustainability, policy solutions that incorporate multiple stakeholders working across multiple domains and scales now prevail. However, this has constrained the solutions proposed to address the sustainability of biofuels, resulting in standardisation and simplification. This is exemplified by 'one size fits all' certification schemes that fail to capture the political, economic and ecological complexities in different settings. More sophisticated policy solutions are thus required that reflect these complex local realities. In this regard, political ecology, which investigates how nationally and globally-linked political and economic activities have multifaceted impacts on local contexts, is well suited to the challenge.

The methodological approach adopted in this research bridges structural and poststructural perspectives within political ecology. While poststructural political ecology requires analysis of discourse – of texts and language – a structural approach pays attention to the material factors that shape human-environment relations. The lack of a Guatemalan biofuels policy and the closed nature of many of the actors involved in the sector, meant that there were few written documents to analyse. A full discourse analysis was therefore not possible, but given the aims and objectives of the research neither was it desirable. The resulting methodology, which emphasises the roles of different actors, their interests and characteristics, and that draws on the strengths of structural and poststructural approaches to political ecology represents one of the research's methodological contributions.

Within political ecology, scale is a foundational concept and one which proved critical to this research. In particular, the focus on 'chains' or 'webs of explanation' required a methodological approach that would bridge the multiple scales of biofuels and take into account local, national and global influences. The nested approach taken in this thesis therefore examines not only the outcomes of biofuels for people at the local level, but also how these outcomes are conditioned and constrained by the broad political economic systems within which people live. Two other themes from political ecology were also relevant to this analysis: power and marginalisation. These themes required consideration of the unequal distribution of the costs and benefits of biofuels both within and between countries. They also called for the evaluation of the material and cultural factors that allow some actors, and not others, to influence the direction of biofuels development (O'Brien and Leichenko 2003; Dauvergne and Neville 2010). Thus, the framing of the research within political ecology had both conceptual and practical implications. Conceptually, the interrelated themes of scale, power and marginalisation provided important analytical threads which run throughout this thesis. Practically, the focus on power and marginalisation required the adoption of a qualitative, case study approach.

The qualitative research strategy drew on more than seventy interviews with stakeholders at multiple scales, including those in relative positions of power (e.g. government officials, international financial institution actors, mill owners) and those typically at the margins of policy making processes (e.g. the *campesinos* and human rights campaigners). This strategy was complemented with participant observation techniques and document analysis. Emerging scholarly leaders in the field of sustainable energy (most notably Benjamin Sovacool) increasingly emphasise the importance of qualitative approaches in unravelling the complexities of socio-technical energy systems. For instance, in the highly contested case of the Medupi coal-fired power plant in South Africa – a controversial megaproject, much like the case of biofuels in Guatemala – Rafey and Sovacool (2011) employ qualitative methods to unravel the discursive dynamics behind the development. Qualitative approaches have similarly been championed in Sovacool's other work (see Sovacool et al. 2011a, 2011b; Sovacool and Drupady 2012; Sovacool 2013). As discussed in Chapters Two and Three of this thesis, typical approaches to the study of biofuels – particularly their associated sustainability outcomes – have been oriented towards quantitative methodologies. An implication of this methodological bias is that key aspects such as the social and livelihood impacts of biofuels have been largely overlooked (Hodbod and Tomei 2013; Hunsberger et al. forthcoming). Quantitative methodologies, while important and necessary, cannot contribute richness, detail and lived realities to our understanding of populations, particularly those communities affected by the development of biofuels. This thesis has sought to redress this balance by incorporating voices from multiple scales in order to capture the diversity of perspectives and experiences of those promoting and contesting biofuels in Guatemala and in the EU. Qualitative tools have been particularly important and relevant in unpacking the highly polarised nature of debate on biofuels in both the Guatemalan and European contexts. This thesis therefore contributes to a small, but growing body of empirical work that employs qualitative methods to explore the social, cultural and political-economic aspects of sustainable energy, rather than its quantifiable aspects.

In adopting an inductive, qualitative and locally-grounded approach, the research demonstrates the value of a case study approach. A criticism of case study research is the perceived lack of generalisability (see Chapter Three). However, while Guatemala necessarily represents a unique arrangement of social, political economic and historical elements, certain features of the biofuels sector are undoubtedly evidenced elsewhere; for instance (and drawing on my own earlier research on soy biodiesel in Argentina), the important but neglected role of domestic elites in shaping the form and governance of biofuels (Tomei and Upham 2009). The research presented in this thesis has revealed many such factors that are worthy of further research in other territories, and particularly those of Latin America for reasons that range from their shared colonial histories and influence by the U.S. to similarities in land tenure and other socio-economic inequalities.

Other findings may, however, be less transferable; for example, biofuels are being produced in Guatemala without the political support that has proved so important to other countries. In this respect, Guatemala may provide an extreme or exceptional case. My literature survey has revealed no other case where this lack of support has been documented. Documenting and analysing exceptional cases is nevertheless important. In this instance Guatemala provides insights not only into how biofuels can develop in the absence of the state, but also into implications for governance.

9.2. Politicised biofuels

Driven by several policy challenges, including climate change, energy security and rural development, biofuels have, since the turn of the century, been promoted by governments across the globe. Ecological modernisation, which, as discussed in Chapter Two, searches for a positive-sum relationship between economic growth and environmental protection, provides a powerful theory for conceptualising the emergence of biofuels. In particular, the technology's 'fit' with existing transport modalities and institutions, its potential to stimulate innovation, create new markets and deliver environmental benefits, means that biofuels seemed to offer a 'clean' energy solution of the type advocated by proponents of ecological modernisation. However, the neglect of social and global development dimensions within this discourse has been criticised, as has its lack of radical potential (Hajer 1995; Dryzek 2005). This research finds evidence to support these criticisms, demonstrating that the narrow framing of biofuels as primarily an issue of carbon overlooked the potential for social and environmental harm. Indeed, evidence continues to emerge that calls into question the supposed environmental and social benefits of biofuels. Land use change, both direct and indirect, highlights the importance of previous land uses for determining the greenhouse gas (GHG) emissions of biofuels, while concerns about the impacts on food security lead many to question the ethics of diverting land from food to energy production. Evidence has also emerged that suggests biofuels contribute to large-scale land acquisitions, with negative consequences for rural livelihoods, especially in the global South. Although the extent to which biofuels have been responsible for food price hikes and land grabs is debatable, such controversies have led some to suggest that biofuels policy has moved ahead of the evidence (Sharman and Holmes 2010; Upham et al. 2013). However, the advocacy of biofuels on environmental and, to a lesser extent, social grounds introduces a normative dimension to their promotion. It is this normative dimension that has also offered opportunities for non-state actors to influence the forms in which this mandated market is actually developing under specific contexts.

An objective of my research was to analyse the global policy environment within which biofuels in Guatemala are developing. This led me to focus on the European Union (EU) as a proxy for the global level. Two factors supported this choice: firstly, the EU is one of the few markets to explicitly address the sustainability of biofuels; and secondly, it is also the principal market for biofuels produced in Guatemala. In Chapter Four I draw on documentary evidence and interview data to trace the development of EU biofuels policy from its inception in the 1990s to the present day. This analysis shows how the framework has been strengthened over time, culminating in the 2009 Renewable Energy Directive (RED) which set a 10% target for renewable energy in transport by 2020. It also describes how various actors, including NGOs and the private sector, have sought to influence the form and content of biofuel regulation. Indirect land use change (ILUC) provides a key example of how these actors have vied for the privileging of particular narratives and solutions.

