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Dagmar Mithöfer
Hochschule Rhein-Waal - University of Applied Sciences

V. Ernesto Méndez
University of Vermont

Arshiya Bose
University of Cambridge

Philippe Vaast
Université de Montpellier

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Harnessing local strength for sustainable coffee value chains in India and Nicaragua: reevaluating certification to global sustainability standards

Dagmar Mithöfer*, V. Ernesto Méndez †, Arshiva Bose ‡,cd and Philippe Vaast*ef

*Faculty of Life Sciences, Rhine-Waal University of Applied Sciences, Kleve, Germany; †Agroecology and Livelihoods Collaborative (ALC), University of Vermont, Burlington, VT, USA; ‡Department of Geography, University of Cambridge, Cambridge, UK; cd Group of Forest Development and Management, ETH-Zurich, Zürich, Switzerland; ef UMR Eco&Sols, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Université de Montpellier, Montpellier cedex 2, France; f Vietnam Office, World Agroforestry Centre (ICRAF), Hanoi, Vietnam

ABSTRACT

Coffee is generally grown in areas derived from forest, and both its expansion and management cause biodiversity loss. Sustainability standards in coffee are well established but have been criticized while social and environmental impact is elusive. This paper assesses the issue-attention cycle of coffee production in India and Nicaragua, including producer concerns and responses over time to concerns (sustainability standards, public regulations and development projects). Systematic comparison of the socioeconomic, environmental and policy context in both countries is then used to explore potential effects of sustainability standards. Results show limits, in local context, to relevance of global certification approaches: in both countries due to naturally high levels of biodiversity within coffee production systems global standards are easily met. They do not provide recognition for the swing potential (difference between best and worst) and do not raise the bar of environmental outcomes though standards are desired by producer organizations. The temporal comparison shows that currently local stakeholders harness improvements through their unique local value propositions: the ‘small producer’ symbol in Nicaragua and certification of geographic origin in India. Nicaragua builds on the strength of its smallholder sector while India builds on its strength of being home to a global biodiversity hotspot.

1. Introduction

The ecological range of coffee, especially the higher-valued Arabica coffee, coincides with mountain forests, most of considerable biodiversity and locally relevant as providers of ecosystem services (Dewi et al. 2017). Coffee is produced in production systems of varied biodiversity (Perfecto et al. 2005). Complex shade coffee systems provide ecosystem services such as pollination, pest control, climate regulation, carbon sequestration, nutrient storage and cycling (Jha et al. 2014). However, biodiversity-rich shade production systems are in decline (Jha et al. 2014); coffee trade is associated with high negative biodiversity impact (Chaudhary and Kastner 2016).

Sustainability standards that arose in response to consumer concerns are widely used in coffee, and supposedly provide signals to consumers that a given product is not associated with negative social and environmental issues. Among tropical tree crops, cocoa, rubber, oil palm, and timber, sustainability concerns date back longest and private standards are most mature in coffee (Potts et al. 2014). They aim to provide a market-driven solution to dissatisfaction with public regulation for globally traded goods (Millard 2011; Potts et al. 2014). Multiple standards have emerged and coexist due to historical ties between producer and consumer countries and the respective country contexts including leading firms and the existence of intermediaries such as producer-organizations and NGOs that drive the uptake of standards in producing countries (Manning et al. 2012; Vermeulen and Kok 2012). Adoption of sustainability standards by the coffee industry is part of a larger evolving corporate social responsibility strategy (Ley et al. 2016). Coffee markets are mature, characterized by small effects of income increases on coffee consumption as well as low price elasticities of supply and demand (Ponte 2002). Following liberalization and the abandoning of international coffee agreements, the power in the coffee value chain moved to downstream actors, roasters and multinational corporations (Ponte 2002; Taylor 2005), resulting in the shift of value addition from producer to consumer.
countries (Ponte 2002; Talbot 2002). The highly concentrated coffee market (Ponte 2002; Kaplinsky 2004) is dominated by three large transnational companies and a few coffee roasters who rely on the services of trading companies, three of which jointly handle 50% of the green coffee bean trade (Panhuysen and van Reenen 2012). The prevalence of standards in coffee has further been attributed to the maturity of the market and the high concentration in manufacturing, as well as consumers facing a single ingredient (Alvarez and von Hagen 2012).

Global imports of coffee certified to a sustainability standard have steadily increased over the past decade. Several large companies have committed to sourcing sustainably produced coffee (Kolk 2012, 2013). The three largest coffee roasters purchased 5–7% of their coffee as sustainably certified or verified and aimed to increase the share to 20–30% by 2015 (Panhuysen and van Reenen 2012). For some companies, application of sustainability standards is now considered mainstream in business strategies for risk and reputation management while safeguarding core commercial interests (Raynolds 2009; Millard 2011). Other companies fully subscribe to the missions of the standards as such while quality-oriented companies take a middle ground (Raynolds 2009). Standard-compliant production was at an estimated 40% of global production and 12% of global exports in 2012 (Potts et al. 2014) but not all certified coffee is sold as such (de Janvry et al. 2015).

Sustainability standards in coffee and their impact have attracted considerable research, e.g. studies on the impact of certification to C.A.F.E. Practices and Nespresso AAA in Columbia (Vellema et al. 2015), certification to UTZ and Fairtrade in Kenya (van Rijsbergen et al. 2016), certification to organic standards in Uganda (Bolwig et al. 2009), and certification to Organic standards and Fairtrade in Nicaragua (Beuchelt and Zeller 2011). Impact assessment is complex due to a multitude of potentially confounding factors (Lambin et al. 2014) as well as indirect and secondary effects that may appear. For example, certified Colombian coffee farmers were found to specialize in coffee production at the opportunity cost of reduced alternative income generating activities resulting in higher coffee but not total household income (Vellema et al. 2015). Impact studies mostly focused on economic indicators such as coffee prices and income (Blackman and Rivera 2011) but more recently have focused on the impact on environmental indicators (e.g. Ibanez and Blackman 2016). Meta studies on the impact of sustainability standards have shown there is still no consensus on the multiple impacts of sustainability standards on smallholder producers and production systems (Blackman and Rivera 2011; Bray and Neilson 2017).

The researches focus on output – do standards achieve what they aim at? – has been questioned as sole determinant of legitimacy since participation and democratic processes by which sustainability standards are set and implemented also matter in achieving legitimacy (Henson 2011; Fuchs et al. 2011a, 2011b). Complementary to research on impact of sustainability standards on coffee producers, research on coffee value chains has focused on the imbalance of power between smallholder coffee producers and large coffee companies (Talbot 2002). Concerns have been raised that sustainability standards may further this imbalance (Kaplinsky and Fitter 2004; Daviron and Vagneron 2011).

Sustainability standards potentially interact with public instruments of land use governance in terms of potentially influencing agenda setting, implementation and enforcement (Lambin et al. 2014). However, systematic research on local socioeconomic and ecological conditions and policy frameworks prior to the introduction of sustainability standards and systematic research on the interactions between sustainability standards and policy frameworks in a particular country are missing (Steering Committee 2012). This paper aims to address this gap by a systematic comparison of socioeconomic and ecological conditions and the history of policies that directly and indirectly influence social, economic and environmental sustainability of coffee production in Nicaragua and India. Specifically, the paper addresses the questions:

- What are current local issues (i.e. items people are concerned of) and what is the range of best case and worst case agroecological and socioeconomic scenarios (swing potential) in coffee production systems in India and Nicaragua?
- Historically what responses (public policies, development and private sector initiatives) have been triggered by concerns?
- How do these responses work? Do sustainability standards provide a solution to local sustainability concerns and provide distinctions within the existing management swing potential in coffee production systems?

Finally, in addressing these questions, the paper discusses to what extent contextual factors enable or limit the potential impact of sustainability standards.

2. Analytical framework, methods and description of country case study sites

This paper is part of a comparison of five globally traded tropical commodities and is shaped by a common framework, which combines the conceptual perspectives of the global value chain and swing potential concepts as well as the policy issue-attention cycle (Mithöfer et al. 2017) (Figure 1).

The global value chain concept elaborates how actors work together across large distances. In particular, it focuses on governance along the chain, which
is shaped by suppliers’ capabilities, the complexity of exchange between suppliers and buyers along the different nodes of the chain and the ability to norm the information attached to this exchange (Gereffi et al. 2005; Ponte and Sturgeon 2013). Sustainability standards increase complexity as they specify multiple attributes a product or the way it is produced has to meet. The management swing potential represents the difference between best and worst ways of producing a commodity, evaluated from a specific angle. It was initially developed to assess greenhouse gas emissions for alternative management regimes in energy crops (Davis et al. 2013). It can apply to any single or combined set of sustainability indicators of economic, social and environmental outcomes. Coffee produced on a gradient of diverse shade to monoculture sun grown systems is characterized by a wide swing potential in terms of associated biodiversity and carbon footprint (Vaat et al. 2016).

The issue-attention cycle traces stages through which issues gain political prominence, leading to one or multiple public or private policy responses. The cycle has five phases, from initial scoping phase (stage one) in which issues are first acknowledged, through negotiation response at stage three in which solutions are identified and implemented (stage four), to reevaluation response in phase five (Tomich et al. 2004). Complementary to Lambin et al. (2014), the framework applied here explicitly acknowledges the temporal dimension of public and private regulatory instruments (Mithöfer et al. 2017). Sustainability standards, further private sector and development initiatives as well as public policies constitute responses negotiated to address a concern.

The framework resulted in four propositions (Figure 2), which were used as a starting point for the present paper. In the framework the lower part of the swing potential is thought to trigger public concerns, which are taken up and move through the phases of the issue-attention cycle resulting in (public and private) interventions addressing concerns (Mithöfer et al. 2017). The width of the swing potential defines the solution space and potential impact of interventions; global value chains are a means of implementing private interventions such as sustainability standards in coffee production areas (ibid.). By combining the three concepts, the conceptual framework deliberately connects issues that are often analyzed separately.

