Chapter 2
International Sustainability Standards and Certification

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Abstract Standards have evolved as the major mode of governance for biofuels. In particular, the European Union (EU) policy approach actively employs a variety of voluntary certification standards under its meta-standard in order to safeguard sustainability of its mandated biofuel demand. Advantages and disadvantages of this novel, hybrid governance arrangement have been widely discussed. In order to fully understand the implications of this international governance arrangement, we argue that more research is required to determine the dynamics that evolve in specific contexts as to whether standards come to matter and which. In this chapter, we highlight two macro-level factors of such dynamics—markets and policy—for the geographic focus of this volume: Latin America and the Caribbean (LAC). The current adoption of standards reflects the production and trade patterns of the region. EU sustainability criteria are most relevant for the biodiesel exporting industry in Argentina, while the US standard for greenhouse gas (GHG) savings influences Brazilian ethanol producers. Showing a tendency to minimal compliance, the current standard adoption in Argentina points at problematic dynamics within the EU Renewable Energy Directive (RED) governance arrangement. Weak regulatory and policy frameworks may pose barriers to the uptake of certification standards. Especially in LAC, where biofuel production often developed from already existing flex crop industries, biofuel policy is embedded in multiple sectoral policy areas and historical agrarian structures. The EU's 100 % captive market for certified biofuels is likely to help overcoming this barrier. However, further research is urgently needed as to whether certification in weak policy contexts has complementarity or cosmetic effects.

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2.1 Introduction

Despite their promotion as an environmentally friendly alternative to fossil fuels, the rapid expansion of biofuels from crops set into motion over the past decade has raised numerous concerns about detrimental effects on ecosystems and communities living in and around biofuel production sites (see Chap. 1; German et al. 2011; Lüdeke-Freund et al. 2012). In anticipation of and in response to these effects, public and private actors on different scales have developed regulations, standards, and codes of conduct to mitigate or minimize the negative impacts of biofuels and their production processes (Bailis and Baka 2011). These initiatives reflect a shift from government to governance, which is a phenomenon seen in other primary commodity sectors (Biermann and Pattberg 2012). In this shift non-state actors, for example, standard-setting organizations and auditing firms, assume some responsibility for governing the behavior of producers and/or consumers. However, in contrast to other sectors, in which "non-state market-driven" rulemaking through standards may be explained by a lack of state interest or ability to govern (Cashore 2002), biofuel governance is better characterized as a *hybrid mode of governance*, in which the state remains a central figure, but a greater role exists for private actors and vocal civil-society groups (Swyngedouw 2005; Bailis and Baka 2011).

As a main advantage, certification standards are acknowledged for their potential to transcend nation-state boundaries and thus influence international supply chains to adhere to principles of sustainability, and thus function "as a mechanism in countries with poor abilities to enforce policy" (Diaz-Chavez 2011, p. 5768; cf. Lewandowski and Faaij 2006; Verdonk et al. 2007; Mol 2010; Janssen and Rutz 2011; Scarlat and Dallemand 2011). At the same time, however, there is a necessity to include stakeholders at points of productions in standard-setting processes (Lewandowski and Faaji 2006; Verdonk et al. 2007), to consider their capabilities and interests (Lee et al. 2011; Edwards and Laurance 2012; Romijn et al. 2013), and to account for local practices and physical environments (Khatiwada et al. 2012; Efroymson et al. 2013). While most certification standards relevant to biofuels are "second-generation standards" that have adopted participatory practices in standard-governance and auditing (Ponte and Riisgaard 2011, p. 259), some are not. In addition, the European Union's (EU's) hybrid arrangement includes standards that differ greatly in scope with some representing the minimum set of environmental criteria stipulated by the EU and others addressing a wide range of environmental and social issues.

Given the transnational sphere of influence of these arrangements (Barry et al. 2012, p. 2), sustainability standards set elsewhere are potentially relevant to biofuel production in Latin America and the Caribbean (LAC). The questions we ask in this chapter are thus: What is the relevance of international standards and certification for sustainable biofuel production in the LAC region? In which countries will certification standards help to bridge a 'governance gap'? Which standards might circumvent local stakeholders' interests and needs and where? In fact, little has been said as to whether and how competing standards and certification schemes (come to) matter at all at points of production. In order to understand the efficacy of governance interventions, we need to consider specific contexts. As Pawson frames it, context operates by "constraining the choices of stakeholders" and creating "different pregiven characteristics that leave some well-disposed and some badly-disposed" to benefit from a particular set of institutional arrangements (Pawson 2006, p. 25). Thus, we should ask, "What works for whom in what circumstances?"

This book is focused on the LAC region, where contextually, biofuel development can be viewed as an outgrowth of preexisting agro-industries. Governing for sustainability across the LAC region encompasses a complex array of land use policies, labor laws, and environmental regulations. The political landscape is also populated by peasant movements, labor unions, trade associations, and environmental watchdogs. In some countries, like Peru and Colombia, where drug trafficking remains a source of instability, biofuel crops have even been promoted as alternatives to coca cultivation. Clearly, circumstances vary around the region and local context is an essential factor affecting the viability of governance efforts.

In addition, while this collection includes a chapter on biofuel production in Caribbean states, little information exists about governance in the island nations. This is not surprising, given the relatively small role that Caribbean nations play in the region's biofuel production. Most of the production that does occur consists of dewatering hydrous ethanol imported from Brazil. As previously mentioned, biofuel industries around the world are highly dependent on preexisting agro-industries to supply feedstock. In the Caribbean region, sugarcane, which is the most likely candidate for biofuel feedstock (see Chap. 10), has been declining for decades. Current production is just one-third of what it had been in the 1980s (FAOSTAT 2013). Thus, our discussion focuses on governance efforts in countries of Central and South America.

This chapter takes a macro-perspective to consider contextual factors that shape the international governance for sustainable biofuels. We frame our discussion in the literature on global environmental governance and draw on research from other areas of social and environmental standards. The latter informs our focus on the two macro-level institutional factors that guide our assessment—markets and regulatory frameworks. Our goal is not to provide a comprehensive review, but rather to highlight some key macro-level contextual determinants that influence whether and how sustainability standards (might) come to matter in LAC.

The chapter begins by introducing the demand side for certification—the transnational, hybrid governance arrangements shaped by EU and US policies as well as multilateral organizations, and the standards and certification systems adopted to safeguard sustainability of biofuels. We argue that *if* international standards and certification matter (i.e., whether they are taken up), will largely depend on the specific biofuel sector characteristics in the countries of the region. We will thus shed light on biofuel industry developments throughout LAC and important characteristics of the region in Sect. 2.3 and contrast these developments with current certification patterns. While Sect. 2.4 then addresses the standards' approaches to critical sustainability issues of biofuel in LAC, Sect. 2.5 will elaborate on intersections between countries' legal and policy frameworks and international sustainability standards. The conclusion will summarize and point to further research needs, including more theory building and linkage to results from existing certification research.

2.2 International Approaches to Sustainable Biofuels: Governance through Standards

In this section, we review the various approaches of governance toward sustainable biofuels through standards. Compared to traditional regulation enforced by the state, governance implies the steering of behavior and conduct of others by means of networks consisting of non-state and state actors (Ponte et al. 2011). In the last two decades, standards have come to function as a key tool in governing conduct in more and more areas. Standards can be defined as sets of "specifications and/or criteria for the manufacture, use, and/or attributes of a product, process, or service" (Matus 2009, p. 1). They represent norms by which "people, objects and actions can be judged and compared, and which provide a common language to evaluators, the evaluated and their audiences" (Ponte et al. 2011, p. 1).

Standard setting can be driven by different groups of actors such as governments, civil society, industry, or a variety of these actors together in multi-stakeholder initiatives. Typically, literature distinguishes between standards set by public authority and hence embedded in regulation, and voluntary standards that are often referred to as 'private' because they are not rooted in state authority (Ponte et al. 2011). Private actors are perceived to outweigh public actors in determining and monitoring sustainability standards due to a 'global governance gap' as state-based and multilateral efforts fail to address environmental and labor issues (Overdevest 2010). In response to this 'gap', standards have emerged as critical modes of governance for biofuel production, albeit with substantial overlap between private and public rulemaking: "we witness the emergence of private market environmental authorities, moral environmental authorities and all kinds of hybrid authorities in biofuel regulation" (Mol 2010, p. 61).

2.2.1 Governmental (Meta-) Standards

As major sources of biofuel demand, including exports from the LAC region, the US and EU's biofuel policies are important frameworks affecting regional biofuel governance. In the USA, the Energy Policy Act of 2005 introduced the Renewable Fuel Standard (RFS), which created biofuel-blending mandates for transport fuels (US Congress 2005, p. 551). The 2007 Energy Independence and Security Act (EISA) raised the annual renewable fuel targets to 136 billion liters by 2022 (57 billion liters of ethanol and 21 billion liters of advanced biofuels by 2015; 79 billion liters of advanced biofuels by 2022; Scarlat and Dallemand 2011). Since 2010, the revised RFS program (or RFS2) requires greenhouse gas (GHG) emission reductions of 20 % for conventional, 50 % for advanced, and 60 % for cellulosic biofuels. RFS2 defines a methodology to assess life-cycle GHG emissions from each fuel pathway, including emissions from indirect land use change (iLUC, see Chap. 1). The US Environmental Protection Agency (EPA) is tasked to implement, monitor, and report all activities related to the program. To this end, the EPA assesses and stipulates feedstock options.