The literature on governance for sustainable development posits a move away from hierarchical modes of governance towards hybrid and polycentric approaches that incorporate multiple actors, levels and policy arenas. The EU approach to the governance of biofuels provides an example of this shift. Primarily concerned with the GHG impacts of the policy, the mandatory sustainability criteria focus on GHG emission savings and the prevention of direct land use change. The use of 'voluntary' certification schemes enables the EU to extend its regulatory arm into other environmental and social issues. This thesis argues that although the EU's approach has been subject to much criticism, particularly by those who would like to see a moratorium on biofuels, it is also innovative and the region represents one of the few markets to address the sustainability impacts of its demand. However, the complexity of biofuels raises questions about whether this governance approach is able to capture the impacts that matter most to those affected by their production and use. Like Palmer (2012), whose research focuses on ILUC, this research contends that the EU's narrow framing of sustainability as unforeseen GHG emissions has limited the debate. It finds that while scholars have argued for the 'opening up' of policy appraisals to alternative knowledges, perspectives and values (e.g. Stirling 2006, 2008, 2009; Meadowcroft 2007; Brown 2009), the EU continues to privilege scientific and technical evidence and therefore to advantage certain (economic) interests over others. The ability to control what counts as a 'sustainable' biofuel is a key form of power, one which also has practical consequences for those who produce, process and consume biofuels (Hunsberger et al. forthcoming).

Guatemala is one country that has responded to European demand for biofuels. Although it is a relatively minor contributor, supplying just 0.6% of the biofuels consumed within the EU in 2010 (Ecofys 2013), this represents virtually all of the biofuels produced in Guatemala in that year. It is important to reiterate that between 2008 and 2010, the majority of the biofuels consumed within the EU were produced by Member States (Ecofys 2011, 2013). Only around 20% of EU biofuel demand was met from imported biofuels, yet it is this proportion that has been subject to the greatest criticism. For many countries, of which Guatemala is one, the EU mandate has incentivised the production of biofuels, particularly from feedstocks that lend themselves to large-scale, export-oriented agriculture. While many studies have focused on the major exporting countries, particularly Brazil, Argentina, Indonesia and Malaysia, fewer centre on those countries that export smaller quantities of biofuels. Although countries such as

Guatemala are small net contributors to EU and global demand, they represent an important dimension of biofuels policy, particularly given the large effects biofuel production may have on populations within those countries.

9.3. Biofuels in Guatemala

In 2011-12, Guatemala produced around 103 million litres of biofuel; the vast majority of which used sugarcane as a feedstock. This large-scale, export-oriented model of production from sugarcane was the first of three possible biofuel models identified in Chapter Six, the other two being large-scale production of biodiesel from African palm, and small to medium-scale production of biodiesel from various feedstocks. Within Guatemala no palm oil was processed to produce biodiesel, while much of the remaining biodiesel production was used in commercial fleets. Much of the empirical research presented in this thesis therefore focuses on sugarcane ethanol, which represented a 'case within a case' (see Chapter Three).

All three models of production have powerful economic drivers. For example, the potential contribution that biofuels, specifically jatropha, could make to the incomes of rural households was a key motivator of small-scale projects; while, at the opposite end of the scale, the opening up of international biofuel markets provided opportunities for the sugar mills to diversify production. The sectoral shift towards biorefineries, i.e. the production of multiple products from sugarcane, was expected to continue, possibly leading to further concentration of the sector. However, uncertain profit margins had also provided a challenge to the developing biofuel sector, leading one fuel ethanol producer to cease production. Similarly, the unfavourable economics of producing biodiesel from palm oil was an important barrier to the development of a large-scale biodiesel sector. While globally, governments have provided key support for biofuels, establishing a range of mechanisms to incentivise their production and use, in Guatemala, state support for biofuels has been largely absent. In the absence of the state, it has been left to well-capitalised actors, specifically Guatemala's sugarcane elites, to decide the direction of the biofuel sector's development. These actors are motivated primarily by profit; other potential drivers, including those delivering public goods (for instance, climate change mitigation), hold much less salience. Thus, a finding of this research was that biofuels in Guatemala have not developed in response to a need for energy security or to mitigate climate change, but rather due to international market demand. Furthermore, given Guatemala's history of privileging the needs of domestic elites, the biofuel model that has developed is unlikely to deliver the benefits posited in the biofuels literature.

The actors involved in the promotion and contestation of biofuels were examined in Chapter Seven. The chapter describes how, despite several efforts to develop a domestic biofuels market, there remains little prospect that a market will be developed in the short to medium term. Supported by international organisations, and particularly the Organisation of American States (OAS), the Guatemalan state continues to express an interest in creating a domestic mandate for biofuels yet little progress has been made. This research offers two explanations for the near absence of the state in the biofuels sector: firstly, the lack of buy-in from key stakeholders; and secondly, the weakness of public institutions. In Guatemala's 'political marketplace' (Briscoe and Rodriguez-Pellecer 2010), insufficient political and economic support mean that biofuels will remain an exogenous solution to the country's energy and rural development needs, one that finds little purchase domestically.

A further conclusion is that the multiple pressures facing the Guatemalan state, combined with the alignment of state and private sector interests, mean that until a powerful economic actor is motivated to lobby for biofuels, there is little likelihood of a domestic market. This finding highlights the significant alignment of state and private sector interests; a relationship that has long characterised Guatemalan politics (see Chapter Five). The highly unequal power relations between actors not only privilege certain narratives and interests, but also influence what does and does not enter the policy arena. Many NGOs, for example, are vehemently opposed to biofuels, which they blame for driving land use changes and increasing the vulnerability of rural communities. Such perspectives are, however, dismissed for being 'anti-development' and excluded from policy debates. An implication of this finding is that it will be crucial to open up and broaden the policy debate on biofuels, particularly to those opposed to and affected by their production and consumption. However, given Guatemala's history this will be a hugely challenging undertaking and one that will undoubtedly be met with fierce resistance by those promoting biofuels. International organisations, such as the OAS, would be uniquely placed to promote such dialogue.

This research has found that while biofuels are a relatively new phenomenon in Guatemala, their development touches upon many deep-rooted issues, such as land tenure, racism and poverty. In Guatemala, biofuels polarise opinion and much of this polemic centres on the wider agrarian system within which biofuels are embedded. Since ethanol from sugarcane is the only biofuel being produced on a large-scale, this investigation of the differential outcomes focuses on the cultivation of sugarcane in two regions: the Pacific Coast and the Polochic Valley. Drawing on interviews and field visits, Chapter Eight presents a disturbing picture of rural communities whose needs are neglected by the state and disregarded by landowning elites. The research found that, although the modernisation of the sugarcane sector had led to improvements in labour conditions and, more recently, to environmental practices, few of these benefits were experienced by those living in rural communities. Rather, Guatemala's *campesinos* spoke of the changes that were underway in their livelihoods and communities, which they argued were caused by the expansion of large-scale agriculture – not just sugarcane. In spite of the certification of Guatemala's ethanol production as 'sustainable' by the International Sustainability and Carbon Certification (ISCC), one of the voluntary schemes recognised by the EU, the evidence presented in this thesis shows that many of the sugarcane sector's practices are in fact socially and environmentally unsustainable.