The analysis of this paper is based on a geographically focused literature review complemented by observations and information from research projects conducted previously and for different purposes. Literature was identified by search of the Web of Science using the search terms value/supply chain, certification/standard, governance, price/poverty/social, labor, biodiversity/environment and production (Table 1) and screened so that its content matches the objectives of the present paper as applied to coffee in Nicaragua and India. Scientific publications were not subjected to further quality criteria and were not evaluated for example on frequency of an individual issue.

![Figure 1](image-url). Local context and discourse shaping the potential impact of sustainability standards (based on Mithöfer et al. 2017).
Complementary to the structured literature review, observations and findings from long-term research in Western Ghats, India (CAFNET 2011; Bose 2014; Bose et al. 2016) and Northern Nicaragua (e.g. Méndez et al. 2010a; Baca et al. 2013; Jha et al. 2014) were integrated in the present paper. This process followed a protocol which standardized information of the grey literature to be collected through author networks and from previous projects for all commodity case studies of this Special Issue. The data collection protocol included data to be collected on commodity statistics in each country, the contribution of the commodity to local livelihoods, an enumeration of local issues as well as inventory of development projects and policies that addressed these issues over time. The protocol also collected information on actors involved in the uptake of sustainability standards in the local site as well as the identification of other actors involved. The sequence of the results sections follows the stages of the issues attention cycle: we first identify current concerns, then look back on how concerns have been addressed over time and finally reevaluate how well responses have worked from the present perspective. The discussion section compares the results between the two countries and the current scientific debate at global level.

The two countries and sites were selected from a portfolio of ‘sentinel landscapes’ that are representative of agro-ecological systems, forest transition and population density and were selected to carry out long-term monitoring of rural development and environmental sustainability in the Tropics (see Dewi et al. 2017). In both sites, issues with regard to the provision of ecosystem services include the expansion of highland crops (coffee and tea), overharvesting of timber and vulnerable biodiversity amongst others (Dewi et al. 2017).

Historically, Nicaragua’s dependence and political focus on coffee has been higher than in India (Gilbert 2005) although in India coffee also sustains livelihoods and provides employment in coffee producing areas.
(Neilson and Pritchard 2010b). Both countries have been subject to intense research on coffee. Indian coffee production has switched from Arabica to increased production of Robusta coffee for the bulk market and has faced increased competition of Brazil and Vietnam (Chengappa et al. 2014). Nicaragua constitutes a major producer of Fairtrade coffee ( Valkila et al. 2010) and coffee is a major contributor to the national economy and job market (Bacon et al. 2008b). The study sites Kodagu district in the Western Ghats, India (Box 1) and

**Box 1. Description of the case study site: The Western Ghats, India.**

Coffee production in India dominates the hill tracts of Western Ghats, spanning the states of Karnataka (which accounts for 53% of total coffee volume), Kerala (28%) and Tamil Nadu (11%). In the Western Ghats, the Kodagu district of Karnataka produced the largest volume of coffee in India (38% of the annual production in 2015). Coffee is one of the key drivers of the regional economy and the cultural identity of Kodagu district (Satish et al. 2006; Ghazoul et al. 2009). Coffee production provides direct employment for about 500,000 people in India, 254,000 in Kodagu alone (Lee and Lee 2007). Almost 99% of all farms in Kodagu district are smallholdings (less than 10 ha), and in 2012–2013, coffee in the district covered a total of 104,000 ha (75,500 ha of Robusta, Coffea canephora, and 28,500 ha of Arabica, Coffea arabica) (CBI 2016). Coffee cultivation accounted for 45% of the district’s total agricultural outputs in 2012–2013.

Western Ghats is a proposed UNESCO World Heritage Site (UNESCO 2013) and is recognized as one of the 34 ‘biodiversity hotspots’ in the world (Myers et al. 2000). The region, less than 6% of India’s landmass, contains 30% of all plant and vertebrate species found in India, with high levels of endemism. While wet evergreen forests have the highest plant diversity and endemism, the dry forests provide critical habitats for wide-ranging animals like tigers (Panthera tigris) and Asian elephants (Elephas maximus). In addition to biodiversity, a number of indigenous communities reside in Western Ghats and depend on forest and natural resources for subsistence and cultural survival (Gadgil et al. 1993; Hegde et al. 1996; Chandran 1997; Garcia and Pascal 2006; Macura et al. 2011).

Traditionally, coffee production in Western Ghats was developed as a multi-layered agroforestry system, sustained by coffee farmers based on their local knowledge of the benefits of shade trees for coffee plant health, soil, water and other aspects of coffee cultivation. The diversity of crops grown includes coffee, black pepper, vanilla, cardamom, and mandarins, as well as timber valuable trees, which provide additional income especially during a slump in coffee prices. Shade coffee plantations provide a range of ecosystem services such as hydrological, carbon sequestration and pollination (Bhagwat et al. 2009; Aminakudige and Satish 2009; Boreaux et al. 2013a, 2013b; Vaast et al. 2016). Shaded coffee systems protect habitats and species outside protected areas and in human-dominated landscapes (Depommier 2003; Bhagwat et al. 2005a, 2008; Garcia et al. 2010; Kushalappa et al. undated, Caudill et al. 2014).

The deregulation of the International Coffee Agreement and withdrawal of state-regulatory mechanisms played an important role in shaping the Indian coffee sector. The liberalization process in the mid-1990s led to structural reorganization: coffee farmers of varying farm sizes are now permitted to engage independently in the market in the absence of regulatory processes established by government agencies such as the Coffee Board of India (Ambinakudige 2009).

In India, coffee producers’ associations are dysfunctional (Neilson and Pritchard 2007) and represent political organizations for lobbying rather than marketing or production cooperatives (Marie-Vivien et al. 2014). Most coffee farmers sell their coffee at the farm gate to purchasing agents who are often small, informal networks of locally based traders (Mercereau and Vignault 2008). Sometimes these middlemen buy coffee at farm gate at the cheapest price possible, often extending loans to farmers with exorbitant interest rates and forcing them to sell their coffee exclusively to them. Coffee is processed at the curing unit depending on its final destination. It is then either exported directly by the curing unit or sold in the domestic market through other agents or coffee auctions organized by the Coffee Board of India. Some producers engage directly with exporters and coffee auctioneers through more formal contracts. Recommendations on agricultural management and marketing of coffee are developed by the Coffee Board of India (Ambinakudige 2005a) and represent political organizations for lobbying rather than marketing or production cooperatives such as the Coffee Board of India (Ambinakudige 2009).

While most private actors purchase coffee from a pool of coffee producers, some trading companies also manage their own plantations both on the study site as well as in other coffee producing districts of the Western Ghats. Coffee producers wanting to sell their coffee to these private actors can either approach them directly or through a small trader, who in turn sells coffee to these exporters. Most Indian coffee is exported with local demand expected to grow. Currently 39 out of a total of 67 exporters registered with the Coffee Board of India are located in Karnataka State and of this four are based in Kodagu District (CBI 2017).

**Box 2. Description of the case study site: Northern Nicaragua.**

Nicaragua’s agricultural and livestock sectors accounted for 20%, the highest portion of the country’s GDP in 2012. Coffee is Nicaragua’s most important export commodity and product, accounting for 19.5% of the value of all exportable products (CEPALSTAT 2014). Nicaragua produces Arabica coffee and most of the coffee is produced in Matagalpa, Jinotega and Nueva Segovia in Northern Nicaragua. In Matagalpa and Jinotega departments, coffee represents the main agricultural and economic activity. In 2012, Jinotega reported 40.5% (42,530 t in 39,096 ha) and Matagalpa 29% (31,184 t in 34,481 ha) of national coffee production (INIDE and MAGFOR 2012) including producers of all sizes. Nicaraguan coffee plantations are predominantly managed under shade (mostly rustic following the classification of Perfecto et al. 2005), which are ecologically well adapted to the region and compatible with various environmental conservation efforts including conservation of biodiversity and the provision of ecosystem services.

The Nicaraguan coffee sector is shaped by strong cooperatives. First-level cooperatives are made up by individual smallholder farms or collectively-managed properties to second-level unions (made up of first-level cooperatives), and third-level cooperatives (made up of first- and second-level cooperatives). Usually, second-level cooperatives are able to acquire and manage processing infrastructure as well as provide a variety of technical, marketing and social services to their members. Larger second-level unions and most third-level cooperatives are able to directly export their coffee and invest in more technologically advanced technology, such as quality control facilities. Finally, Nicaragua is the only country in Central America with a strong political advocacy organization that specifically serves the smallholder and cooperative sectors, namely the Nicaraguan Association of Smallholder Coffee Producers (CAFENICA). CAFENICA currently represents 10 cooperative organizations (most of them second- or third-level cooperatives) with a total of over 10,000 farmer members (CAFENICA 2016). Twelve second- or third-level cooperatives are active exporters of which nine are based in the north (CEI undated). Eight out of fifteen processing facilities (Guía Agropecuaria undated) are in Northern Nicaragua (one is a third-level cooperative). Many times, processing facilities only serve the farm or cooperative in which they are located. Other key actors in the coffee supply chain include private plantations, processors, exporters, NGOs and government organizations (GOs), universities and local government.
in Northern Nicaragua (Box 2), are the major coffee producing areas in these two countries. In Nicaragua, a major recurring theme in the literature is agrarian change and the development of the cooperative sector while in India attention in the case study site is mostly on its biodiversity value. This is reflected in the number and focus of publications on socioeconomic versus environmental topics (Table 1).

In 2012, India contributed 4% and Nicaragua 1% to global coffee production, while yields roughly matched the global average (FAOSTAT 2016) (Figure 3). In 2011, India represented 3% and Nicaragua 1% of global coffee export volume. Since 2002, the value of coffee exports has increased in both countries at much steeper rates than coffee volumes.