Relevant to LAC producers, ethanol made from sugarcane and biodiesel from soybean oil are considered advanced biofuels. In contrast, palm oil is ruled out as a biodiesel pathway under RFS2 (EPA 2011). EPA assigns renewable identification numbers (RINs) to obligated parties that satisfy their volume obligations for each category of biofuel. RINs provide a proof for compliance and a system of tracking biofuels from production to consumption. Biofuels that do not comply with GHG requirements are not excluded from use, but do not count toward blenders' obligations (Scarlat and Dallemand 2011).[1]

In 2009, the EU adopted the *Renewable Energy Directive 2009/28/EC* (RED) and amended the complementary *Fuel Quality Directive 98/70/EC* through *Directive 2009/30/EC*. The legislation stipulates that by 2020, the share of energy from renewable sources in transport shall reach a share of at least 10 %. For biofuels and other liquid bioenergy carriers, the EU RED provides mandatory sustainability criteria (EU 2009): In order to be counted toward the 10 % target and to be eligible for funding schemes, biofuels were required to prove reduced life-cycle GHG emission reduction of 35 % (increasing to 50 % in 2017 and to 60 % after 2018 for new plants).[2] Unlike RFS, the EU RED does not assess and stipulate eligible feedstock pathways but focuses on production criteria: Fuels produced on land with recognized high biodiversity and carbon stocks and on peatland cannot be counted under the RED. Like the RFS2, the RED does not include social or socioeconomic criteria. The European Commission (EC), however, monitors the origin of biofuels in order to assess production effects in the EU and third countries as well as impacts on LUC, commodity prices, and food security (Scarlat and Dallemand 2011). Reacting to persistent concern about food security, the EC in late 2012 suggested amending the RED such that only 5 % of the 10 % of renewable fuels used in European transport are derived from food crops (conventional or first-generation biofuels). Further, GHG emission reduction requirements shall be increased for new biofuel providers with effect from mid-2014 (EU 2012).[3] Compliance with the RED mandatory sustainability criteria can be demonstrated in three ways: voluntary certification within several qualifying standards, Member State competent authority criteria, or bilateral agreements between the EU and third countries. Member States are to accept standards accepted by the EC.[4] Thirteen such standards, of which we introduce some in the next section, had been accredited at the end of 2012 (EC 2013a).[5]

[1] The *Low Carbon Fuel Standard* (LCFS): the US state of California takes a different approach, obliging all transport fuel providers to reduce the carbon intensity of transport fuels by 10 % by 2020. To this end, a cap-and-trade system based on reporting has been imposed (Scarlat and Dallemand 2011). The LCFS defines its own GHG calculation methodology based on a life-cycle approach that includes both direct and indirect land use change impacts.

[2] Advanced biofuels made from residues, nonfood cellulosic material, and lignocellulosic material are double-counted, i.e., their contribution against the 10 % target can be considered twice that made by other biofuels.

[3] The suggested amendment is expected to pass through the legislative procedure by the end of 2013 (European Parliament 2013).

[4] In some Member States, sustainability policies and standards were already in place when the RED was finalized (Scarlat and Dallemand 2011).

[5] The 13 schemes are Bonsucro, Ensus, Greenergy, ISCC, NTA 8080, Abengoa RSBA, Red Cert, Red Tractor, RTRS EU RED, RSB EU RED, RSPO EU RED, 2BSvs, and SQC.

The EC itself refers to RED as “the most comprehensive and advanced binding sustainability scheme of its kind anywhere in the world” (EC 2010, p. 1). This regulation can indeed be considered significant as the RED pathway explicitly functions as a meta-standard, recognizing certification schemes as “quasi-implementing agencies” (Biermann and Pattberg 2012). In this way, the EU RED exemplifies hybrid governance by actively blending state authority and private (non-state) actors (Mol 2010; Bailis and Baka 2011). Here, non-state certification standards, which we discuss in the next section, provide assurance that production of biofuels meets environmental requirements by means of assessment, evaluation, and certification through third parties—the certification bodies (Hatanaka et al. 2005).

2.2.2 Voluntary Standards

Voluntary standards have evolved in parallel to standards set by national governments. In this discussion, we differentiate between sustainability standards that require third-party verification (certification standards) and standards provided as guidance norms in multilateral arrangements, but lack any oversight.

Biofuel sustainability standards generated by private actors differ in many aspects, including the actor groups involved in initiating and determining standard setting, focus on certain feedstock vis-à-vis biomass in general, and geographical scope (Table 2.1). In terms of geographic scope, nine of the 13 certification standards recognized under the EU RED are applicable to biofuel production in LAC—the remainder are limited to EU Member States.[6] Critics have noted that the proliferation of standards schemes can be problematic, particularly for the EU’s governance arrangement (van Dam et al. 2010; Scarlat and Dallemand 2011; Soliman and Roggeveen 2012; IEA Bioenergy 2012b). With a lack of harmonization, definitions of key terms (such as forestland or high conservation value) and methodological approaches vary. For producers especially, proliferation imposes complexity and may lead to increased costs in order to demonstrate compliance across inconsistent criteria (Scarlat and Dallemand 2011; Soliman and Roggeveen 2012).

Certification standards also differ in that some focus on specific crops, while others cover bioenergy or biomaterials more generally. Crop-specific schemes for palm oil (Roundtable on Sustainable Palm Oil, RSPO), soy (Round Table on Responsible Soy, RTRS), and sugarcane (Bonsucro) were originally developed for specific markets. As is discussed in Chap. 1, they cover a variety of social and environmental issues. Initially they omitted criteria on GHG emissions, but they have added them in order to gain recognition under the EU RED (Table 2.5).

[6] Abengoa Bioenergia and Greenergy developed certification standards applicable only for their own supply chains (the RED Bioenergy Sustainability Assurance (RBSA) and the Greenergy schemes) and are not included in this discussion.

Table 2.1 Characteristics of critical voluntary certification standards

	Initiators	Stakeholders/members involved	Scope and status	Adoption worldwide[a]
Round Table on Responsible Soy (RTRS)[b]	WWF, Maggi Group, Unilever, Cordaid, Coop, Fetraf-Sul	150 members: NGO's (11 %); producers (19 %); industry, finance and trade (49 %); observers (21 %)	Global; operational in 2011	31 certificates
Roundtable on Sustainable Palm Oil (RSPO)[c]	WWF, Migros, Unilever, Malaysian Palm Oil Association, Aarhus United UK Ltd	816 members in seven categories: processors and traders (38 %), consumer goods manufacturers (37 %), growers (16 %), retailers (6 %), social NGOs (1 %), environmental NGOs (2 %); banks and investors (1 %)	Global; operational in 2008	871 certificates
Bonsucro (former Better Sugarcane Initiative, BSI)[d]	WWF and IFC (World Bank)	Representatives of 74 members (one representative from each of the five categories): industrial (millers) (39 %), intermediary (supply chain) (34 %), end-users (12 %), civil society/NGOs (10 %); farmers (5 %)	Global; operational in 2010	43 certificates
International Sustainability and Carbon Certification (ISCC)[e]	Initiated and facilitated by Meo Carbon Solutions consulting and funded by the German Federal Ministry of Agriculture (BMELV)	65 full members today: biomass producers and processors; trade, logistics, and user; NGOs, social sector, science and research, public sector	Global; operational in 2010	1489 certificates
Roundtable on Sustainable Biomaterials (RSB)[f]	Swiss EPFL (École Polytechnique Fédérale de Lausanne) Energy Center	98 members organized in three different chambers and seven categories: farmers and growers (15 %), producers (21 %), retailers; transportation industry and banks (10 %), rights-based NGOs (4 %), rural development organizations (7 %), environmental organizations (16 %); IGOs and governments (26 %)	Global; operational in 2011	7 certificates

Table 2.1 (continued)

	Initiators	Stakeholders/members involved	Scope and status	Adoption worldwide[a]
The Netherlands Technical Agreement—NTA 8080/81[g]	The Netherlands Standards Institute (NEN) (based on Cramer Criteria)	22 members: NGO (14 %), government (9 %), power companies (18 %), universities (5 %), produce (5 %), industry (50 %)	Global; operational in 2011	26 certificates
Biomass Biofuels voluntary scheme (2BSvs)[h]	Associations representing the French biofuel industry (crop producers and downstream clients) and auditing firm Bureau Veritas as technical advisor	Seven French consortium members—large French corporations and agricultural cooperatives	Global imports; operational in 2011	625 certificates

Where information from websites was incomplete further information was obtained by addressing standard organizations directly

[a] In certificates issued as of July 2013

[b] www.responsiblesoy.org/

[c] www.rspo.org/

[d] www.bonsucro.com/

[e] www.iscc-system.org/

[f] http://rsb.org/

[g] www.sustainable-biomass.org/

[h] http://en.2bsvs.org/

Among the actors engaged in drawing up bioenergy standards are governmental organizations (e.g., in the case of NTA 8080 and International Sustainability and Carbon Certification, ISCC), industry associations (e.g., in the case of 2BSvs), single companies (e.g., Greenergy and Abengoa Bioenergia), and multi-stakeholder roundtable initiatives (e.g., Roundtable on Sustainable Biomaterials (RSB), RSPO, Bonsurco, and RTRS). Although initiated by governmental agencies in Germany and the Netherlands, ISCC and NTA 8080 have both consulted stakeholders in determining sustainability criteria and indicators.

Standard organizations have held stakeholder meetings in the LAC region to include regional perspectives (e.g., RSB 2013b). To account for the contingencies raised by local context, the RTRS and RSPO provide for "national interpretations" of their standards based on the inputs from civil society and commercial groups who convene to agree on country-specific criteria and indicators (Johnson 2012). The RTRS has been interpreted on a national level in Argentina, Brazil, and Uruguay; Bolivian and Paraguayan interpretations are yet to be completed (RTRS 2013c). Colombia has concluded such a national interpretation of the RSPO, while Ecuador is in the early stages of the process. Aside from the integration in national contexts, the RSPO also created the "local interpretation" mechanism which can be applied by single companies to interpret and adopt—in consultation with local stakeholders—RSPO criteria and indicators. One Guatemalan, one Brazilian, and one Colombian company have seized this opportunity so far (RSPO 2013b). Sustainability standards arising from multi-stakeholder initiatives indeed have been recognized for increasing legitimacy and potential democratic credentials based on such instruments of consensus (Pattberg 2012; Mol 2010). Yet, exactly these deliberative structures have been criticized because they may enable certain stakeholders to gain disproportionate influence and focus attention on certain topics, leaving other issues unaddressed (Chap. 7; Elgert 2013; Johnson 2012; Schouten et al. 2012).

Another approach, led by Germany and Brazil, is where the International Standardization Organization (ISO) is currently developing ISO 13065 for sustainable bioenergy. Involving 35 observing and participating countries, the ISO aims to "create globally harmonized sustainability criteria" and to provide "a level playing field for all countries and stakeholders" (ISO 2011). Results of the process in the form of a draft standard are expected in 2014 (Dale et al. 2013).

Many multilateral agencies have also weighed in on biofuel sustainability. As a result, a multitude of frameworks, guidelines, and toolkits to safeguard or assess sustainability in biofuel production have been developed, but are not intended to provide certification. On an international level, the *Global Bioenergy Partnership* (GBEP) coordinated agreement on a list of 24 sustainability indicators to guide national efforts in bioenergy sector development (Scarlat and Dallemand 2011). Endorsed in November 2011, this list could also serve as a base for voluntary implementation. In LAC, Colombia has pilot-tested the GBEP criteria (see Chap. 7).[7] Similarly, the "Bioenergy and Food Security Criteria and Indicators" (BEFSCI) was developed by the United

[7] Argentina, Brazil, Colombia, Mexico, and Paraguay have GBEP member status, while Chile, El Salvador, and Peru are participating as observers (GBEP 2011).