However, this research also demonstrates the dangers of drawing conclusions on the basis of simplified assumptions; in particular, the assumption that so-called 'flex crops' (see Chapter Two), such as palm oil and sugarcane, will necessarily be used to produce biofuels. Two examples drawn from this thesis may be used to illustrate this point. The expansion of African palm and the evictions that took place in the Polochic Valley were blamed by NGOs on increased global demand for biofuels. This research found that this blame was, however, misplaced: no palm oil produced in Guatemala was processed for biodiesel; while the Chabil Utzaj sugar mill in the Polochic Valley lacked the capacity to produce ethanol. These findings do not diminish or negate the impacts that the expansion of African palm and sugarcane has had on local communities. They do however highlight the importance of research that takes into account the complex political economic factors that drive land use change, which include the inter-relationships between energy and food markets.

For some actors, however, the simple message that this assumption conveys continues to hold considerable appeal. For NGOs, in particular, biofuels provide a hook on which to hang their critique of the harm caused by the North's insatiable demand for (bio)fuel (e.g. 'Biofuels: Green Dreams or Climate Change Nightmare', Greenpeace 2007; 'Food not Fuel', ActionAid 2013). Indeed, this research has shown that NGOs have used biofuels to draw international attention to the land use changes underway in Guatemala and the consequences for rural communities. This raises the question of whether, in the absence of such a hook, the events that took place in the Polochic Valley would have received as much attention from international media and NGOs. Regardless, this exposure arguably galvanised action, including the *campesino* march that took place in March 2012, and the awarding of land to the evicted communities. What happened in the Polochic was abhorrent yet, as I have shown, it is a mistake to conclude that it was driven simply by demand for biofuels. Rather it was a consequence of Guatemala's history of racism, impunity and inequality. Addressing these deep-rooted political economic issues represents an enormous challenge, one that will extend far beyond the confines of debates about biofuels.

9.4. Governance for sustainability

One consequence of the absence of the Guatemalan state in the biofuels sector is that it is the market that sets the requirements with which biofuels produced in Guatemala should comply. This finding leads to a discussion of the final research objective, an assessment of whether the EU's approach to governance for sustainability captures those issues that are salient to the Guatemalan context. The research presented in this thesis has shown that it does not. Nonetheless, German and Schoneveld (2012) contend that the EU's approach to governing the sustainability of biofuels represents an important step towards incentivising the adoption of more sustainable practices. This research supports this assessment, but identifies some areas of concern for the EU's governance framework.

Firstly, as this research demonstrates, the perception that the EU market requires biofuel producers to comply with the 'highest [sustainability] standards' (IO5, April 2013) runs the risk of legitimising unsustainable practices. In Guatemala, the ability to demonstrate compliance with sustainability schemes effectively 'rubber stamps' the agricultural and social practices of the palm oil and sugarcane sectors. For these companies, certification provides a powerful defence against claims that production leads to negative social and environmental impacts. By negating the concerns of those affected by agricultural production, certification strengthens the position of more powerful actors and further marginalises already vulnerable people and communities. Furthermore, the evidence presented in this thesis suggests that certification schemes which focus on a single agricultural commodity, metric or, in the case of biofuels, by-product, fail to capture the interactions between systems. As we saw in Chapter Eight, the somewhat arbitrary distinction made between the impacts of different crops makes little sense to local people for whom it is large-scale agriculture, and the decisions of the landowners themselves, that affects their livelihoods.

Secondly, the EU's focus on carbon has not only limited the debate on sustainable biofuels, but it has also diminished the importance of the social and livelihood impacts of biofuels. As discussed earlier, the EU's hybrid approach to governance enables the EU to extend the scope of its framework without falling foul of international trade agreements (see also

Chapter Four). However, a finding of this thesis is that the focus on carbon as the dominant measure of sustainability essentially privileges the priorities of international elites rather than those of local actors who are affected by the production of biofuels and their feedstocks. Chapter Eight draws attention to three such concerns – land, labour and local environments – that are downplayed or overlooked by the ISCC.

This finding illustrates a further, related weakness in this mode of governance, specifically the sustainability ambitions of both the schemes themselves and those of their clients. The variation in the ambitions of the accepted certification schemes allows for considerable scope in what is permissible. Several schemes, of which the ISCC is by no means the poorest performer (see German and Schoneveld 2012), have adopted a minimum compliance approach to social sustainability. The option for biofuel producers to choose the scheme with which they demonstrate compliance has done little to raise the ambitions of many of these schemes. Further, as we saw in Chapters Six and Eight, for Guatemala's biofuel producers the value of compliance with sustainability schemes is recognised less on the grounds of improved environmental and social practices than on the basis of it being a requirement of the sugarcane sector's clients. These findings support Glasbergen's (2007) caution that the most important incentive to participate has shifted away from the intrinsic value of sustainable production towards the assurance of market access.

The final concern relates to the role of the state. Hunsberger et al. (forthcoming) observe that national laws, for instance on land tenure, environmental protection, indigenous rights and labour practices, are better placed to influence practice than voluntary measures specific to biofuels. However, a key issue to emerge from this thesis is the weakness of the Guatemalan state and its capture by domestic elites. This casts doubt upon the capacity and willingness of state institutions to implement, enforce and monitor compliance with the law. In the absence of the state, voluntary schemes assume additional importance yet, as this research has shown, may be blind to the political economic realities within which biofuels are produced. While it is beyond the scope of the EU RED to address deep-rooted, structural issues in producer countries, the governance framework put in place to address the sustainability impacts should surely not worsen the plight of those affected by biofuel production.

These findings hold implications for European biofuels policy, and global certification initiatives more generally, particularly given the binding 10% renewable fuels target remains in place and policy support for biofuels looks set to continue. Here I suggest some possible ways forward.

In the short-term, the EU should promote the continued strengthening of the approved certification schemes. One way to do this would be to phase out those schemes that take a minimum compliance approach to the EU RED. Doing so would send a strong signal to biofuel producers and obligated suppliers that the EU was committed to addressing the social and livelihood impacts of biofuels. As German and Shoneveld (2012: 776) point out, the continued acceptance of schemes devoid of any criteria on social issues incentivises a 'race to the bottom'. Furthermore, it reduces the likelihood that biofuels will encourage more socially responsible practices.

For certification schemes more generally, the evidence presented in this thesis supports Hunsberger et al's call for a shift to more proactive and flexible modes of governance (forthcoming). Current measures that focus on monitoring and, where possible, redressing the impacts of biofuels and other products could be improved through the adoption of more proactive approaches that seek to anticipate and avoid problems before they arise. This would involve the adoption of a more inclusive and precautionary approach, one that 'opens up' rather than 'closes down' the debate, and builds on a diverse evidence-base drawn from the technical, biophysical and social sciences. However, a key challenge will be to resolve the tension between the need for context-specific yet broadly relevant approaches to governance for sustainability. There is no simple solution to this trade-off. Yet more flexible governance instruments could provide important adaptive capacity; the use of country-specific modules that reflected complex political, economic, and ecological dynamics could provide an important step forward.