Coffee exports contributed 5% to GDP for Nicaragua in 2012 and less than 1% to India’s GDP (FAOSTAT 2016). Domestic consumption is low in both countries (ICO 2016). Exports of processed coffee constitute 41% of green coffee exports in India and about 3% in Nicaragua. In 2014, Indian coffee farmers received an average of USD 1.76/lb for wet-processed Arabica and $US1.05/lb for Robusta; Nicaraguan coffee farmers received an average of USD 0.7/lb for wet-processed Arabica (ICO undated-b). Nicaragua contributes 10% to global organic coffee exports while that of India is negligible (ICO 2013). India chiefly exports to Italy (31%) and Germany (16%) while Nicaragua mostly exports to the USA (48%) and Germany (5%) (ITC 2015).

3. Issues addressed by global sustainability standards and reevaluation at global level

Sustainability standards, built on early initiatives concerned with soil health and fair producer prices in the 1970s and 1990s, respectively (Soto and Le Coq 2011), now cover a range of initiatives with differences in focus and initiators (Table 1). They comprise the standard (defining the norms), the assurance system (conformity assessment: making sure and providing proof the standard is adhered to), often a label and capacity building (Milber et al. 2015). Producers seeking recognition for adherence to voluntary standard are regularly audited – usually by a third party – against these preset criteria. Standard development and conformity assessment can be held by separate actors. Voluntary sustainability standards encompass those labeled on the product contributing to brand development and those that serve in business-to-business communication for risk management and defining entry barriers (Potts et al. 2014). Standards provide for individual as well as group certification, the latter to address the needs of smallholders.

All standards reviewed in the context of this paper require adherence to national law, in particular to labor laws. Varied focus is placed on establishing management systems. The Sustainable Agriculture Standard (SAN), which is assured by the Rainforest Alliance seal, requires establishment of a social and environmental management system while UTZ requires an internal management system by which member compliance is assured (Table 1). Incorporation of a premium in the pricing strategy differs by standards; it is a major component of Fairtrade. Despite the oversupply, and hence international price volatility, and not being part of standard specifications, price premiums may be part of the actual contract in order to retain highly qualified suppliers within the supplier pool (Swinnen and Vandeplas 2011).

Although voluntary sustainability standards were initiated by separate concerns, they have converged
on some common issues over time. Currently all standards considered here stipulate adherence to principles of integrated pests and diseases management, including handling, storage and spraying of chemicals with protected gears, and ban substances black-listed by international agreements such as the Stockholm Convention. Organic agriculture bans the use of synthetic agro-chemicals. All standards ban the use of child labor (under age 15) unless children help parents and education is not compromised. Maintenance of shade is explicitly detailed only by the SAN as a non-compulsory development criterion and by UTZ to be established in year three following certification initiation (Table 2). Further environmental criteria include those enhancing sustainable management of soil, biodiversity, waste and water. Criteria on business development skills and farmer training are more recent and the extent of their inclusion differs among standards. The number of criteria in any dimension does not necessarily reflect comprehensiveness, nor does it reflect the strictness of the requirement stipulated, and nor does this reflect local understanding and strictness in implementation. First published in 2004, ISEAL’s standard-setting code assures representation of different stakeholders’ views during standard setting and aims to balance global and local interests (ISEAL 2014). Over time and in collaboration with other stakeholders, standards have move beyond plot and farm levels to address larger issues at landscape level. For example, the most recent update of the 2017 SAN Standard requires farms to maintain high conservation value areas and natural ecosystems (SAN 2017).

Certification schemes have mostly been developed for Arabica coffee, the high quality coffee preferred by northern consumers. Both social and environmental standards do not directly address quality, but none of the buyers and roasters that specialize in certified coffee or their own company standards buys coffee of poor quality.

Over time different actors have partnered to work jointly towards a sustainable coffee sector (Bitzer et al. 2008). The International Coffee Agreement of 2001 focused on a sustainable coffee industry (ICO undated-a). The International Coffee Agreement of 2007 focuses on benefits for local communities and small coffee producers (ICO undated-a). In 2015, a large public-private partnership was formed when the International Coffee Organization (ICO), the 4C Association and The Sustainable Trade Initiative (IDH) signed a Memorandum of Understanding for a ‘Long-Term Sustainability of the World Coffee Market’ (ICO 2015), one component of which is to develop national sustainability curricula (NewForesight Consultancy 2015).

Beyond larger coalitions which included additional actors, recently actors have merged to harness synergies between programs of work and/or to increase efficiency in supply chain operations by cutting costs. The 4C Association merged with the Sustainable Coffee Program in 2016 forming the Global Coffee Platform which now harnesses synergies of either program and is

### Table 2. Initiators, motivation and implementation of national laws and management systems of selected sustainability standards in coffee.

| Standard                  | Founding date | Founding organizations | Initial concern & focus | Adherence to national laws in producing countries | (Social & environmental) management system                                                                 |
|---------------------------|---------------|------------------------|-------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| IFOAM                     | 1992 (early initiatives in 1967) | Union of national and regional organic movements | Use of external inputs | Referred to in general, in particular labor laws | To be established                                                                                      |
| Rainforest Alliance        | 1987          | NGOs                   | Deforestation and extinction of species in tropical rainforests in Central America | To be established | To be established                                                                                     |
| FLO (Fairtrade)            | 1997 (early initiatives in 1988) | Organizations in the United States and Europe | Livelihoods of the poor (in particular smallholder producers), terms of trade | Labor laws, waste & pollution management             | Monitoring system needs to be implemented                                                             |
| UTZ Certified              | 2001          | Dutch Ahold Coffee Company & Guatemalan coffee producers | Transparency along the supply chain, responsible coffee production | Referred to in general | Internal management system to be established; documentation required                                   |
| 4C Association             | 2006          | Public-private partnership between BMZ, GIZ and the German Coffee Association | Baseline mainstream sustainability standards | Labor laws | Documentation required                                                                              |

Sources: 4C Association (2009); Potts et al. (2010); Potts et al. (2014); SAN (2010); FLO (2011); IFOAM (2014); UTZ (2015b, 2015c); Global Coffee Platform (2016). 
Rainforest Alliance and UTZ Certified merged late in 2017 under a single certification program, the ‘Rainforest Alliance standard’, which combines the strengths of the current individual standards while creating a single auditing process (Rainforest Alliance 2017). In 2011, Fairtrade USA split from FLO due to a decision to also certify plantations to also benefit workers (Raymonds and Murray 2011). Fairtrade, UTZ Certified and Rainforest Alliance are members of 4C Association. The 4C Association ceased to exist in April 2016 following a merger of the 4C Association and the Sustainable Coffee Program, which resulted in the launch of the Global Coffee Program (GCP 2017). The Sustainable Coffee Program of the Sustainable Trade Initiative was a public-private consortium that developed country-specific program to develop socially and environmentally friendly coffee production systems (SCP Undated). BMZ: Federal Ministry for Economic Cooperation and Development, Germany; GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit.
a business-to-business scheme (GCP 2017). Recently, the SAN standard and UTZ merged (late 2017) in order to reduce cost of standard implementation and the assurance systems while combining the strength of either standard (Rainforest Alliance 2017).

Although sustainability standards are predominantly part of industry self-regulation, voluntary and private, they interact with government actions via multiple channels, including funding and support of particular NGOs, political support to sustainability initiatives and regulation of public procurement (Kolk 2012; Vermeulen and Kok 2012).

Sustainability standards in coffee have been interpreted as (1) steps toward standardization of sustainability attributes to increase efficiency in supply chains at the expense of smallholder producers (Daviron and Vagneron 2011), (2) a way to establish traceability and manage risks (Raynolds 2009; Levy et al. 2016), (3) a driver of structural change (Neilson 2008), (4) a strategy to capture market gains (March 2007), and (5) a business strategy of retailers and roasters aiming at product differentiation and market segmentation (Ponte 2002). Voluntary sustainability standards have been shown to be adopted by large companies to achieve business goals rather than as a response to consumers’ pressure (Elder et al. 2014). Voluntary sustainability standards can be de facto mandatory constituting an entry barrier to the market in case they are required in buyer supplier contracts (Neilson and Pritchard 2010b). Companies have been shown to abandon voluntary sustainability standards once their own systems are set up (Kolk 2012). Recently, de Janvry et al. (2015) showed that under current rules and in a competitive market Fairtrade results in erosion of producer benefits in terms of price premiums due to lack of entry barriers to the scheme. The authors conclude that consumers should better support producers directly than through such market mechanisms (de Janvry et al. 2015). However, beyond prices and premiums coffee producer livelihoods also benefit from other factors such as training on best practices, access to inputs, access to financing and access to markets (see e.g. Bray and Neilson 2017).

4. Current local issues and swing potential in the country case study sites

4.1 Western Ghats, India

Like many biodiversity-rich areas across the globe, the Western Ghats is undergoing rapid transformation (Gaucherel et al. 2016). Menon and Bawa (1997) estimate that 40% of the natural vegetation was lost from 1920 to 1990 with open/cultivated lands, coffee and tea plantations and hydroelectric reservoirs, of which coffee plantations accounted for 16% of forest cover lost. Coffee farms have spread from low-elevation moist deciduous forests to montane evergreen forests. Garcia et al. (2010) suggest that in some coffee production districts, 30% of forest cover was lost between 1977 and 1997 while the area under coffee doubled (Lal et al. 1990). Coffee has also been shown to invade forests and forest fragments (Joshi et al. 2009).