Nations Food and Agriculture Organization (UN FAO) to inform national bioenergy frameworks on how to prevent threats to food security. FAO also joined forces with UNEP to establish the "Bioenergy Decision Support Tool" (Fritsche 2012).

Specifically targeting the LAC region, the Inter-American Development Bank (IADB) developed the *Biofuels Sustainability Scorecard*. Launched in 2008 and revised in 2009, the Scorecard is based on sustainability criteria of the RSB and provides a tool to understand, oversee, and possibly track the range of complex issues associated with biofuel production and use. The Scorecard is designed for use at the project level, and addresses social, environmental, and economic issues of sustainability as well as crosscutting governance aspects (Janssen and Rutz 2011).

These multiple efforts have led to a fragmented network of actors and a multitude of partly independent, partly interconnected standards. At one level, there is an incentive for each group of stakeholders to work with meta-standards like the EU RED because participation will likely increase adoption rates of their standard. The RED has also forced some convergence between schemes and EU Member States' approaches. For example, crop-based standards like RTRS and RSPO defer to the EU's requirements of 35 % GHG emission reductions. The RED also works as a binding force between the standards as the regulation encourages mutual recognition among the standards. Subsequently, for example, the ISCC under its EU standard recognizes all other RED-accepted standards. Mutual recognition among standards is not limited to biofuels, indirectly linking additional standards into a broader network. For example, the RED-accepted RSB recognizes agricultural and forestry standard schemes like SAN/RA and FSC (SAN 2012), which are not qualifying RED standards. Similarly, the ISCC accepts FSC and PEFC certificates as proof of sustainable wood production (IEA Bioenergy 2012b). Further mimetic effects can be observed among voluntary standards; for example, the IADB adopted RSB criteria for its scorecard.

Whether international approaches to sustainable biofuels will be applied in the LAC region will largely depend on the specific biofuel industry characteristics such as the feedstock processed, the industry size, and its export orientation. The following section focuses on production and trade in the region and assesses which sustainability schemes have yet been adopted in LAC countries.

2.3 Biofuel Production, Trade, and Certification in LAC

Biofuel and bioenergy support policies in the EU and the USA indubitably had a tremendous effect on the global production and trade of biofuel within the last decade (Lamers et al. 2011). Thus, biofuel markets worldwide are expected to also be increasingly impacted by the sustainability criteria embedded in the US and European policies (OECD/FAO 2012). However, the reach and impact of the sustainability issues that are addressed in biofuel governance and certification in regions like LAC remain unclear. Research on environmental and social standard setting in other sectors finds that uptake depends on macroeconomic factors such as high export rates (to Europe and the USA), foreign direct investments, and per capita income, as well as trade (Guler et al. 2002; Delmas 2002; Neymayer and Perkins 2004; van Kooten et al. 2005; Potoski and Prakash 2004; Durst et al. 2006). As shown in the previous section, the EU established a regulatory regime of adopting a "governance through standards" (Ponte et al. 2011) approach. Certification thus becomes a trade-related pressure for feedstock and biofuel producers targeting the EU's "100 % captive markets for sustainable biofuels" (Ponte 2012), taking on the role of global quasi-implementing agents of an EU policy (Levidow 2013).[8] A similar, albeit narrower, picture is drawn for imports to the USA. GHG emission reductions achieved by a given fuel pathway are set by the EPA. These rulings define the feedstocks and fuels that reach US markets from biofuel producers in LAC (OECD/FAO 2012).

Assuming that trade drives certification in the international biofuel industry, the following section focuses on the economic parameters of the biofuel and feedstock development in the LAC region. Production- and trade-related data help us to understand where biofuel standards and certification may be of particular relevance. The discussion is enriched through an assessment of the current status of standard uptake in the region.

2.3.1 Characteristics and Current Developments of Biofuel Production and Trade in LAC

In the last decade, Latin American countries, in particular, witnessed large investments and numerous governmental plans to enhance biofuel production (Rutz et al. 2008; van Gelder et al. 2012). The demand for biofuels is largely a result of blending targets or mandates implemented in recent years by national governments around the world including many countries in the LAC region itself (Table 2.2). Most countries have established blending mandates or targets for both ethanol and biodiesel. In the majority of cases, however, the biofuel production remains below the target (Diop et al. 2013; OECD/FAO 2012).

The major biofuel feedstock in LAC are the so-called "flex crops," which are agricultural commodities that have multiple or flexible uses in diverse industries, including food, feed, and industrial applications as well as fuel (Borras et al. 2012). Soy, sugarcane, oil palm, and maize are the most prominent examples of flex crops used in LAC to produce biofuel, all fit this description to some degree. As this collection of chapters shows, the region's biofuel industries are outgrowths of preexisting agro-industries. Sugarcane, soybean, and oil palm complexes each have diverse historical trajectories. Sugarcane cultivation, for example, dates to the early colonization of the region by the Portuguese and Spanish (Abbot 2009). Soybeans, grown primarily in Brazil and Argentina, are intimately linked to the regions' enormous cattle complex, as well as rapidly growing demand for high-protein animal feeds in the EU and China. These links can explain both the rapid expansion of biofuel investment

[8] Given existing rulings under the World Trade Organization (WTO; Bernstein and Hannah 2008; Ackrill and Kay 2011), it is noteworthy that sustainability criteria addressing biofuel production (and not biofuel as a product) have not been challenged. However, Argentina, Brazil, and Colombia have warned the EU that they may file a complaint (Janssen and Rutz 2011).

Table 2.2 Biofuel targets and mandates in the LAC region

Country	Mandate
Argentina[b,c]	E5 and B7 mandates are in place. The B7 mandate increased from B5 in 2010. There was an intention to reach B10 blending by October 2012, but it was postponed. The new goal is to reach 10 % by July through a gradual increase (e.g., see Chap. 5)
Bolivia[b]	B2.5 and E10 mandate in place
Brazil[b]	Mandates a minimum ethanol content of 18–20 %. This was reduced from 25 % in 2011 when ethanol supplies tightened due to rising global sugar prices. Currently there is a B5 mandate (e.g., see Chap. 4) but the industry is overcapitalized, with 60 % of the installed capacity currently idled. The industry is calling for an increase to B7 in 2013, building to B10 in 2014 to utilize this excess capacity. Longer-term objectives are B20 by 2020
Chile[a]	Voluntary E5 ethanol and B5 biodiesel targets in place, but not mandatory
Colombia[b]	E8-10 ethanol mandate in place since 2008, with discussions underway to increase the mandate, biodiesel mandate in place B10 (e.g., see Chap. 7)
Costa Rica[b,c]	E7 and B20 mandates in place
Dom Rep[b]	E15 and B2 mandate in place
Ecuador[b]	Targets of B2 by 2014 and B17 by 2024; E5 pilot programs implemented in several provinces
Guatemala[b,c]	E5 mandate introduced (e.g., see Chap. 8)
Jamaica[a,b,c]	E10 mandate (e.g., see Chap. 10)
Mexico[b]	E2 "soft" ethanol mandate in place in the state of Guadalajara, which was to be expanded to Mexico City and Monterrey in 2012, though program has stalled (e.g., see Chap. 9)
Panama[b]	Preparing to introduce an E2 mandate in April 2013, rising to E5 in 2014, E7 in 2015 and E10 by April 2016
Paraguay[b,c]	E24 and B1 mandates in place
Peru[b,c]	Mandates of E7.8 and B5 in place. Expected to move toward B5 (e.g., see Chap. 6)
Uruguay[b,c]	B5 mandate in place

[a]Adapted from Lane 2012
[b]Adapted from REN21 2013a
[c]Adapted from REN21 2013b

in LAC as well as the slow pace with which some of the blending mandates have been met. The latter is the result of high feedstock prices on global markets that have hampered the development of a biofuel industry in some countries of the region in the last few years (OECD/FAO 2012). Linkages between intermediate- and end-use sectors and varying degrees of complementarity and substitutability between each feedstock increase consumer vulnerability to price fluctuations (Diop et al. 2013).

Moreover, independently of the further use of the crop, both soy and sugarcane have been implicated in LUCs and problematic land appropriation in Brazil and Argentina (Borras et al. 2012). Despite the potential negative impacts of increased reliance on flex crops, these crops also have certain advantages. For example, they increase flexibility and allow producers to adjust to potentially volatile market conditions (Borras et al. 2012; Diop et al. 2013). Thus, it is no surprise that a significant amount of investments in Latin America is found in the flex crop production (van Gelder et al. 2012).

Table 2.3 Biofuel production and trade in Argentina and Brazil (in million liters). (Sources: Currently, data on the adequate amount of biofuel production and trade statistics in developing countries are lacking (Diop et al. 2013; Lamers et al. 2011), numbers fluctuate regarding the source used. This table is based on data from USDA (Barros 2012; Joseph 2012a) and updated with data published by the INDEC (National Statistics and Census Institute Argentina))

		Ethanol[a]				Biodiesel			
		2010	2011	2012	2013[b]	2010	2011	2012	2013[b]
Brazil	Production	24,516	20,212	19,970	22,500	2,386	2,673	2,700	2,760
	Consumption	22,167	19,290	20,000	21,700	2,462	2,613	2,691	2,772
	Export	562	1,083	1,000	1,000	8	6	0	0
Argentina	Production	122	170	251	400	2,050	2,742	2,774	2,800
	Consumption	118	166	237	390	573	848	987	1,300
	Export	0	0	0	0	1,535	1,900	1,759	1,500

[a]Numbers are exclusively for fuel usage, ethanol production and consumption for all uses are around 10–13 % higher
[b]Estimated

As outlined in Chap. 1, there are significant differences in the way biofuel production and consumption have developed in the region. Overall, Argentina and Brazil present the only established fairly export-oriented biofuel industries in South America (OECD/FAO 2012). Brazil dominates global fuel ethanol production together with the USA (Lamers et al. 2011) producing most of its ethanol for domestic markets (Barros 2012). Compared to local consumption, only relatively small amounts of ethanol are exported (Table 2.3). In 2012, most ethanol exports arrived in the USA, and smaller amounts went to other countries such as Japan, South Korea, Jamaica, and the Netherlands (Barros 2012). Hence, the US EPA's provision regarding GHG emissions appears to be more relevant to Brazilian ethanol production than European sustainability criteria at the moment.

Brazil is also the second largest producer of soybeans, after the USA (FAOSTAT 2013); the major flex crop used for biodiesel production accounts for 77 % of all biodiesel in Brazil (Zimmerman 2013). Given that soy is also a fundamental staple food item in the Brazilian diet, the soybean and oil production are observed by the government: The biodiesel blending target of 5 % will only be increased if the soybean production can supply both, the food and industrial sectors to prevent inflationary pressures (Zimmermann 2013). This might be one of the reasons why the biodiesel production remains far below the ethanol production (2,700 million liters in 2012, see Table 2.4). Currently, Brazil's biodiesel production only covers the domestic demand and is not exported (Barros 2012).