As European focus turns to the post-2020 period, it is critical that the learning and experience that has accompanied the debates surrounding the sustainability of biofuels is not lost, but instead feeds into and informs any future policy framework. The European Commission's vision for post-2020 climate and energy policy indicates a significant change in the policy framework to promote biofuels (EC 2014). Specifically, the removal of a binding target for renewable fuels signals the end of policy support for conventional, first generation biofuels. For fuels, attention has already shifted to advanced biofuels, which are promoted on the grounds of their improved environmental sustainability. It is also likely that the Commission will promote a more strategic approach to biomass – one that recognises its multiple end uses for fuel, electricity, heating and cooling (IEEP 2014). The concept of a 'bioeconomy' has also found policy traction, a term that encompasses the sustainable production and conversion of biomass for multiple uses, including food, feed, fibre, industrial and energy products (OECD 2009; BECOTEPS 2011; EC 2012b). This shift in focus raises key questions about the governance of future bioenergy policies, particularly as current sustainability criteria cover only biofuels and bioliquids. As the feedstock base widens to supply an increasingly diverse range of industries, the development of sustainability criteria that capture this diversity will become ever more complex, contested and uncertain. The Institute for European Environmental Policy (IEEP 2014) argue for a stable set of standards that meet the requirements of the next few decades, which should include:

- Retaining and strengthening the existing GHG saving requirements;
- Extending the scope of the current standards to cover both land-based feedstocks, and waste and residue feedstocks;
- Enlarging the scope to also consider biomass feedstocks, thus reintegrating biofuels into the broader debate on biomass use for energy and materials; and,
- Basing future sustainability mechanisms on full lifecycle GHG emissions to promote new and emerging low carbon technologies.

This sounds like a pragmatic way forward, yet continues to overlook many of the sustainability issues that have been raised in this thesis – specifically, the social, livelihood and non-carbon environmental impacts of feedstock production and processing. It also remains focused on the energy uses, ignoring the multiplicity of uses of both flex crops and land. The continuation of a narrow, technocratic framing which emphasises only the GHG impacts will therefore do little to address the wider sustainability issues. These are clearly complex issues to which there are no simple answers; even a moratorium on first generation biofuels would not resolve the issues faced by rural communities in countries such as Guatemala.

The proposed policy framework, with its more strategic approach to biomass and bioenergy, does however provide an opportunity to reopen the debate, to take a more precautionary approach (e.g. Stirling 2009), one that incorporates alternative knowledge(s), framings and solutions. Perhaps the adoption of a more holistic approach to governance – one that looks at the landscape, rather than focusing on a single crop or product – would enable the incorporation of multiple goals, including carbon savings, resilient livelihoods and a sustainable bioeconomy. The evidence presented in this thesis demonstrates the importance of opening up the debate to not only incorporate excluded voices, but also to generate a more nuanced understanding of the complex interactions between crops, land and the various sectors they supply. The experience with first generation biofuels has provided valuable lessons for the post-2020 climate and energy framework, particularly the need to open up the debate in order to anticipate and avoid potential harms. Such lessons will need to be heeded in order to avoid simply repeating the same mistakes.

These conclusions do not, however, represent an end point in our understanding of biofuels in Guatemala and, in the final section I highlight some areas that warrant further research.

9.4. Future research directions

This research, informed by political ecology, addresses a key research gap in the biofuels literature, namely the local level outcomes of biofuels. Further research is required in this area to enable greater understanding of the outcomes of increased global demand for biofuels at the regional, national and local levels. This research has focused on Guatemala yet other countries in Central America are also pursuing biofuels. For instance, Costa Rica and Panama have established laws to promote biofuels, while Honduras is undertaking research on advanced biofuels (Tomei and Diaz-Chavez 2014). Despite cultural, political and economic differences, the six Central American states face common challenges including growing drug-related violence, social inequalities and dependence on imported oil (Gent and Tomei forthcoming). A comparative study of biofuels in the isthmus would be instructive, especially given the growing involvement of domestic elites in the agricultural sectors of other Central American states. While not unique to Guatemala, or indeed Central America, this research has shown the importance of examining the role of domestic elites in the biofuels sector. As South-South trade in biofuels increases, this transnationalisation of previously domestic elites will be another important area of investigation (Mol 2007; Dauvergne and Neville 2009, 2010).

Within Guatemala itself, several research gaps have already been identified. Although these gaps stem from the research presented in this thesis, and are discussed here with specific reference to Guatemala, many have wider applicability:

Firstly, there is a need for basic research on the agronomic performance of various biofuel feedstocks in Guatemala, including jatropha, castor and sorghum. These crops are highlighted in the biofuels literature for their potential to generate opportunities for local communities (see Chapter Two); however, there is a need for more case studies that investigate how these crops contribute to rural livelihoods. If biofuel crops are to make a sustained contribution to livelihoods, then projects promoting their use must not be one-off interventions. Rather they must be sustained over time in order to address the multiplicity of challenges faced by the rural – often marginalised – populations in Guatemala; not least the establishment of equitable value chains that deliver genuine opportunities for the rural poor.

Tied to this research gap is the requirement for research on the broader environmental and land use impacts of biofuel feedstock production. This thesis has demonstrated the importance of understanding the political economic factors which shape the outcomes of biofuels, but such research needs to be carried out in parallel with studies from other disciplines, including the natural sciences, economics and geography. Three such areas of research were identified in the main body of this thesis: water resources, life cycle assessment (LCA) and land capacity. With regard to the first of these, Chapter Eight highlighted the impacts of agricultural production on water resources and the paucity of evidence on this issue. Research is needed that maps the diversion of waterways, that assesses the impacts of agricultural production on water quantity and quality and that searches for sustainable solutions that promote the rational use of water. Some research in this area is already underway; for instance, the Private Institute for Research on Climate Change (ICC) is undertaking research on watershed management, primarily focused on upland areas of importance to the sugarcane sector. However, there is a need for more case studies, particularly at the local level, to allow further assessment of this issue.

A second area of research is that of the life cycle impacts of biofuels, a key concern for EU policymakers. As discussed in Chapter Six, the only LCA on Guatemalan biofuels was commissioned by the sugarcane sector. This assessment was for internal use only and did not use locally-specific data. LCA has been criticised for drawing artificial boundaries around the impacts of production (Adams et al. 2013) yet, in a country where there is little research of this nature, such assessments would at the very least provide a tool for highlighting potential areas of concern.

Finally, the remaking of the maps of the agricultural land capacity (see Figure 8) may have consequences for biofuels and other crops that need to be understood. In particular, if these maps demonstrate greater agricultural capacity than at present, as was suggested in interview (see Chapter Three), then there is a real possibility that their future publication will drive land use changes and further land concentration. To protect rural communities and natural environments from potential land acquisitions, such as occurred in Sayaxche and the Polochic Valley, measures will need to be put in place.

Another topic worthy of investigation is the practices of independent sugarcane producers. Much attention has been paid to Guatemala's sugar mills yet, as Chapters Six and Eight have suggested, far less is known about the agricultural and labour practices of independent producers who manage around 20% of the land cultivated with sugarcane. With the sugar mills unable or reluctant to exert control over the practices of independents for fear that their produce would be sold to other mills, these producers are not subject to the same market requirements as the mills. It is therefore likely that few of the environmental and labour reforms that had contributed to the 'modernisation' of the sugarcane sector have reached these producers. The Plaza Pública investigation (Arce and Rodríguez Pellecer 2012) into child labour on sugarcane plantations suggests that such practices may be common, yet there is little published research on the subject. More generally, the incorporation of independent producers into global value chains is a research area that has attracted much recent attention (e.g. Glasbergen 2007; Hunsberger et al. forthcoming). This would be a valuable subject for research on biofuels, particularly because of the linkages with broader debates on sustainable energy for international development, an emerging and critical area of scholarship.

Finally, a critical area for future research is on the performance of sustainability schemes, particularly their ability to capture the social and livelihood issues associated with biofuels. As discussed in Chapter Four, many of the thirteen schemes accepted by the EU (see Table 5) are incipient; for instance, in November 2013, the Roundtable on Sustainable Biomaterials had just ten certified operators (RSB 2013). There is therefore little evidence of their effectiveness in practice and while this research represents an empirical contribution to this subject, further evidence is required.