Since the early 1990s, there have been significant changes in the canopy cover of coffee plantations. There are numerous drivers for these changes, including the shift from growing Arabica to Robusta coffee. Currently, Robusta dominates 70% of total coffee production. While this shift to Robusta was motivated primarily due to easier management and better pest resistance, it has had unintended consequences on the reduction of tree canopy cover on coffee plantations as Robusta requires less buffering effects of shade than Arabica. Additionally, the increased development of irrigation areas has reduced the need for shade cover in the dry, summer months (Central Ground Water Board 2007; Garcia et al. 2010; Boreux et al. 2013a). Easy availability and application of agrochemical fertilizers have greatly replaced the use of organic manure originating from leaf litter and tree pruning. Finally, newly developed varieties of coffee more resistant to heat and drought are replacing older varieties.

As coffee farmers have become less dependent on ecosystem services provided by forest trees, such as microclimate regulation in the form of temperature and humidity control and provision of organic matter, native shade trees are being replaced by exotic species such as Grevillea robusta (Garcia et al. 2010; Nath et al. 2011, 2016). Such exotics are fast-growing, and often, as in the case of G. robusta, serve as living stand to pepper vines (Piper nigrum) and are marketable for timber without restriction imposed on native species (Garcia et al. 2010; Nath et al. 2016). The planting of G. robusta is seen by coffee farmers as a source of contingency funds in the event of a drastic fall in coffee prices, or urgent or exceptional needs such as medical expenses, familial events such as wedding or burial.

Apart from these environmental concerns, economic and social concerns prevail (Table 3) such as volatile coffee prices (Ambínakudige 2009) and structural changes in rural areas triggered by changes in international market demand (e.g. increased importance of quality parameters leading to industry models of working through purchasing agents for risk sharing versus direct contracting (Neilson and Pritchard 2010b)). Similar to findings of Soto-Pinto et al. (2000) and Perfecto et al. (2005), productivity of coffee is less under high-shade cover conditions (Table 4) (Chethana et al. 2010). Arabica coffee brings back higher net returns than Robusta (Chengappa et al. 2014) but is more susceptible to pests than Robusta.
Table 3. Current social, economic and environmental issues in the Western Ghats, India and Northern Nicaragua.

|                      | India (based on Upendra Nath (2013) unless stated differently) | Nicaragua |
|----------------------|---------------------------------------------------------------|-----------|
| **Social**           |                                                               |           |
| Access to clean water| Poor access to education and healthcare                       | Food security (Bacon et al. 2008a; Pino 2014; Baca et al. 2013) |
| Poor living conditions| Low level of farmer organization & poor organizational management | Poor access to education and healthcare (Valkila and Nygren 2010) |
| Labor exploitation   |                                                               | Gender inequality (Rocha 2003) as cited in Bacon 2010 |
| Discrimination, gender|                                                              | Land tenure insecurity (Donovan and Poole 2014)  |
| Inequality           |                                                              | Limited skills for cooperative governance (Donovan and Poole 2014) |
| Seasonality of labor | Crop loss and human injuries by elephants (Ninan and Sathyapalan 2005; Neilsen and Pritchard 2010a) | Gender inequality in cooperative governance and economic opportunities (Valkila and Nygren 2010) |
|                      | Fenimation of permanent workers with low payment and high dependency |           |
| **Economic**         |                                                               |           |
| High labor casualization| Lack of agricultural credit                                   | Limited asset building (Donovan and Poole 2014) |
| (Neilsen and Pritchard 2010a) |                                                 | Limited farm credit and high interest rates (Baca et al. 2013; Pino 2014) |
| Low minimum wages    | Low productivity                                               | Debt (Wilson 2010) |
| Labor shortages      | Price volatility                                               | Poor crop management skills & lack of extension (Donovan and Poole 2014) |
| High costs of production (labor, fertilizer, pest control) | High wage rates                                               | Low productivity (Beuchelt and Zeller 2013; Donovan and Poole 2014) |
| Thin profit margins for traders |                                                              | High costs of production (labor, fertilizer, pest control) (Beuchelt and Zeller 2013; Donovan and Poole 2014) |
| **Environmental**    |                                                               |           |
| Conversion of primary forest habitat (Garcia et al. 2010) | Loss of biodiversity and habitat destruction (Garcia et al. 2010) | Shift from diversified shade coffee to simplified shade or unshaded coffee (Jha et al. 2014) |
| Conversion of sacred groves (Ormsby 2013) | Loss of biodiversity and habitat destruction (Garcia et al. 2010) |           |
| Loss of biodiversity and habitat destruction (Garcia et al. 2010) | Loss of biodiversity and habitat destruction (Garcia et al. 2010) |           |
| Agrochemical use and food safety |                                                              |           |
| Substitution of native tree species with exotics (Garcia et al. 2010) | Substitution of native tree species with exotics (Garcia et al. 2010) |           |

4.2. Northern Nicaragua

One of the most significant environmental threats facing Nicaragua and other coffee producing countries is the conversion of shade coffee to more intensive production with simplified or no shade at all (Jha et al. 2014) (Table 3). Simplified systems, made of one shade stratum composed of one or few tree species, not only lose many environmental benefits provided by a diversified shade canopy, but they also generate negative environmental impacts as they increase the use of synthetic fertilizers and pesticides. In addition, concerns exist regarding the impacts of climate change, especially increasing temperature and variability in rainfall patterns, which could affect production, quality and value of coffee at elevations that are optimal at present, but could become suboptimal in the future (Baca et al. 2014; Bunn et al. 2015). Recent research shows the negative effects of climate change and corn-price fluctuations on food security for Nicaraguan smallholder farmers (Bacon et al. 2014).

From a social and economic perspective, smallholders and cooperatives face persistent livelihood issues. Poverty levels remain high and seasonal food insecurity over several months of the year is common. In part, this is due to the instability of coffee as a cash crop, with prices fluctuating within and between years (Wilson 2010). In addition, some farmers, heavily dependent on coffee, have abandoned a more diversified livelihood strategy, resulting in high levels of vulnerability. Indebtedness is a persisting major structural problem for Nicaraguan smallholder coffee producers triggered by the coffee crisis and the drop of coffee prices in 2000 (Wilson 2010). Development of the private agro-export sector led to the appropriation of formerly worker-owned coffee plantations leading to job losses and food insecurity of coffee workers before land was actually redistributed to a share of the workforce (Wilson 2015). Organic as well as noncertified coffee farmers experience periods of food insecurity during the months prior to the coffee harvesting which is due to variability in annual rainfall cycles, rising maize prices, and low coffee harvests and volatile coffee prices (Bacon et al. 2014).

Numerous studies compared production systems via social and economic indicators (Table 4) contributing to an assessment of their swing potential. Mean coffee yields vary greatly between surveys from 354 kg/ha in a 2007 survey (Beuchelt and Zeller 2011) to 1561 kg/ha in a 2010 survey (Jena et al. 2017). Organic coffee fetches the highest prices although varying strongly according to buyers’ origin (private traders versus cooperatives). It is followed by Fairtrade and conventional systems (Jena et al. 2017).

5. Responses to concerns over time in the case study countries

5.1. Western Ghats, India

In Kodagu, legal and policy frameworks constitute a bottom line for many of the critical criterion of
Table 4. Swing potential: Minima and maxima reported for sustainability indicators of coffee farming systems in Nicaragua and India.

| Indicator                        | Nicaragua            | India                  |
|----------------------------------|-----------------------|------------------------|
|                                  | CSS | OSS | FT | OFT | Source                                  | LS | CSS | OSS | RFA | Source                                  |
| **Environment**                  |     |     |    |     |                                           |    |     |     |     |                                           |
| Species                          | 3.3 | 5   |    |     | Per 500 m² (Haggar et al. 2015). Between | 2.6 | 1.8–3.5 |     |     | Per 25 m² (Bali et al. 2007); 53 species per ha (CAFNET 2011) |
|                                  |     |     |    |     | 2003 and 2012 > 60 species per 1000 m²  |     |     |     |     |                                          |
|                                 |     |     |    |     | (Goodall et al. 2015)                    |     |     |     |     |                                          |
| Shannon index                    | 0.82| 1.2 |    |     | Per 500 m² (Haggar et al. 2015)          | 3.3 | 2.1–4.7 | 77 | 60 | 71                                           |
| Tree density                     | 85a | 92b |    |     | Per 500 m² (Haggar et al. 2015), commercial polyculture 305 shade trees/ha (SD = 83) |     |     |     |     |                                          |
|                                 |     |     |    |     | (Van Rilkoort et al. 2014)               |     |     |     |     |                                          |
| % of shaded coffee               |     |     |    |     | Shaded coffee declined from 55% of the national coffee area in 1996 to 25% of the coffee area in 2012 (Jha et al. 2014) |     |     |     |     |                                          |
| Shade cover (%)                  | 63a | 75b |    |     | Haggar et al. (2015)                     |     |     |     |     |                                          |
| Number of strata                 | 2.34a | 2.63b |    |     | Haggar et al. (2015)                     |     |     |     |     |                                          |
| Carbon footprint (kg CO₂         | 0.26–0.67 | 0.12–0.52 |    |     | Noponen et al. (2012)                     |     |     |     |     |                                          |
| equivalents)                     |     |     |    |     |                                          |     |     |     |     |                                          |
| Ecological water purification     | 40  | 68  |    |     | Bacon et al. (2008b)                      |     |     |     |     |                                          |
| system (% of households)         |     |     |    |     |                                          |     |     |     |     |                                          |
| Soil and water conservation      | 10  | 43  |    |     | Bacon et al. (2008b)                      |     |     |     |     |                                          |
| (% of households)                |     |     |    |     |                                          |     |     |     |     |                                          |
| **Social**                       |     |     |    |     |                                          |     |     |     |     |                                          |
| Benefits to the community        |     |     |    |     |                                          |     |     |     |     |                                          |
| Env pollution reduced            | >   | <   |    |     |                                          |     |     |     |     |                                          |
| Social projects, community       |     |     |    |     |                                          |     |     |     |     |                                          |
| infra-structure                  |     |     |    |     |                                          |     |     |     |     |                                          |
| Jena et al. (2017)               |     |     |    |     |                                          |     |     |     |     |                                          |
| **Economic**                     |     |     |    |     |                                          |     |     |     |     |                                          |
| Coffee yield (kg/ha)             | 812 ± 534 | 522 ± 233 | 812 ± 534 | 812 ± 534 | 2005 survey (Valkila 2009)                          |     |     |     |     |                                          |
|                                 |     |     |    |     | With no significant difference in quantity of input use: |
|                                 |     |     |    |     | High-shade and native-tree cover (>70%): 1440 kg/ha |
|                                 |     |     |    |     | Low-shade cover (<70%): 2136 kg/ha |
|                                 |     |     |    |     | Although coffee growers under high shade had slightly lower input costs, they still incurred a net loss of Rs15.50 (SUS0.31) per kg relative to low shade (Chethana et al. 2010) |