This is different for soy as raw material: Soybeans are mostly exported to China (over 70 % of all exports) and around 16 % to the EU. Thus, Brazilian soybean exporters (also) targeting European biofuel suppliers might need to prove compliance with the RED criteria. Soybean oil is mainly exported to China and India (Zimmermann 2013).

Even though Argentina has also built an ethanol industry (Table 2.3), compared to Brazil the Argentine ethanol sector is much smaller but still growing (Joseph 2012a). Argentina's ethanol industry so far relies on sugarcane exclusively, but corn is on the rise here (also in Brazil, Babcock and Carriquiry 2012). In 2013, roughly 30 % of the total ethanol volumes are expected to be corn-based. Ethanol is not expected to be exported in the near future, because domestic demand is given priority (Joseph 2012a).

While Brazil dominates the ethanol industry, Argentina leads the biodiesel exports. Being among the largest biodiesel producers worldwide, the country relies mainly on soybean oil; 40 % of all soybean oil produced is processed to biodiesel. Besides implementing a B7 mandate (Table 2.2), the government incentivizes the biodiesel industry through reduced taxation of biodiesel exports compared to exports of soybean oil (Joseph 2012a). Exporting 60 % of its biodiesel (1.7 billion liters in 2012), Argentina used to mainly target the EU, specifically Spain.[9] Evidently thus, EU-RED sustainability criteria and certification would be relevant to soy and biodiesel producers in Argentina. In mid-2012, however, Spain closed its market, prohibiting imports of biodiesel from outside the EU. Further, the EU recently imposed temporary antidumping taxes of between 6 and 10 % on biodiesel imports from Indonesia and Argentina (EC 2013b), which is being opposed by Argentina (Chap. 5). The dispute is ongoing and Argentina recently lodged a complaint with the World Trade Organization against the EU. As it is currently not profitable for Argentina, exports to Europe have halted. Against this background, forecasts predict a drop of Argentina's exports from 3000 million liters to 2800 million liters by the National Statistics and Census Institute Argentina (INDEC, Joseph 2012a). Meanwhile the country is in search of new markets such as Peru and the USA.

In order to avoid restrictions on their strong export industry, both Argentina and Brazil closely monitor other countries' trade-related import policies, including sustainability criteria. Because EU markets are important for biodiesel producers in Argentina, the RED ruling is particularly relevant to soy production. In 2012/2013, Argentina has challenged the RED quasi-mandatory restrictions by providing evidence regarding the minimum GHG emission savings of its soybean oil in a study prepared by its Agricultural Research Institute (INTA). According to the study results, widespread no-tilling practices and short distance from farms to processing facilities imply that Argentine biodiesel meets the EU's GHG emission threshold (Joseph 2012a). In addition, the Argentine Chamber of Biodiesel established the voluntary CARBIO Sustainability Certification Scheme (CSCS). So far, neither of the two measures has been officially recognized by the EU. In the USA, Argentina's soy-based biodiesel is currently assessed for an EPA approval to be awarded Renewable Identification Number (RIN) alternative fuel credits, which prove that US importers and refiners are meeting the biofuel standards for biodiesel blending (Biofuel Industry News 2013). Initially, Brazilian sugarcane ethanol was penalized by the US RFS for exceeding iLUC thresholds although it was recognized under its "conventional biofuel" category (Bailis and Baka 2011). Finally, due to significant industry pressure, Brazilian cane-ethanol even qualified as "advanced biofuel" as reanalyzes of iLUC associated led to downward corrections of values by 93 %. Further pressure is raised on Brazil and Argentina by proposals in the USA and the EU in 2012 to put a cap on food-based biofuels in their biofuel policies. This insecurity might intensify the already declining EU investment projects due to today's high

[9] Spain imported around 1 billion liters in 2011 (Joseph 2012a).

grain and oilseed prices and the lack of success to date with *Jatropha* (Babcock and Carriquiry 2012; Wahl et al. 2012).

Colombia does not quite reach Argentina's and Brazil's production quantities, but the country has reached ground building a biofuel industry since 2002. Due to granted tax incentives by different states when buying less productive land (Pacheco 2012; Pinzon 2012), some of the largest palm oil plantations in Latin America are nowadays based in Colombia, which has led to palm oil exports. Colombia produced around 537 million liters of biodiesel from palm oil in 2011, which the country does not export yet. In addition, local sugarcane production is fairly high. Being among the largest ethanol producers worldwide, the country produced around 351 million liters of ethanol and is predicted to produce 410 million liters in 2013. Colombia is close to reach its mandated B10 and E8-10 levels (Table 2.2) and has set its biodiesel blending target for 2015 even higher, to 20 %. Due to the strong buildup efforts of the biofuel industry, Colombia is expected to become a biofuel exporter in the medium term (Pinzon 2012).

Some of the remaining countries in the region show nascent developments or at least potential to develop a biofuel industry. Potential is seen in these countries due to their profitable feedstock industry, policy attempts such as strong governmental subsidies, or because they have taken first steps toward a biofuel industry by building biofuel plants. Ethanol industries emerge, for example, in Peru where 220 million liters of ethanol made from sugarcane were produced in 2012 (Janssen and Rutz 2011; Nolte 2012). In 2013, Peru is predicted to export around 129 million liters of ethanol. Lately, Peru exported mainly to the Netherlands. An ethanol industry based primarily on corn developed in Paraguay, with 180 million liters of ethanol production being expected in 2013 (Joseph 2012b). In addition, Guatemala currently exports small amounts of ethanol from sugarcane, mostly to Europe (Tay 2012). Through the Caribbean Basin Initiative (CBI) development program, initially launched in 1983, Caribbean nations have a duty-free access to the US market (see Chap. 1). This has led to reprocessing of Brazilian fuel in the Caribbean, especially in Jamaica, to benefit from tax-free imports. Besides Jamaica, also the Dominican Republic has a large ethanol plant. In addition, El Salvador, Costa Rica, Trinidad and Tobago, and the US Virgin Islands have exported smaller amounts of ethanol under the CBI. Lately, the Bahamas replaced Jamaica in ethanol exports to the USA (Ribando et al. 2010).

For biodiesel, several Central and South American countries have begun to rely on African oil palm. Guatemala and Honduras have favorable conditions and high yields of palm oil cultivation to potentially build a biodiesel industry in the near future (Janssen and Rutz 2011; Tay 2012). Honduras owns several extraction plants appropriate for biodiesel production and the topographic conditions are well suited to grow African oil palm. Up until now, Honduras rather exports palm oil to food markets because of the high prices achieved on international market (Gomez 2012). Peru established a small palm oil-based biodiesel industry, but most biodiesel is imported for domestic consumption (Chap. 6 and Nolte 2012). In the past, palm oil has also been the basis in sporadic and small exports of biodiesel from Ecuador (Vega 2012; Pacheco 2012) and could become relevant in Panama (Guardia 2013). With the aim of substituting refined soybean oil in the food industry in order to allocate more soybean oil for biodiesel, significant investments in oil palm as a third flex crop have occurred in Brazil lately (Barros 2012).

Table 2.4 Voluntary certification standards adoption in LAC countries

	No. of certified entities						
	RSB[a]	ISCC[b]	2BSvs[c]	RSPO[d]	RTRS[e]	Bonsucro[f]	Total
Argentina	–	19 (17 RED)	58 RED	–	12 (5 RED)	–	89 (80 RED)
Brazil	–	9 (7 RED)	2 RED	4	9 (1 RED)	36 (27 RED)	60 (37 RED)
Chile	–	1 RED	–	–	–	–	1 RED
Colombia	–	–	–	2	–	–	2
Costa Rica	–	3 RED	–	–	–	–	3 RED
Guatemala	–	6 RED	–	–	–	–	6 RED
Panama	–	1 RED	–	–	–	–	1 RED
Paraguay	–	3 (2 RED)	2 RED	–	1	–	6 (4 RED)
Peru	1 RED	1 RED	–	–	–	–	2 RED
El Salvador	–	–	–	–	–	–	–
Mexico	1 RED	–	–	1	–	–	2 (1 RED)
Nicaragua	–	3 RED	–	–	–		3 RED
Uruguay	–	1 RED	–	–	1	–	2 (1 RED)
Total	2 RED	47 (42 RED)	62 RED	7	23 (6 RED)	36 (27 RED)	177 (139 RED)

The abbreviation RED marks certificates that qualify under the EU-RED meta-standard. Numbers include single operators certified (usually feedstock producers or mills/first gathering points) as well as chain of custody certifications which include several operators in a production chain

[a]RSB 2013d
[b]ISCC 2013a
[c]2BSvs 2013
[d]RSPO 2013a
[e]RTRS 2013a, b
[f]Bonsucro 2013

Against this backdrop, it is reasonable to assume that adoption of international biofuel standards and certification—to the extent that it is driven by trade—at the moment is likely to occur mostly in export-oriented countries such as Brazil (ethanol), Argentina (biodiesel), and to a lesser extent in Guatemala and Peru (ethanol). However, to the extent that feedstock producers interact flexibly with international food, feed, and fuel markets, certification could also become relevant to feedstock-exporting countries such as Argentina and Brazil (soybeans, soybean oil, and sugar), Colombia and Honduras (palm oil), and many others (Zezza 2013). In addition, intraregional expansion of flex crop cultivation and biofuel production chains—for example, Brazilian producers expanding to Paraguay and Bolivia (Borras et al. 2012)—may make international standards relevant in these countries, too.

2.3.2 *Current Status of Standard Adoption in LAC*

In this section, we now examine the degree to which sustainability standards have made inroads in the LAC region. To this end, we have collected data of standard adoption, i.e., the numbers of certificates issued in LAC countries in February and July 2013. Table 2.4 presents the adoption of certification standards across the LAC region at the time of writing (July 2013).[10] We identify those certificates that qualify under the EU-RED meta-standard specifically. While we cannot relate these data to figures of total production volumes, they are helpful for depicting trends, especially in comparison to each other.

Unsurprisingly, by far the majority of certification activities are found in Argentina (89 in total, 80 of which are EU-RED compatible), followed by Brazil (57 in total, 41 EU-RED compatible). Among the schemes, 2BSvs (62 certificates) and ISCC (47 certificates, of which 42 apply to biofuel chains) are the most prevalent ones. RTRS, with 12 certificates, nine of which are linked to biofuel production, is the third most popular in Argentina. In Brazil, the sugarcane-specific Bonsucro standard is the most relevant at the moment with 36 certificates (27 RED compatible). RTRS and ISCC follow with nine certificates issued by each; however, only one RTRS certificate and seven ISCC certificates apply to biofuel chains. In her assessment of biofuel certification in Brazil, Zezza (2013) finds that certification demand there stems mostly from sugar-sourcing food industries as well as emerging bio-plastics markets.