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Appendix I. Sample interview guides

EU BIOFUELS POLICY

My name is Julia Tomei and I am a second year PhD student at the UCL Energy Institute. My research is concerned with how EU biofuels policy is translated into local outcomes in developing countries, using Guatemala as a case study.

Thank you for agreeing to talk with me today and to participate in this research project. I would like to reassure you that this interview will be confidential and the recording and transcripts will be available only to me. Furthermore, your actual name will never be used in any study outputs and if I use any quotes, I will refer to you only as an EU policymaker/ NGO/ Industry. Do you mind if I record the interview so that I don't miss anything?

NB: Wherever possible ask for examples:

- Can you give me a specific example of that?
- Can you be more specific?
- Can you say more about that?
- What is your take on...

EU Policy

I would like to start by asking your personal role within the Commission and about the responsibilities of DG [ENER/ DEVCO/ ENV/ CLIMA] towards biofuels policy?

What is the DG [ENV/ DEVCO/ ENER/ CLIMA] position on biofuels? In what ways, if at all, has it changed over the past few years [and why]?

What were the drivers/ factors that triggered initial interest in biofuels at the EU level? [PROMPT: any particular key influences i.e. individuals/ organisations/ policies elsewhere/ global events?] [Was there 'universal' support at this stage?]

In your opinion, what have been the key events that have since shaped the way in which the policy framework has developed?

Which stakeholders [e.g. business/ NGOs/ research institutions] have been most influential in guiding EU biofuels policy to date?

Communications from the Commission prior to the adoption of the 2003 Biofuels Directive do not appear to question the (positive) environmental impacts of biofuels. What events raised concerns about the sustainability credentials of biofuels?

What led to the strengthening of the sustainability criteria between the 2007 proposal and the final directive?

Why were the RED/ FQD mandatory criteria chosen and not others e.g. social sustainability criteria?

How effective do you think the sustainability standards (and the certification schemes allied to them) will be in addressing the sustainability concerns re biofuels? Do you think any risks/concerns/issues are missing from these standards? If so, are there any proposals planned to address these gaps?

Do you have confidence that sustainability reporting for the RED/ FQD can adequately address direct land use change?

Indirect Land Use Change

When did the issue of ILUC first gain attention at the Commission? How was the issue initially received?

To what extent do you believe the ILUC debate is 'resolvable'? How might it be addressed?

Will the introduction of an ILUC factor reassure biofuel critics?

Why has the Commission taken so long to report on ILUC?

In light of the Reuters article, when can we expect a decision/ announcement on ILUC and what should we expect?

Impacts on third countries

Given the potential size of European biofuels markets, the policy & regulatory framework has potentially broad international impacts in terms of environment, energy, development, and trade policies.

Despite this, the opportunities and risks for developing countries only really seem to have been picked up on after the 2003 Biofuels Directive. What is your personal take as an expert/ policymaker on how third countries have come to be considered within the framework?

When did the EU realise that the bloc could not/ should not meet its own demand?

In your opinion, what are the biggest risks to developing countries of investing in EU/ global biofuel markets? [PROMPT: uncertainty, technical capacity, institutional capacity, risk of currency devaluation, political instability] How might these be addressed?

What are the key challenges for developing countries in (implementing and) complying with the sustainability criteria? How is the EU assisting developing countries to address these challenges? [Who has responsibility for auditing practices in developing countries?]

I recently saw an announcement by the Commission that it would be reviewing energy deals with third countries as part of its efforts to develop a common external energy policy. How do biofuels fit into this?

I have spoken to some critics of biofuels who hope that the 2014 review clause in the RED offers an opportunity to review (and reduce) the 10% target. Do you think a review and possible reduction of the target should be considered? Is it at all likely?

Is there anything else you would like to mention that we haven't discussed during this interview?

THANK YOU AND CLOSE

GUATEMALA: BASIC INTERVIEW GUIDE

Muchas gracias por aceptar conversar conmigo y por su participación en esta investigación doctoral. Quisiera asegurarla que esta reunión será tratada con absoluta reserva. Además, su participación en esta investigación será anónima y su nombre no aparecerá en ningún resultado. ¿La molestaría si grabo esta reunión para que no pierda nada?

El desarrollo de los biocombustibles al nivel mundial

¿Cuál es su opinión sobre el aumento a un nivel mundial del uso de los biocombustibles?

¿Cuáles son los principales consideraciones – éticos o medioambientales – asociados con el aumento en el uso global de los biocombustibles?

El desarrollo del sector de los biocombustibles en Guatemala

¿Qué piensa usted del sector de los biocombustibles en Guatemala y cómo está desarrollándose? ¿Hay un rol para los biocombustibles aquí en Guatemala? ¿Deben, o pueden, estar una parte de la matriz energética?

¿Cuáles son los impulsos principales de los biocombustibles en Guatemala? ¿Hay diferencias entre los que impulsan el biodiesel y el etanol?

Como yo lo entiendo, a pesar de distintos esfuerzos para desarrollar una política pública de biocombustibles en Guatemala, aun no lo hay. En su opinión, ¿por qué no hay una política pública de los biocombustibles? ¿Cuáles son las consecuencias de esta ausencia por Guatemala? ¿Es importante que Guatemala tenga una política de biocombustibles?

A un nivel Centroamericano, ¿es importante que haya esfuerzos para desarrollar estándares para los biocombustibles? ¿Los tendrían impactos sobre el sector Guatemalteco de biocombustibles?

La Unión Europea ha definido algunos criterios de sostenibilidad por la producción de biocombustibles, ¿cree usted que estos criterios afectarán cómo el sector está desarrollándose en Guatemala? ¿Pueden ser un mecanismo para mitigar los impactos sociales y medioambientales de la producción de biocombustibles?

¿Cómo piensa usted que el sector de los biocombustibles Guatemalteco se va a desarrollar en los próximos 5 o 10 años/ a largo plazo?

Y, por fin, una de las razones para este viaje a Guatemala era para identifica potenciales vacíos de conocimiento con respeto a los biocombustibles. ¿En su opinión, que vacios de conocimiento hay en esta tema?

GRACIAS Y FIN

GUATEMALA: BASIC INTERVIEW GUIDE – SUGAR MILLS

Muchas gracias por aceptar conversar conmigo y por su participación en esta investigación doctoral. Quisiera asegurarla que esta reunión será tratada con absoluta reserva. Además, su participación en esta investigación será anónima y su nombre no aparecerá en ningún resultado. ¿La molestaría si grabo esta reunión para que no pierda nada?

¿Podemos empezar con una descripción de las funciones que usted realiza aquí en [INGENIO]?

¿Por qué y cuando decidió [INGENIO] embarcarse en un programa de etanol? ¿Cuáles fueron los factores claves que impulsaron este interés? ¿Cuáles fueron (y son) los riesgos de la inversión en etanol?

Entiendo que los mercados principales por el etanol son los europeos, ¿por qué? [¿estos mercados siempre fueron el propósito de INGENIO?] ¿Es probable que cambien en el corto o mediano plazo? ej. mercados asiáticos.

¿Qué tan enterados se encuentran de las políticas europeas sobre biocombustibles? Con que políticas… ¿cómo piensa que se aplican las políticas aquí?

Dado la importancia de los mercados Europeos, ¿cómo influyen los requerimientos europeos para biocombustibles en la producción aquí? ¿Las provisiones para los biocombustibles han traído cambios en la práctica?