(Continued)
| Indicator                                      | Nicaragua                                      | Source                      | India                      | Source                      |
|------------------------------------------------|------------------------------------------------|-----------------------------|----------------------------|-----------------------------|
|                                                 | CSS | OSS | FT | OFT |                                        | LS | CSS | OSS | RFA | Source                      |
| Green coffee yield (kg/ha)                     | 366$^b$ | 434$^a$ |    | 354$^a$ | 2007 survey (Beuchelt and Zeller 2011) |    |      |     |     |                             |
| Coffee yield (kg/ha)                           | 1206 (198) | 1190 (806) | 1561 (1208) | Jena et al. (2017) |
| Average farm gate price (US $/kg)              | 2.1$^{ab}$ | 2.3$^a$ | 2.3$^b$ | Beuchelt and Zeller (2011) |
| Coffee prices from cooperative (US$/quintal)   | 49.4 (5.5) | 62.7 (6.8) | 49.4 (6.8) | Jena et al. (2017) |
| Coffee prices from private traders (US$/quintal)| 43.3 (7.9) | 41.8 (5.8) | 43.8 (6.8) | Jena et al. (2017) |
| Ni: Gross margin from coffee (US$/ha)          | 504$^a$ | 743$^{ab}$ |    | 518$^{b}$ | Beuchelt and Zeller (2011) | A: 59,255 | A: 64,374 | A: 61,762 | (Chengappa et al. 2014) |
| In: Net returns (Rs/acre)                      | x | x |    |      |                                                      | R: 47,777 | R: 56,317 | R: 50,532 |                             |
| Off farm income x                               |     |     |      |      | Sign.> than x | Beuchelt and Zeller (2011) | Valkila (2009) |
| Payments & terms of payment Faster than FTO    |     |     |      |      |                                                      | Valkila (2009) |
| Price risk                                    |     |     |      |      | O prices more stable than C prices                  | Valkila (2009) |

Notes: Same letter denotes significant difference at 5%. Figures are means, figures in () are standard deviation, otherwise minimum – maximum is shown. Year denotes survey year; C: conventional; O: organic; FT: fairtrade; U: UTZ; RFA: Rainforest Alliance; SS: small-scale; LS: large-scale; A: Arabica; R: Robusta.
| Year   | Nicaragua Instrument & effect                                                                 | India Instrument & effect                                                                                                                                                                                                 |
|--------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prior to 1970 |                                                                                               |                                                                                                                                                |
| 1970s  | Agarian change; land reforms and foundation of cooperatives as response to landlessness and political unrest (Fraser et al. 2014; Bruce 2016) | Bonded Labour System (Abolition) Act: Prohibition of forced labor.                                                                                                                                             |
| 1980s  | First Fairtrade certification through social and land solidarity networks, including the National Union of Farmers and Livestock Producers | Water Act: Prevent and control of water pollution, install waste water treatment systems for wet processing units of coffee (Damodaran 2002)                                                                                           |
|        | Nicaragua ratifies the Convention on Biological Diversity (CBD 2017)                          | Karnataka Preservation of Trees Act: Restrictions on peoples' right to fell native tree species thereby restricting conversion to fully exposed sun-grown coffee.                                                                                 |
|        | Spread of Fairtrade focusing on coffee production in the north (Levi and Linton 2003 as cited in Valkila and Nygren 2010) | National Child Labour (Prohibition and Regulation) Act: Prohibition of part-time and full-time workers under the age of 15 National Forest Policy (GoI 2011)                                                                 |
|        | Foundation of second level union of cooperatives (Bacon 2010)                                 |                                                                                                                                                |
|        | USAID funded coffee quality project that supported bigger cooperatives to train people and build coffee quality labs on site (Bacon 2013) | National Conservation Strategy and Policy Statement on Environment and Development (GoI 2011) Fairtrade starts working in India (Chengappa et al. 2014) but not the Western Ghats India ratifies the Convention on Biological Diversity (CBD 2017) |
|        |                                                                                               |                                                                                                                                                |
| 1989   | International Coffee Agreement failed resulting in low coffee prices globally (Bacon 2010; Fraser et al. 2014) | Liberalization of the coffee trade: coffee growers exposed to volatility of the international coffee market (Madhusudan 2005; Russell et al. 2012); Frosts in Brazil reduced Brazilian coffee production, value of Indian exports increased and coffee production expanded (Madhusudan 2005); liberalization led to an increase in producer prices and reduced costs along the supply chain (Madhusudan 2005; Russell et al. 2012) and an expansion of coffee area (Ambinakudige and Cho 2009) |
| 1990s  | Liberalization of coffee exports, support of coffee importers and roasters at the expense of coffee cooperatives: Some coffee cooperatives collapsed while larger surviving cooperatives strengthened (Bacon 2010) |                                                                                                                                                |
|        |                                                                                               |                                                                                                                                                |
| 2000s  |                                                                                               |                                                                                                                                                |
| 2002/3 | Coffee crisis: Drop in coffee prices                                                            |                                                                                                                                                |
|        | Coffee crisis: Drop in coffee prices, loss of employment, rural urban migration, collapse of banks (Bacon 2003), strengthened Fairtrade (Bacon et al. 2008b; Utting 2009) |                                                                                                                                                |
|        | Expansion of Fairtrade via strong private sector mainstreaming (Fraser et al. 2014)            |                                                                                                                                                |
|        | Food sovereignty, security and nutrition law: Implementation of national programs, e.g. National food program; Program zero hunger; Program zero usury; National program for agro-industry Larger Fairtrade certified cooperative unions promote additional certification to organic (Valkila 2009) | National Water Policy (GoI 2011) Implementation of the Geographical Indication of Goods Act 1999                                                                                                                      |
|        |                                                                                               | Amalgamated Coffee Bean Trading Company initiates certification to UTZ in India, since then UTZ has been taken up by further exporters in support by NGOs (Chengappa et al. 2014) |

(Continued)
| Year | Instrument & effect | Nicaragua | India | Nicaragua | India |
|------|---------------------|-----------|-------|-----------|-------|
|      |                     | S/E Env   | S/E Env | S/E Env   | S/E Env |
| 2010s | Market and enterprise development and quality enhancement supported by the Central American and Dominican Republic Quality Coffee Program (CADR QCP) (Chemonics International 2006) | x | x | x | x |
|       | Nicaragua Sustainable Forestry, Agriculture and Tourism Alliance: improve competitiveness, foster producer buyer linkages, conservation of biological diversity, certification to sustainability standards (USAID and Rainforest Alliance, 2010) | x | x | x | x |
|       | National Rural Employment Guarantee Act: entitles rural households to 100 days of work in a financial year much of this in natural resource conservation (GoI 2008) | x | x | x | x |
|       | National Environmental Policy: Conserve environmental resources to secure livelihoods & ensure livelihood benefits from sustained environmental resources (GoI 2011) | x | x | x | x |
|       | Exporters and NGOs initiate Rainforest Alliance, UTZ in Kodagu district and organic certification in Karnataka state for individual large farms (Chengappa et al. 2014; Marie-Vivien et al. 2014) | x | x | x | x |
|       | National Biodiversity Action Plan: support on farm conservation of biodiversity through economic incentives and action on invasive species (GoI 2008) | x | x | x | x |
|       | Official launch of Fairtrade in India (Chengappa et al. 2014) | x | x | x | x |
|       | Debt relief package for small coffee producers (Upendranadh 2013) | x | x | x | x |
|       | Promotion of agro-ecological or organic production law: formation of Produzcamos Bank, oriented to provide credit to small-scale enterprises and farmers in the agricultural and rural sector | x | x | x | x |
|       | Coffee transformation and development law: Law taxes coffee growers between US$1 and US$4 per quintal (100 lbs), depending on the price for their coffee. | x | x | x | x |
|       | Taxes are used for the fund for Coffee Transformation and Development, which is governed by a public-private council. | x | x | x | x |
|       | The Fund will support the Program for Coffee Transformation and Development, which will focus on: | x | x | x | x |
|       | Providing credit for coffee farmers; Providing technical assistance & training; Investing in infrastructure; Sustainable technology for production, processing and marketing | x | x | x | x |
|       | Nestle India initiates 4C certification (Chengappa et al. 2014) | x | x | x | x |
|       | Better Coffee Harvest Project to increase coffee productivity via improved agronomic practices, access to inputs as well as diversification of crops | x | x | x | x |
|       | Coffee transformation and development law: | x | x | x | x |
|       | Nestle India initiates 4C certification (Chengappa et al. 2014) | x | x | x | x |
|       | CAFNET facilitates UTZ and Rainforest certification of eight smallholder farmer groups of a total of 90 farmers (Bose et al. 2016; Solér et al. 2017; CAFNET 2011) | x | x | x | x |
|       | Companies push certification without assistance from NGOs. First attempts of branding the landscape, trademarks, labeling of geographic origin (Chengappa et al. 2014; Marie-Vivien et al. 2014) | x | x | x | x |

S/E: socioeconomic focus of the intervention; Env: environmental focus of the intervention.
sustainability standards (Table 5). These policies are indicators of responses to past issues. Workers’ rights on farms have been protected from 1951 onwards while environmental issues such as the conversion of protected areas to coffee have addressed by the Wildlife Protection Act of India of 1972. With respect to biodiversity, the focus has centered on protected areas and exotic wildlife species, such as the tiger or Asian elephant (Sodhi et al. 2010).