The patterns of adoption reflect the distribution of biofuel (feedstock) production and trade in the LAC region also: For Paraguay and Guatemala, we count six certificates each. In Guatemala, all six are ISCC-certified ethanol producers. In Paraguay, three ISCC and two 2BSvs certificates have been issued to US-based agribusiness giants ADM and Cargill (ADM holds certificates of compliance with both standards), and one domestic soy producer holds an RTRS certificate (nonbiofuel). Nicaragua and Costa Rica follow with three ISCC certificates, each for sugarcane production. With two RSPO certificates that are not compatible with the EU's RED standard, Colombian adoption may still confirm palm oil trade as a driver. Despite its large volumes of biofuel production, biofuel chain certification may lag because Colombian flex crop and biofuel productions do not (yet) cater to foreign markets. Peru (for sugarcane and ethanol), Uruguay (for soy), and Mexico (for *Jatropha* and palm oil) each holds two certificates. Finally, Chile holds an ISCC certificate for biofuels from waste.

While the 2BSvs thus has the highest level of engagement, the ISCC standard is more widespread in the LAC region. Awareness of the RSB is high among practitioners as well as researchers (e.g., International Energy Agency (IEA) Bioenergy 2013; Fortin 2011), but the number of operators seeking certification under the RSB is strikingly low. Most ISCC-certified entities operate in either the soy and to a lesser extent in sugarcane chains (others include, e.g., canola, cassava, and corn). 2BSvs-certified entities are mainly involved with soy, sunflower, and corn producers, but also include wheat, sorghum, and sugarcane producers.

Among the crop-specific schemes, Bonsucro and RTRS are the most prevalent in the region, and the levels of engagement with these schemes are the third and fourth highest in the region (23 and 36). Reflecting their leadership in soybean and sugar production, Argentina hosts the largest number of RTRS certifications and Brazil leads in Bonsucro certifications. In a related point, the RSPO standard appears to

[10] As the NTA 8080 scheme has not seen any entities certified in the LAC region at all so far, it has been excluded from this table.

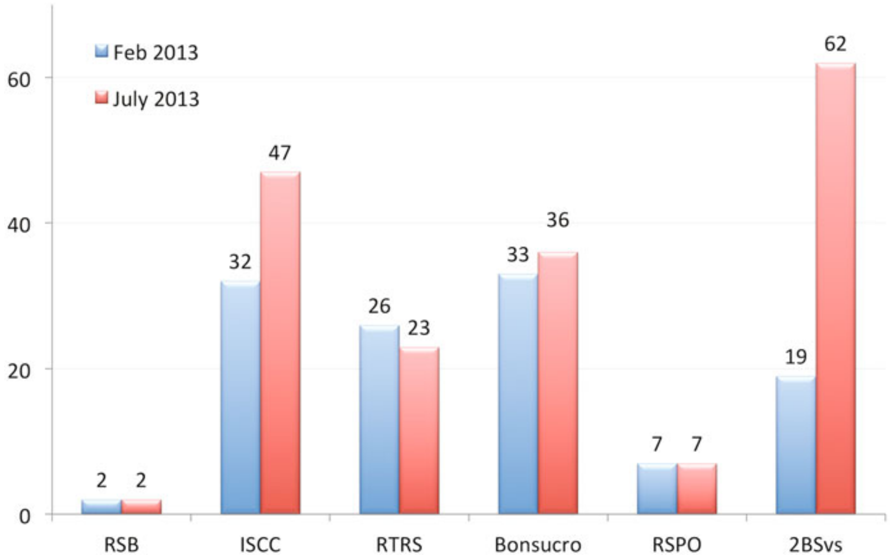

Fig. 2.1 Comparison of certification standard adoption in LAC in February and July 2013. (Sources: RSB 2013d; ISCC 2013a; 2BSvs 2013; RSPO 2013a; RTRS 2013a, b; Bonsucro 2013)

have attracted much less interest than other crop-specific schemes despite constituting the main biodiesel feedstock in Colombia as well as Peru (Chap. 6). This may be due to several factors including the larger role of soy and sugarcane in the region's biofuel industries. In addition, the RSPO was included relatively recently as a RED qualifying standard (in late 2012); currently, the standard does not certify production that was started after January 2008 compliant with the RED.

Interestingly, the region had witnessed great dynamics in standard adoption during the time of our investigation (see Fig. 2.1). In February 2013, Bonsucro (33), ISCC (32), and RTRS (26) had the leads in terms of numbers of certificates issued, followed by the 2BSvs (26). Overall certification adoption figures were similar in Argentina (48) and Brazil (45). Meanwhile, the 2BSvs has more than tripled its presence in the region, especially in Argentina, while other schemes grew more slowly or not at all (RSPO and RSB; although the RTRS even shows slightly lower presence, fluctuations may be because of outstanding website updates).

This development is likely to be linked to two factors: The first refers to the way standard organizations strategically interplay with industry characteristics. At the beginning, only crop-specific schemes catered to the increasingly important role of sugarcane and soy as flex crops in the regional "food–feed–fuel complex" (Borras et al. 2012; Bailis and Baka 2011).[11] Primarily addressing food sectors, RTRS and

[11] For example, Borras et al. (2012) attribute the rapid expansion of these "flex crops" in such diverse countries as Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Guatemala to "recent changes in the global food-energy regime" (p. 17).

Bonsucro were initiated before the EU-RED mandate was finalized. The RTRS, Bonsucro, and RSPO count national industry and trade associations among its founding members. Having become RED-qualifying schemes, they serve dual purposes. This flexibility may make schemes more attractive for producers and investors (Borras et al. 2012). Meanwhile, the ISCC expanded its certification scheme to include food, feed, technical, and chemical sectors as well as bioenergy under the ISCC Plus standard (ISCC 2013b), which may allow them to better meet demand for certification among the many entities in the LAC region participating in flex crop production. The RSB took a similar step in early 2013, changing the name of their program from the *Roundtable on Sustainable Biofuels* to the *Roundtable on Sustainable Biomaterials* and opening their certification scheme to biochemicals, textiles, and food additives.

It can be assumed that the rapid growth and overtaking of 2BSvs are due to a second factor that concerns the relationship between standard content, standard governance, and competition (Ponte and Riisgaard 2011). Our examination suggests that in the biofuel production industry-driven standards (ISCC and 2BSvs) are more successful than more inclusive roundtable initiatives. In fact, the standard considered most inclusive and comprehensive, the RSB, is the least successful, while the purely industry-led 2BSvs, which also covers only the EU-RED minimum criteria, is the most successful (see Table 2.5). On the other hand, ISCC and RSB cover a similarly wider range of criteria. The major difference between these two schemes lies in the extent of participatory inclusion of stakeholders in standard setting and governance. In this regard, the ISCC might be perceived as more efficient and thus more appealing to producers (Ponte and Riisgaard 2011). In line with institutionalist rationale (Cashore 2002), German and Schoneveld (2011) assume that the RSB will be used mostly by entities that are aligned with the norms espoused by the principles. Similarly, Upham and colleagues argue that the types of stakeholders involved in RSB and ISCC affect the choice of large biofuel or feedstock producers in particular, and that legitimacy (understood as participatory inclusion) may not necessarily translate into uptake and compliance:

> In Europe, it may also be that the voluntary Roundtable on Sustainable Biofuels certification scheme, as the initiative that is perhaps the most inclusive, responsive to NGO and small producer concerns and explicit in acknowledging Northern over-consumption and indirect land use change, may achieve wide and widest legitimacy. On the other hand, large producers may prefer the familiarity of, for example, ISCC's nonprofit company status coupled with a lack of close NGO involvement at a governance level. (Upham et al. 2011, p. 2676)

Furthermore, the fact that the 2BSvs expanded almost exclusively in Argentina may also be linked to a comparatively divergent awareness for sustainability issues. Like in Brazil, biodiesel in Argentina is also based on soybean oil. However, the Argentine industry appears to be perceived less critical regarding its impact on land use and deforestation than the Brazilian industry although there is evidence that in Argentina, too, soy expansion occurred at the expense of native forests (HLPE 2013) and public health due to the use of agrochemicals.[12]

[12] Contrary to patterns in Brazil and elsewhere, expansion of agricultural frontiers into the Argentine Chaco was driven by agri-business directly, not by poor farmers (Tomei et al. 2010).

Table 2.5 Overview of sustainability aspects covered in relevant sustainability standards with a focus on LUC, land rights, and food security. (Sources: EPA 2010; EU 2009; RSB 2010; ISCC 2011; RTRS 2010; RTRS 2013d; RSPO 2013c; Bonsucro 2011; RSPO 2012; Bonsucro 2011; 2BSvs 2012)

	EU RED	US RFS	RSB EU RED	ISCC EU	RTRS EU	Bonscuro EU	RSPO EU	2BSvs
GHG emissions	35 % (increasing to 50/60 % in 2017/18), incl. from dLUC	20/50/60 % depending on fuel type, incl. from dLUC and iLUC	50 % incl. from dLUC	According to EU RED	According to EU RED	According to EU RED	According to EU RED	According to EU RED
Conservation/ LUC	After 1 Jan. 2008, no production on land with high biodiversity value (primary forest, other wooded land; designated HCV areas); highly biodiverse grassland; land with high carbon stock (e.g., forested areas, wetland); land that was peatland; limited exploitation of designated HCV areas, high carbon stock land, peatland	–	EU-RED criteria; conduct screening of local/regional/global conservation values and assess impact if necessary, no conversion without screening; maintain/enhance affected ecosystem functions; protect/restore/create ecological corridors and buffer zones; prevent invading species	EU-RED criteria	EU-RED criteria[a]; after May 2009, no use of land cleared of native habitat except for if in accordance with RTRS maps; in case of no maps: land used for agriculture/pasture for 12 years before 2009; no conversion of native forests; no use of protected or HCV native habitats; maintain on-site biodiversity and natural vegetation	EU-RED criteria; assess impacts on biodiversity and ecosystems services (incl. HCV identification); no conversion of HCV areas after 1 Jan. 2008 establish environmental management plan to mitigate adverse impacts	EU-RED criteria[a]; assess environmental impacts incl. endangered species and HCV areas; establish environmental management plan to mitigate negative impacts; no conversion of primary forest or any designated HCV area after Nov. 2005	EU-RED criteria