Para [INGENIO], ¿qué significa la sostenibilidad del sector azucarero/ de los biocombustibles?

Con referencia al ISCC:

- ¿Cómo funciona este sistema de certificación en la práctica?
- ¿Por qué optaron por el ISCC y no el RSB, Bonsucro?
- ¿Ha traído cambios en las prácticas de [INGENIO] la conformidad con el ISCC?
- ¿Cuál es el costo de la certificación?
- ¿Cómo muestran el cumplimiento de las emisiones de los gases de efecto invernadero?
- En 2006/07, [INGENIO] cultivó X% y proveedores X% (datos de CENGICAÑA); ¿cómo incluye estos productores independientes en la certificación del etanol?
- ¿El ISCC captura los asuntos de sostenibilidad importantes para [INGENIO]? ¿Hay algunos asuntos no contemplados importantes?
- ¿Es [INGENIO] el único ingenio en Guatemala que – hasta la fecha – esta certificando sus productos? ¿Es solo para el etanol o también para el azúcar?

¿Qué piensa de los esfuerzos hasta la fecha para desarrollar un mercado domestico de biocombustibles en Guatemala? ¿Ha participado [INGENIO] en las discusiones? Si hubiera un mercado interno por los biocombustibles, ¿le interesaría a [INGENIO]?

¿Qué piensa usted de la crítica dirigida al sector de los biocombustibles por parte de los ONGs? Ej. que impulsan la extensión de tierras y el desalojo de comunidades rurales, afectan la seguridad alimentaria etc.

¿Qué expectativas y esperanzas tiene [INGENIO] por el futuro del sector de los biocombustibles aquí en Guatemala?

¿Hay alguien más con quien debo platicar?

[Si hay tiempo… CENGICAÑA estima que [INGENIO] va a producir alrededor de X litros de etanol al día (o X días al año) durante esta zafra – 2011/12 – ¿todo es para combustible?]

GRACIAS Y FIN

GUATEMALA: EXPERT INTERVIEWS – THE POLOCHIC VALLEY

Muchas gracias por aceptar conversar conmigo y por su participación en esta investigación doctoral. Quisiera asegurarle que esta reunión será tratada con absoluta reserva. Además su participación en esta investigación será anónima y su nombre no aparecerá en ningún resultado. ¿Le molestaría si grabo esta reunión para que no pierda nada?

¿Podemos empezar con una descripción de las funciones de [ORGANIZACIÓN], y dentro de esa que funciones usted realiza?

¿Me puede contar un poco sobre lo que pasó en el Polochic, especialmente desde la llegada de Chabil Utzaj?

- ¿Cómo es la cronología?
- ¿De dónde venían estas comunidades? ¿Adónde fueron después de los desalojos?
- ¿De cuántas comunidades estamos hablamos? ¿Cómo se llaman?

¿Cómo participó [ORGANIZACIÓN] en lo que pasó en el Polochic y desde cuándo?

¿Participó [ORGANIZACIÓN] en las mesas de diálogo? ¿Me puede contar que ocurrió en las mesas? Según las comunidades, hasta el día antes de los desalojos, pensaron que había un acuerdo con Widdman para que ellos pudieran comprar (por FONTIERRAS) la tierra. ¿Qué hubiera pasado para llevarles a pensar eso?

En su opinión, ¿por qué recibieron tanta atención los desalojos en el Polochic el año pasado?

- ¿Por qué utilizaron tanta fuerza durante los desalojos en el Polochic en 2011? ¿Es normal?

Muchas ONGs les echaban la culpa a la creciente demanda global para los biocombustibles. Para usted, ¿hay alguna verdad en esto?

¿Cómo reconoce el estado los derechos consuetudinarios (o tradicionales) a la tierra? Por ejemplo, que para los pueblos indígenas la tierra continua siendo de propiedad colectiva y usufructo.

¿Qué es la posición de la [ORGANIZACIÓN] sobre invasores, y qué derechos tienen esa gente? Por ejemplo si pierden sus casas, milpas, animales y bienes durante un desalojo.

GRACIAS Y FIN

Appendix II. Information Sheets

UCL ENERGY INSTITUTE

Dear [participant's name],

Thank you for agreeing to participate in this study. This research investigates how global biofuels policy is translated into local outcomes in developing countries, using Guatemala as a case study. This information sheet provides more detail about the research, which is funded under the Supergen Biomass and Bioenergy consortium (http://www.supergen-bioenergy.net/) by the UK Engineering and Physical Sciences Research Council (EPSRC). The research is supervised by Prof Paul Ekins (UCL) and Dr Rocio Diaz-Chavez (Imperial College).

Background to the research. A starting assumption for my thesis is that there are no natural markets for biofuels. Therefore, markets – as well as the rules and institutions that govern their use – have had to be created and national and international policy has played a critical role. To date, the EU has been a key actor in the creation of these global biofuels markets. The size of the EU market also offers developing countries the opportunity to develop biofuels production capacity whether or not a domestic market has been established.

The first stage of my research is an analysis of EU biofuels policy. I have been constructing a chronology of EU biofuels policy and I now have an extensive list of policies, but would like to use this interview to gain a better understanding of the *key events* that have shaped the development of biofuels policy. This first stage of my research will provide me with a better understanding of the EU biofuel policy framework, its evolution, key issues, and hopes & expectations for the future. Further, although the Renewable Energy Directive and Fuel Quality Directive are internal energy policies, the biofuels provisions (in particular) have implications for trade and development. I am therefore also interested in the *external implications of this policy*, especially the opportunities and risks for developing countries.

The second stage of research consists of field work in Guatemala, which will commence next month. Having conducted a scoping study last year, I have identified a number of policy makers, researchers and producers with whom I will conduct interviews and carry out further ethnographic research.

Expectations of this interview. I would like to thank you again for agreeing to speak to me about EU biofuels policy, as it will contribute to the first stage of my research. I will have some specific questions, but would also welcome any thoughts or comments that arise during the interview. I anticipate that the interview should take approximately one hour. I would like to reassure you that any information you provide will be treated as confidential and handled in accordance with the UK Data Protection Act 1998. Furthermore, participation in this research is anonymous and you will not be identified by name in any outputs from this research; if you are quoted, I will refer to you only as an 'EU policymaker'. If for any reason you want to withdraw from this study, you may do so at any time. If you would like to discuss the information given here with others, you are very welcome to do so.

If you have any questions or comments about this study, please do not hesitate to ask - my contact details can be found at the bottom of this information sheet.

Yours sincerely,

Julia Tomei

UCL ENERGY INSTITUTE

Con un cordial saludo, me permito manifestarle mi agradecimiento por su valiosa participación en esta investigación. El objetivo de este estudio es establecer ¿cómo las políticas globales de biocombustibles se traducen en países en desarrollo y qué resultados locales está teniendo?, utilizando a Guatemala como un estudio de caso. Este folleto le provee más información sobre la investigación, la cual está financiada por el consorcio '*Supergen Biomass and Bioenergy*' (http://www.supergen-bioenergy.net/) del Consejo de Investigación de Ingeniería y Ciencias Físicas (EPSRC) del Reino Unido. La investigación es supervisada por el Prof. Paul Ekins (University College Londres) y la Dra. Rocío Diaz-Chávez (Imperial College Londres).

Antecedentes de la investigación. Una suposición inicial de esta tesis es que no existen mercados naturales por los biocombustibles. Por lo tanto, se han creado tanto los mercados como las reglas e instituciones que controlan su uso, en donde la política internacional ha tomado un rol crítico en esta dinámica. Hasta ahora, la Unión Europa ha sido un importante actor en la creación de estos mercados globales. De hecho, el tamaño del mercado europeo ofrece a países en desarrollo la oportunidad de desarrollar la capacidad de producción aun cuando no exista un mercado doméstico establecido.