In the Western Ghats, Rainforest Alliance, Organic and UTZ Certified are active since 2008 and 2009, respectively. Certification to Rainforest Alliance and UTZ Certified was driven by the research project, CAFNET, in collaboration with certified buyers and auditing companies with financial support to UTZ Certified from the Dutch government. Following awareness-raising meetings from 2009 to 2010, individual coffee farmers as well as farmers’ groups formed groups of coffee producers that followed the standard specifications. CAFNET carried out pre-certification monitoring along with representatives of a key buyer of certified coffee during which the team evaluated the coffee farms against certification standards. Three rounds of pre-certification monitoring were carried out in which the CAFNET team and the certified buyer made suggestions for improvement and ensured that farm management, including book-keeping, labor facilities, and drying yard, complied with the requirements of Rainforest Alliance or UTZ Certified. The final certification audit was carried out by an independent auditing company and the audit report was forwarded to Rainforest Alliance and UTZ Certified, based on which farmers were conferred an official certificate. The certificate, jointly owned by the certified buyer and the individual coffee farmer, specifies that coffee from certified farms could be sold as certified coffee only if sold directly to the certified buyer. If certified farmers wish to sell their coffee to alternative traders or exporters, the exporter cannot use the certification label. In Kodagu, the certified buyer covers the certification fees and audit expenses on behalf of farmers, but in return farmers enter into a contract wherein they are only able to sell certified coffee to that particular certified buyer. The certified buyer provides a premium for certified coffee that ranges from Rs50 ($US1) to Rs100 ($US2) per 50-kg bag of Robusta cherry and Arabica parchment, respectively (CAFNET 2011; Bose 2014). Following this initial process, a total of 187 producers has been certified in the study site (from a total of 43,775 producers) (Marie-Vivien et al. 2014). Two large buyers constitute the largest buyers of certified coffee and now drive certification by actively recruiting producers to participate. The current process of obtaining certification no longer entails the collaboration of the CAFNET project. Nowadays, coffee farmers and buyers liaise directly, and buyers carry out pre-certification audits. The buyer still covers costs of auditing and certification and the certificate is still jointly owned. The premium for certified coffee ranges from 2% to 5% of the market price, depending on price volatility, and whether it is Robusta, Arabica or green bean coffee (Bose 2014). Multinational exporters and large traders offer two major incentives: (a) reliability of payments in comparison to small traders who are often short of cash or even go bankrupt, and hence are unable to pay producers on time; and (b) information on coffee quality in the form of a formal report on quality parameters such as moisture and bean quality, particularly bean size and % of bean damaged (CAFNET 2011; Marie-Vivien et al. 2014).

5.2. Northern Nicaragua

Poverty and landlessness coupled with political unrest and changes triggered agrarian reforms in Nicaragua (from 1979 onwards) and the development of a strong cooperative system, which was the entry point of the strong Fairtrade movement in the country (Fraser et al. 2014; Bruce 2016) (Table 5). Following the agrarian land reforms, market deregulation and privatization of technical and extension services in the 1990s resulted in stronger direct ties between smallholders, NGOs (offering technical assistance) and buyers (Méndez et al. 2010b), stronger producers’ organizations and development of the sustainably certified coffee sector (Bacon et al. 2006b). The Nicaraguan government has focused strongly on strengthening farmers’ cooperatives. Maintenance of shaded coffee systems, deforestation and biodiversity loss are directly and indirectly addressed by the ratification of the Convention on Biological Diversity, and the laws on food sovereignty, organic and agroecological production. However, the laws have no teeth and certifiers have pressured farmers to also undertake environmental measures.

Government policy instruments, such as food security and coffee laws, have the potential to leverage efforts for the improvement of the livelihoods of Nicaraguan coffee farmers. However, most of the advances to date have been accomplished by cooperatives with the support of coffee companies and NGOs. Nicaragua has been a regional innovator in the development of the high value or ‘specialty’ coffee sector negotiated through second- and third-level smallholder farmers’ cooperatives. The solidarity networks that stemmed from the Sandinista revolution were important in connecting Nicaraguan producers to early Fairtrade efforts in the 1980s and to the USA and European solidarity networks. Cooperatives first leveraged Fairtrade certification through social and land solidarity networks, including the National Union of Farmers and Livestock Producers founded in 1981, and with a strong link to the Sandinista revolution and its international networks. Others
supporting this process included faith-based organizations from the USA and Europe, including Catholic Relief Services (CRS) and the European Interchurch Organization for Development Cooperation. By the mid-1990s, and with support from these networks, many of the larger cooperative unions had achieved Fairtrade certification. In the 2000s, these unions promoted a combined Fairtrade/Organic certification, in part due to a demand from buyers, and the presence of NGOs supporting Organic certification (Valkila 2009). There has been an increasing tendency from cooperatives to seek certification through regional certifiers, as thus reduce costs compared to the international agencies based in the USA and Europe.

Fairtrade has been seen as a first useful step in market integration on which Rainforest Alliance and Café Practices from Starbucks Company have built on for subsequent productivity improvement (Ruben and Zuniga 2011). Rainforest Alliance initially worked with large-scale coffee producers and placed little focus on coffee system components important to small-scale producers such as medicinal plants and food crops (Méndez et al. 2010b).

Other actors from the coffee sector include the National Coffee Council (CONACAFE), the Nicaraguan Association of Specialty Coffees, the Union of Nicaraguan Coffee Producers and several organizations specifically representing exporters and processors. Although these organizations have become increasingly involved with specialty and certified markets, they tend to be heavily influenced by larger producers and exporters, with limited involvement from the cooperative sector. Regional actors of relevance include the InterAmerican Institute for Cooperation in Agriculture (IICA), the Tropical Agriculture Research and Higher Education Center (CATIE) and the Cooperative Regional Program for the Modernization and Development of Coffee (PROMECAFE) in Central America. These national and regional institutions play active roles in a program aiming at enhancing competitiveness, diversification and food security of the Nicaraguan coffee sector (MAGFOR et al. 2008).

6. Reevaluation: how do responses perform, and what secondary effects emerge?

6.1. Western Ghats, India

Coffee, produced in multi-strata agroforestry systems, is grown under a mosaic of different tree species. The average coffee farms in Kodagu district ranged from commercial polyculture to rustic, with an average shade cover of 40% and tree species richness of 53 species/ha (CAFNET 2011) (Table 4). As a district average, tree densities on plantations and smallholder farms range from 285 to 1,471 trees/ha, comparable to surrounding deciduous and evergreen forests (Desjeux 1999). Fast-growing and timber-valuable exotics such as *Grevillea robusta* comprise approximately 23% of the canopy (Bose 2014). Producers use a combination of organic and chemical inputs to enhance production and control pests and diseases outbreaks.

The production system currently adopted by certified producers is almost identical to that of noncertified producers (Bose et al. 2016). Certified farmers fall within a spectrum of shade-management types from commercial polyculture to rustic plantations. The average density of native trees was significantly lower on certified farms (169 trees/ha) than conventional ones (271 trees/ha). The percentage of *G. robusta* on certified plantations (29% of total trees) was marginally higher than noncertified farms (23% of total trees) (CAFNET 2011). The existing density of native trees on certified farms – though lower than on noncertified farms – is more than ten times higher than the requirement of Rainforest Alliance (cf Table 6).

The regional member organization of the Sustainable Agriculture Network (SAN), Nature Conservation Foundation, India, held initially a series of workshops to develop Local Interpretation Guidelines (LIG). The objective of these LIG was to tailor the Rainforest Alliance standards to the local context with particular relevance to local laws, institutions and policies. Key stakeholders such as coffee producers and environmental organizations were requested to contribute to this consultative process. This process gave voice to concerns such as the feasibility of ‘establishing a social and environmental management system’. Maintenance of tree density was seen as straightforward; however, maintaining a diversity of native tree species was more challenging, especially in the absence of clear guidelines regarding which species to plant or conserve and specific benefit for coffee.

Despite the initial momentum, these LIG have not as yet been approved and circulated among key stakeholders. Correspondence with Rainforest Alliance indicated limited scope of the LIG in triggering modifications to the global Rainforest Alliance standards in addressing producers’ concerns for a separate set of standards for small-farmers, or revised shade criterion integrating both tree density and tree diversity that were locally more relevant.

Individual coffee plantations undergo marginal modifications to management practices in order to qualify for certification, mostly changes are related to documentation of management practices (Marie-Vivien et al. 2014; Bose et al. 2016). This is partially due to the low-management swing potential in the landscape given its naturally high biodiversity, predominance of coffee shade management, and local regulatory systems, as well as the lack of local adaptation of global certification standards.