Table 2.5 (continued)

	EU RED	US RFS	RSB EU RED	ISCC EU	RTRS EU	Bonscuro EU	RSPO EU	2BSvs
Soil	–	–	+	+	+	+ (no core criterion)	+	~
Water	–	–	+	+	+	+ (no core criterion)	+	~
Air	–	–	+	+	+	+	+	~
Waste	–	–	+	+	+	+	+	–
Land tenure/ rights	–	–	Asses formal/informal land and land use rights prior to any land use; FPIC is basis for any transfer of any rights to land (use) and compensation	Identify and respect existing land rights; proof legal land use and secured traditional rights	Demonstrate legal, uncontested rights; avoid/resolve conflicts with traditional land uses; FPIC is basis for transfer of any rights to land	Demonstrate legal, uncontested rights; (no core criterion)	Demonstrate legal uncontested rights; FPIC is basis for transfer of any rights to land (use)	–
Human rights	–	–	+	+	–	+	+	–
Labor rights/ conditions	–	–	+	+	+	+	+	~
(Local) food security	–	–	Assess risks to regional/local food security and mitigate negative impacts in food insecure regions; enhance local food security of directly affected stakeholders	No replacement of staple crops; local food prices do not rise as a direct effect (minor must)	–	–	–	–
Rural/social development	–	–	+	+	+	–	+	–

+ included, ~ recommended, – not included; equal marks do not imply equal rigor and enforcement of criteria
[a] Stricter criteria apply for conflicting standard and EU-RED criteria

A recent survey by the IEA (IEA Bioenergy 2012a) sheds light on the consequences of mandatory certification introduced especially by the EU: biofuel producers say that increased costs for certification mandated for entering the US and EU markets are usually met by choosing cheaper feedstock suppliers. Thus, the pressure is passed down the production chain, which favors large, efficient, and internationally experienced suppliers. For the LAC region, this could translate into a strategic advantage for large agro-industrial producers already dominant in flex crop production (Pacheco 2012; Borras et al. 2012) and thus further promote standards perceived as more appealing and feasible to these audiences (Zezza 2013).[13] This raises the question whether the transnational governance network for sustainable biofuels established by the EU and its reliance on certification may cause a development that runs counter to domestic and international policy objectives of contributing to rural development and social inclusion (Franco et al. 2010).

Having acquired a better picture on production, trade, and certification in the LAC region, we now want to look deeper into sustainability problems associated with biofuel production in the region and assess how standards address specific issues.

2.4 International Standards and Regional Sustainability Issues

Most sustainability problems with biofuels arise in feedstock production stages (German et al. 2011; Burritt and Schaltegger 2012). In this section, we introduce three hotspots of biofuel sustainability in LAC—LUC and resulting GHG emissions, land tenure conflicts, as well as effects on food security (Janssen and Rutz 2011; Chap. 1). Further, we review sustainability aspects covered by relevant international standards and in brief discuss their approaches to critical sustainability issues of the region.

2.4.1 LUC and GHG Emissions

LUC, i.e., the conversion of prior land uses and resulting changes of ecological functions, presents a particular challenge to the sustainability of biofuels produced in LAC. Most prominently, the expansion of agricultural frontiers in Latin America driven by growing flex crop cultivation has posed threats to native forests as well as other natural vegetation rich in carbon stocks and/or biodiversity (Seghezzo et al. 2011).

[13] Research that addresses the role of smallholder producers in sustainability governance through certification schemes supports this line of argument. Assessing sustainability certification in tropical agriculture Edwards and Laurance concluded that "current certification schemes select against small-holder producers, because schemes are complex, expensive, and difficult to apply at the scale of just a few hectares" (Edwards and Laurance 2012). Lee et al. (2011) confirm this result for biofuel feedstock production in particular and point out the need to understand and integrate the specific circumstances of small-scale producers as their buy-in is critical for truly sustainable biofuel markets.

As stated above, the EU RED precludes the direct conversion of forests, legally protected areas, and highly biodiverse grassland as well as land with high carbon stocks (e.g., wetland and forests) and peatland (see also Table 2.5). Being qualifying RED schemes all voluntary certification standards reviewed here thus are aligned with these criteria.[14] Most certification standards furthermore stipulate high conservation value (HCV) assessments and ban conversion of HCV areas. However, HCV areas are ‘no-go-areas’ according to the RSPO, while the EU RED, 2BSvs, ISCC, RTRS, Bonsucro, and RSB allow for limited exploitation if the conservation value is maintained (Guariguata et al. 2011, p. 9).

Identifying biodiverse and sensitive areas, standard approaches agree that national regulations and international conventions should be followed (van Dam et al. 2010); some also include stakeholders in such assessments (e.g., RSB and RSPO). The RTRS approach is an example of both: RTRS Criterion 4.4 stipulates that (after 2009) land cleared of native habitat shall not be used for soy cultivation unless it is in line with RTRS-approved maps and systems (developed in multi-stakeholder processes), which are at the time of writing were almost finalized for Brazil, and about to be established for Paraguay (according to correspondence with RTRS representative). Where such maps do not exist (Argentina, Bolivia, and Uruguay maps are yet to follow), the RTRS allows the use of areas cleared and used for agriculture or pasture for 12 years before 2009. In the absence of mapping, native forests are no-go-areas and conversion of other native habitat is limited by official ecological zoning rules or must be preceded by HCV assessments.

The approach that the RTRS and other sustainability schemes have developed to address LUC has been criticized because it fails to account for leakage effects that can contribute to iLUC: “Cattle production, for instance, has been assigned much of the blame for deforestation rates that was once reserved for soy. This however, neglects the expansion of soy onto former pasture, pushing cattle production (. . .) into newly deforested regions” (Elgert 2013, p. 7; see also Barona et al. 2010).[15] Furthermore, the standards have also been challenged by affected countries on the basis of specific provisions. For example, the EU’s definition of grassland has been opposed by Brazilian authorities and stakeholders for lack of a clear scientific basis and international agreement. Hence, while in Brazil an area with native grasses is considered natural grassland despite cattle grazing, the EU’s definition excludes many such areas with limited human intervention (Zezza 2013).

LUC, especially at the expense of native forests, may lead to loss of terrestrial carbon and an increase in GHG emissions associated with biofuel production (Searchinger et al. 2008). GHG emissions are addressed by all the governmental and certification standards reviewed here. They are also prominent in national biofuel policies within the LAC region, as we examine further below. However, GHG

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[14] RSPO, RTRS, and Bonsucro incorporate EU RED criteria as voluntary, complementary modules which, if adapted, have to be fully complied with. RSB and ISCC integrate EU RED in their core principles and criteria, whereas the 2BSvs consists of EU RED criteria only.

[15] At the time of writing, the RSB announced the development of a “Low Indirect Impact Biofuels” module (RSB 2013c).

assessments and reduction requirements differ among sustainability schemes (see Table 2.5).[16] The US RFS includes iLUC in its GHG emission reduction calculation method, while other standards and schemes do not.

2.4.2 Land Tenure and Property Rights

Conflicts over property rights and land tenure characterize agrarian and welfare politics in the LAC region. Although Borras et al. (2012) refrain from labeling most of the recent developments in LAC as ‘land grabs’, incidents of violent and nonviolent conflicts are still numerous (Johnson 2012; Garcia-Lopez and Arizpe 2010). In contrast to the governmental standards, most voluntary certification standards agree on the need for respecting and securing land tenure (Table 2.5), although in the Bonsucro standard land rights are not a core criterion. Only the 2BSvs does not mention land tenure issues at all.

Most standards (e.g., Bonsucro and RTRS) primarily require clear proof of legal title to land. The ISCC, for example, in Principle 5 requires producers to identify and respect existing land rights, and to prove that “land is used legitimately and that traditional land rights have been secured” (ISCC 2011, p. 29). In order to proof compliance, however, land titles appear to be emphasized, as producers must provide documents that “show legal ownership or lease, history of land tenure, and the actual legal use of the land.”

While the land titling approach is much in line with some scholars and practices of development organizations, critics have also noted that title requirements may lead to a concentration of benefits for some, while disenfranchising others (Hirsch 2011). Selfa et al. in their case study on Bonsucro in Colombia (Chap. 7) show that such practices may disadvantage people with informal and traditional rights to land and little power. Showing an awareness of such critiques, the RSB emphasizes respect for both formal and informal rights, by requiring every operator to assess any type of land and land use rights and forbids any activity before negotiations with affected stakeholders have been concluded with free, prior, and informed consent (FPIC, van Dam et al. 2010). FPIC is also essential to safeguard indigenous people’s rights (RSB 2010). Yet, even assessments utilizing FPIC approaches have been criticized. For example, these processes may leave wiggle room. They are susceptible to variable interpretations of who must comply and subject to alternative views of compliance (German and Schoneveld 2011).

2.4.3 Food Sovereignty and Security

While there is some uncertainty over the size of the impact, current and future biofuel production is expected to affect prices of grains and edible oils. This can have

[16] Methodologies utilized to estimate GHG emissions also differ. See for example, Hennecke et al. (2012), who compare calculation methodologies accepted under the RED. There is also divergence between the RED and RFS2 (Khatiwada et al. 2012).

direct impacts on food security, particularly among poor populations in developing countries who allocate large proportion of their income to buy food (Janssen and Rutz 2011). Typically, this issue is associated with feedstock production for biofuels either “diverting or replacing food crops” (Bailis and Baka 2011, p. 8). This dichotomous perspective, however, overlooks inseparable links of current biofuel crops to food and feed markets, with many overlapping sustainability issues.

Only the ISCC and RSB approach food security at all and thereby differ considerably in their charges (Table 2.5, see also Chap. 1). As with land rights, the RSB is the only standard dedicating a separate principle to food security. It charges a screening exercise that identifies regions of food insecurity. When operating in such regions, additional steps are required such that operators enhance food security for directly involved stakeholders (RSB 2010, p. 17). In the ISCC, food security is a “minor must” criterion which, if followed, prohibits the replacement of staple crops and demands that “local food prices do not rise as a direct effect of biomass production” (ISCC 2011, p. 28).

Factors affecting food security are interlinked with other social and environmental impacts of flex crop production. For example, large-scale land acquisitions for oil palm plantations in Ecuador have not only driven LUC and deforestation, but also displaced farmers who subsequently migrated into areas occupied by Afro-Ecuadorians and indigenous people raising tensions and increasing the potential for conflict (Hazelwood 2012). Diminishing access to land for small-scale farming and to forest resources for subsistence can directly threaten food sovereignty and imperil rural livelihoods (Buitron 2002; Elgert 2013).