La primera etapa de la investigación consistió en un análisis de la política europea de los biocombustibles. El análisis de documentos y entrevistas a detalle, permitieron en entender el marco de la política europea de los biocombustibles, su evolución, y escenarios futuros. Por ejemplo, aunque la Directiva de Energía Renovable es una política energética interna, las provisiones para los biocombustibles tienen importantes implicaciones para el comercio y el desarrollo. Es por esta razón que también me interesa conocer las implicaciones externas de esa política, especialmente las oportunidades y riesgos para países en desarrollo.

La segunda etapa consiste en el trabajo de campo aquí en Guatemala. El año pasado hice un estudio preliminar sobre el alcance de mi proyecto y en esta segunda etapa se tiene previsto profundizar en la investigación. En esta etapa me brindará un mayor conocimiento del sector guatemalteco de los biocombustibles, su evolución y cómo se está relacionando y respondiendo a las políticas europeas.

Expectativas de la entrevista. Le agradezco en gran manera su disposición de aceptar conversar conmigo sobre los biocombustibles en Guatemala. Tendré preguntas específicas cuando nos encontremos, pero le agradeceré cualquier idea o comentario que surja de la entrevista. Estimo que la entrevista durará aproximadamente una hora. Quisiera asegurarle que cualquier información que usted me provea será tratada con absoluta reserva según el Acta de Protección de Datos (1988) del Reino Unido. Además, su participación en esta investigación será anónima y su nombre no aparecerá en ningún resultado. Si, por cualquier razón, usted desea retirarse de este estudio, puede indicármelo en cualquier momento.

Cualquier observación o comentario que desee hacerme sobre este estudio, por favor no dude en contactarme. Mis datos personales aparecen al final de este folleto.

Atentamente,

Julia Tomei

Appendix III. ISCC Principles and Criteria

Criterion number	Source	Criterion	Major must	Minor must
PRINCIPLE 1: Biomass shall not be produced on land with high biodiversity value or high carbon stock (according to Article 17(3), (4) and (5) of the Directive 2009/28/EC. HCV areas shall be protected.				
1.1	2009/28/EC	Biomass is not produced on land with high biodiversity value	X	
1.2	2009/28/EC	Biomass is not produced on highly biodiverse grassland	X	
1.3	2009/28/EC	Biomass is not produced on land with high carbon stock	X	
1.4	2009/28/EC	Biomass is not produced on land that was peatland in January 2008 or thereafter (Article 17(5) of the Directive 2009/28/EC)	X	
1.5	2009/28/EC	If land was converted after January 1, 2008, the conversion and the use should not run contrary to Principle 1	X	
1.6	Sustainability	All other production areas of the farm/ plantation comply with the ISCC Principle 1	X	
PRINCIPLE 2: Biomass shall be produced in an environmentally responsible way. This includes the protection of soil, water and air and the application of Good Agricultural Practices				
2.1 Environmental impact assessment and stakeholder consultation				
2.1.1	Cross Compliance	Environmental aspects are considered if planning buildings, drainage etc.	X	
2.2 Natural water courses				
2.2.1	Sustainability	Natural vegetation areas around springs and natural watercourses are maintained or re-established		X
2.3 Soil conservation and avoidance of soil erosion				
2.3.1	Sustainability	Good agricultural practices must be applied with respect to: Prevention and control of erosion, maintaining and improving soil nutrient balance, soil organic matter, soil pH, soil structure, soil biodiversity and prevention of salinisation. A soil management plan aimed at sustainable soil management, erosion prevention and erosion control must be documented. Annual documentation of applied good agricultural practices with respect to the abovementioned aspects must be in place		~~X~~
2.3.2	Cross Compliance	Field cultivation techniques used to reduce the possibility of soil erosion	X	
2.4 Soil organic matter and soil structure				
2.4.1	Cross Compliance	Soil organic matter is preserved	X	
2.4.2	Cross Compliance	Organic fertilizer is used according to nutritional requirements of the soil	X	

2.4.3	Cross Compliance	Burning as part of the cultivation process is not allowed without permission. Burning as part of land clearance is not allowed	X	
2.4.4	Cross Compliance	Techniques have been used that improve or maintain soil structure	X	
2.4.5	Sustainability	The use of agricultural by-products does not jeopardize the function of local uses of the by-products, soil organic matter or soil nutrients balance. Documentation must be available that the use of by-products does not occur at the expense of the soil nutrient balance, soil organic matter balance or important traditional uses (such as fodder, natural fertiliser, material, local fuel etc.) unless documentation is available that similar or better alternatives are available and are applied	X	
2.5 Ground Water and Irrigation				
2.5.1	Cross Compliance	Mineral oil products and Plant Protection Products are stored in an appropriate manner which reduces the risk of contaminating the environment	X	
2.5.2	Cross Compliance (from 2010)	If ground water is used for irrigation, the producer respects existing water rights, both formal and customary, and can justify the irrigation in light of accessibility of water for human consumption. Local legislation is followed.	X	
2.5.3	Sustainability	Documentation of water management plan aimed at sustainable water use and prevention of water pollution. Annual documentation of applied good agricultural practices with respect to: efficient water usage, responsible uses of agro-chemicals, waste discharge must be available		X
2.5.4	Sustainability/ GAP	The producer can justify the method of irrigation used in light of water conservation		X
2.5.5	Sustainability	To protect the environment, water is abstracted from a sustainable source		X
2.6 Use of Fertilizer				
2.6.1	Cross Compliance	During the application of fertilizers with a considerable nitrogen content care is taken not to contaminate the surface and ground water	X	
2.6.2	Cross Compliance	Fertilizers with a considerable nitrogen content are only applied on absorptive soils	X	
2.6.3	Cross Compliance	Complete records of all fertilizer applications are available (where, what, how much, date)	X	
2.6.4	Cross Compliance (from 2010)	The fertilizer application machinery allows accurate fertilizer application	X	
2.6.5	GAP	Inorganic fertilizers are stored in a covered, clean and dry area		X

2.6.6	Cross Compliance	Fertilizers are stored in an appropriate manner, which reduces the risk of contamination of water courses	X	
2.6.7	Cross Compliance	Fertiliser is used according to an input/output balance	X	
2.6.8	Cross Compliance	The use of raw sewage sludge is not allowed	X	
2.7 Integrated Pest Management (IPM)				
2.7.1	2009/128/EG	Assistance with implementation of IPM systems has been obtained through training or advice		X
2.7.2	2009/128/EG	The producer can show evidence of implementation of at least one activity that falls in the category of "Prevention"		X
2.7.3	2009/128/EG	The producer can show evidence of implementation of at least one activity that falls in the category of "Observation and Monitoring"		X
2.7.4	2009/128/EG	The producer can show evidence of implementation of at least one activity that falls in the category of "Intervention"		X
2.8 Use of Plant Protection Products (PPP)				
2.8.1	Cross Compliance	Staff dealing with plant protection products is competent	X	
2.8.2	Cross Compliance	Producers only use plant protection products that are registered in the country of use for the target crop where such official registration scheme exists	X	
2.8.3	Cross Compliance	The producer follows the label instructions	X	
2.8.4	Cross Compliance	All application equipment is calibrated	X	
2.8.5	GAP	Invoices of registered plant protection products are kept		X
2.8.6	Cross Compliance	If there are local restrictions on the use of plant protection products they are observed	X	
2.8.7	Cross Compliance	All the plant protection product applications have been recorded (where, when, what, how much, why, who)	X	
2.8.8	Cross Compliance	Surplus application mixes or tank washings is disposed of in a way not to contaminate the ground water	X	
2.9 Plant Protection Product Storage				
2.9.1	Cross Compliance / Local legislation on dangerous substances	Plant protection products are stored in accordance with local regulations in a secure, appropriate storage. Potential contamination of the ground water must be avoided	X	
2.9.2	Cross Compliance	There are facilities for measuring and mixing plant protection products	X	
2.9.3	Cross Compliance/	There are facilities to deal with spillage to avoid contamination of the ground water	X	