On the economic and social sides, as producers are legally bound to sell coffee as ‘certified’ only to...
Table 6. Number of compliance criteria and description of selected criteria by sustainability standard.

| Standard          | Env. Mgt. (#) | Biodiversity                                                                 | Shade                                                                 | Productivity | Prices | Labor & Development (?) |
|-------------------|---------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------|--------|-------------------------|
| IFOAM             | 20            | Maintain and improve landscape and enhance biodiversity quality via wildlife refuge and habitats; destruction of high conservation value areas is prohibited; practice crop rotation. | Crops in areas originally with forest cover maintain ≥12 native species/ha; two strata; canopy density 40%. | –            | –      | 15 –                    |
| Rainforest Alliance | 24         | Do not destroy natural ecosystems; no negative effects on national parks; buffer strips. | –                                                                     | –            | –      | 40 –                    |
| FLO (Fairtrade)   | 40            | Avoid negative impact on protected areas & areas of high conservation value (Report on activities enhancing biodiversity; buffer zones). | –                                                                     | –            | –      | 29 (Training, premium; transparency) |
| UTZ Certified     | 33            | Suitable cropping systems; buffer zones; no deforestation since 2008; no deforestation & degradation of secondary forest unless land titles or land rights are available; no production within 2 km of protected areas unless allowed (home gardens; promote ecological diversity via planting trees). | No degradation of secondary forest without land rights & local permits (Adequate number of shade trees planted and/or maintained) | Good planting material, access to training & inputs | Transparency reflect quality. | 36 28 |
| 4C Association    | 29            | Land use map; actions for conservation and restoration of natural vegetation and fauna and protection of sensitive areas. | –                                                                     | Access to training | Transparency | 31 22 |

Sources: SAN (2010); FLO (2011); IFOAM (2014); UTZ (2015a, 2015b, 2015c); Global Coffee Platform (2016)

Note: Information in () indicates development criteria to be implemented over time, others are compulsory from year one onwards.
Environmental Policy and National Biodiversity Action Plan focus on the dual aims of natural resource conservation and livelihood benefits by promoting economic incentives for biodiversity conservation (GoI 2008, 2011) (Table 5).

Disenchantment with the low spread and poorly perceived contribution of sustainability standards to biodiversity conservation gave rise to exploring the potentials of branding the landscape, trademarks and labeling of geographic indicators aiming at recognizing and valuing the biodiversity at landscape level via economic incentives (Chengappa et al. 2014; Marie-Vivien et al. 2014). To what extent such initiatives will be able to eliminate the drivers of biodiversity loss and land use changes remains to be seen.

### 6.2. Northern Nicaragua

Nicaragua provides an example where strong services suppliers to rural communities, i.e. in the form of highly organized cooperatives, were able to utilize a variety of networks to implement a diversity of sustainable voluntary standards. In Northern Nicaragua, the larger second- and third-level cooperatives started with Fairtrade in the late 1980s, and – mostly under the umbrella of CAFENICA – within a decade had successfully added Organic certification (Valkila 2009). By 2007, up to 5% of Nicaraguan coffee was certified organic, and most of this was done via Fairtrade representing an estimated 9,000 farmers producing 10.7 million kg of coffee (Valkila 2009).

However, informal visits (between 2011 and 2015, 1–2 visits per year) by one of the authors of this study to Northern Nicaragua yielded comments by cooperative staff and members on how many farmers had decided to abandon organic certification. Reasons included the high amount of labor required; persistently lower yields, and small premiums that did not provide sufficient return on investment. As part of a long-term research project to assess changes in livelihood over a seven-year period, Caswell et al. (2014) surveyed over 100 households in three countries and included questions related to the performance of sustainable coffee certified markets. In Nicaragua, the 11 households surveyed were members of at least a first-level cooperative and a second-level cooperative union, and all within the study site. Farmers reported selling to five different types of specialty markets, in addition to the conventional market, including Fairtrade, Organic, Fairtrade & Organic and other certified markets. They reported selling coffee as ‘uncertified organic’. Farm gate price performances showed an upward trend from 2006 to a peak in 2011 and then decline in 2012. For the 2012/13 harvest, Fairtrade had the highest average price with US$0.75/lb, followed by conventional coffee at a mean average price of US$0.65/lb while Fairtrade/organic and non-certified had the lowest prices (US$0.45/lb and US$0.44/lb, respectively) (Caswell et al. 2014). The price decline is a cause of farmers dis-adopting organic production. This situation was probably worsened by the recent leaf rust epidemic which severely affected organic farmers.

Though Nicaragua has signed the core convention of the International Labor Organization, compliance is not assured (Valkila and Nygren 2010). Although Nicaraguan coffee cooperatives are well positioned to enhance the livelihood of their members, a large number of studies in the country continue to report precarious situations for farming families. Preexisting conditions related to the lack of livelihood assets and social infrastructure remains one of the largest challenges (Donovan and Poole 2014). Livelihood changes for the better will come from more comprehensive interventions, including those targeting enhancements of value chains and certified markets, but also those considering issues of food security, livelihood diversification and political advocacy (Méndez et al. 2010a; Bacon et al. 2014; Donovan and Poole 2014). Of key importance is the consolidation and strengthening of cooperative organizations in the areas of governance, accountability, administrative capacity and business skills to access and deal directly with international market and clients. All of these represent long-term issues that require integrated and consistent investment. Although Nicaraguan second- and third-level cooperatives take full advantage of the contributions that certifications make in terms of price and other support (capacity building and linking to networks), as well as acquiring visibility for their certified products, they critique low premiums and a lack of participation in the definition of certification standards and governance. The Small Producer Symbol (SPP) is a response to disenchantment with the mainstream direction taken by Fairtrade. SPP values the identity and the economic, social, cultural and ecological contributions of products from Small Producers’ Organizations (SPP-FUNDEPPO 2016).

Overall, Nicaraguan cooperatives have earned a high reputation with their buyers in terms of trust and maintenance of standards for certified coffees (Méndez, personal observation and communications with a variety of roasters, including Keurig Green Mountain, Cooperative Coffees, Equal Exchange and Dean’s Beans). In addition, some cooperative organizations in the Northern region are going beyond certifications to improve the conditions of their communities and landscapes from both social and environmental perspectives with the help of international organizations, such as CRS, Save the Children, Heifer International and considerable funding from Keurig Green Mountain. For example, the UCA San Ramón cooperative in Matagalpa has an established agro-ecotourism project and is now seeking to develop a cooperative-level environmental management plan. Well-established cooperatives maintain good links to buyers and development
projects offering coffee prices to their members higher than those of Fairtrade (Donovan and Poole 2014).

With regard to environmental swing potential, there is no conclusive evidence to the contributions that sustainability standards might have made over time to reducing the pace of shade trees loss (as documented globally by Jha et al. 2014) or the maintenance of tree diversity (as documented locally in San Ramon, Nicaragua by Goodall et al. 2015).

7. Country comparison and discussion of enabling and limiting contextual factors

Sustainability standards are private instruments of land use governance that interact with public instruments of land use governance at three levels: where the bar is set, how it is being met and systems to verify actors’ behavior on a continuum of complementarity, substitution and antagonism (Lambin et al. 2014). Corporate social responsibility in sustainable coffee has been a continuous temporal process in which corporations have responded to interventions by NGOs by adoption of sustainability standards, further collaboration in umbrella organizations as well as further company own strategies (Levy et al. 2016). In this temporal process, sustainability standards are caught between the conflicting needs for alignment and differentiation (Reinecke et al. 2012), aspirations of global relevance in locally differing contexts.

Clearly, the context differs amongst countries and furthermore is dynamic over time (Tomich et al. 2004; Mithöfer et al. 2017). Hence, interaction between public and private instruments is dynamic over time. At first glance, all standards considered in this paper address multiple concerns. Recently, standards placed greater focus on training, productivity and business development. Local regulatory contexts provide the foundations, on which sustainability standards can build. The regulatory framework in Nicaragua has been characterized by strong support for economic development of the coffee sector, particularly the sound development of cooperatives. Here, government instruments, such as coffee and food security and sovereignty laws provide a baseline on which standards can build to leverage sustainable coffee production. Following Lambin et al. (2014) in Nicaragua, public and private instruments for social and economic development goals have been complementary in agenda setting and implementation over time. In India, the regulatory framework constitutes a reasonable baseline to social and environmental concerns with greater focus on environmental issues (Table 5).

In both countries, the management swing potential between best and worst management practices with respect to key environmental factors is low with some differences between production systems (Table 7). In India, most farm management practices are moderately to highly sustainable and quite similar in terms of shade management, chemical inputs and soil and

| Table 7. Market access, value chains and swing potential of coffee systems in Nicaragua and India. |
|----------------------------------|----------------------------------|
| Nicaragua                        | India                           |
| **Market access, vertical coordination and governance of coffee value chains at producer – 1st level buyer node** | **Market access, vertical coordination and governance of coffee value chains at producer – 1st level buyer node** |
| Presence of producer organizations | Present                         | Absent                        |
| Age of producer organizations    | Well established                | –                              |
| Producers’ coffee marketing strategy and buyer structure | Mostly via cooperatives some via village traders | Village traders, recently export firms started buying directly from farmers |
| Presence and characteristics of vertical coordination and upgrading | Three levels of cooperatives, second and third level unions of cooperatives operate as exporters and as voice on behalf of their members | Village traders extend credit to farmers |
| Governance structure at producer-1st level buyer value chain node | Relational                       | Market                        |
| Presence of sustainability standards | Fairtrade, Organic, UTZ, Birdfriendly, Rainforest Alliance, SPS. Increasing presence of regional certifiers. | Rainforest Alliance, UTZ, Organic |
| Presence of NGOs | Long history of strong presence focusing on economic and social development | Low, one project focusing on biodiversity |
| **Swing potential** | **Swing potential** |
| Variety | Arabica | Conversion to Robusta: currently 70% Robusta, 30% Arabica |
| Coffee prices | Low (greater variation from village traders to cooperatives than between certification schemes) | Low (greater variation between Arabica and Robusta) |
| Productivity | High (greater variation between survey years than across coffee systems) | Shaded coffee systems with high swing potential due to conversion to Robusta, loss of shade and substitution of native trees by G. robusta |
| Shade & biodiversity | Shaded coffee systems | High swing potential at landscape level due to expansion of coffee area and invasion of coffee in protected areas |
water contamination (CAFNET 2011). In the past (up to the 1990s), the international coffee trade put greater emphasis on farmers meeting sanitary and phyto-sanitary requirements than on complying with environmental policies at the expense of coffee landscape health (Damodaran 2002). In India, the high biodiversity value of the landscape facilitated easy certification to sustainability standards (Bose et al. 2016). Local conditions (e.g. in terms of biodiversity value) are far above the threshold stipulated by the criteria of sustainability standards. Adaptation of the standards to local conditions in terms of ‘raising the bar’ (Raynolds et al. 2007) following local consultations has not yet been implemented. Therefore, standards present in India are not in the position to increase the provision of ecosystem services via an enhanced biodiversity protection and maintenance of diversified shade tree cover on coffee farms. The current certification models maintain the status quo with respect to coffee management practices (Bose et al. 2016). Standards set below the status quo run the risk of discouraging local coffee stakeholders (Bose et al. 2016) and also the risk of being perceived as promoting corporate greenwashing (Gorrie 2009). They further may undermine the set of stronger public instruments (cf. Lambin et al. 2014).