Overall, the standards reviewed here differ greatly in scope.[17] While most standards agree in a broad sense on safeguarding environmental sustainability, particularly GHG emission reductions, they are far less consistent with social issues. As German and Schoneveld criticize “climate mitigation interests of developed countries as the sole metric for evaluating the performance of feedstock sourced from the global South—in essence, ignoring the national aspirations enshrined in domestic policies that place social and economic development at the forefront” (German and Schoneveld 2011, p. 20). The industry-led 2BSvs is an example for certification schemes accepted under the RED that followed the bare minimum standard and require no more than the EU criteria to be met.[18] This creates pathways for biofuel production to be certified as sustainable while paying little or no attention to social issues. As a tendency, standards that were developed in multi-stakeholder processes are more likely to include social aspects such as human rights, indigenous rights, and labor standards, as well as social and economic well-being of the community (Vogelpohl and Hirschl 2011). However, these standards differ highly in their

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[17] For more detailed discussion see German and Schoneveld (2011), Guariguata et al. (2011), Scarlat and Dallemand (2011), and van Dam et al. (2010).

[18] In addition, the Abengoa company scheme covers EU-RED criteria only and is applicable to Abengoa’s production in Brazil. Red Cert, Red Tractor, SQC, and Ensus—though not applicable for production in the LAC region—are further examples of RED-recognized schemes that do not cover sustainability aspects beyond EU RED.

responses—notwithstanding the varying approaches where such issues are included (German and Schoneveld 2011).

2.5 Intersection of International Standards and National Policies and Regulations

In this section, we look at intersections of international standards and domestic regulatory and policy frameworks. Domestic public policies and regulations at points of production are regarded as decisive determinants of whether and to what extent sustainability standards matter. Weak ability to create and enforce appropriate legal and policy frameworks to manage natural resources has been identified as barriers in the uptake of forestry and fishery certifications (ITC 2012; Barry et al. 2012; Gulbrandsen 2010). In particular, uncertain and/or disputed property, land tenure, and community rights present barriers to adoption of certification standards (Gulbrandsen 2010; Barry et al. 2012). However, the mechanisms and effects of such interplay are complex and contextual. For example, Bartley (2012) finds evidence for two opposing concepts: rivalry and complementarity. Rivalry refers to crowding out effects of private standards over existing or future governmental regulation. Complementary effects may occur when local government regulation and standards are independent but compatible and thus strengthen each other. Alternatively, global standards may work in conjunction with domestic public policy and promote upgrading of regulation (Cashore et al. 2007). Complementarity can also arise from explicit adoption or support of standards by governmental regulation.

In order to highlight some of the key factors that shape the relevance of standards in specific LAC contexts, we briefly review LAC biofuel policies and identify objectives in the following (see also Chaps. 3–10). Further, we look for evidence of general compatibility as well as rivalry and complementary effects.

2.5.1 National Biofuel Objectives

In promoting biofuel policies, LAC governments are motivated by economic, social, and environmental benefits. Table 2.6 provides an overview of biofuel policy objectives within 15 LAC countries that either already have established a biofuel industry or have been identified as potential emerging biofuel markets. There is a consensus among policy makers in LAC that biofuel production should occur to the advantage, or at least not to the detriment of the environment. Of course, as elsewhere, biofuel policies are also introduced to reduce consumption of fossil fuels or decrease GHG emissions.[19] However, in contrast to the USA and the EU, biofuel policies in the LAC region do not stipulate any GHG emission reduction targets.

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[19] For example, in Brazil, however, energy security and autonomy as well as socioeconomic development were initial goals of deploying a ethanol industry; reducing negative climate change impacts and other environmental objectives were later on added (Guariguata et al. 2011, p. 15).

Table 2.6 Overview of biofuel policy objectives in the LAC region

	Argentina[a]	Bolivia[b]	Brazil[c]	Chile[d]	Colombia[e]	Costa Rica[f]	Dominican Rep.[g]	Ecuador[h]	Guatemala[i]	Jamaica[j]	Mexico[k]	Panama[l]	Paraguay[m]	Peru[m]	Uruguay[n]	Total
Contribute to energy security/provide energy access in remote areas	•	•	•	•	•	•			•	•	•	•		•	•	12
Achieve energy autonomy/competitive advantage/enter new markets	•	•	•	•	•	•	•	•	•	•			•		•	12
Encourage investments/stimulate economic growth	•		•	•			•		•	•		•	•	•	•	10
Promote rural and socioeconomic development	•		•	•	•		•			•	•	•		•	•	10
Strengthen/diversify agricultural sector	•		•		•	•	•	•			•	•	•	•		10
Create employment opportunities	•	•	•	•	•			•	•		•	•	•	•	•	12
Reduce poverty/promote social inclusion/increase income of farmers/improve living conditions	•		•	•	•	•					•		•			7

Table 2.6 (continued)

	Argentina[a]	Bolivia[b]	Brazil[c]	Chile[d]	Colombia[e]	Costa Rica[f]	Dominican Rep.[g]	Ecuador[h]	Guatemala[i]	Jamaica[j]	Mexico[k]	Panama[l]	Paraguay[m]	Peru[m]	Uruguay[n]	Total
Reduce GHG emissions/mitigate climate change/engage in carbon markets	•	•	•	•	•	•	•	•		•	•		•		•	12
Protect the environment/safeguard environmental advantages	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	15
Food security		•	•			•		•	•	•	•					7

[a] Joseph 2012a; Infoleg 2006; Secretaría de Energia 2009; Morgera et al. 2009
[b] IICA 2010; Presidente Interino de la Republica 2005
[c] Morgera et al. 2009; IICA 2010
[d] CNE 2008; Minenergía 2012; IICA 2010
[e] MINMINAS 2008; DNP 2011
[f] MAG-MINAE 2007; MINAE 2008; MINAET 2011
[g] DENC-SEIC 2003; El Congreso Nacional 2007; IICA 2010
[h] Presidente Constitucional del Ecuador 2004
[i] Congreso Guatemala 2003; MEN 2011
[j] MEN 2010
[k] Secretaria de Energia 2008; Morgera et al. 2009; Cámara de Diputados 2008
[l] Gobierno Panamá 2011; Secretaría Nacional de Energía 2012
[m] IICA 2010
[n] Cámara de la Republica Uruguay 2007; IICA 2010

Governments are also led by strategic concerns, focusing on energy independence or on competitive advantages that may be reached with the new technology. Some governments also aim to take advantage of external demand for biofuel feedstock to strengthen agricultural trade, enhance agricultural production, and stimulate the economy. Many governments consider their domestic biofuel industry as an opportunity to create employment opportunities and enhance socioeconomic development in rural areas. Related objectives described in national policies include a strengthening of the agricultural sector as well as the development of regional economies. Although to a lesser extent, poverty reduction and improvement of living conditions of marginalized as well as food security are still mentioned explicitly in about half of the country policies reviewed. Interestingly, Peruvian policy makers explicitly stipulate the objective of biofuel production as an alternative to the illicit cultivation of coca leaves contributing to the National Strategy to Combat Drugs (El Presidente de la República 2005).

Obviously, some of these goals, such as entering new markets or combating drugs, are set on a macro-level that is not within the sphere of influence of producer-level standards. Yet, in a very broad sense, it appears that there is potential compatibility of the majority of domestic biofuel strategies vis-à-vis the sustainability aspects promoted by the standards reviewed in the previous section. Foremost the voluntary standards that include environmental, social, and (to fewer degrees) economic aspects of biofuel production, show considerable overlap with most domestic strategies presented in Table 2.6. Brazilian and Argentine policies stand out for their multiple objectives. Furthermore, all biofuel strategies examined also emphasize socioeconomic objectives to some extent. Given the focus on GHG reduction targets of governmental standards in the EU and the USA, the question of which certification standards will prevail, especially under the EU-RED scheme, is a critical one.

Yet, even where governmental regulations exist, complementary effects of standards cannot be assumed. Corruption, lack of capacity, and unwillingness or inability to implement policies and enforce laws often create barriers to effective policy implementation (e.g., Schoneveld et al. 2010; Suich and Tacconi 2012). Further, policies within other sectors may conflict with the objectives of biofuel policies, impede their implementation, and crowd out sustainability efforts (Durst et al. 2006). Next, we therefore highlight contextual factors in broader policy and regulatory frameworks that influence whether and to what extent sustainability standards matter.

2.5.2 Factors in National Policy and Regulatory Frameworks

All of the flex crops described above are affected by other agriculture and/or forestry policies that impact cultivation practices, zoning, and socioeconomic outcomes (Marin et al. 2011; Tomei et al. 2010). Deploying a sustainable bioenergy industry requires a holistic approach that creates conditions conducive to socially and environmentally positive outcomes. Thus, the potential interactions with policies affecting other sectors are crucial for understanding the relevance of any intervention attempting to govern biofuel production and use. In an anecdotal manner, we review evidence that illustrates existence of relevant policies and regulations in LAC and issues of implementation as well as their intersection with standards.

In Argentina, biofuel deployment has two main drivers: the nation's energy policy promotes biofuels to enhance domestic energy security and reduce dependence on oil imports while also articulating socioeconomic and environmental objectives (Recalde 2012). To this end, the Argentine government promotes biodiesel production for domestic markets through several policy instruments. At the same time, for Argentina's domestic agribusiness, biodiesel is tightly linked to the Argentine "soy revolution" (Tomei et al. 2010). The past 15 years have witnessed the evolution of a highly capitalized, large-scale soy industry, oriented primarily toward foreign markets. "In the absence of strong policy, it has been left to agroindustry to determine the development of the nascent biofuels sector, toward one focused primarily on the export market" (Tomei and Upham 2011, p. 45), which is argued to bring economic benefits to the country (Recalde 2012). Tomei et al. (2010) show that the beneficiaries of these developments are large agribusinesses and multinationals, while small- and medium-scale producers are structurally disadvantaged.

There are also several often-overlooked negative social and environmental impacts. Within Argentina, enforcement of agricultural and environmental legislation has proven to be problematic. This context of national dependence on the soy sector and a relatively weak public sector, has implications for certification that "presume[s] well-functioning institutions for environmental protection and monitoring, which often do not exist" (Tomei et al. 2010, p. 387). Nevertheless, certification is prevalent in Argentina. However, as we note above, the majority of certificates are with the 2BSvs standard, which requires the *minimum* of EU-RED sustainability criteria. Against this backdrop the question of effectiveness arises: Can certification succeed where domestic policy fails?