	GefahrstoffVO Local legislation on dangerous substances			
2.9.4	GAP	The product inventory is documented and readily available		X
2.9.5	Cross Compliance	All plant protection products are stored in their original package	X	
2.9.6	GAP	Liquids are not stored on shelves above powders		X
2.9.7	GAP	Obsolete plant protection products are securely maintained and identified and disposed of by authorised or approved channels		X
2.10 Empty Plant Protection Product Containers and Waste Disposal				
2.10.1	GAP	The re-use of empty plant protection product containers for purposes other than containing and transporting of the identical product is avoided		X
2.10.2	GAP	The disposal of empty plant protection product containers does occur in a manner that avoids exposure to humans and the environment		X
2.10.3	GAP	Official collection and disposal systems are used when available		X
2.10.4	Cross Compliance/ GAP	Empty containers are rinsed either via the use of an integrated pressure rinsing device on the application equipment, or at least three times with water. The rinsate from empty containers is returned to the application equipment tank. Local regulations regarding disposal or destruction of containers are followed.	X	
2.10.5	KrW-/abfG Local legislation	The premises have adequate provisions for waste disposal		X
2.10.6	KrW-/abfG Local legislation	There is a farm waste management plan. Waste recycling avoids or reduces wastage and avoids the use of landfill or burning		X
PRINCIPLE 3: Safe working conditions through training and education, use of protective clothing and proper and timely assistance in the event of accidents				
3.1 Safe Working conditions				
3.1.1	Employer's Liability Insurance Association	The farm has a health, safety and hygiene policy and procedures including issues of the risk assessment		X
3.1.2	VSG 1 First Aid legislation	First Aid kits are present at all permanent sites and in the vicinity of fieldwork		X
3.1.3	Cross Compliance/ GAP	Workers (including subcontractors) are equipped with suitable protective clothing in accordance with legal requirements and/or label instructions or as authorised by a competent authority. Protective clothing is cleaned after use and stored so as to prevent contamination of clothing or equipment	X	

3.1.4	ArbeitsstättenVO Local legislation on work place	Potential hazards are clearly identified by warning signs and placed where appropriate		X
3.1.5	Employer's Liability Insurance Association	There are records kept for training activities and attendees		X
3.1.6	2009/128/EG GefahrstoffVO Local legislation on dangerous substances	All workers handling and/or administering chemicals, disinfectants, plant protection products, biocides or other hazardous substances and all workers operating dangerous or complex equipment as defined in the risk assessment have certificates of competence, and/or details of other such qualifications	X	
3.1.7	2009/128/EG	All workers received adequate health and safety training and they are instructed according to the risk assessment		X
3.1.8	ArbeitsstättenVO Local legislation on work place	Workers have access to clean food storage areas, designated dining areas, hand washing facilities and drinking water		X
3.1.9	ArbeitsstättenVO Local legislation on work place	On site living quarters are habitable and have the basic services and facilities		X
3.2 Plant Protection Product Handling				
3.2.1	GAP	The accident procedure is evident within ten meters of the plant protection product/ chemical storage facilities		X
3.2.2	ArbeitsstättenVO Local legislation on work place	There are facilities to deal with accidental operator contamination		X
3.2.3	Cross Compliance ArbeitsstättenVO Local legislation on work place	There are procedures dealing with re-entry times on the farm	X	
PRINCIPLE 4: Biomass production shall not violate human rights, labour rights or land rights. It shall promote responsible labour conditions and workers' health, safety and welfare and shall be based on responsible community relations. **The criteria listed here is based on internationally recognized requirements concerning social aspects (International Labour Organization, core ILO standards: ILO 29, 105, 138, 182, 87, 98, 100, 111)**				
4.1		A self-declaration on good social practice regarding human rights has been communicated to the employees and signed by the farm management and the employees' representative		X
4.2		Employment conditions comply with equality principles	X	
4.3		There is no indication of discrimination (distinction, exclusion or preference) practiced that denies or impairs equality of opportunity, conditions or	X	

		treatment based on individual characteristics and group membership or association. For example, on the basis of: race, caste, nationality, religion, disability, gender etc.		
4.4		There is no indication of forced labour at the farm	X	
4.5		Workers have the freedom to join labour organizations or organize themselves to perform collective bargaining. Workers must have the right to organize and negotiate their working conditions. Workers exercising this right should not be discriminated against or suffer repercussions	X	
4.6		The farm does pay a living wage which meets at least legal or industry minimum standards	X	
4.7		The person responsible for workers' health, safety and good social practice and the elected individual(s) of trust have knowledge about and/or access to recent national labour regulations/collective bargaining agreements		X
4.8		All impacts for surrounding areas, communities, users and land owners taken into account and sufficiently compensated for		X
4.9		The management does hold regular two-way communication meetings with their employees where issues affecting the business or related to worker health, safety and welfare can be discussed openly		X
4.10		There is at least one worker or a workers' council elected freely and democratically who represent the interests of the staff to the management		X
4.11		There is a complaint form and/or procedure available on the farm, where employees and affected communities can make a complaint		X
4.12		All children living on the farm have access to quality primary school education	X	
4.13		There are records that provide an accurate overview of all employees (including seasonal workers and subcontracted workers on the farm) and indicate full names, a job description, date of birth, date of entry, wage and the period of employment		X
4.14		No minors are employed on the farm	X	
4.15		All employees are provided with fair legal contracts. Copies of working contracts can be shown for every employee indicated in the records. These have been signed by both the employee and the employer		X
4.16		There is a time recording system that shows daily working time and overtime on a daily basis for all employees		X
4.17		The working hours and breaks of the individual worker are indicated in the time records comply with legal regulations and/or collective bargaining agreements		X

4.18		Pay slips document the conformity of payment with at least legal regulations and/or collective bargaining agreements		X
4.19		Other forms of social benefits are offered by the employer to employees, their families and/or community		X
4.20		Mediation is available in case of a social conflict		X
4.21		Fair and transparent contract farming arrangements are in place		X
4.22		Biomass production does not impair food security		X
PRINCIPLE 5: Biomass production shall take place in compliance with all applicable regional and national laws and shall follow relevant international treaties				
5.1		The producer can proof that the land is used legitimately and that traditional land rights have been secured	X	
5.2		There is awareness of, and compliance with, all applicable regional and national laws and ratified international treaties	X	
PRINCIPLE 6: Good management practices shall be implemented				
6.1	Cross Compliance	A recording system is established for each unit of production. These records must be kept in an ordered and up-to-date condition for at least 3 years	X	
6.2	Cross Compliance	Records are kept for the description of the areas in use	X	
6.3	Cross Compliance	In case of the engagement of subcontractors they must comply fully with the ISCC standard and provide the documentation and information	X	

Source: ISCC (2011)