In Nicaragua, strong cooperatives and direct ties to their buyers provide a platform on which standards built on. Development programs and direct links to buyers strengthened coffee cooperatives and contributed to coffee quality knowledge and infrastructure for improvement of coffee quality (Bacon 2013) as well as processing infrastructure (Table 5). In India, smallholder coffee farmers are not organized in cooperatives (Neilson and Pritchard 2007; Upendranadh 2013), hence sustainability standards started working with larger farms before moving on to work with independently operating smallholder coffee farmers with support from a research project (CAFNET 2011; Chengappa et al. 2014; Marie-Vivien et al. 2014). Nicaraguan smallholders are well positioned to balance global buyers’ power because they are represented by strong advocacy organizations in the form of third-level cooperatives, and CAFENICA at national level. These organizations are well positioned to advocate for smallholders in government and private initiatives. Indian smallholders do not have this advocacy power, but still successfully compete at the global coffee market due to the efficiency of the well-working historical producer–trader spot-market relations and the international reputation of coffee quality produced in the Western Ghats. The international reputation results in high coffee prices on international markets, and this despite the low economic and environmental benefits from coffee differentiation via sustainability standards relative to the existing production and marketing systems. In Nicaragua, these coffee organizations have recently leveraged support to address underlying structural issues and diversification of income sources, hence, improved their position in the value chain (also referred to as ‘upgrading’ Humphrey and Schmitz 2001).

While swing potential with regard to environmental aspects is low in the Western Ghats, structural, social and economic inequalities prevail between production systems, particularly between coffee plantations and smallholders’ farms. The Plantation Labour Act of India dated from 1951 only concerns plantations over five hectares (John and Mansingh 2013), plantations were found to qualify for certification to UTZ. Certified on labor requirements without having to implement further changes (Neilson and Pritchard 2010a) and small farmers were found to provide similar benefits to their workers prior to rising labor costs (Upendranadh 2013). In this situation, certification could contribute to a positive swing potential for issues such as the use of child labor, improved living conditions of temporary and permanent workers, encroachment of nearby Protected Areas and reduction of native shade trees – provided that audits are carried out with care and that criteria of standards are more stringent than the prevailing situation on-farm. However, in such adaptation sustainability standards have to ensure their complementarity to existing labor regulations and practices and not disincentive public actors (Neilson and Pritchard 2010a). The swing potential in terms of enhancing coffee quality is low due to past investments in coffee quality on both countries as well as the naturally high quality of Arabica coffee in India.

Mithöfer et al. (2017) expected responses of the sustainability issue attention cycle to be triggered by problems thus curbing the downward swing potential. However, our analysis shows that responses are rather triggered by upgrading possibilities harnessing the upward swing potential. This can be seen by the progression to labeling to geographic origin in India, creating a biodiversity value proposition at landscape level and in Nicaragua creating the Small Producer Symbol with its value proposition for working with smallholders. Notably, Nicaraguan cooperatives with support of NGOs have also moved beyond certification at the farm level to interventions at community and landscape level.

8. Conclusion

Coffee producers in Nicaragua and India both face environmental, social and economic concerns at household as well as community and landscape level. The swing potential is bounded by past and current regulatory systems and development programs. In both countries, interventions have targeted the development of the coffee sector over time but
with difference in focus. In Nicaragua interventions mostly focused on strengthening of the social and economic development of the sector via support to coffee cooperatives while in India smallholder coffee cooperatives are dysfunctional (Neilson and Pritchard 2007) and interventions focused on environmental goals such as forest and biodiversity conservation.

Both countries have moved on distinct certification trajectories. India now focuses on the environmental characteristics of its site, namely the high biodiversity value at landscape level which is translated into labeling of geographic origin. Hence, ‘certification of second generation’ moving beyond first experiences with UTZ and Rainforest Alliance. Nicaragua builds on its strength of the smallholder sector and social justice movements which is reflected in the development and uptake of the Small Producers Symbol. Both countries have moved beyond certification at the farm (group) level to the landscape shown by interventions of Nicaraguan coffee cooperatives at community and landscape level that complement certification schemes.

Sustainability standards and their adoption as well as their potential impacts have to be analyzed within the context of the producer country. The question not only is ‘What is the impact of sustainability standards?’ but also ‘What can be their potential impact given local conditions?’ Limited impact of sustainability standards may not only be due to limited time lag between implementation of the standard and impact assessment (Jena and Grote 2017) but simply due to the fact that local conditions were at or above the norms stipulated by the standard sometimes long before a sustainability standard arrived in a particular site.

Sustainability standards can provide a partial solution to local sustainability concerns but sometimes quite unintended so – as in the case in India – appearance of buyers for certified coffee triggered existing traders to match prices offered due to increased competition over prices. Public regulatory and development interventions provide the baseline and impulse on which well-aligned private-sector actors can build on to address social and environmental concerns. However, the diversity of production systems, ecosystems and sociological historical contexts strengthens the case for local, rather than global, sustainability standards. Local certification standards should take into account the existing management swing potential and design standards in order to make tangible improvements or concerted efforts to maintain the status quo (especially for rapidly downward sustainability trends). Sustainability standards have to be complementary to existing public regulatory and development interventions for credibility and avoidance of negative impact such as lowering the bar and being seen as enabling greenwashing. In dealing with global sustainability standards, local policies should ask for and monitor additionality of sustainability standards – what value do they add given local conditions?

With respect to the environmental dimension, research on the effect of forests, forest fragments and agroforestry systems and their connectivity (e.g. Raman 2006) clearly highlights the limitations of a plot level approach for certification. In order to attain higher levels in the provision of ecosystem services, sustainability standards should work with environmental projects for environmental conservation at landscape level. Therefore, coffee cultivated in strategic environmental hotspots, such as buffer zones around forest fragments, corridors linking forest fragments, riverbanks and steep slopes, should be given extra attention via preferential payment for ecosystem services, hence an approach in relative opposition to the blanket approach of paying a similar premium to any coffee area responding to the certification scheme criteria.

Notes

1. In this paper, the swing potential is assessed based on the spread between minimum and maximum values of economic, social and environmental indicators as found in the literature for each site.

2. In India, biodiversity studies focus on forest loss, forest fragmentation and sacred groves (e.g. Garcia et al. 2010), the contribution of forest (Anand et al. 2008) and the conservation of biological resources (e.g. Raman and Mudappa 2003; Bhagwat et al. 2005b; Brown et al. 2006; Raman 2006; Dolia et al. 2008; Kapoor 2008; Anand et al. 2010; Prakash et al. 2012), provision of ecosystem services such as pollination (Boreux et al. 2013b) and fertile soil and leaf litter as inputs to coffee production (Ormsby 2013) as well as the contribution of coffee systems to biodiversity conservation (e.g. Bhagwat et al. 2005a; Dolia et al. 2008; Caudill et al. 2014; Wordley et al. 2015).

3. The price of Arabica coffee of India has been much higher than those coming from various origins due to the following reasons: (1) it is a relatively high altitude coffee (1100–1300 masl), (2) under shade, (3) of high quality and (4) of relatively low volume available for export (hence relatively rare) due to the decreasing production (linked to increasing damages and loss due to a trunk borer and hence replacement by Robusta resistant to this pest) and increasing domestic demand (it is foreseen that Indian domestic demand will be up to 50% of the national production over the next decade). Arabica coffee from Nicaragua has a lesser reputation and hence fetches only a lower price than neighboring countries (particularly to Costa Rica and Guatemala) and international market due to lower altitude where a large part of Nicaragua coffee is produced and poor management of wet processing.

4. Sustainability standards are seen to compete at a ‘standards’ market’ between convergence and differentiation. The former is characterized by the increasing alignment of norms and practices while the latter captures the need of particular standards to maintain distinct attributes and value proposition (Reinecke et al. 2012).
5. ISEAL is an NGO umbrella organization for sustainability standards, whereby standards show commitment to a unified movement of sustainability standards for the benefits of people and the environment (ISEAL 2016).

6. The revision of the SAN standard to its current form also resulted in a revision of the shade criterion, which now is considered weaker than it used to be (Craves 2017).

7. CAPNET – Connecting, Enhancing and Sustaining Environmental Services and Market Values of Coffee Agroforestry in Central America, East Africa and India (2007–2011). The project aimed at documenting biodiversity, traditional agroforestry knowledge and dynamics of landscape change.

8. Commercial polyculture is characterized by 31–40% shade cover and 6–20 species; rustic farms are characterized by 71–100% shade and more than 50 species of trees (Perfecto et al. 2005).

9. Out-turn is mostly used locally in India and is a term describing the ratio (or %) of green beans to cherries (fresh or dry) after final processing before export and/or roasting.

10. Many farmers do not want to engage into improving their coffee quality, particularly the harvesting and drying process as they feel that it is not economically rewarding.

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ORCID

V. Ernesto Méndez http://orcid.org/0000-0001-7394-5679
Arshiya Bose http://orcid.org/0000-0003-0041-2702

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