In our focal region, Brazil has the longest-standing biofuel policy and industry. As is discussed in Chaps. 3 and 4 of this collection, the country has enacted general environmental legislation including a strict Forest Code as well as Agro-ecological Zoning to prevent deforestation in the Amazon and other high-conservation value areas. However, these laws have a history of inconsistent enforcement (Nepstad et al. 2006; Lima et al. 2011). The Brazilian Forest Code specifically has raised concerns among civil society organizations because of a lack of enforcement, compounded by lobbying from sugar and soy producers to relax the law (WWF 2012; Lima et al. 2011).[20] Furthermore, it is also widely recognized that poorly defined property rights present an important reason for ongoing deforestation and land conflicts along Brazil's agricultural frontiers (Hospes et al. 2012).

[20] The Forest Code, Lei n°4.771, was established in 1965 and in 2012 modified by Lei n°12.651, though these modifications are disputed and may be decided upon by the Supreme Court. It limits the amount that can be cleared on any plot of land based on a legal requirement that 80 % of each plot in the Amazon must not be deforested and 35 % of native vegetation cover has to be conserved in the Cerrado. The law also regulates use of sensitive landscapes such as riversides, hilltops, and steep slopes. These are called Areas of Permanent Preservation (APP) and are not allowed for agricultural production and expansion (Hospes et al. 2012).

Analyses of policies governing land acquisition in Brazil and Bolivia find that mechanisms supporting small farmers and indigenous communities' rights conflict with policies supporting development of large agribusiness (Pacheco and Benatti 2012). Such policy incoherence may hinder effective implementation of sustainable practices (Howlett and Rayner 2007). Similarly, conservationist objectives included in land policy may impose unbearable burdens on small landholders and are therefore frequently violated (Pacheco and Benatti 2012). In complex settings with specific socio-political and economic contexts, policy instruments might not lead to the envisioned outcomes. To the extent that sustainability standards rely on such national regulation, their adoption and efficacy may thus be at risk.

This incongruence is evident in Colombia as well, where oil palm and sugarcane expansion has been induced by governmental incentives such as tax reductions, tax holidays, and access to land and loans (Pacheco 2012, p. 20; also see Chap. 7). The domestic biofuel industry was among the main beneficiaries of these incentives, boosted by a blending mandate that created demand for biofuel feedstock. Despite striking a normative tone about employment and rural development, Colombia's *General Policy for Biofuels* does not prescribe specific details (MINMINAS 2007). Instead, biofuel policies reinforce existing inequalities in land distribution to the advantage of large-scale agribusiness. Moreover, sugarcane production contributes to water access and quality problems in rural communities. Chapter 7 in this collection illustrates how neither the Bonsucro standard nor GBEP indicators can overcome existing power structures and thus are not objectively operationalized to mitigate negative effects for neighboring communities.

Additional incoherence between the rhetoric of sustainability objectives and actual agricultural and biofuel strategies is evident throughout the LAC region. For example, in Paraguay, a FAO assessment finds that the country's biofuel policy contradicts the government's sustainable development strategy, which emphasizes food sovereignty, land reforms, and promotion of family farming (Rodriguez and Dietze 2010). Socioeconomic development in Paraguay is actually impeded by large-scale soybean cultivation, which crowds out family farming and poses a threat to food security among vulnerable parts of the population (Rodriguez and Dietze 2010; Elgert 2013). Similarly, Ecuador's government has articulated policy objectives that include creating more employment opportunities, enhancing energy security, and boosting social and environmental welfare especially among rural communities (Alban and Cardenas 2007). At the same time, biofuel investment and land acquisition policies have been enacted supporting rapid expansion of the oil palm frontier for large agribusiness. The latter has contributed to "rapid deforestation, conflict and displacement resulting from the legal and illegal large-scale acquisitions of land for palm cultivation" (Johnson 2012, p. 2), contravening the state's sustainability objectives.

According to Bartley (2012), voluntary standards may also be directly used as frameworks, indicators of compliance, or employed in due diligence processes and thereby complement public policy (see also Pattberg 2012). This is evident for biofuel standards in the LAC region where the RSB's principles and criteria formed the backbone for several regional efforts including the IADB Scorecard (Janssen and

Rutz 2011), an assessment of biofuel sustainability commissioned by the Colombian government to inform policy making (MINMINAS 2012), and Mexico's "Flight Plan toward Sustainable Aviation Biofuels" (ASA 2012).[21] The fact that governmental and industry actors acknowledge a standard as a benchmark indicates that it is seen as the most appropriate standard, which also implies discursive effects (Pattberg 2012). In the case of the RSB, this is particularly interesting, because its governance structure excludes state and intergovernmental organizations from voting (Fortin 2011). One reason for its widespread acceptance might be the unprecedented degree of consensus-based standard formulation, which saw more than 120 member organizations from over 30 developed and developing countries contribute (RSB 2013a, b). Yet, as we showed in Sect. 2.3 of this chapter, RSB adoption by producers remains low.

At the same time, international approaches to govern toward sustainability are not always accepted by regional actors. As discussed earlier, Argentina as well as Brazil challenged sustainability criteria imposed by both, the US and European policy makers, and allocated efforts to develop domestic alternatives. Besides the Argentine CSCS initiative (see Sect. 2.3.1), a Brazilian group of domestic stakeholders attempted to introduce a national certification scheme in direct response to the proliferation of external standards. The objective was to "avoid the internationalization of models alien to our reality and reverse the traditional trend of the county being struck by and submitted to rules that do not always meet our interests" (Menezes 2008).

Indeed, Brazil presents a striking example of domestic voluntary initiatives and market-based instruments developed on national and subnational levels. For example, aiming toward sustainable soy production, Brazilian agribusinesses and NGOs formed three kinds of initiatives: The *Soy Platform of Brazil* was started by a Brazilian NGO and four Brazilian networks. In 2006, the *Soy Moratorium* was signed by two Brazilian associations, ABIOVE (Brazilian Association of Vegetable Oil Industries) and ANEC (National Association of Grain Exporters of Brazil), to declare that they would not purchase soy grown on Amazon land deforested after 24 July 2006 for at least 2 years. These two associations, Aprosoja (Mato Grosso Soybean Producers Association), and the NGO ARES (Responsible Agribusiness Institute) initiated *Soja Plus* (Hospes et al. 2012). By developing a certification scheme, Soja Plus aims at a "simple, voluntary, participative, transparent, verifiable process that is adapted to the realities of the Brazilian rural property and meets the consumer's desire for the sustainable production of soybeans" (Soja Plus 2013).

In addition, with a focus on social inclusion the Brazilian National Biodiesel Program (PNBP) incorporates the *Selo Social* (Social Stamp) program. The Selo Social promotes social inclusion in the biodiesel industry by creating a tax incentive for producers to obtain feedstock from small-scale family farmers and provide them with technical support (see Chap. 4). On a subnational level, the state of Sao Paolo in 2007 initiated the *Etanol Verde* (Green Ethanol) certification scheme in the framework

[21] The *Plan de Vuelo* was closely aligned with other regional and global aviation biofuels initiatives that sought to facilitate production chains in adherence with RSB principles (e.g., International Air Transport Association (IATA 2012) and Sustainable Aviation Fuel Users Group (SAFUG 2012)).

of the Agro-environmental Protocol in order to promote environmental compliance and decent labor conditions in its sugarcane industry (Janssen and Rutz 2011).

While these initiatives represent conceptual spillovers of voluntary market-based instruments and partnerships with private actors, their implications for international standards and their adoption remain unclear and will depend on many factors. Producers might find the barriers of adopting an international certification standard reduced if they are familiar with domestic schemes (Ponte and Riisgaard 2011), which might imply a structural complementarity of domestic policy approaches and international standards. On the other hand, competition between domestic and international certification standards might occur if the domestic certification standards seek recognition under the EU RED.

2.6 Concluding Thoughts and Directions for Future Research

Standards have evolved as the major mode of sustainability governance in international biofuel markets. In particular, the EU through its meta-standard approach grants legitimacy to multiple certification standards, which in some cases differ substantially in their scope as well as in their governance structures and deliberative capacities. Particularly for those LAC countries with an export-oriented biofuel sector, the US RFS and EU's RED are critical policy instruments. As is apparent from our discussion, however, it is possible that the RED's recognition of standards with differing scopes, variable degrees of rigor, and stakeholder inclusion will lead to a "lowering of the bar" in standard uptake. In LAC, the consequence would be that critical issues of sustainability (such as multiple social and socioeconomic issues) will remain unaddressed.

In this context of competing standards, it is thus also important to ask which schemes will prevail. In the broader field of research on sustainability standards, legitimacy of standards and standard organizations is assumed to be a significant driver of uptake. The marginal uptake of the RSB vis-à-vis the fast-growing 2BSvs under the EU RED show, however, that this concept requires refinement. Which audiences are critical to grant acceptance to a standard? What are the dynamics behind legitimacy granting by different groups of stakeholders? Could mounting pressure from civil society groups mediate and increase traction among the more rigorous biofuel standards? Further research in this area will help informing governmental policy as well as standard systems design.

With view to standards' intersection with LAC policies, it becomes apparent that the goals of international governance schemes and national biofuel objectives within the LAC region are not necessarily incompatible. International state-based standards originating from the EU and the USA emphasize climate change mitigation, while most international voluntary schemes cover a broader range of environmental and socioeconomic aspects. National policy objectives within the LAC region mention a wide range of issues, although not all with hard targets. Challenges are raised when new modes of governance are layered atop preexisting laws and regulations. Biofuel policies are always embedded in a broader policy context, with preexisting regulations within other sectors such as transportation, energy, agriculture, and forestry creating competing interests and objectives. For producers seeking compliance with standards (and possibly certification) on a voluntary basis in contexts of insufficient governmental regulation or enforcement, research results from other sectors suggest that this might pose a barrier to standard adoption. Given the EU market pressure, a fierce price competition, and general preoccupation of the sector with certification, however, biofuel markets may differ from other commodity markets in which certification is largely voluntary. Due to the EU's coupling of market and certification demand, standard adoption is more likely to also occur in countries with weak legal and political frameworks, as is the case in Argentina.

Whether standard adoption in rivalry situations will then be symbolic lacking substantive effects, or whether it might close governance gaps where adequate measures and legal frameworks are missing and thus complement domestic policy frameworks, requires further research. A discussion of the potential of biofuel standards and certification to contribute to sustainability of production where they are adopted is outside the scope of this chapter. Yet, we also note that for certification standards effective and equitable governance is not straightforward. In Latin America in particular, capture of the state by agribusiness translates into a risk of capture for standards, even if—or exactly when—standards are respondent to local contexts by means of stakeholder inclusion. However, in order to contribute to domestic and international policy goals of environmental protection and socioeconomic development the current international sustainability governance architecture would need to overcome existing political and agrarian structures to also include and benefit smallholder producers and rural communities.

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